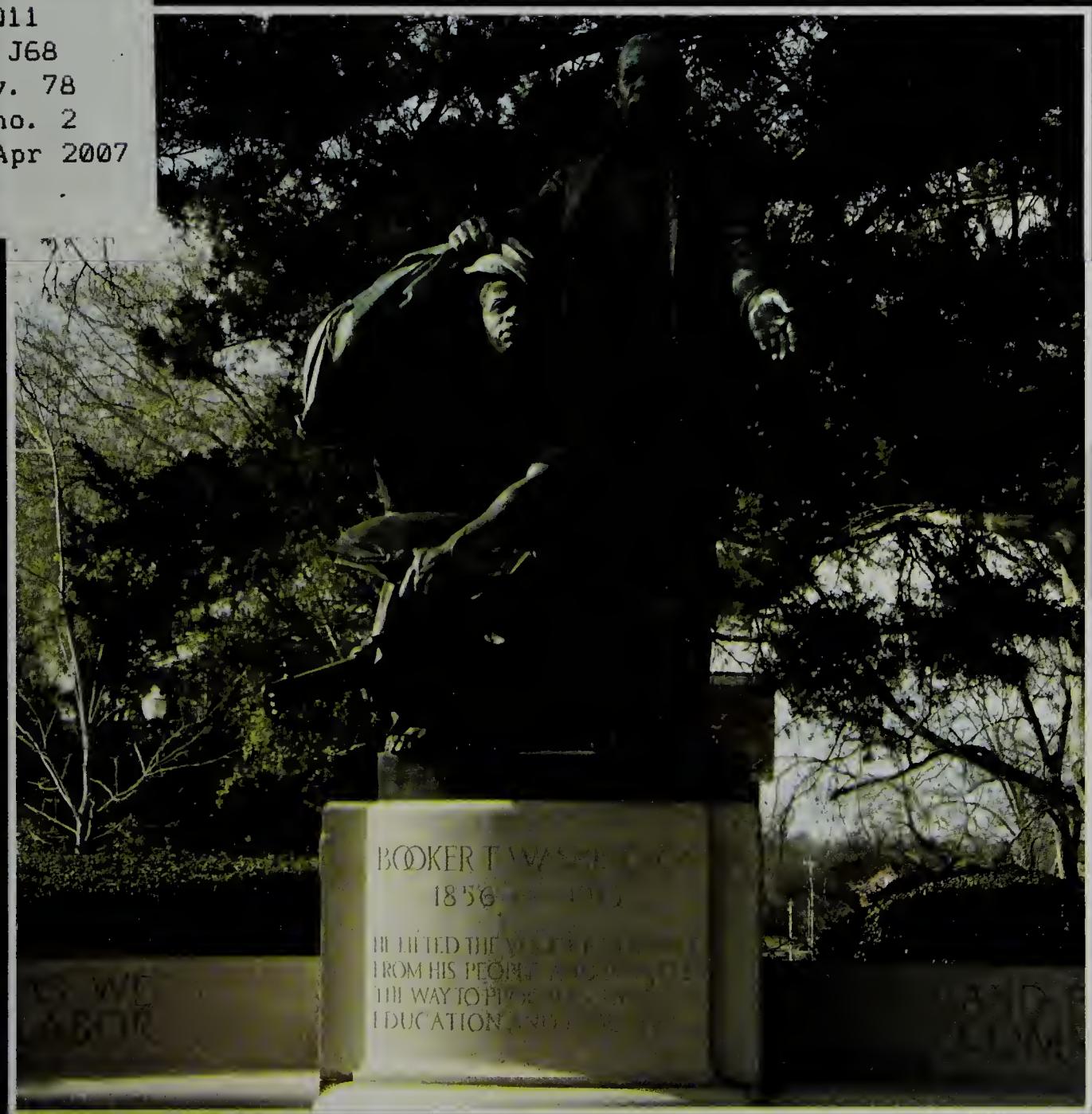


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Cover Photograph: Booker T. Washington Monument Tuskegee University (Tuskegee Alabama).

Photo Courtesy of: Dr. George Cline, Professor of Biology, Jacksonville State University.

The Booker T. Washington monument is a bronze statue designed by sculptor Charles Keck. The statue depicts Washington standing over a crouching black man, believed to have been a former slave, lifting the veil of ignorance from his face. The man is clasping an open book and sits on a plow and anvil. The open book represents Washington's opening the road to education and the plow and anvil correspond to the instruments of agriculture and industry, which were early education principles of Washington's. The life course of Booker T. Washington served to shed the light of education on a race of people.

The monument is considered the "Center of Campus" and was the site of the inaugurations of Military Pilot Training at Tuskegee Institute in 1941.

Editorial Comment:

On behalf of the Alabama Academy of Science, I would like to express my deepest sadness and sympathy for the loss of Dr. Ron Jenkins of Samford University (April 27, 2007). He was a friend and longtime mentor for many students. Dr. Jenkins was an excellent scientist and teacher who was admired by his students and colleagues alike. He was asked on one occasion "So, Dr. J., what do you do here at Samford University?" He answered: Well, I advise students, solve their academic problems, write letters of recommendation, and teach. I listen much more than I talk, and I like to photograph spiders in my spare time. He will be missed very much by all of us.

*Safaa Al-Hamdani
Editor, Alabama Academy of Science Journal*

**THE JOURNAL
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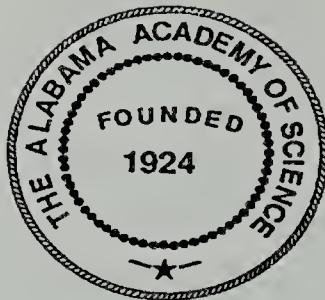
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ABSTRACTS

The 84th Annual Alabama Academy of Science Meeting Tuskegee University Tuskegee, AL

February 28 - March 2, 2007

Anthropology Abstract Papers

1Wx15: Theoretical Considerations in a Middle Woodland Environment. Megan L. Henry, Auburn University, Auburn, AL, 36849.

Indian Hill (1Wx15), a small Middle Woodland settlement in the Alabama River region, was inhabited by indigenous people nearly 2000 years ago. Currently there is little information available for constructing the lifeways of these native Alabamians. The Middle Woodland characterizes a period in prehistory which represents transition, new technology, increased sedentism and a change in subsistence patterns. This research will attempt to relate an ideographic perspective to the analysis and interpretation of the Indian Hill site, 1Wx15, in Wilcox County, Alabama. It is the goal of this paper to apply an ecological theoretical structure to the archaeological record found from the excavations conducted at 1Wx15 by linking human behavioral dynamics with considerations to the environment and geography.

A Ceramic Assemblage from a Proto-Historic Domestic Structure at Hickory Ground 1ee89. Cameron W. Gill, Dept. of Anthropology, Auburn University, 36849.

Excavations conducted on behalf of the Porch Creek Indians at the Historic Creek town of Hickory Ground (1Ee89) have recovered evidence of an extensive proto-historic occupation. Material culture from this occupation is largely present within the domestic structures. While lithic as well as other artifacts have been recovered, the material culture consists mainly of two distinct ceramic types. One appears to be a late Moundville derived phase while the other appears to be a Lamar associated phase. This paper will present analysis on a ceramic assemblage from one of the domestic structures located at Hickory Ground.

A Review of Evidence for Blacksmithing on the Early Alabama Frontier. William J Lowe, Auburn University, Auburn, AL, 36849.

This paper will examine the physical evidence of blacksmithing on the early Alabama frontier with particular interest directed to Fort Mitchell in Russell County. It will also provide the reader with a review of blacksmithing, which will be followed by a description of specific handmade artifacts such as door hinges, nails, spikes, remnants of chain, and miscellaneous pieces of hardware that were recovered from the Fort Mitchell site. Even though no remnants of a blacksmith shop were ever discovered during excavations at the

site, the postulate that there was such a shop present at Fort Mitchell may be demonstrated by the presence of such artifacts as repair links for chain and other materials that would have required the skills of a blacksmith for either use or repair.

A Summary of the Recent Archaeological Investigations of Hickory Ground 1Ee89 Elmore County Alabama. Dr. John W. Cottier, Dept. of Anthropology, Auburn University, Auburn, AL, 36849. Continuous excavations of the Historic Creek town of Hickory Ground, 1Ee89, have been conducted over the last four years. This research has demonstrated evidence of Historic Creek domestic and public activities, including storage facilities, corncob pits, domestic structures and an early 19th century square ground and associated council house. The recovered information also provides additional evidence of the late Creek trend of greater settlement dispersal and economic importance within the physical town unit.

William "Rock" Jackson: A Study in Mortuary Folk Art in 19th Century East Alabama. Monica J Norton and Harry O. Holstein, Auburn University, Auburn University, 36849.

Mortuary analysis in historical archaeology is a field promising a wealth of information concerning past attitudes towards death. Previous studies have concentrated on large-scale studies over large geographical areas to ascertain relationships between manifestations of mortuary ritual, primarily the headstone and the cemetery, and with community demographics and ideology. This paper will be a preliminary inspection at a smaller-scale project limited to a single stone carver during the 19th century in the East Alabama/West Georgia area: William "Rock" Jackson. The artist, his template and possible motivations for his unique artwork is of primary interest in this essay. With this introductory analysis, I conclude that certain artwork is associated with an individual's age and gender. In addition, the art reflects a general shift in style over time.

Behavioral and Social Sciences Paper Abstracts

A Comparative Analysis of Socioeconomic Indicators of Black Belt Region and Selected Rural Regions within the State of Alabama (1970-2000). Christopher Stuckey, Department of Community Planning and Urban Studies, Alabama A&M University, Normal, AL 35759.

A sustainable socioeconomic environment should be available for all residents, regardless of race, gender, age, income levels or geographical locations. Regionalism was the response to the significant social and economic changes, which occurred, 50 years after the end of the civil war (Friedmann & Weaver, 1979). Regional conformity does not imply equality, uniformity or conformity. It does allow for the opportunity to redress demographic, economic, social and environmental weaknesses and to carry forth to its full potential (Glasson, 1975). Over the past three decades the Black Belt socioeconomic health has failed, when a comparison and analysis of the other rural regions was conducted disparities in socioeconomic growth and development was observed based on the following indicators: Literacy, as an indicator compared with educational attainment (Finkley, 2005) The object of this study is three fold: 1. What are the measurable characteristics of regional socioeconomic growth and development in the rural Black Belt and other rural regions in Alabama from 1970 to 2000? 2. What are the socioeconomic development trends that influence development and growth patterns in the Black belt region compared with other rural regions in the state of Alabama? 3. How does adult literacy and educational attainment impact socioeconomic status with regards to overall regional development and growth? This analysis focuses on the disparity of development by rural regions compared with the Black Belt region.

Authentic Teacher Voices Differentiated Reading Instruction in a Local Public School Setting. Dana L. Stuckey, School of Education, Alabama A& M University, Normal, AL 35801.

The purpose of this study was to investigate how six fifth-grade classroom teachers implemented differentiated reading instruction in their classrooms. Six teacher participants from two selected classrooms were questioned about their knowledge, practice and implementation of differentiated reading instruction. Surveys, interviews, and observations were used as data sources. Two teachers from the participating group were observed in their classrooms. The Differentiated Classroom Observation Scale (Cassady, Speirs, Neumeister, Adams, Cross, Dixon, & Pierce, 2004) will be used to identify use of differentiated instruction. Data collection will occur over one school semester. Week one of the data collection included teacher surveys and interviews. During week two, the researcher reviewed data to determine the two classrooms to be observed. Weeks three through six included, observations of two selected classrooms based on their positive responses to differentiated reading instruction responses on their surveys. Five one- hour classroom observations using the DCOS Scale will occur during reading and or language arts classroom lessons. The findings indicated that... The implications of the results are

Church Arson in Alabama: A Study of Psychological Coping. Melonee C. Tubb, William L. Ballew, Danyelle J. Brooks, Shawn E. Geron, Larry W. Bates, and Richard A. Hudiburg, University of North Alabama, Florence, AL 35632.

In early 2006 nine rural churches were burned in Alabama. Five of the churches were predominately black congregations and four were predominately white congregations. The focus of the current study was on the effects these church burnings had on the attendees. Questionnaires were provided to attendees of the affected churches. Fourteen adult attendees of seven Alabama churches burned by later determined arson completed questionnaires concerning perceived stress (PSS), anxiety (STAI), depression (DID), and locus of control (LOC). The respondents reported significantly higher mean ($M = 17.75$, $SD = 7.93$) perceived stress than found by Cohen and Williamson (1988), $t(13) = 2.23$, $p < .05$. State anxiety was positively related to both perceived stress ($r = 0.73$, $p < .01$) and chance locus of control ($r = 0.54$, $p < .05$). Damage to the church building was negatively related to state anxiety ($r = -0.62$, $p < .05$) and perceived stress ($r = -0.76$, $p < .05$). None of our participants met criteria for major depressive disorder. Participants' subscale DIDs were significantly lower than the DID outpatient psychiatric patient standardization sample. Respondents with chance-type locus of control had higher state anxiety ($r = 0.52$, $p < .05$). The respondents had lower internal locus of control, $t(13) = -5.22$, $p < .01$, and powerful others locus of control, $t(13) = -9.61$, $p < .01$, than LOC standardization sample.

Effects of a Sport Stacking Intervention on Children with Disabilities. Candice Howard-Shaughnessy and Gayle Bush, Dept. of Kinesiology & Health Promotion, Troy University. Tamera Byrd and Ashley Baker, College of Education, Troy University, Troy, AL 36081.

Elementary physical education is often the child's first formal experience with movement instruction. Children can build a foundation of motor skills for participation in sports and lifetime physical activities. Sport Stacking is a sport played in over 6600 physical education and after school programs. Sport Stacking involves object-control and manipulation of objects using fine motor movements, hand-eye coordination, and tracking abilities. Speed Stacks, Inc. claims sport stacking promotes hand-eye coordination, ambidexterity, quickness, concentration, and bilateral proficiency in a normal sample of physical education classes. Current studies do not include and/or support significant improvements when children with disabilities engage in sport stacking. In this research project, a kindergarten class consisting of children with special needs was assessed using the Soda Pop Test (designed to document hand-eye coordination) and the Yardstick Test (which measures reaction time plus movement time). After collecting these baseline measures, a 12-week intervention was conducted with each student, three days a week for 30 minutes. Each child was to demonstrate "mastery" of stacking three (then progressing to) six cups during the intervention, abiding by the rules of Speed Stacks, Inc. After the intervention, a post-test was conducted to assess change. Significant differences were evaluated ($p < .05$) in fine motor abilities of grasping and voluntarily releasing. Sport Stacking is now used regularly as a fine motor improvement activity in this particular kindergarten class. Further research with a larger sample size is recommended for future studies.

Food for Thought. Leslie Calloway, Jan O. Case, Department of Mathematical, Computing, and Information Sciences, Jacksonville State University, Jacksonville, AL 36265.

This study focuses on the relationship of free or reduced priced meal status and academic performance as measured by grades at a public school in Gadsden, Alabama. Data was collected from sixth graders ($n = 148$), seventh graders ($n = 138$), and eighth graders ($n = 147$). The racial composition of the school is primarily black (64.9%) and white (26.3%) and also included Asian, Hispanic, biracial, and other. Statistical analyses and methods of One-Way Analysis of Variance (ANOVA), Chi-Square Testing, and odds ratio were used to examine the data. Students who received free meals scored significantly lower in all subjects than those who paid for meals. Further, black students were more likely to receive free meal status than white students were. This study also investigated gender disparity in academic performance and differences in academic performance between grade levels and race. Females significantly outperformed males in most subjects. Eighth graders scored lower in mathematics and science than sixth and seventh graders. This study successfully replicated findings reported in the literature.

Bioethics, History, and Philosophy of Sciences Abstract Papers

Neuroscience and Free Will. Gerard Elfstrom, Dept. of Philosophy, Auburn University, Auburn, AL 36849-5210.

In 1983, Benjamin Libet published the results of experiments which showed that the areas of the brain controlling motor activity become active about 350 milliseconds before subjects consciously decide to flick a wrist. Libet's research has been the focus of intense discussion and research since the time of its publication. Some, including Libet, believe these results support the following chain of inference: Cortical activity in motor areas of the brain begins several hundred milliseconds before subjects report a conscious decision to initiate a wrist flick. Since causes must precede effects, conscious decision cannot be the cause of the wrist flick. If the wrist flick was not caused by a conscious decision, it was not freely chosen. It is probable that all physical movements are like these wrist flicks in that the activity in the cortical areas controlling motion begins prior to the subject's conscious decision to act. As a result, no physical movements result from free choice. If this is the case, free will does not exist. I will not contest Libet's results, but I propose to examine the plausibility of each link in the above chain of inference and the strength of its connection to the link following. I will conclude that Libet's chain of inference is insufficient to support the belief that humans lack free will.

Pluripotent Human Stem Cells Without Embryo Destruction: Can Technology Solve the Moral Dilemma? James T. Bradley, Dept. of Biological Sciences, Auburn University, Auburn, AL 36849.

For persons who ascribe full moral status to early human embryos, embryonic stem cell (ESC) production and use violates the second formulation of Immanuel Kant's categorical imperative, "...treat humanity, whether in thine own person or in that of any other, in every case as an end withal, never as a means only..." Alternative ways of obtaining pluripotent stem cells have been suggested in an attempt to sidestep this moral dilemma: pre-implantation blastomere isolation, alternate nuclear transfer, somatic nuclear transfer using non-human animal eggs, and blastomere isolation from embryos in "cleavage arrest" after in vitro fertilization. One or more of these methods may satisfy some persons that the sanctity of personhood is not violated, but they are unlikely to satisfy all. Satisfaction with an alternate technology may depend upon one's definition of "human" and of "embryo." Moreover, additional ethical issues not present in the conventional ESC methodology may be raised by some of these technologies.

Solving the Frame Problem: What Teaching Machines Can Teach Us About Ourselves. Keith Gibson and Joanna Phillips, Dept. of English, Auburn University, Auburn, AL 36849.

Cognitive scientists have, for more than 60 years, been working to create human-level intelligence in machines. As these efforts have grown more sophisticated, they have become more like what we, as educators, would consider teaching. Our research examines

the rhetorical components of two different paths to machine intelligence: neural networks and open source databases. We will present a brief description of each field, followed by a specific comparison and analysis of the way each purports to help the machine construct its identity. We will then conduct an analysis of current composition theory with some specific comparisons of the methods employed for machines and for humans. We will then conclude with some questions for the future of each field: How will our understanding of identity change as our views on intelligence change? How might we need to re-configure our notions of reasoning if, as Ray Kurzweil suggests, humans and machines grow together in the next century? Rhetorical theory must evolve to keep pace with these fundamental changes on the horizon, and we will offer some suggestions on new directions.

Biological Sciences Paper Abstracts

Agonistic Behavior of Male Crayfish *Procambarus Suttkusi*. Amanda F. McCall and Paul M. Stewart, Dept. of Biol. and Environ. Sciences, Troy University, Troy, AL 36082. Thomas P. Simon, Indiana Biological Survey, Aquatic Research Center, Bloomington, IN 47401.

Crayfish use agonistic interactions to compete for resources, including habitat, food, and reproductive access. Little behavioral information exists for crayfish endemic to the southeastern coastal plain ecoregion. This study examined intraspecific agonistic behaviors of size-matched *Procambarus suttkusi* males. Paired contests between Form II vs. Form II, Form I vs. Form I, and Form II vs. Form I males were used to identify dominance orders and examine initiation behaviors preferred by winners and losers. Feeding contests between the same pairs of crayfish were also performed to document associations between winners of the agonistic and feeding contests. Winners of Form II and Form I intra-form interactions of previous studies preferred lunge and claw raise behaviors and losers preferred ambivalent contact. Form II vs. Form I winners preferred the claw raise and losers had no preference in these same studies. There were no significant differences found, however, among the three initiation behaviors observed in the present study. Other studies have documented Form I males to be more aggressive than Form II males, but Form I males did not dominate Form II males in the current study. This may be due to the close size matching of our combatants. Winners of the agonistic contests also dominated the feeding contests. This study suggested that agonistic behaviors and form dominance are species specific.

Analysis of Commonly Used Reference Genes for Quantitative Real-Time PCR Studies in Channel Catfish. Chris A. Murdock, Dept. of Biology, JSU, Jacksonville, AL 36265. Brian C. Small, Lelania Bilodeau, Brian C. Peterson, and Geoffrey C. Waldbieser, USDA-ARS, Stoneville, MS 38776.

Quantitative real-time PCR represents a sensitive and convenient method for measuring mRNA levels from a given sample. However, normalization of expression data to an internal standard is critical for comparisons of expression levels between tissue samples. Recent studies have suggested that the expression levels of many commonly used reference genes vary depending on treatment conditions, disease states, and tissue/cell types. In the reported study a total of seven commonly used reference genes 18S rRNA (18S), α tubulin (TUBA), β actin (ACTB), β -2-microglobulin (B2M), elongation factor 1 α (EEF1A), glyceraldehyde-3-phosphate dehydrogenase (GAPDH), and an RNA polymerase II subunit (POLR2B) were evaluated in channel catfish. Basal expression levels of all seven reference genes were determined for 15 different types of tissue. Expression data for each reference gene between these tissues revealed that 18S expression varied least. Further analyses of expression were conducted in tissues within the growth, stress, and reproductive axes of channel catfish. For example, changes in expression of the selected reference genes were investigated in the hypothalamus-pituitary-head kidney axis in response to low-water stress. All reference genes, with the exception of POLR2B in the head kidney, were found

to be suitable for normalization. Collectively, the results of this study suggest that no single reference gene is optimal across all tissue types and physiological conditions.

Analysis of Selected Southeastern Herpetological Communities: Frogs. George R. Cline and Robert E. Carter, Jr. Jacksonville State University, Jacksonville, AL 36265.

The southeastern United States has long been noted for its biological diversity. Amphibians and reptiles are among those groups that contribute to the overall diversity of the region, yet surprisingly little research has been published on herpetological communities or the analysis of their structure. We examined literature references from 36 sites across 11 states. Presence/absence data were used in all analyses. Nomenclature was updated to current taxonomy. Preliminary analysis indicated 43 species of frogs representing 8 Genera and 6 Families. Nine frog species were unique to the two Texas sites; this had a significant impact on the data analysis, prompting their removal from further analysis. We eventually examined 34 sites, including 34 species representing 8 Genera and 6 Families. Species Richness ranged from 3 –32 species per site. Two sites (Savannah River Ecology Lab, SC, and Congaree Swamp National Monument, SC) had high species richness (32 and 21 species, respectively), while 15 sites had 10 or fewer frog species. As predicted by ecological theory, there were several rare species (8 species were found at less than 9% of the sites). Principal Components Analysis was run to search for patterns among the frog communities. The first two PCs explained 47.9% of the variance. The first Principal Component contrasted bufonids and ranids, while the second principal component was weighted heavily on southern hylids. This analysis produced 4 distinct groups; Coastal, Uplands, South Carolina Swamps, and Swamps. These groups were also supported by Cluster Analysis.

Assessment of the Hygiene Practice and Proper Utilization of Contact Lenses Among College Students. Wendy Gregoroy, Kelli Hudson, and Safaa Al-Hamdani, Dept. of Biology, Jacksonville State University, Jacksonville, AL 36265.

The proper utilization of contact lenses and the hygiene practices of 360 randomly selected college students at Jacksonville State University were surveyed in this study. Several intriguing findings were highlighted in this study which showed majority of the contact wearing failed to follow the proper procedure of utilization. A total of 54% admitted to having slept in their contact lens, 28% of the surveys indicated a failure of cleaning the contact as instructed. The majority of the students surveyed, 60%, preferred monthly wears in comparison to 14% daily wear contact lenses. A relatively impressive number of the students, 76%, were successful in following the doctor recommendation in having a pair of back up glasses.

Assessment of Fish Assemblages Upstream and Downstream of Unpaved Road Crossings in the Choctawhatchee River Watershed. James L. Stewart, Patrick Witmer, Amanda McKenzie, Kyle Hodges, Paul M. Stewart, Department of Biological & Environmental Sciences, Troy University, Troy, AL 36081.

Small streams throughout the southeastern United States are important reservoirs of biodiversity. Due to sedimentation and fragmentation, caused by unpaved road stream crossing structures, fish assemblages and species are threatened. These crossings can destroy habitats, thus altering the structure and function of fish assemblages. The goals of this study were to evaluate fish assemblages upstream and downstream of unpaved road stream crossings and examine the influence of water and habitat quality. Fifteen unpaved road stream crossings were sampled in

the Choctawhatchee River watershed in southeast Alabama. Sampling for each stream crossing was performed by backpack electrofishing 100 m upstream and 100 m downstream of the crossing structure. Each upstream and downstream reach was evaluated separately for fish assemblages and diversity, water chemistry, and habitat quality using the Ohio EPA's Qualitative Habitat Evaluation Index and the US EPA's Rapid Bioassessment Protocol (RBP). Correlations of environmental variables (pH and specific conductance) and species diversity indices (Shannon-Wiener diversity and Margalef's species richness) were observed. Pielou's evenness ($z = -1.977$, $p = 0.048$), RBP ($z = -3.013$, $p = 0.003$), and total number of individuals ($z = -1.647$, $p = 0.10$) were significantly different upstream vs. downstream from the stream road crossings. Results of the study suggested that several diversity variables were correlated with environmental variables, and several differences were observed between the upstream and downstream fish assemblages.

Assessment of Phosphorus Loading, Enrichment, and Sources in the Choctawhatchee River Basin. Tanushree A. Chakravarty, Dept. of Biol. and Environ. Sciences, Troy University, Troy, AL 36081, Michael W. Mullen, Choctawhatchee Riverkeeper, P.O. Box 6734, Banks, 36005 and Paul M. Stewart, Dept. of Biol. and Environ. Sciences, Troy University, Troy, AL 36081.

High levels of phosphorus can cause eutrophication and ecological changes in surface waters. The Choctawhatchee River watershed faces environmental threats from a variety of sources including increased phosphorus levels. Sources of this phosphorus are point and non-point pollution, which include wastewater treatment plants, poultry processing plants, row crop agriculture, and urban stormwater runoff. This study is currently examining total phosphorus and other water quality parameters at 48 sites in the watershed. Surface water samples are being collected at locations represented by both point and non-point sources. We will present a progress report on the research wherein we compare our current data to data previously collected by Soil and Water Conservation Districts and the Choctawhatchee-Pea Watershed Management Authority. These results will allow us to assess whether or not better land management practices targeted at controlling phosphorus loading and stringent limits for total phosphorus for the Choctawhatchee River basin are needed.

Bioremediation of Hexavalent Chromium by *Exigobacterium* Sp. Gs1. Benedict C. Okeke, Dept. of Biology, Auburn University Montgomery, Montgomery, AL 36117.

Cr is an essential element for living systems. However, the toxic, mutagenic and carcinogenic effects of Cr(VI) necessitated the regulation of its concentration in drinking water. Sources of anthropogenic Cr(VI) contamination include chrome-plating, alloy formation, nuclear waste and wood preservation. The adverse health effects Cr(VI) pollution is of increasing concern world-wide and has spurred the development of methods to remediate water and soil contaminated with Cr(VI). Physicochemical and bioremediation treatments can be used to detoxify Cr(VI). Bioremediation is a more attractive option in that the technology is relatively cheap and environmentally benign. In this study, a bacterial isolate identified as *Exigobacterium* sp. GS1 by 16S rRNA gene sequencing displayed rapid removal of Cr(VI) from water. *Exigobacterium* sp. GS1 significantly reduced Cr(VI) in cultures containing 0 - 9% salt (NaCl) indicating salt tolerance. Similarly the isolate substantially reduced Cr(VI) over a wide range of temperature (18 - 45 degrees C) and pH (5.0 - 9.0). The optimum temperature and initial pH for Cr(VI) reduction were 35 - 40 degrees C and 7 - 8, respectively. At initial concentration of 8,000 µg/L, > 90% Cr (VI) was reduced and the rate of removal followed zero-order kinetics. *Exigobacterium* sp. GS1 could be useful for bioremediation of Cr(VI).

Surveys of Breeding Birds in Mobile County, Alabama. Jenny Albrecht-Booth, C. Smoot Major, and David H. Nelson, Dept. of Biological Sciences, University of South Alabama, Mobile, AL 36688.

Two established routes that are part of the North American Breeding Bird Survey were surveyed in southern Alabama during the month of June, 2006: Georgetown (#02069) and St. Elmo (#02217). The vegetative communities within these habitats were quite comparable. The strong habitat similarities led to the finding of many of the same species of birds on both routes. The kinds of birds encountered were expected, and typical to the habitat types. A combined total of 2123 birds representing 73 species were observed on both routes. The Georgetown route yielded a total of 893 observations of 47 species of birds. The St. Elmo route yielded a total of 1230 individuals of 47 species. The most abundant species found on both routes included the Northern Cardinal, Northern Mockingbird, European Starling, Blue Jay, and Purple Martin. The Georgetown route exhibited less vehicular traffic and revealed the Yellow-breasted Chat (13), Eastern Meadowlark (4), Wood Thrush (4), Summer Tanager (3), Black Vulture (2), Blue Grosbeak (2), and Hooded Warbler (2). These 7 species were not recorded at the other location. Characterized by a prominent lake, the St. Elmo route revealed several aquatic species not observed at the other site: the Canada Goose (125), Laughing Gull (15), American White Pelican (5), Little Blue Heron (2), Ring-billed Gull (2), and Ring-necked Duck (2). One mature Bald Eagle was also observed at the St. Elmo site.

Combined B12 and Folate Deficiency in a Young Male. Tim Presley, MS3 and Robert E. Pieroni, M.D., UASOM, Tuscaloosa Program, Tuscaloosa, AL 35401.

Macrocytic anemia is defined as an anemia with an elevated mean cell volume and macrocytes noted on the peripheral blood smear. Megaloblastic anemia is the most common cause of macrocytosis and usually results from either vitamin B12 or folic acid deficiency. The occurrence of combined deficiency of these vitamins is very uncommon. We shall discuss the case of a young male who presented to our hospital with megaloblastic anemia secondary to deficiencies of both B12 and folate. We will discuss in detail the epidemiology, differential diagnoses, clinical manifestations, potential complications, workup and treatment of this combined deficiency syndrome.

Delirium Secondary to a Notable Drug Interaction. Robert E. Pieroni, M.D. and Tim Presley, MS3, UASOM, Tuscaloosa Program, Tuscaloosa, AL 35401.

A young, autistic male was hospitalized with increasing lethargy, anorexia and altered mental status progressing to delirium. He had a history of seizures for which he was receiving carbamazepine, and shortly before admission his physician had prescribed fluconazole for thrush. In view of a potential drug interaction, his medications were withheld in the hospital. The patient's serum carbamazepine level was found to be in the toxic range. His mental status and appetite rapidly improved and he was discharged on appropriate medication. This case illustrates the potential dangers when prescribing medications which are metabolized by the liver's P450 system. Fluconazole, a known inhibitor of this system, specifically the 3A4 isoenzyme, has been shown to impede the metabolism of carbamazepine with resultant toxic effects. In addition to this case, we shall review clinically relevant medication interactions involving liver isoenzymes, and methods to prevent drug toxicity.

Sarcophagid Larvae and Their Relationship with the White-Topped Pitcher Plant (*Sarracenia Leucophylla*). Angela M. Spano and Debbie R. Folkerts, Dept. of Biological Sciences, Auburn University, Auburn, AL 36849.

Maggots of the sarcophagid genera *Fletcherimyia* and *Sarcophaga* can be found feeding among the prey mass in leaves of the carnivorous white-topped pitcher plant, *Sarracenia leucophylla* (Sarraceniaceae). Few researchers have investigated the sarcophagid flies inhabiting this plant, and no studies have been conducted to show how consumption of prey by these maggots affects the nutritional status of the plants. In an Auburn University funded study, pitchers in Conecuh National Forest, Alabama, were subjected to one of four experimental treatments during the growing season: 1) no prey or larvae; 2) prey only; 3) prey and larvae; 4) unmanipulated controls. After 8 weeks, pitchers were collected and analyzed for nutrient content. Results show higher nutrient content in pitchers containing both prey and larvae indicating that larvae may increase rates of prey decomposition, making nutrients more readily available to pitchers.

Effects of Carbon Dioxide, Genotype, and Fertilizer on Wood Growth in *Pinus Elliottii*. Roland Dute, Ural Walker, Charles Williams, Tiffany Grant, Robert Boyd, and G. Brett Runion, Auburn University, AL 36849.

The rising level of CO₂ in our atmosphere is well documented. A study was done to assess the impact of such atmospheric change on growth of *Pinus elliottii* (slash pine). Seedlings of three different genotypes were grown either at low or high soil nitrogen concentrations (0.02 or 0.2 mg N g⁻¹) and ambient or elevated CO₂ (365 ul l⁻¹ or 720 ul l⁻¹). After 2.5 years, wood disks were collected from bases of 72 trunks and the cross-sectional areas of the wood (in mm²) were determined. Data thus collected were analyzed using Proc Mixed. Both elevated CO₂ and elevated nitrogen concentrations led to increased wood growth. There was also a genotype effect. Slash pines responded in a synergistic manner to elevated CO₂ and nitrogen. Significant genotype X fertilizer and CO₂ X genotype X fertilizer interactions also were encountered. In summary, wood growth in slash pines is enhanced under elevated CO₂. In a future high CO₂ world, wood growth could be further augmented by choosing proper seed sources and by fertilization.

Efficacy of Leaf Litter Refugium Bags for Sampling Adult Streamside Salamanders (Caudata:Plethodontidae). Clifford J. Webb, George R. Cline, Charles Williams, and Tiffany Grant, Jacksonville State University, Jacksonville, AL 36265.

Assessment methods exist for monitoring anuran populations but few techniques are available for monitoring caudatans. Salamander populations are abundant, with stable numbers over time and are an important component for nutrient cycling in an ecosystem but are difficult to quantify. This study evaluated a new method of surveying salamanders: leaf litter refugium bags. Hand collection was also employed. The study seeks to ascertain a difference in bag use interspecifically and intraspecifically across habitats. Previously, these bags were used primarily to evaluate larval populations. This 14 month study is part of a larger study that utilizes these bags for sampling adult stream salamanders. The study site is a first order, intermittent stream in the Talladega National Forest (33° 32'57.4"N, 85°49'23.7"W) in Alabama. Three reaches were sampled. Each reach contained three hydro-geomorphic (HGM) units: riffle, glide and pool, with one repeat per reach. Bags were placed in all three HGM units as well as in the thalweg, splash and riparian zone of each unit. Seven different species of salamander were collected: *Eurycea cirrigera*, *Eurycea guttolineata*, *Desmognathus conanti*, *Plethodon glutinosus*, *Plethodon serratus*, *Gyrinophilus porphyriticus* and *Pseudotriton ruber*. Trap efficacy varied among species producing the highest numbers for *D. conanti* and *E. cirrigera*. There appeared to be a positive correlation between bag usage in riffles, thalwegs and splash zones with 45% of salamander bag use in the splash zone. A possible intraspecific relationship may exist between body size and appearance in optimal habitat. All salamander numbers are reported as catch per unit effort.

Further Evaluation of the Effect of the Photodynamic Dye Phloxine B on the Growth of *Tetrahymena Pyriformis* In Vitro. Misty Chapman, Mark Meade, Benji Blair, and C.P. Olander, Dept. of Biology, Jacksonville State University, Jacksonville, AL 36265.

Phloxine B is a water-soluble halogenated xanthene dye that has recently gained popularity as an insecticide. Once ingested in baits, the dye is photoactivated causing tissue damage and the ultimate demise of the animal. Currently, researchers are examining the efficacy of phloxine B as an externally applied therapeutic bathe for fish infested with protozoan. In this study, we examined the effects of various concentrations of phloxine B on *Tetrahymena pyriformis*, a closely related protozoan to the *Ichthyophthirius multifiliis* more pathogenic species that reek havoc on fish farming. Acute exposure at 10000 ppb phloxine B after 24hr and 48hr in the light significantly reduces the number of *T. pyriformis* cells in culture. Chronic exposure to 10, 100, 1000, and 10000 ppb phloxine B at 25°C, in light (15 μ Em-2s-1), and in the dark (0 μ Em-2s-1) are reported. The deleterious effects of phloxine b can be detected at concentrations as low as 100 ppb.

Genetic Structure of Montana Sauger Populations. Rachael N. Koigi, Neil Billington, Jingyuan Xiong, Dept. of Biol. and Environ. Sci., Troy University, Troy, AL 36082, Brian L. Sloss, Ryan Francowiak, Wisconsin Coop. Fishery Res. Unit, University of Wisconsin-Stevens Point, Stevens Point, WI 54481, and William Gardner, Montana Dept. of Fish, Wildlife, and Parks, Lewiston, MT 59457.

Sauger (*Sander canadensis*) are native to Montana and concern has been expressed about their population decline from historic levels. An important step for developing a management plan for the conservation of Montana sauger is determining their genetic structure. Genetic variation was examined by protein electrophoresis at two polymorphic loci (EST* and SOD-2*) and microsatellite DNA analysis to determine how it was partitioned in sauger collected from 21 sites; 16 sites in Montana, four sites in neighboring states, and one site from Alberta, Canada. Because of small sample sizes, fish from the individual sites were combined into composite populations based upon presumed major hydrologic/geographic features and barriers to migration. Sauger exhibited moderate population structuring based upon allozyme data, but some composites exhibited heterozygote deficiencies consistent with the Wahlund effect. This was likely due to many samples being collected during the summer and fall, rather than at spring spawning time. Genetic diversity determined by microsatellites showed less structuring among composite populations, but the Bighorn River population from Wyoming was significantly different from all other populations, suggesting this population should be managed as a distinct genetic unit. This work provides a foundation for future research and management initiatives aimed at conserving the genetic integrity of Montana sauger.

Genetic Variation in Sauger and Walleye Determined by Protein Electrophoresis. Sonia, Lyle, Janet Gaston, Amy M. Barr, Rachael N. Koigi, Ronald E. Creech, and Neil Billington. Dept. of Biol. and Environ. Sci., Troy Univ., Troy, AL 36082.

Sauger (*Sander canadensis*) and walleye (*S. vitreus*) are large predaceous percid fish species

that are common in the Great Plains region and the mid-western U.S. that are popular with anglers. Information on the population genetic structure of these two species will be useful for their management. Cellulose acetate gel electrophoresis was used to screen genetic variation in 991 sauger from 11 populations and 1090 walleye from seven populations. Two polymorphic loci in sauger, esterase (EST*) and super oxide dismutase (SOD-2*), and two polymorphic loci in walleye, malate dehydrogenase (mMDH-3*) and general muscle protein (PROT-3*), were surveyed. Highly significant among population heterogeneity was found for sauger at both EST* and SOD-2*. Highly significant among heterogeneity was found for walleye at mMDH-3* and significant heterogeneity at PROT-3*. A number of populations showed significant deviations from Hardy-Weinberg expectations, all due to heterozygote deficits, likely caused by the Wahlund effect because samples were mostly collected during the summer and fall, a period when sauger and walleye are highly mobile, rather than during the spring when they are presumed to segregate into discrete spawning aggregates. Managers are encouraged to manage populations of sauger and walleye that are genetically distinct separately because these populations may exhibit local adaptations.

Herpetological Inventory of the Lillian Swamp in Baldwin County, Alabama. Joel A. Borden, David H. Nelson, Lindsey T. Herron, Dept. of Biology, University of South Alabama, Mobile, AL 36688.

A herpetological field survey was conducted from May to November 2006 on the Lillian Swamp Forever Wild Property in Baldwin County, Alabama. Sampling techniques included drift fences with pitfalls and surface funnels, minnow traps, dipnets, hand captures, visual surveys, cryptozoan (cover) boards, anuran vocalization, PVC treefrog refugia, and hoop traps. A total of 12 species of amphibians were encountered (N=904): 2 salamanders and 10 anurans. Most frequently encountered were Southern leopard frogs, Southern cricket frogs, Narrowmouth toads, Pinewoods treefrogs, and Pig frogs. Only one specimen of the Southern two-lined salamander was encountered. Terrestrial funnel traps were the most effective sampling technique for amphibians, accounting for 20 percent of captures. A total of 32 species of reptiles were encountered (N=838): 8 turtles, 7 lizards, and 17 snakes. Most frequently recorded were Six-lined racerunners, Black racers, Banded water snakes, Cottonmouths, and Ribbon snakes. Terrestrial funnel traps proved to be the most productive technique for reptiles, accounting for 59 percent of captures. Several species of special concern were encountered, including the Southeastern five-lined skink, Eastern kingsnake, Corn snake, and Coachwhip.

Hybridization Between Sauger and Walleye. Amy M. Barr and Neil Billington, Dept. of Biol. and Environ. Sci., Troy University, Troy, AL 36082.

Sauger (*Sander canadensis*) and walleye (*S. vitreus*) are large predatory fishes in the family Percidae. They naturally hybridize and the F1 hybrids backcross with the parental species leading to introgression. A literature review revealed that hybridization rates between sauger and walleye ranged from 0-23% and that protein electrophoresis is more reliable than morphological examination for identifying hybrid and introgressed fish. Cellulose

acetate gel electrophoresis at four diagnostic loci (mMDH-1* and PGM-1* from muscle, and ALAT* and IDDH* from liver) was used to examine >1600 fish collected from five mid-western reservoirs (one from North Dakota, three from South Dakota and one from Saskatchewan, Canada) to document hybridization and introgression between sauger and walleye. In Lake Sakakawea, ND, 20.4% of sauger contained walleye alleles. In Lake Sharpe, SD, 3.3% of sauger and 4.5% of walleye were hybrids, in Lake Francis Case, SD, 3.3% of sauger and 4.3% of walleye were hybrids, in Lewis and Clark Lake, SD, 8.9% sauger and 35.4% of walleye were hybrids. In Lake Diefenbaker, SK, 16.5% of walleye and 28.0% sauger were hybrids. The hybridization rates found in Lake Diefenbaker sauger and in Lewis and Clark Lake walleye were higher than have been reported in other studies. In all cases we confirmed that protein electrophoresis was much more reliable than morphological examination for separating sauger, walleye, and their hybrids.

Kinetic Analysis of Bacterial Pigmentation. Pryce L. Haddix, Sarah Edgell and Pius Nwobi, Dept. of Biology, Auburn University Montgomery, Montgomery, AL 36124.

Serratia marcescens is an environmental bacterium and opportunistic pathogen known primarily for its bright red pigmentation. Our studies have examined the kinetics of prodigiosin pigment expression in an attempt to identify how prodigiosin benefits the producing cell. Previous work has shown that prodigiosin is present in the cells of laboratory cultures growing at both low and high cell densities. For this study, pigmented cells were grown at low density under conditions which did not induce pigment synthesis. Prodigiosin levels per cell decreased during low-density, logarithmic population growth but began to increase as the population entered the high-density growth phase. Mathematical modeling indicated that prodigiosin concentration per cell decreased as a function of two variables: low-density growth rate and initial prodigiosin per cell concentration. The rate of prodigiosin per cell decrease did not correlate with low-density growth rate, suggesting that prodigiosin pigment levels do not affect low-density growth rate.

Limnology of Southeastern Alabama Water Bodies. P. Taylor Ezell, and Neil Billington, Dept. of Biol. and Environ. Sci., Troy University, Troy, AL 36082.

Most water bodies in southeastern Alabama are man-made ponds or reservoirs. In order to understand more about their limnology, 92 water bodies in southeastern Alabama, mostly ponds, were surveyed during spring or fall mixing for physical, chemical, and biological factors including pH, alkalinity, hardness, turbidity, total dissolved solids, Secchi disk depth, nutrient levels (total nitrogen, total phosphorus, nitrate + nitrite, and orthophosphate), and chlorophyll a concentrations. Five of these ponds were extensively studied every two weeks at least one year. In these ponds vertical profiles of temperature and oxygen concentrations were also recorded to determine when thermal stratification occurred and to monitor oxygen concentrations under these conditions. The five ponds studied in detail showed thermal stratification during the summer and winter mixing that were consistent with them being warm monomictic systems. However, summer mixing was also observed that appeared to be related to high winds associated with hurricane activity. Phosphorus

levels tended to be high because many pond owners fertilize their ponds with phosphorus in spring, however, nitrogen levels were low and nitrogen may be the limiting nutrient in southeastern Alabama water bodies. Low nitrogen levels associated with high phosphorus present a concern because cyanobacteria favor these conditions because they can fix their own nitrogen, whereas the more desirable green algae cannot. Cyanobacteria are known to be poisonous to cattle and dogs, therefore some owners may need to consider fertilizing with nitrogen rather than phosphorus.

Medical Evaluation of Symptomatic Hypocalcemia. Alan J. Pernick, M.D., and Robert E. Pieroni, M.D., UASOM, Tuscaloosa Program, Tuscaloosa, AL 35401.

Calcium regulation is essential for normal cellular function, cell membrane stability, blood coagulation and nerve conduction. Unrecognized hypocalcemia can result in marked morbidity and even death. We shall present the case of a 35 year old male who presented to our hospital with chest pain. On evaluation, he was noted to have marked neuromuscular irritability as manifested by facial and extremity numbness and cramping, as well as Chvostek and Trousseau signs. His serum calcium was noted to be markedly reduced. We shall discuss the differential diagnoses, clinical features, and workup of hypocalcemic states, with special emphasis on the early diagnosis and treatment of our patient.

Pit Membrane Ontogeny in Two Gymnosperm Species. Roland Dute, LaToya Hagler, and Adam Black, Auburn University, AL 36849.

A study was undertaken to compare and contrast bordered pit pair structure and development in wood of *Abies firma* and *Metasequoia glyptostroboides*. Initial phases of ontogeny are identical for both species. The pit membrane from its earliest stages contains complex, branched plasmodesmata. Torus thickening of the pit membrane occurs early in pit development well before initiation of pit borders. As pit borders enlarge, plastids occlude the apertures. When cell lysis occurs, matrix material is lost from pit membranes of *Metasequoia*. The resulting pit membrane structure of margo and torus is strictly fibrillar. By contrast, cell lysis in *Abies* leads to loss of matrix material from only the margo, whereas the torus remains largely unaffected. We hypothesize that tori of *Metasequoia* and *Abies* differ chemically, and that this difference is responsible for their dissimilar responses during cell lysis.

Reproduction and Population Structure in *Commelina Erecta*. Roland Dute, Christy Hoit, Jennifer Trusty, Debbie Folkerts, and Leslie Goertzen, Auburn University, AL 36849.

This study provides information about the growth and reproduction of *Commelina erecta* and is part of a continuing study of a single population in Auburn, Alabama. Flowers of *C. erecta* are bisexual and are visited by insects. The major flower visitors of our population are two species of *Toxomerus*, a genus of syrphid flies although other insects such as *Bombus*, the bumble bee, are known to collect pollen. A study involving bagged inflorescences has shown that *C. erecta* flowers are capable of self-pollination and seed set.

Each aerial shoot is associated with a rhizome. The aerial stem is annual and is replaced by growth of an axillary bud located below the abscission zone. Shoot scars show the rhizomes to vary from two to six years old. Investigation of intersimple sequence repeats (ISSR) near microsatellite loci for 14 plants shows individuals within the population to be genetically indistinguishable. It is hypothesized that the population in question arose from a genetically depauperate source and maintains itself by self-fertilization and subsequent perennial, rhizomatous growth.

**Road-Kill Survey of Alabama Red-Bellied Turtles on the Mobile Bay Causeway.
David H. Nelson and Cynthia Scardamalia-Nelson, Department of Biological Sciences,
University of South Alabama, Mobile, AL 36688.**

A systematic, road-kill survey was conducted (by bicycle or automobile) on the Mobile Bay Causeway from April 2001 to December 2006 to assess the numbers of Alabama red-bellied turtles (*Pseudemys alabamensis*) killed by automobile traffic. A federally endangered species, *Pseudemys alabamensis* has been designated as the official "Alabama state reptile." A total of 444 Alabama red-bellied turtles were recorded over the six-year study: 326 hatchlings, 101 adult females (most gravid), 13 juveniles, and 4 males. A majority of hatchlings (94.4%) over-wintered in the nests to emerge during the following Spring (March-May). Fewer numbers of hatchlings (5.5%) emerged during the Fall (October and November) of the same year. Direct hits by hurricanes apparently may result in fewer roadside mortalities of hatchlings (as they are drowned or emerge prematurely). The mortality of adult females (N=101) was greatest (91.1%) during the nesting season: May, June, July. Each year, from 5 to 34 nesting females (mean = 15.3) were killed by vehicular traffic on the road. Because of the limited availability of favorable nesting sites in the lower delta, gravid females are attracted to the shoulders of elevated roadsides where they deposit eggs (and may incur mortality). Agencies of the state (ADCNR, DOT) and federal (USFW) governments are presently seeking a viable solution to reduce the roadside mortality of turtles on the Mobile Bay causeway.

**Stable Expression of the Androgen Receptor in HeLa Cells. Philip D. Reynolds,
Department of Biological and Environmental Science, Troy University, Troy, AL
36082.**

Stable cell lines expressing the human androgen receptor (AR) were generated and characterized for biochemical and functional properties. Two HeLa cell lines (AR3a and AR1c) and one PC3 cell line (AR2a11) survived neomycin selection and were cloned by single cell isolation. Initial characterization of the stable cell lines indicated the expression of a high-affinity AR (Kd's of 0.06-0.08 nM R1881) with receptor concentrations similar to physiologic conditions. Transcriptional activity was measured by transfecting a luciferase reporter vector into each stable cell line. Stimulation with DHT caused an induction of luciferase activity in a dose dependent manner. Further characterization revealed significant differences in stably expressed AR compared with transiently expressed AR. If the AR is transiently expressed in cells, it degrades very rapidly in the absence of hormone (t_{1/2}=3 h)

with hormone addition preventing its degradation ($t_{1/2}=18$ h). In contrast, stably expressed AR degrades at similar rates in the absence or presence of hormone ($t_{1/2}= 6.5$ h and 5.5 h, respectively). Using immunocytochemistry, transiently expressed AR was located both in the cytoplasmic and nuclear compartments in the absence of hormone, whereas stably expressed AR was predominantly nuclear. These data suggest that nuclear AR expressed from stable, replicating templates undergoes cellular processing which protects it from the rapid degradation events observed in cells transiently expressing AR.

The Anourogenital Slit and the Necropsy of a Bottlenose Dolphin. Gerald T. Regan, Marterra Foundation, 4000 Dauphin Street, Mobile, AL 36608-1791.

I took advantage of the stranding of an unusually useful specimen to investigate features of the anourogenital slit that have not been addressed in the literature or in a half dozen workshops that I have attended. Such a slit is present only in females. It is generally expected that during a necropsy the slit will be examined for length, for the presence of parasites, and for the collection of urine. In April of 2006 a specimen stranded on a pile of driftwood that apparently protected the specimen from scavengers. The specimen was bloated just enough to have the blubber along the slit forced apart making the contents visible in a gently convex pattern. Besides the anus and the opening of the vagina, the area under the clitoral hood was evident. That area clearly contained the external orifice of the urethra and the distal tip of the clitoris. When the hood was cut open in a longitudinal direction, most of the clitoris was visible. A cross section of the clitoris showed that it, like the penis, was mainly cartilaginous. Two arteries appeared to run along the dorsal surface of the cartilage. I concluded from these observations that every necropsy of a female dolphin ought to include an inspection of the surfaces within the clitoral hood unless it has been destroyed. Otherwise, no parasites will be found and urine cannot be collected effectively by urethral catheter.

Variability of Antibiotic Resistance in Surface Water Fecal Coliforms from Dry Creek, Al. Katherine Eubanks and Brian S. Burnes, Dept. of Biology, Judson College, Marion, AL 36756.

Dry Creek is located in the Cahaba River watershed. Fecal coliforms (FC) were isolated from water samples taken in 2001 and 2006 and tested for resistance to a number of antibiotics. The comparisons were based on antibiotic resistance patterns generated by exposure of the FC isolates to various concentrations of eight antibiotics (ampicillin, chloramphenicol, erythromycin, neomycin, oxytetracycline, spectinomycin dihydrochloride, streptomycin sulfate, and tetracycline hydrochloride). In 2001, the majority of the 385 FC tested showed multiple –antibiotic resistances. In 2006, most of the 96 FC tested varied with a 20% increase or decrease in antibiotic resistance except for neomycin resistance, which decreased 76%.

Variation in Human Fecal Coliform Antibiotic Resistance Patterns over Three Years.
Margaret Audley and Brian S. Burnes, Dept. of Biology, Judson College, Marion, AL 36756.

The State of Alabama listed Dry Creek on the 1996 303(d) list as not supporting its designated use due to high pathogen concentrations. Fecal coliform (FC) bacteria, the pathogen indicators, from Dry Creek were compared to FC from the surrounding watershed to determine the source, human or nonhuman, of FC contamination. The comparisons were based on antibiotic resistance patterns generated by exposure of the FC isolates to various concentrations of eight antibiotics (ampicillin, chloramphenicol, erythromycin, neomycin, oxytetracycline, spectinomycin dihydrochloride, streptomycin sulfate, and tetracycline hydrochloride). A reference database of 384 FC isolates was constructed from human FC. The number of different antibiotic resistance patterns is shown to vary over time, from 112 in 2001 to 36 in 2004.

Vascular Flora of the Coon Creek Forever Wild Tract, Tallapoosa County, Al.
T. Wayne Barger, State Lands Division, ALDCNR, Natural Heritage Section, Montgomery, AL 36130. Dan Tenaglia, www.alabamaplants.com, 1416 Victoria Ave, Opelika, AL 36801.

The Coon Creek Tract, located in Tallapoosa County, Alabama, is a relatively small (130 ha) tract that was purchased by the State of Alabama Forever Wild Program on February 1, 1995. The tract lies 45 km west of Auburn, AL with the main tributary of the tract, Coon Creek, dissecting the property and eventually emptying into the Tallapoosa River. The tract is managed by the Alabama Department of Conservation and Natural Resources with an emphasis on recreational use, habitat management and rare species protection. Due to a lack of biological surveys, little is known of the biodiversity of Tallapoosa County. For this study, the vascular flora of the Coon Creek tract was surveyed intensely beginning March 2006. As of the deadline for this abstract, 477 plant specimens had been collected, verified and reposed in the herbarium at the Anniston Museum of Natural History. 301 genera and 110 families have been collected from the tract. Asteraceae was found to be the largest family with 69 species. Poaceae, Cyperaceae, and Fabaceae were the next largest families with 44, 30, and 29 species, respectively. Carex was the largest genus represented with 15 taxa.

Water Quality and Habitat Assessment of Cathy's Creek, Cleburne County, Alabama.
R. Tyler Greer, Jonathon Adams, and Frank A. Romano, III, Jacksonville State University, Department of Biology, Jacksonville, AL 36265.

Cathy's Creek is located in the Shoal Creek district of the Talladega National Forest in Cleburne County, Alabama and is part of the Shoal Creek, Choccolocco, and Coosa River watersheds. Cathy's Creek is located in the Ridge and Valley physiographic province of the Appalachian Mountains. Most of the length of Cathy's Creek flows within the Talladega National Forest) and the area has limited use (hiking, hunting, horseback riding, and camping). The assessment of Cathy's Creek included habitat and water quality assessments, analyses of benthic macro-invertebrates, stream physical characteristics,

microbial, chemical characteristics, and riparian vegetation. EPA and USGS protocols were followed. Water quality was assessed using benthic macroinvertebrates. Both a taxon level and family level metric was used in these assessments. Taxon level assessment index was 28.33 scoring into the excellent range (> 22). The family biotic index was 3.86 rating water quality as very good (3.76-4.25) with possible slight organic pollution. Stream habitat assessment metrics scored a 136 (out of 150) that rates Cathy's Creek in the suboptimal range. Only 80 cfu's/100 ml of fecal coliform bacteria were found. This is well below EPA criteria for safe water. Chemical parameters scored Cathy's Creek's water as permissible for recreational use and whole body contact. Riparian vegetation was dominated by Alders, Oaks, and Pines.

Biological Sciences Poster Abstracts

Vitellogenin Induction in *Xenopus Laevis* and Detection Using Pro-Q Diamond. Bernice Moser and James Rayburn, Biology Department, Jacksonville State University, Jacksonville, AL 36265.

Vitellogenin has been used as a biomarker for reproductive endocrine disruptors. Vitellogenin can be induced in males by pesticides, pharmaceuticals, plastic products, and steroids from poultry and livestock that enter the aquatic environment via run-off. New assays that allow for cheaper, quicker, and less invasive detection of endocrine disruptors need to be examined. Vitellogenin is a high molecular weight phospholipoprotein that has been reported in the mucus and plasma of fish. In frogs it has a molecular weight of approximately 200 kDa. Pro-Q Diamond Phosphoprotein Gel Stain is a commercially available dye capable of detecting as little as 1-16 ng of phosphoprotein per band. Previous researchers have been successful in using it to detect vitellogenin in the plasma and blood of fish. *Xenopus laevis* juveniles and one adult were injected intraperitoneally with 30g of 17-estradiol (E2) per gram of frog. Aqueous exposures to E2 were performed on 96-hr *X. laevis* tadpoles for a period of 60 days. Blood was collected and placed into heparin-coated capillary tubes. The blood was then centrifuged at 5000 rpm for 10 minutes, and the plasma was placed in aprotinin-treated tubes. Plasma samples were then separated using sodium dodecyl sulfate-polyacrylamide gel electrophoresis and stained with Pro-Q Diamond Gel Stain. Phosphoprotein bands were detected and the molecular weights determined. We would like to acknowledge Jacksonville State University and AAS for funding.

A Preliminary Comparison of Freshwater Jellyfish, Marine Jellyfish and Sea Anemone. Kaci Rodgers, James Rayburn, George Cline and Mijitaba Hamissou. Biology Department, Jacksonville State University, Jacksonville, AL 36265.

The cnidarians are divided into classes including Hydrozoa, Schyphozoa and Anthozoa. The two body forms represented in Cnidaria are the polyps such as sea anemones and corals, and medusae such as jellyfish. The defining characteristic of this phylum is their nematocysts or stinging tentacles. In this experiment Hydrozoans are represented by the freshwater jellyfish (*Craspedacusta sowerbii*), Schyphozoa represented by the marine jellyfish, and Anthozoa represented by the sea anemone. The occurrence of the freshwater jellyfish (*Craspedacusta sowerbii*) in ponds, lakes, rivers and quarries is unpredictable and is therefore considered an invasive species. It is found in many areas across the United

States including areas around Jacksonville State University in Alabama. The freshwater jellyfish medusae are usually seen between the months of July and October when the water is warmer and food is abundant. Marne jellyfish were collected at Dauphin Island Sea Lab in Mobile, AL during the month of July. Jellyfish were frozen and brought back to Jacksonville State University for further analysis. Sea Anemones were purchased from a supply house. The objective of this experiment is to determine relationships of the freshwater jellyfish to the two other classes by comparing proteins. Whole body samples were separated by SDS-Page. This research will give insight to the diversity of the freshwater jellyfish and its associated classes.

Taxonomic Analysis of *Prunus Serotina* and *P. Alabamensis* (Var) Using Molecular Techniques. Janet E. Roberts, Mijitaba Hamissou and David R. Whetstone, Dept. of Biology, Jacksonville State University, Jacksonville, AL 36265.

The family Rosaceae includes many plant members of ornamental and economic importance such as roses, apples, apricots, almonds, prunes, plums, peaches, loquats, strawberries, blackberries, and cherries. The genus Prunus includes the peaches, plums, and cherries. *Prunus alabamensis* (Mohr) Little (Alabama Black Cherry) has been considered as a variety of the species *Prunus serotina* Ehrhart (Wild Black Cherry) by many botanists. *P. serotina* and *P. alabamensis* exhibit unique characteristics that may expose differences and similarities between the two taxa. Those characteristics include an inability to hybridize due to distinctly separate flowering times and the occupation of different habitats. The purpose of this study is to use molecular approaches to determine relationships between *P. serotina* and *P. alabamensis*. Genomic studies, including Restriction Fragment Length Polymorphism (RFLP) and isozyme analysis, along with anatomical investigations will be performed.

Occurrence of *Chaetogaster* Sp.(Oligochaeta) among *Physa* Sp. (Gastropoda) from Lake Lu in Livingston, Alabama. Tracy W. Duckworth, Dept. of Biology, Univ. of West Ala., Livingston, AL 35470.

The oligochaete annelid *Chaetogaster* sp. has been shown to form associations with a number of freshwater molluscs. This study investigates interactions between *Chaetogaster* sp. and snails in Sumter County, AL. One hundred *Physa* sp., an aquatic gastropod, were collected from Lake LU, a 54 acre impoundment on the campus of the University of West Alabama in Livingston, Alabama. The snails were examined for presence of *Chaetogaster* sp. and prevalence, intensity, and frequency distribution were determined. Infestation rates were observed to follow a log-normal distribution.

Differential Localization of Rin 1. Natalie N King, Jin Cui, Bruce Horazdovsky, and Wonder P Drake, Oakwood College Huntsville, AL 35896, Mayo Clinic, Rochester, MN 55905.

The internalization of cell surface receptors is mediated by the endocytic pathway. Movement through this pathway is regulated by the small GTPase Rab5, which is responsible for the targeting and fusion of endocytic vesicles with early endosomal structures. In order for Rab5 to be active, it must be in its GTP-bound form. Rab5-specific guanine nucleotide

exchange factors (GEFs) are responsible for this activation. In previous studies, it has been shown that the Rab5 GEF Rin1 is directly involved in the internalization of the epidermal growth factor receptor (EGFR) and the attenuation of its signaling cascade. To uncover other possible functions of Rin1 we analyzed its localization patterns in a number of different cell lines. Four constructs of Human Rin1 were generated: Rin1 with a N-terminal GFP tag, Rin1 with a C-terminal GFP tag, Rin1 tagless full length, and Rin1 Δ tagless (lacking the Rab5 GEF domain). These constructs were transfected into HeLa and NT2 cells. Immunofluorescence techniques were used to visualize Rin1 localization patterns. It was previously shown that Rin1 localized primarily to the plasma membrane and endosomes in CHO cells. Surprisingly, Rin1 localized to the nucleus in HeLa and NT2 cells. Further studies are being performed to access the functional significance of Rin1 nuclear localization. MARC/MBRS/BRIDGES program Dr. Alexandrine Randriamahefa Oakwood College RISE-I-CARE Mayo Medical Clinic : Dr. Bruce Horazdovsky and Jin Cui.

Histone Acetylation on Histone Methylation During Memory Consolidation. Sonja Artis 1, Farah D. Lubin2, and J. David Sweatt2 1Department of Biological Sciences, Oakwood College, Huntsville, Alabama 35896. 2Department of Neurobiology, University of Alabama at Birmingham, Birmingham, Alabama 35294.

Long term memory formation is believed to require several steps including alterations in chromatin structure. Previously, we have shown that the acetylation of histone H3 at lysine (Lys) 14 is greatly increased during contextual fear conditioning. Whether acetylation of Lys 14 is associated with other post-translational modifications of the histone H3 tail during contextual fear conditioning is unknown. Recently, histone methylation has been found to be associated with transcriptional activation and regulation of gene expression. Methylation of histone H3 at Lys 4 (H3K4) has been associated with the euchromatin (transcriptionally active) and at Lys 9 (H3K9) with the heterochromatin (transcriptionally silent). We determined whether enhanced histone H3 acetylation altered histone H3 methylation levels at Lys 4 and Lys 9 in hippocampus during memory consolidation. Similar to histone H3 acetylation, we found that trimethylated (me3) H3K4 levels in area CA1 were regulated in contextual fear conditioning (context + shock). No change in dimethylated (me2) H3K9 levels were observed during contextual fear conditioning. Furthermore, elevating acetylated histone levels through the use of sodium butyrate (NaB), histone deacetylase (HDAC) inhibitor, significantly enhanced H3K4me3 levels in area CA1 following 1 hr of context exposure alone. Interestingly, the observed increases in H3K4me3 were not significantly enhanced with NaB treatment after contextual fear conditioning. These results suggest that methylation of the histone H3-tail, similar to other covalent modifications, is dynamically regulated during memory formation and thus provides further insight into the mechanisms involved in memory consolidation.

Effect of Ginger (*Zingiber Officinale*) Extracts on Blood Glucose Profiles of Alloxan Induced Diabetic Sprague-Dawley Rats. Victor Harris, Debra L. Byrd, Adriel D. Johnson, Sr., Dept. of Biological Sciences, Univ. of Alabama in Huntsville, Huntsville, AL 35899. Jacqueline U. Johnson, Dept. Food and Animal Science, Alabama A&M University, Normal, AL 35762.

Diabetes mellitus is one of the most significant diseases in the world. Natural extracts have been utilized to treat the hyperglycemia that is characteristic of diabetes. In this study, the antihyperglycemic effect of *Zingiber officinale* Roscoe (family, Zingiberaceae) in an alloxan-induced animal model, male Sprague-Dawley rat age 8 weeks, was studied. Following a 24 hour fasting period with water ad libitum, diabetes was induced by a single subcutaneous injection of alloxan monohydrate at a dose of 120 mg/kg BW. Ginger extract, ground powder, dissolved in deionized water was administered orally at different doses (100, 150, and 200 mg/kg) for 15 days. This study is a pilot to assess the blood glucose lowering effect of *Zingiber officinale* in alloxan induced diabetic rats.

eGFP Fusions to Identify Determinants for Dimerization and Polar Clustering in the Aer Aerotaxis Protein of Escherichia Coli. Melissa S. Charles, Daniel Salcedo, Mark S. Johnson, and Barry L. Taylor Department of Biochemistry and Microbiology, Loma Linda University, School of Medicine, Loma Linda, CA Department of Biological Sciences, Oakwood College, Huntsville, AL 35896.

Escherichia coli smells food in its environment and, like a tracking dog, rapidly changes direction to swim to areas where food is plentiful. This tracking system is called bacterial chemotaxis, and in *E. coli*, is orchestrated by five transmembrane chemoreceptors, which respond to pH, osmolarity, energy levels, and a vast array of other environmental signals. Oxygen is sensed by the Aer transmembrane protein, which is unique among the chemoreceptors in that its sensory and signaling domains are in the cytoplasm. Although the signaling unit is a dimer, Aer forms a trimer of dimers, and higher order clusters at the cell poles. These clusters may help amplify signals coming from a single dimer. To form polar clusters, chemoreceptors require a highly conserved domain (HCD) which binds to the CheA/W complex of the chemotaxis signaling cascade. In this study, the determinants for Aer dimerization and polar clustering were examined. The fluorescent protein, eGFP, was visualized in vivo using fluorescence microscopy to observe the localization of the truncated Aer peptide. By making chimeric fusions of the Aer protein and eGFP, the location of Aer was visualized in the cell. The truncated Aer homodimer, lacking the signaling domain, displayed no distinct polar localization, and could not support aerotaxis. Based on that evidence, we propose that the Aer protein's affinity to locate at the poles, and possibly cluster, is mediated in part by the presence of the signaling domain.

Enrichment and Isolation of Cr(VI) Resistant Bacteria for Cr(VI) Bioremediation in Water. Benedict C. Okeke, Charles Oji, Shakena Crenshaw, Jeffrey Laymon, Dept. of Biology, Auburn University Montgomery, Montgomery, AL 36117.

Contamination of water and soils by hexavalent chromium, (Cr (VI)), is currently a serious public health problem. Sources of chromium pollution of water and soils are wastes from industries involved in leather tanning, chromium plating, wood preservation, preparation of alloys and processing of nuclear materials. Cr (VI), is toxic, mutagenic and carcinogenic to living systems. Chromium-resistant bacteria (CRB) can reduce and detoxify Cr (VI) to Cr (III). Twelve bacteria resistant to high concentration of Cr(VI) were isolated from soil enrichment cultures. The effects of temperature, pH, salt and pollutant concentrations on bioreduction of Cr(VI) by one isolate tentatively identified by 16S rDNA as *Bacillus* sp. PB2 were studied. The isolate grew luxuriantly and substantially reduced Cr (VI) at initial pH 7.5 to 9. The optimal temperature for growth and Cr(VI) reduction was 35 degrees C. Substantial reduction of Cr(VI) was observed at 0 to 3% NaCl. Time course studies revealed > 90% reduction of Cr(VI) at an initial concentration of 8,000 µg/L, in 8 h. *Bacillus* sp. PB2 strongly reduces Cr(VI) and could be useful for bioremediation of hexavalent chromium in contaminated sites. The study was partly funded by an Auburn University Montgomery undergraduate grant in aid.

Enzymatic Amylase Release from an Embryonic Chick Pancreatic Whole Organ Culture System Using Short-Term Incubation Times. Rakesha L. Davis, Debra L. Byrd, Adriel D. Johnson, Sr., Dept. of Biological Sciences, Univ. of Alabama in Huntsville, Huntsville, AL 35899. Jacqueline U. Johnson, Alabama A&M University, Dept. of Food and Animal Science, Normal, AL 35762.

Various in vitro systems have been used as models to examine the mechanisms regulating secretions from the avian endocrine and exocrine pancreas. Several systems use short-term incubation of pancreatic pieces or slices, and cell or acini dispersions, and in vivo and in vitro pancreatic perfusion. Our laboratory developed an eighteen day-old embryonic chick whole organ pancreatic culture system which does not disrupt the intrinsic innervation within the pancreas and also allows in vitro investigation of exocrine function with tissue preparations that contain a larger proportion of in vivo regulatory mechanisms intact. Previous studies using this embryonic chick whole organ culture system have measured pancreatic amylase release during incubation periods of 2, 4, 6, 8, and 12 hours. In this study, the entire embryonic chick pancreas was dissected, placed in CMRL-1066 organ culture medium and then incubated in a water bath at a temperature of 37 C. Experiments used in this study examined short term incubation time periods of 5, 15, 30, 60, 90, and 120 minutes to determine pancreatic amylase release. Preliminary studies indicate that there were no significant differences in pancreatic amylase release during the period of less than 2 hours using this whole organ culture system.

Extracts from Sweet Potato Greens Inhibit Tumor Cell Invasion in an African American Breast Cancer Cell Line. Ifayet Johnson-Mayo 1, Zhiliang Huang2, Baowu Wang2, Ralphenia D. Pace2, Pamela Leggett-Robinson3 and Roberta M. Troy1 Departments of Biology1, Food and Nutritional Sciences2 and Chemistry3, Tuskegee University, Tuskegee, AL 36088.

Chronic diseases such as cancer and cardiovascular disease affect African Americans disproportionately, particularly in the Black Belt of Alabama. Recent investigations have revealed that diet plays a major role in disease progression. Increasing intake of fruits and vegetables has been correlated with reduced risk of disease. In the African American community, intake of fruits and vegetables indigenous to the population would make for an easier transition to healthy eating habits. In this study, extracts from sweet potato greens was shown to inhibit tumor cell invasion by 62% in the African American breast cancer cell line, MDA-MB 468 as determined by a matrigel invasion assay. Further studies examining the mechanism of this inhibition will be conducted. These data will provide the framework for investigations leading to the development of new dietary regiments in the Black Belt and other communities.

Hypoglycemic Effect of *Pimenta Diocia* on Blood Glucose Levels of Diabetic Induced Female Sprague-Dawley Rats. Debra L. Byrd and Adriel D. Johnson, Sr., Dept. of Biological Sciences, Univ. of Alabama in Huntsville, Huntsville, AL 35899.

Diabetes mellitus is clinically recognized as a chronic metabolic disorder. Increased blood glucose levels characterize this disease and are associated with impaired insulin secretion and/or insulin action. There is an increased interest in evaluating plant products to treat diabetes mellitus due to the therapeutic potential of their inherent bioactive substances. The purpose of the present research is to evaluate the hypoglycemic effect of *Pimenta diocia* (allspice) in lowering the blood glucose levels of experimentally induced diabetic rats. Thirty-five 8-week-old female Sprague-Dawley rats were housed in metabolic cages under controlled environmental conditions. *Pimenta diocia* (allspice) contained 65-75% eugenol and was extracted twice with 640 ml of water for 16 h at 90°C. Experimental animals were allowed to acclimatize for 14 days and had free access to food and water. Alloxan (1.00 mol/L) was prepared and adjusted according to rat weight. After a 24 h fasting period, rats were injected subcutaneously with a single dose of 50mg/kg alloxan. After 4 days, the fasting blood glucose levels were determined using a hand held blood glucose monitoring system. Rats showing fasting blood glucose more than 200 mg/dL were considered diabetic. Treatment groups included alloxan (50mg/kg BW) in combination with 50, 100, 150, 200 mg/kg BW of allspice water extract. The present study is a pilot to assess the hypoglycemic potential of *Pimenta diocia* in diabetic induced rats.

Lycopene Inhibits Tumor Cell Invasion and Mmp-2 Activity in an African American Breast Cancer Cell Line. Khalda Fadlalla 1, Tahirah Farrer-Bradley2, Pamela Leggett-Robinson2 and Roberta M. Troy1 Departments of Biology1 and Chemistry2, Tuskegee University, Tuskegee, AL 36088.

African American females tend to have a more aggressive form of breast cancer and have a higher mortality than what is observed in other groups. The aggressiveness of the cancer exhibited has been associated with several factors, one in particular being the overexpression of matrix metalloproteinases (MMPs). In recent studies, the overexpression of MMP-2 has been correlated with tumor size, cancer stage, and ultimately poor prognosis in breast cancer patients. In recent years, dietary natural products such as lycopene have been shown to exhibit anti-cancer activity and might be utilized not only as a chemopreventive agent but might be efficacious in a chemotherapeutic manner. However, in ethnic groups, very little is known about the lycopene content in tissues and its possible correlation to reduced risk of disease. In this study, lycopene (15 g), extracted from commercially available tomato paste and resolved on TLC plates was shown to inhibit tumor cell invasion by 62% and MMP-2 activity by 25% in the African American breast cancer cell line, MDA-MB 468 as determined by a matrigel invasion assay and gelatin zymography. These data show that the mechanism of lycopene inhibition of invasion may in part be due to inhibition of active MMP-2.

Mating Studies of Agaricales Fungi from Mobile, Alabama. Peter F. Murphy and Juan L. Mata, Dept. of Biological Sciences, University of South Alabama, Mobile, AL 36688.

The Agaricales are among the more conspicuous and better understood fungi. Despite their variation in size, shape, color, and other tangible characters mushrooms are organisms taxonomically difficult to separate on the sole basis of morphology. Application of other concepts, such as cytology, mating systems, and more recently DNA sequencing, has been instrumental in developing a more natural classification system. Observation and scoring of mating experiments and their culture morphology has proven to be a useful approach in fungal taxonomy and systematics when attempting to address problems in species identity and genetic boundaries. It is possible to determine a mushroom's genetic system by performing an intracollection pairing of single basidiospore isolates (SBIs) and/or detect whether two or more specimens of a putative species are interfertile by setting up an intercollection pairing of SBIs. The genera *Lentinula* and *Gymnopus* are ubiquitous mushrooms living as wood and leaf litter decomposers in forest ecosystems. *Lentinula edodes*, the shiitake mushroom, is probably the best known species in that genus due to its commercial value. A sister species, *L. raphanica*, the American shiitake, grows locally in the Gulf Coast region of the United States but has received very little attention and is still poorly understood. *Gymnopus luxurians* and *G. biformis* are recorded throughout the Americas, but reports on mating systems are scarce. In this paper we present our results of the matings from these mushrooms. Previous workers have shown that species in *Lentinula*, including *L. raphanica*, are of the bifactorial mating system; a similar situation occurs with

Gymnopus. Results of intercollection matings are also reported in both genera. In addition to the genetic aspects of the research, we describe the macroscopic interactions of fungal cultures, and identify tester strains to be used in future genetic research.

Mechanism of Bafilomycin Induced Neuroprotection Against Autophagic Stress.
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Neurodegenerative diseases are characterized by the loss of neurons in most, if not all, cases of neurodegenerative diseases. Chloroquine (CHQ) is an antimalarial drug which is also used in the treatment of autoimmune diseases. Because CHQ is a weak base it concentrates in acidic vesicles such as lysosomes and effectively raises their pH, which disrupts the function of lysosomes. Bafilomycin A1 (BafA1) is a macrolide antibiotic that was characterized initially for its selective inhibition of V-ATPase. Baf A1 is known to prevent apoptosis resulting from CHQ induced stress by increasing the pH of acidic vesicles. This disruption in vesicular acidification by both CHQ and BafA1 has been proposed to prevent the fusion of autophagosomes with lysosomes, causing an inhibition of autophagy. This inhibition of autophagy in turn causes Bax-dependent apoptosis showing an important link between the two death processes. BafA1 has also been shown to inhibit CHQ induced apoptosis, which suggests a complex interrelationship between the two inhibitors of autophagy. Various combinations of BafA1 and CHQ, both single and combined, were examined to determine whether the cytoprotective effects of BafA1 on CHQ-treated cells was dependent on the V-ATPase. These combinations of BafA1 and CHQ were treated on cultured cerebellar granule neurons. These studies will help us to understand the mechanism of the autophagic cell death pathways.

Modulation of Pro- and Anti-Apoptotic Molecules as a Rational Approach to Anti-Metabolite Selectivity for Pancreatic Cancer. **Samuel C. Nwosu, Tochuckwu V. Ifeacho, Christina N. Pfandl, Nathan R. Wall Departments of Biochemistry & Microbiology and Center for Health Disparities Research, Loma Linda University, School of Medicine, Loma Linda, CA 92350 *Department of Biological Sciences, Oakwood College, Huntsville, AL 35896.**

Gemcitabine was established as standard treatment for advanced pancreatic cancer after a superior clinical benefit response was demonstrated in a randomized study comparing it to 5-fluorouracil (FU). Until recently, many subsequent randomized trials of newer, often gemcitabine-based combinations have not been able to show improved survival over gemcitabine. At present, there is no standard second-line treatment for patients who have become refractory to gemcitabine. The inhibitor of apoptosis protein survivin has been shown to be upregulated in pancreatic cancer, and has been associated with a more

unfavorable outcome. It was with this in mind that we undertook to study a group of cytosine analogs/anti-metabolites and to investigate their effects on proteins associated with death inhibition in the pancreatic cancer cell line, Panc-1. Our studies have shown that though many of these agents modulate the protein expression of survivin and other cell cycle and apoptotic regulatory proteins, single use of any of these agents will not prove effective. Further development of these anti-metabolite drugs and their use in combination with each other or other agents may one day lead to the more effective treatment of pancreatic cancer.

Novel Mouse Models for Studying Epilepsy and Excitotoxicity. Jasmine M. Olander, Matthew English, Zuo-Lei Xie, Dr. Jianhua Zhang Division of Neuropathology, Department of Pathology University of Alabama Birmingham, Birmingham, AL 35294.

Epilepsy is a neurological disorder that is characterized by sudden recurrent sensory disturbances, loss of consciousness, convulsions, abnormal electrical brain activity, excessive glutamate receptor activation, and excitotoxicity. In humans as well as experimental animal models glutamate or kainic acid bind to glutamate receptors and elicits c-Fos expression. c-Fos is a transcription factor that controls the expression of many genes that are involved in neuronal function and survival. We are researching the idea that spatially and temporally controlled elevation of c-Fos can precondition neurons against seizures and allow these cells to survive a neurotoxic stimulus. To test this idea a novel mouse model with inducible c-Fos expression must be generated. We first generated a bi-transgenic mouse CaMKIIα-TTA:Tet-reporter gene lacZ, this mouse has inducible lacZ expression. We found that it is possible to regulate the expression of lacZ through the administration of doxycycline and we believe that this method will allow us to make an inducible c-Fos regulated novel mouse model.

Rare Vascular Plants of Crenshaw County, Alabama. Alvin R. Diamond, Jr., Dept. of Biological and Environmental Sciences, Troy University, Troy, AL 36082.

Crenshaw County has an area of 1,582 square km and lies in central south Alabama approximately 160 km north of the Gulf of Mexico. The vascular flora of the county was surveyed from 1987 to 2006. A total of 1192 species and two named hybrids in 589 genera from 160 families were documented. Twenty-four species (2% of the flora) documented during the study appear on the 2006 Inventory List of Rare, Threatened and Endangered Plants, Animals and Natural Communities of Alabama as compiled by the Alabama Natural Heritage Program. The names of the rare taxa are followed by designations of their status. Each species has a global rank (G) representing its status range-wide, and a state rank (S) representing its status within Alabama. A rank of 1 indicates those species that are considered critically imperiled; those with a rank of 5 are considered secure.

S43126 (Compound I) Activates the Pi3k/Akt Signaling Pathway in Pc12 Cells.
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Metabolic Syndrome X, a condition characterized by obesity, insulin resistance/hyperinsulinemia, dyslipidemia, impaired glucose intolerance, and hypertension, affects approximately 70 million Americans and is quickly becoming the most prevalent disease of mankind. Recently, imidazoline drugs are emerging as therapeutic agents for several conditions associated with Metabolic Syndrome X. Studies from our laboratory showed a reduction in blood pressure when moxonidine, an imidazoline compound, was injected into the rostral ventrolateral medulla (RVLM) of spontaneously hypertensive rats (SHR). Furthermore, we showed that moxonidine activates the insulin signaling cascade, resulting in increased glucose uptake in HEK 293T cells. We have obtained a novel imidazoline compound, S43126 (Compound 1), which, like moxonidine, reduces blood pressure in SHR rat models, whose effect was offset by a highly specific I1-imidazoline antagonist, efaxorin. To investigate whether S43126 also activates the insulin signaling pathway, we used PC12 cells, a model cell line that possesses both the I1-imidazoline and insulin receptor. Cells were treated for various times with S43126 in a dose-dependent manner. Using Western blot analysis, we showed that S43126 stimulates the phosphorylation of components of the insulin signaling pathway, such as protein kinase B (PKB/Akt), endothelial nitric oxide synthase (eNOS), a substrate of PKB/Akt, and the mitogen activated protein kinase (MAPK) ERK 1/2. Rilmecnidine, a known imidazoline compound, gave similar effects on the insulin signaling pathway. Interestingly, efaxorin abolished these effects. To further determine that the I1-imidazoline receptor contributed to the S43126-stimulation of the insulin signaling cascade, we overexpressed the recently cloned I1-imidazoline receptor anti-sera selected protein (IRAS) in PC12 cells and treated cells with various doses of S43126. An increase in the phosphorylation of PKB/Akt protein expression was observed. Together, these results implicate S43126, like moxonidine, as a novel compound that provides crosstalk between the I1-imidazoline receptor and the insulin receptor signaling pathways. Acknowledgements: This research was supported in part by the Center for Health Disparities NIH/NCMHD grant 5P20MD001632.

Snorkel/Scuba Survey of Historic Hellbender Streams (What to Do When Hellbenders Don't Come?). James R. Rayburn, George Cline, and Clifford Webb Department of Biology, Jacksonville State University, Jacksonville AL, 36265.

Hellbenders (*Cryptobranchus alleganiensis*) are large aquatic salamanders found in fast flowing streams. Researchers have detected declines in populations from throughout the species range. In Alabama, they are restricted to the Tennessee River drainage system where they are listed as a Priority 1 species (highest conservation concern). In October

2005, we began a survey of historic sites in three Alabama Counties north of the Tennessee River. Surveys were conducted by flipping rocks while walking, snorkeling, and scuba diving, stream stretches and later, by trapping. No hellbenders were observed during 20 site surveys. Discovery of a dead hellbender late in 2006 caused us to change or survey strategy to include live trapping, but these efforts were limited and have been unsuccessful to date. Physical and chemical characteristics of these streams are as follows. Flow rates ranged from 3.6 – 129.1 cm/s. These waters ranged from neutral to slightly alkaline (pH 7.00-8.12). Conductivity was relatively low at these sites (29-177 us/cm) indicating low dissolved ion concentrations. Dissolved oxygen and temperature are in the good range for these waters (49-100% DO; 4.5- 8.9 mg O₂/l; 15.32-29.9 oC). These streams are fairly clear (turbidity 3-59 NTUs), but there was considerable siltation at most sites. Water quality is high enough to support pollution in-tolerant species such as crayfish (a major component of hellbender diets) and queen snakes (*Regina septemvittata*). These survey techniques have produced hellbenders in neighboring states living under similar conditions. More extensive surveys with increased trapping are planned for the next activity season.

Developmental Toxicity of Hand Soap to *Palaemonetes pugio* Embryos. Justin Whisante and James Rayburn Department of Biology Jacksonville State University, Jacksonville, AL, 36265.

As part of a class project for Marine Toxicology we tested the toxicity of hand soap to embryos of grass shrimp (*Palaemonetes pugio*). Hand soap will get rinsed down in to water treatment plants and eventually can impact aquatic life. Many aquatic organisms are sensitive to surfactants such as hand soap. Grass shrimp make a good model for testing for toxicity in marine environments because they are readily available and an important food source for many fish species. Concentration of hand soap were selected to be tested from 0.01 to 100 parts per million. The solutions were made up in a standardize sea water of 20 ppt. Embryos approximately 4 days from hatch were selected from grass shrimp and removed. These embryos were placed into 24 well plates and observed daily for mortality. The test lasted for 4 day and at the end of that time final mortality were recorded and reported. These test indicated that at the concentrations tested very little mortality was seen.

Twist Inhibits Insulin-like Growth Factor Binding Protein-6 (IGFBP-6) Expression by a Transcriptional Mechanism in Prostate Cancer Cells. Alexander KN Oakwood College, Department of Biological Sciences, Huntsville, AL , Linkhart TA Loma Linda University, Department of Microbiology and Biochemistry, Loma Linda, CA, Glackin CA City of Hope, Beckman Research Institute, Duarte, CA Strong DD Musculoskeletal Disease Center, Jerry L. Pettis Memorial VA Medical Center, Loma Linda, CA, Strohbach, CA Musculoskeletal Disease Center, Jerry L. Pettis Memorial VA Medical Center, Loma Linda, CA 92357.

Prostate cancer is one of the most common cancers in the United States with 317,000 cases per year and 41,000 deaths per year. Prostate cancer is the most commonly diagnosed cancer in American men representing one third of all new cancer cases each year. TWIST is a basic helix-loop-helix (bHLH) transcription factor that is important for cell type determination and differentiation. Most bHLH transcription factors bind as dimers to the consensus sequence CA N N TG, which is referred to as an E-box. TWIST has been identified as an oncogene that inhibits apoptosis through p53-dependent and –independent pathways. TWIST expression is increased in prostate cancer and positively correlated with Gleason grading. Evidence indicates TWIST is a key factor responsible for metastasis of prostate cancer. Furthermore, down-regulation of TWIST by siRNA has been shown to suppress metastatic ability. The insulin-like growth factor system, which includes IGFs and their binding proteins, has also been implicated in the growth and progression of prostate cancer. IGFBP-6 has been shown to have anti-proliferative and pro-apoptotic effects on a number of cancer cell lines. The promoter of IGFBP-6 contains four functional E-boxes. Therefore, we hypothesized that TWIST may exert its antiapoptotic effects in part by down-regulating IGFBP-6. First, due to conflicting reports, we determined the ability of LNCaP cells to be efficiently transfected with plasmid DNA (pEGFP-N3-TWIST) using Effectene (QIAGEN). We found that using Effectene we were able to attain a transfection efficiency of 10-20%. Second, we tested the ability of TWIST to regulate the IGFBP-6 promoter. LNCaP cells were co-transfected with a vector in which the IGFBP-6 promoter containing 1.7 kb of the 5' flanking region was linked to a luciferase reporter and a TWIST vector. Transient transfection indicated that TWIST dose dependently inhibited IGFBP-6 promoter activity up to 44% of baseline. Third, we tested the ability of TWIST with a double null mutation in the bHLH and the RBD (Runx2 binding domain) to suppress IGFBP-6 promoter activity. We found that the mutated form of TWIST also dose-dependently inhibited IGFBP-6 transcription indicating that TWIST was not acting by directly binding to the DNA but through a different mechanism. In conclusion, we found that TWIST dose-dependently inhibits IGFBP-6 transcription. The mechanism is not through direct binding of TWIST to the E-boxes in the IGFBP-6 promoter but more likely due to TWIST forming heterodimers with other bHLH transcription factors that positively regulate the IGFBP-6 promoter. Overall this data suggests that one of the mechanisms whereby TWIST exerts its antiapoptotic effects in prostate cancer is by transcriptionally repressing proapoptotic factors.

Chemistry Paper Abstracts

Improving the General Chemistry Experience for Non-Science Majors. Nichole L. Powell and Gregory Pritchett, Dept. of Chemistry, Tuskegee University, Tuskegee, AL 36088.

Introductory chemistry courses usually consist of a high enrollment of students with no prior chemistry background and an unfavorable perception of the subject. In addition, students are faced with a barrage of concepts, which seem to be boring and irrelevant. At Tuskegee, we looked at teaching strategies which could be quickly and easily implemented with the overall aim of helping students become active participants in the learning process, aid knowledge retention, foster a positive attitude, and promote a life-long interest in science. Our pilot study incorporates the General Chemistry portion of a General, Organic and Biochemistry course with its corresponding laboratory course. The course is comprised of the traditional three-hour lecture and two hour laboratory. Laboratory topics were chosen so they complemented the material being taught in the lecture. For select laboratory sessions, students were given only a brief introduction to the topic before conducting experiments. These laboratory sessions required students to work in groups to solve problems thereby incorporating cooperative learning with inquiry-based learning, and active learning. We present the preliminary results of this project.

Investigating Carbon Nanotube Cytotoxicity in African American Breast Cancer Cells. Tiffany N. Taylor, Brittani Batts, and Pamela M. Leggett-Robinson, Department of Chemistry, Tuskegee University, Tuskegee, AL 36088. Roberta Troy, Department of Biology, Tuskegee University, Tuskegee, AL, 36088. Derrick Dean, Material Science, University of Alabama-Birmingham, Birmingham, AL, 35294.

Understanding the cytotoxicity of carbon nanotubes is essential to exploring their potential use in biomedical applications. Pure carbon nanotubes are insoluble and can hazardously accumulate in cells. Previous studies have shown that functionalizing carbon nanotubes with hydrophilic groups increases solubility and decreases cytotoxicity, rendering them more biocompatible. In this research, multi-wall carbon nanotubes (MWCNTs) were modified with water soluble functional groups and toxicity was tested in vitro on African American breast cancer cells.

Investigation of Algorithms for Straight Line Least Squares Analysis with Errors in Both X and Y Values. E. B. Garner and M. B. Moeller, Dept. of Chemistry and Industrial Hygiene, University of North Alabama, Florence, AL 35632.

This study was undertaken to develop an Excel workbook that would perform a straight line least squares analysis on data containing errors in both the X and Y values. The equations for ordinary least squares analysis (OLS) and ordinary weighted least squares analysis (WLS) are derived with the assumption of insignificant uncertainty in X values. In circumstances where the ratio of the uncertainty in X values to the uncertainty in Y values is not constant, neither OLS nor WLS result in least squares estimators. Two iterative general least squares algorithms (GLS) found in the scientific literature were tested by Monte Carlo simulations, and both were found to produce erroneous values. An improved algorithm,

which numerically searches for the slope value that minimizes the sum of squares of the residuals was ultimately incorporated in a user-friendly Excel workbook, GLS-07v1. This workbook is available for download at the author's website, www2.una.edu/mmoeller.

Diamines Selectively Protected for Application in the Synthesis of Molecular Devices.
Jeanne L. Kuhler, Dept. of Physical Sciences, Auburn University, Montgomery, AL 36124. Michael V. Koduri, University of California, Los Angeles, CA 90095.

A series of ethylenediamines and substituted phenylenediamines have been efficiently transformed to their carbamate derivatives in high yields under mild conditions. These reaction conditions are sensitive to the electron-donating and electron-withdrawing properties of the attached substituents. Electron-donating properties are shown to facilitate carbamate production under neutral reaction conditions. These optimized reaction conditions should prove to be useful for a variety of applications including the synthesis of organic dyes, including the squaraine dyes useful for the production of donor-acceptor substituted conjugated polymers, as well as the tetraalkyl-p-phenylenediamines donor-acceptor systems, which are useful as molecular devices.

Value-Added Bagasse Using Compononets of the Pomegranate. Shirron N. LeShure and Adriane G. Ludwick, Dept. of Chemistry, Tuskegee University, Tuskegee, AL 36088.

Through a partnership between Assuit University in Egypt and Tuskegee University we have been developing value-added products from bagasse, a waste product from sugar cane. Our initial objective was to develop an economical way to deworm agricultural animals using environmentally friendly products. The pomegranate root bark, a natural anthelmintic, was studied. Our goal was to determine if the active compounds found in the root bark are also present in the pomegranate husk since the husk is more readily available. Preliminary animal testing from Egypt showed that the pomegranate husk had no effect on Coccidia infected animals but did boost the stamina and health of the animal. Hence our current objective and goals are to develop an understanding of the mechanism by which the pomegranate improves animal health. To achieve this goal, we are studying the compounds in the various parts of the pomegranate. ^1H and ^{13}C NMR, IR and UV are being used to characterize the husk and root bark extracts. Pelletierine, one of the nitrogen containing compounds in the pomegranate, has been synthesized for comparison. Elemental analyses have been done. Animal testing experiments have been designed. The results thus far from this effort will be discussed (Supported by NSF IGERT at Tuskegee University).

Chemistry Poster Abstracts

A Computational Study of Polynitrogen Compounds as an Alternative Source of Fuel. Quianna Johnson, Oluwaseyi Ogebule, Jong Hwa Kim, Jamiu A. Odutola, Department of Chemistry, Alabama A. & M. University, Normal, AL 35762.

For more than a decade there has been an upsurge of interest in developing high-energy and efficient materials. In this study we are investigating properties including energetics of poly-nitrogen clusters. We are using computer quantum mechanical method to understand the nitrogen cluster compounds for their potential use as high-energy material;

particularly by determining how much energy these compounds can store or release. This was determined in three phases. First, the proposed nitrogen clusters were analyzed for their stability by geometry optimization using Gaussian 98 and the ab-initio calculations B3LYP/6-31+G(d)//6-311+G(3df). It was found, somewhat surprisingly, that the nitrogen cluster compounds with the molecular formula N_{2n} were the most stable. Second, the nitrogen clusters whose geometry remained in tact after this optimization were used to perform frequency calculations. The nitrogen cluster molecules, whose geometry remained in tact and showed no imaginary frequencies underwent geometry optimization using the MP2(full)/6-31+G(d)//6-311+G(3df) basis sets. Third, the nitrogen clusters that had no imaginary frequencies were used to perform single point energy calculations using B3LYP/6-31+G(d)//6-311+G(3df) and MP2(full)/6-31+G(d)//6-311+G(3df) basis sets. We found that the constructed structures favor the formation of stable single-bonded nitrogen cluster compounds, and that the stable nitrogen cluster compounds would be a potentially good source of fuel.

Caprolactam Intermediate Application for the Enantioselective Synthesis of Lysine Derivatives. Jeanne L. Kuhler, Dept. of Physical Sciences, Auburn University, Montgomery, AL 36124. Michael V. Koduri, University of California, Los Angeles, CA 90095.

A new synthetic route to produce tri-protected lysine derivatives starting from either L-lysine or D-lysine is described. This route utilizes a caprolactam intermediate to produce differentiation between the two amino groups of lysine. This differentiation facilitates benzyloxycarbonyl protection of the primary amino and also subsequent tert-butyloxycarbonyl protection of the secondary amide group, with higher yields and less racemization.

Arsenic Contamination Levels in Soils in West Anniston Alabama. Bryan Delauney, Nixon Mwebi, Al Nichols & David Steffy, Dept. Of Physical & Earth Sciences, Jacksonville State University, Jacksonville, AL 36265.

Arsenic Contamination levels in soils in West Anniston Alabama Arsenic is ubiquitous mainly due to its past extensive use over 100 years as an essential ingredient in animal feeds, herbicides, pesticides, wood preservatives, semiconductors, alloys and even in smelting. Disposal of this arsenic in the past such as in land fills was in many instances not done with impermeable linings to contain leaches this poses potential exposure to the element through the air, food or water. Because of its known effects to human health, arsenic has been listed as the priority element by EPA in the top of the National Priority List and branded inorganic arsenic as a proven human carcinogen. It is therefore essential to monitor the arsenic disposal either from treated wood or other industrial uses. We have identified an abandoned manufacturing site in west Anniston Alabama, which has shown potential for high levels of arsenic. This study determines the levels of arsenic in the soil around the site and its potential leaching and movement downhill. This work was supported by a grant from Jacksonville State University Research Grant.

Determination of Crude Isothiocyanates in Cabbage: An Investigation of Food Preparation among Ethnic Groups. Khalifa Jordan, Charmaine Tutson, and Pamela M. Leggett-Robinson, Department of Chemistry, Tuskegee University, Tuskegee, AL 36088. Kim Davis Department of Biology, Tuskegee University, Tuskegee, AL 36088. N. Paul Nolen College of Veterinary Medicine, University of Tennessee, Knoxville, TN 37996.

It is well known and accepted that good nutrition is a key component in eliminating the risk of cancer. Therefore, the control of cancer through dietary compounds has gained acceptance. Diets rich in cruciferous vegetables such as broccoli, cabbage, brussel sprouts, bok choy, and cauliflower, have been shown to lower the risks of one developing several cancers such as lung, pancreatic, breast and prostate cancer. This decrease in cancer development has been attributed to a constituent of cruciferous vegetables, isothiocyanates (ITCs). ITCs are a derivative from the family of glucosinolates. The effectiveness of ITCs is dependent on the methods used to isolate the extracts, the specific carcinogen studied, and the target tissue involved. Prostate cancer is a disease that claims thousands of lives each year. African-American males in the “black-belt” region have a high incidence of prostate cancer. Studies suggest that the diets of African-American males versus the diets of other ethnic groups are a contributing factor to the increased incidence of prostate cancer. Data is presented from an investigation determining the % crude ITCs in various preparations of cabbage.

Carbamates Synthesized Efficiently Via the Curtius Rearrangement. Jeanne L. Kuhler, Dept. of Physical Sciences, Auburn University, Montgomery, AL 36124. Michael V. Koduri, University of California, Los Angeles, CA 90095.

The Curtius rearrangement has been used to attach the BOC protecting group to an electron-rich phenylenediamine via a mild and efficient one-pot method. This procedure has subsequently been extended to the reaction of several different carboxylic acids with di-tert-butyl dicarbonate and sodium azide to investigate the scope for this technique. Each reaction investigated allows the formation of an acyl azide intermediate, which undergoes the Curtius rearrangement to produce the desired tert-butyl carbamate in high yields. This one-pot method eliminates the need for time-consuming purification steps of intermediates.

Molecular Dynamics Investigation of Three-Helix Bundles of Mutated Gp41 Tm Domain From Hiv-1. Taryn Hartley and Jong Hwa Kim, Department of Chemistry, Alabama A & M University, Normal, AL 35762.

The transmembrane (TM) domain of gp41 is very likely to be involved in oligomerization of the protein, which is essential in HIV-1 virus-cell membrane fusion. In the current study, the three-helix bundles (right- and left-handed) of the TM domain are built with the central arginine residue in each of the three TM helices replaced with isoleucine. Molecular dynamics is used to investigate the conformations of these mutant helix bundles in a hydrated palmitoyl-oleoyl-phosphatidylethanolamine (POPE) lipid bilayer over the

course of 15-ns simulations. In contrast to our previous study with the right-handed helix bundle of the wild-type TM domain, where several stable inter-strand hydrogen bonds were observed, in these mutant helix bundles no stable inter-strand hydrogen bonds are found in the course of simulation. These findings imply that the central arginine residues play an essential role in maintaining the integrity of the three-helix bundle. Additional simulations examine the stability of the right- and the left-handed helix bundles, where the Gly-Gly-Leu-Val-Gly (GG4) motif in the TM domain is mutated to Ile-Gly-Leu-Val-Ile (II4). This work was supported by NIH Grant GM071350 (to J.H.K.) and by a grant of high performance computing resources and technical support from the Alabama Supercomputer Center.

Processing Effects on %Cis/Trans Lycopene Content in Tomato and Tomato Products.
Lonnie Craft, Tahirah Farrer-Bradley, and Pamela M. Leggett-Robinson, Department of Chemistry, Tuskegee University, Tuskegee, AL 36088.

Epidemiologic and laboratory investigations exploring the relationship between diet and disease suggest an correlation between consumption of fruits and vegetables rich in carotenoids and certain cancer incidence rate. The possible role of carotenoids in disease prevention is not fully understood, due to multiple factors (i.e., absorption, breakdown, transport, and storage) that affect their bioavailability. Lycopene, the pigment responsible for the red color in ripe tomatoes, is an acyclic C₄₀ nonpolar carotenoid and is an important nutrient of the tomato. Quantification of lycopene content is essential for determining and maximizing health benefits; however, there are limited quantification investigations. We report the results of quantification studies carried out on various tomato food products (processed and unprocessed).

Molecular Dynamics Investigation of Human Prion Protein. Angela Reedy and Jong Hwa Kim, Department of Chemistry, Alabama A & M University, Normal, AL 35762.

Transformation of cellular prion (PrPC) to an anomalous isoform (PrPSc) is believed to cause neurological diseases called transmissible spongiform encephalopathies. Since transition to the anomalous isoform of the prion protein involves loss of alpha-helices, it is of interest to understand the stability of the alpha-helices. In this study, molecular dynamics is employed to investigate how different solvent systems affect the stability of three alpha-helical regions in the globular unit of the human prion molecule. The effect of temperature change on the stability of alpha-helices is also examined. This work was made possible in part by a grant of high performance computing resources and technical support from the Alabama Supercomputer Center.

Substituted Indoles of Pharmaceutical Interest Synthesized Via a Palladium-Catalyzed Heteroannulation Route. Jeanne L. Kuhler, Dept. of Physical Sciences, Auburn University, Montgomery, AL 36124. James A. Zhang, Wyeth Pharmaceuticals, Collegeville, PA 19426 and Zheng T. Guo, Wyeth Research, Monmouth Junction, NJ 08852.

Palladium-catalyzed heteroannulation and the Japp-Klingemann routes have been investigated as successful alternative routes toward the synthesis of Sumatriptan. The proposed synthetic route via a palladium-catalyzed heteroannulation strategy was initially problematic with the silylated N,N-dimethylaminobutyne, but has subsequently proven to be successful when an alternative route using bis-silylated 3-butyn-1-ol under similar conditions is implemented.

Engineering and Computer Sciences Abstract Papers

A Comprehensive Survey on Software Security. Chung-Han Chen and Hira Narang, Department of Computer Science, Tuskegee University, AL 36088.

The Internet today is a widespread information infrastructure, and a medium for collaboration and interaction between individuals, organizations, and businesses, without concern for geographic locations. This global internetwork, however, is an open and insecure environment. With the increasing awareness and popularity of the Internet, security issues have been brought to the fore. Although information security is important in general, software security is often not much addressed. As more and more software applications are directly or indirectly accessible from the Internet, the importance of the security of software applications grows steadily. However, most programmers are not trained to develop secure software and it is not easy to change the habit of long-held coding practices. Without taking the security aspects into account at the design and development stage, security vulnerabilities may exist in most of the software applications. Realizing the importance of building secure software application, we recently conducted a survey on software security issues, in which we identified various program flaws and how to fix them. Different auditing tools that may be used to detect the program flaws are also discussed. Our aim in this paper is to emphasize the importance of building secure software applications. This aspect is important but often overlooked in current computer science curricula. At Tuskegee University, we are planning to establish an Information Assurance track under current undergraduate Computer Science program. The course Software Security will be one of the new courses in the curriculum.

Polymer Microfluidic Spotter. Naga S. Korivi, Department of Electrical and Computer Engineering, Louisiana State University, Baton Rouge, LA 70803. Li Jiang, Electrical Engineering Dept., Tuskegee University, Tuskegee, AL 36088.

The field of microfluidics involving the micro-scale flow of liquids and gases has grown immensely. This growth has been aided by the rapid development of lab-on-a-chip devices or micro-analytical systems that are finding increasing number of applications in biomedical and chemical sensing. These devices employ microfluidic structures that can transport, manipulate low volumes of fluid precisely and enable rapid chemical analysis. The recent years have seen the development of miniaturized systems containing microfluidic and electronic components integrated with biological systems for diverse applications like biochemical agent detection, metabolic monitoring and DNA array analysis. For array-based devices, it is necessary to pattern proteins, DNA or other biomolecules on specific locations on the device. We report the development of a microfluidic spotter device that dispenses liquid through multiple outlets. The developed device enables biochemical array or spot formation at pre-determined locations on a substrate. The spotter is made of polydimethylsiloxane which is an optically transparent, moldable and inexpensive polymer. The use of this polymer for fabrication allows for rapid prototyping, making it easy for the device design to be changed to incorporate the outlets in any specific geometry. The

device design enables visual observation of real-time device operation, thereby facilitating enhanced accuracy in liquid spot dispensing.

Nonblocking Algorithms in Java: Design and Performance Issues. Srinivasarao Krishnaprasad, Dept. of MCIS, Jacksonville St. University, Jacksonville, AL 36265.

Multithreaded programming is a popular technique for expressing concurrency in modern software applications. This trend will only increase with the advent of multicore processors. Typically, cooperating threads access and modify shared object using synchronization tools such as semaphores and monitors. Although these tools simplify coding of synchronization logic, they result in blocking algorithms in which threads failing to acquire a lock are blocked and need to be rescheduled later when the lock is free. When several threads contend for the same lock, the run-time system will incur significant overhead of context switching these contending threads and hence will deteriorate the performance. An alternative is to use nonblocking algorithms that use low-level atomic instructions to implement synchronization requirements. This eliminates the cost of blocking which involves suspending a thread, manipulating ready queue, context switching, and eventual rescheduling of blocked threads. Thus, nonblocking algorithms will in general outperform blocking algorithms. But, nonblocking algorithms are difficult to design, code, understand, and debug. The package `java.util.concurrent` of Java 5.0 provides a rich set of classes to develop both blocking and nonblocking algorithms. Atomic variables and the primitive method `compareAndSet()` can be used to develop nonblocking algorithms that express the various synchronization situations using try-and-retry or spin-loop kind of logic. This will result in better performance especially on shared memory multiprocessors where contending threads execute on separate processors.

Barrier Synchronization in Parallel Computations: Some Implementation Issues. Srinivasarao Krishnaprasad, Dept. of MCIS, Jacksonville State University, Jacksonville, AL 36265.

Many scientific and engineering computations have structures suitable for a solution based on parallel algorithms. Typically, during each major iteration or phase of such an algorithm, multiple processes handle independent subtasks concurrently. Because of the data dependencies, all processes must finish their current phase before the next phase can begin. This synchronization requirement is known as barrier synchronization. The issues of how processes wait at the barrier, how they communicate their arrival at the barrier, and how they leave the barrier affect the performance. Parallel computing literature presents several implementations of barrier synchronization proposed by many researchers. Some of these include centralized barrier using a shared counter, distributed counter using a coordinator, tree-structured barrier and symmetric barriers. These are suitable for coarse-grained concurrent subtasks. Depending upon the underlying architectural capabilities one may use busy-waiting via spin loops or explicitly wait to be later awakened. Java is one of the languages that has a built-in support for concurrent programming via multithreading. It is fairly easy to implement barrier synchronization using Java's low-level synchronization

tools: synchronized methods, wait(), and notify(). As an alternative, one may use the CyclicBarrier class which is a predefined class in the J2SE 5.0 version of Java. One may also use the join() method of the Thread class to realize the synchronization although this may result in performance degradation due to repeated thread creations and thread destructions

Camera Parameters from Images. Lin Yang, Dept. of Computer & Information Sciences, University of Alabama, Birmingham, AL 35294-1170. John K. Johnstone, Dept. of Computer & Information Sciences, University of Alabama, Birmingham, AL 35294-1170.

This work is part of a project to extract camera motions from video streams. Here we describe how to compute camera information from a pair of images. A camera maps the objects in our 3D world onto a 2D image. In projective geometry, this mapping can be well represented by a 3x4 camera matrix. Once the camera matrix is known, the intrinsic parameters (e.g., focal length) and extrinsic parameters (e.g., position and orientation in world space) of the camera can be computed. We examine how to extract this camera information automatically from two images of the same object taken from different points of view. First, point correspondences are extracted using feature detection techniques. Then, the fundamental matrix, which encodes the epipolar geometry between these two views, is calculated based on these point correspondences. Finally, two camera matrices can be computed from the fundamental matrix. In other words, we can determine the intrinsic and extrinsic parameters of the cameras that captured the two images. In computing the fundamental matrix, we adopt robust estimation to remove the effect of outliers in the point correspondences.

Inductively Coupled Plasma (Icp) Process Development for Dry Etching of Silicon. Li Jiang, Electrical Engineering Dept., Tuskegee University, Tuskegee, AL 36088. Weisong Wang, Jackie Chen and Ji Fang, Inst. for Micromanufacturing, Louisiana Tech University, Ruston, LA 71272.

Silicon dry etching technology has been used as a standard method for the fabrication of large-scale integrated circuits and micro-electro-mechanical-systems (MEMS) over the last 20 years. Inductively coupled plasma (ICP) etching method is one of the widely accepted techniques for anisotropic etching of silicon. The Bosch process is one of the ICP techniques that can achieve high aspect ratio single crystal silicon structures with vertical sidewalls through alternate etching and passivation steps. Till now, the Bosch process has been mostly developed for application specific processing. None or little effort has been made on the generic study of relationship between design parameters and process performance. In this work, the effects of ICP plasma source power, chamber pressure and temperature, substrate power, reactive and passivation gas flow rate on the etch rate, sidewall profile, material selectivity, surface roughness and other resulting factors have been investigated comprehensively. A high-density ICP system (Alcatel 601E) was used in these experiments. The plasma was generated by a 13.56 MHz radio frequency power supply

and diffused down to a low pressure chamber where a silicon wafer with <100> orientation was processed. The etching steps were analyzed by surface profiler and scanning electron microscope (SEM). Standard Bosch processes for large and small pattern features have been developed. Microfluidic channels with difference aspect ratios have been fabricated with the developed process.

Modeling Nonlinear Friction in a Mass-Spring-Damper System. Mohammad Saiful Islam, Randy Johnson, and Marc Karam, Electrical Engineering Department, Tuskegee University, AL 36088.

The objective of this research is to model nonlinear friction in a Mass-Spring-Damper (MSD) system. The MSD system, Model 210 from Educational Control Products (ECP) Inc., consists of three interchangeable springs with three different levels of stiffness, three adjustable masses placed on carriages with extremely low friction ball bearings, and an adjustable and movable air type damper. The system parameters such as spring constant, damping constant and friction co-efficient were measured by analyzing the real-time step-responses of the MSD-ECP system. Then the system was simulated using MATLAB/Simulink and the step-responses of the real-time and simulated system were compared to verify the system identification. We observed discrepancies between the two responses. This was due to the nonlinearity in the friction coefficient, which we had to model accurately in order for the responses to be similar. This was accomplished using the technique of coefficient scheduling. The discrepancies between step responses were reduced but not completely eliminated. Further research need to be accomplished to obtain more accurate modeling of the nonlinear friction in the MSD system.

Control of a Mass Spring Damper System in Real-Time. Ryan Robinson, Robert Fleming, and Marc Karam, Dept. of Electrical Engineering, Tuskegee University, Tuskegee, AL 36088.

The objective of this research is to compare simulation and real-time control performances of an electromechanical Mass-Spring-Damper (MSD) system. The MSD system is Model 210 from Educational Control Products (ECP) Inc. There are three masses on the system, which can be attached to three different springs, and an air-type damper. Real-time control of the system is made possible by a servo actuator and feedback sensors comprised of high resolution optical encoders. Matlab/Simulink software was used to simulate the control of the MSD system using Proportional (P), Proportional Integral (PI), and Proportional Integral Derivative (PID) controllers. The simulated responses were compared to those obtained by real-time control using ECP's software and hardware. The similarities between the two responses showed that the mathematical MSD model accurately represented the ECP real-time system. We concluded this research by studying the effect on the system responses of varying the controller gains.

Sidestepping the Chinese Room: Aspects of Self-Awareness in a Humanoid Robot.
**Jason M. Gruber, Department of Computer Science, Birmingham-Southern College,
Birmingham, AL. Steven F. Donaldson, Department of Computer Science, Samford
University, Birmingham, AL 35229.**

Self-awareness is a subdiscipline of artificial intelligence that has received some theoretical attention, but few attempts at practical implementation. We present two features implemented in a humanoid robot that are intended as preliminary steps towards self-awareness. The primary feature is a self-awareness oriented exploration of self-recognition. Self-recognition is integral to self-awareness because it allows determination of that which is self and that which is not self. Our approach uses motion in the field of vision as a trigger to save a self image, which can later be compared to other images using a color histogram, pixel counts, and shape context descriptors. In addition, the robot is able to estimate the size of objects based on a previously implemented distance estimation algorithm. After explanations and preliminary results of these features, we close by discussing future extensions of the robot's functionality and the impact of existing features on the study of self-awareness in general.

Substrate Bonding for Micro-Electromechanical Systems and Microfluidic Devices.
Naga S. Korivi, Department of Electrical & Computer Engineering, Louisiana State University, Baton Rouge, LA 70803. Li Jiang, Electrical Engineering Dept., Tuskegee University, Tuskegee, AL 36088.

The recent years have seen significant research in micro-electromechanical systems (MEMS) for various applications. More recently, the integration of flowing fluids with MEMS devices has given rise to the field of microfluidics. Several MEMS and microfluidic devices are based on designs requiring two or more substrates made of silicon, glass or plastic to be bonded together. For MEMS devices, bonding of substrates can be used to realize embedded microstructures, and also be a method of packaging the main device components. For microfluidic devices, the sealing of open fluidic flow channels can be achieved by bonding a substrate over the channels. Due to the use of different substrates and diverse process requirements for microsystems, existing bonding techniques like anodic and surface bonding have not been fully optimized for different applications. Further, it is difficult to use any single bonding methodology universally for microsystems. For example, high temperature bonding is not applicable for micro-devices where biological systems are integrated with microelectronics because biological materials are typically intolerant to such temperatures. This work investigates methods for bonding different substrates. Processes like anodic, surface bonding are optimized for MEMS and microfluidic devices, while relatively new methods like polymer bonding are examined in further detail.

Three-Dimensional Passive Microfluidic Mixer. **Li Jiang, Electrical Engineering Dept., Tuskegee Univ., Tuskegee, AL 36088. Naga S. Korivi, Department of Electrical and Computer Engineering, Louisiana State University, Baton Rouge, LA 70803.**
Microfluidics involves the single or multiphase flow of fluids in micro-scale dimensions.

The ability to handle precise and small quantities of liquids makes microfluidic structures and devices very important in the development of miniaturized biochemical sensors and systems. Fluids flowing in structures with micro-scale dimensions behave differently compared to fluids flowing in macro-scale dimensional structures. Depending on the flow channel dimensions, microfluidic flow can be laminar. In general, turbulence is suppressed due to size reduction, thereby greatly reducing the mixing of fluids. This poses a problem in situations where two or more liquids are required to interact with each other. Further, reduced turbulence in liquids causes increased diffusion times, which can be a problem in miniaturized, portable biochemical sensors where fast analysis times are paramount. This paper reports on the development of a three-dimensional (3D) passive microfluidic mixer structure realized by the bonding of multiple layers of patterned polymer. The developed device consists of a rectangular spiral fluidic channel with ridged sidewalls. The channel was incorporated with solid 3D columns which combined with the 3D spiral structure and sidewall ridges enhance turbulence inside the channel. The developed device can be prototyped in a short time with simple fabrication processes as compared to other reported 3D mixers which require complicated and expensive fabrication techniques.

Engineering and Computer Sciences Poster Abstracts

Language for Describing Application Software in Grid Computing. Enis Afgan, Purushotham Bangalore, Dept. of Computer Science, Birmingham, AL 35294.

A goal of an application developer is to see their solution adopted quickly by a large group of end-users. However, the typical path to adoption requires frequent interaction with end-users to address numerous questions, such as: how to install the application, how to invoke it, the purpose and function of the available options and arguments, as well as how to improve performance for a specific platform configuration. Through the lifetime of the application, additional documentation is created to address such common questions. However, with a new version of the software, much of this work needs to be discarded and redone. Avoiding this pipeline of events is challenging, but through gradual and systematic adoption of the technique proposed in this presentation, it is possible to provide more automated support for the end-user. To address these challenges, we present a new language called the Application Specification Language (ASL). As a new approach toward application specification that focuses on the needs of grid users and grid applications, the ASL is able to capture essential application information such as: general application information, instructions on requirements and installation procedure, invocation information, and application specific hints. Through standardized protocols, tools can be passed the information about an application that is specified in an ASL description thus enabling automated communication and further advances between all representative grid entities: grid users, grid application developers and grid resource owners.

**Mining Intravital Video with One-class Support Vector Machines. Sherita Andrews,
Department of Computer and Information Sciences, University of Alabama –
Birmingham, Birmingham, AL 35294.**

The task of automatically mining intravital video is proven to be more difficult than traditional video mining, especially when dealing with moving cells. This is due to the nature of cells and its environment: inconsistency of cell structure, occlusion by other structures, drastic camera movement, and surrounding noise. One solution is probabilistic learning of pixel intensity values to determine if a cell's position has changed over a sequence of frames. A probabilistic learning approach requires computing a probability value for the intensity at a particular pixel location against a predetermined threshold, which is usually determined experimentally. In an attempt to make the mining process more automatic, the threshold should also be determined automatically instead of by trial and error. This project eliminates the need for a threshold value by using a one-class support vector machine (SVM) to classify an object as moving or stationary. This project applies one-class SVM to tracking moving leukocytes, which are a main predictor of inflammation response. Results show that the one-class SVM approach performed as well as the traditional threshold method.

Geography, Forestry, Conservation, and Planning Paper Abstracts

Disparities in Homeownership in Alabama: A Case Study of Huntsville and Decatur Metropolitan Statistical Areas. Angeleta M. Toney and Dr. Chukudi Izeogu, Dept. of Community Planning and Urban Studies, Alabama A&M University, Normal AL 35762.

Homeownership is a major wealth-creating vehicle in the United States and is considered to be part of the "American Dream." It opens the door to success for many people, because it boosts economic status. Since homeownership creates wealth, it enables families to live in good neighborhoods with good schools. It also helps families finance college, which leads to better paying jobs; these things perpetuate a wealth cycle. Yet some minority groups lag behind in homeownership. This Research Project is a comparative analysis of disparities in homeownership in Huntsville and Decatur, AL Metropolitan Statistical Areas (MSAs). The objective of the project is to examine and compare the average income for Whites, Blacks, Asians, and Hispanics in the Huntsville and Decatur, AL Metropolitan Statistical Areas (MSA), with the averages for the United States and Alabama; focusing on the rate of homeownership among the different racial/ethnic groups. The goal of the project is to describe how homeownership rates in the Huntsville and Decatur MSAs compare with the national and state averages. The project attempts to offer an explanation for the perceived differences. The comparisons utilized in this project are formulated from information obtained from the 2000 United States Census and 2005 American Community Survey as a method of analyzing household incomes, home values, and ownership rates.

Multi-Temporal Pattern Analysis of Land Cover Change in Madison County Alabama. Berneece S. Herbert, Dept of Community Planning & Urban Studies, Alabama A&M University, Normal AL 35762.

Human activities have significantly altered the structure and functioning of the Earth's environment culminating in outcomes of magnitudes that can be observed by changes in global land use and land cover. New approaches to the planning and management of urban and sub-urban regions will depend upon improvements in our knowledge of the causes, chronology, and impacts of the process of urbanization and its driving forces. The purpose of this research was to document the types, geographic distributions, and rates of urbanization over a 10-year period in Madison County Alabama, and to determine key drivers and consequences of urban growth. The overarching goal of this project was improved knowledge of the patterns and drivers of urban land cover change using the key human-induced drivers of the Millennium Assessment and determining the types and extents of urban sprawl in Madison County.

Sustainable Transport Problems in the Urban Third World: A Study Abroad Experience in Ghana, West Africa. Kenneth R. Gilbert, Department of Geography, University of Alabama, Tuscaloosa, AL 35487-0322.

This paper deals with the barriers which urban areas in the “third world” face to the development of a sustainable transportation network. A sustainable transportation network is that sufficiently provides for the needs of the society it serves, that does so in a safe manner, and that presents as little harm to the physical environment as possible. The paper aims to present a few suggestions from the perspective of an American transportation planner about such development. This is a utopian goal, but since the transportation networks in the third world tend to rely heavily on a monomodal network, it is crucial for their development that this mode—typically road networks—are as close to this goal as possible. This paper focuses mainly on Ghana’s two largest cities—Accra and Kumasi—but many of the observations were present in all urban areas visited. Observations were made from a tour bus as it traversed the country in a three week period in late May to early June of 2006. Recognition by the world’s wealthiest nations of Ghana’s stability since 1992 and commitment to economic and political reforms has made it possible for Ghana to begin development of a sustainable transport network. Even while they are still far behind the developed world in this regard, the past few years has provided ripe opportunity to begin such development; and Ghana seems to be jumping at this opportunity.

Trend Analysis of Alabama Black Belt Economic Base. Adande Pigott, LaToya Feagin and Chukudi V. Izeogu, Dept. of Community Planning and Urban Studies, Alabama A&M University, P. O. Box 938 Normal AL 35762.

Alabama’s Black Belt region is a part of the larger Black Belt Region of the Southern United States, which stretches from Texas to Virginia. This region includes some of the poorest counties in the United States. The Black Belt counties of Alabama are located in the central and western part of the State. These counties have downward growth in their population and economy over a thirty-year period. This study is an assessment of the economic base of the Black Belt counties of Alabama. The purpose is to provide an analysis of its resource base as primary determinants of the region’s economy including business activities and the standard of living of the communities. The study is based on secondary data in: economic infrastructure, capital and business investment, forest and farmland acreages and revenues. The data are derived from Alabama County Data Books, Alabama Agricultural Statistics and U.S. Census Reports. The study finds that the Black Belt region is endowed with a diversity of natural resources, which play a key role in the social and economic life of the communities. However, in recent years, modest investments and development have occurred in the region. From 2001 to 2004, new capital investments increased by 26%. New jobs fluctuated from a low of 2.5% in 2001 to a high of 22% in 2002, and fell back to below 10% by 2004. But, from 1997-2002, farmland decreased by 3.9% when compared to the entire state that suffered a 6% loss during the same period. An in-depth analysis of how the region’s economy has changed where it stands to day and how its current socio-political and economic structure influences its future development is important for its desired sustainable development.

Health Sciences Paper Abstracts

Determination of a Factor for the White Blood Cell Estimate. Lucinda A. Utz and Virginia C. Hughes, Division of Clinical Laboratory Sciences, Auburn University at Montgomery, Montgomery, AL 36124.

A white blood cell (WBC) estimate is a rapid method to approximate the total WBC count. In this study, a factor was derived by analyzing 20 whole blood samples. Briefly, blood was drawn from healthy volunteers into a 7mL EDTA collection tube. A numerical number was placed on the tube and the total WBC count was determined using a Cell-DYN 1700. The average WBC count was calculated by preparing a blood smear, staining with Wright stain using the Hematek 100, and counting WBCs in 10 microscopic fields using 400x magnification. The factor was derived by dividing the total WBC count by the average WBC count from the blood smear. The WBC factor was 3.2.

Methamphetamine-Endangered Children in Foster Care. Teena M. McGuinness, USA College of Nursing, Mobile, AL 36688. Sara Majors, MSN, CRNP, USA College of Nursing, Mobile, AL 36688, Sarah Haigler, USA College of Nursing student, Whiddon Scholars Honors Program, Mobile, AL 36688.

Parental substance abuse is a risk to child development. In more than one half of Alabama counties, methamphetamine use is implicated in the majority of child welfare cases. Prenatal substance exposure is a form of child endangerment. Further, children whose parents use methamphetamine may neglect them or expose them to toxic substances if methamphetamine is manufactured in the home. We assessed the developmental status of children known to child welfare who had been endangered by methamphetamine. DHR provided contact information to make home visits to interview the child's primary caregiver. Investigators used the Vineland Adaptive Behavior Scales (VABS) to measure the development of children (communication, motor skills, social skills, and self-care). Results: 28 children have been assessed (average age of children of 4.8). Mean birthweight was 2631 grams (about 5.8 pounds). Prenatal substance exposure occurred in 21 of the children. Significant relationships were found between age of the child and the VABS (older children scored lower) and number of months in care and the VABS (the longer the child was in relative or foster placement, the higher the score). Conclusions: Children endangered by methamphetamine may be challenged from birth with low birthweights and prenatal exposure to methamphetamine, alcohol, and cocaine. These factors represent significant risks to development; these children should be screened for early intervention services. This study was supported by the University Committee for Undergraduate Research at the USA.

Impact on the Family of a Child Experiencing the Process of Epilepsy Diagnosis: The Theory Practice Gap. Kristen M. Chappell, University of Alabama School of Nursing, University of Alabama at Birmingham, Birmingham, AL 35294.

Family-centered care puts the family, rather than health care providers, at the center of the health care delivery system. This approach is commonly disregarded by nurses caring for families of a child who is experiencing the process of epilepsy diagnosis. The purpose of this study was to identify common feelings and themes that occur within the family unit throughout the epilepsy diagnostic process. The family was interviewed at two intervals, using an investigator-designed survey that had been reviewed by a nurse educator, nurse clinician, and nurse practitioner for content validity. The interviews were audiotaped and notes were transcribed. IRB approval was obtained for the study. The data collected during the interviews was evaluated for completeness and reviewed for common trends in relation to the research questions. These themes and trends were adapted to fit the "family research" approach identified by Whall and Loveland-Cherry (1993). Three common trends were revealed throughout the process by the family, including uncertainty, anxiety, and denial. Nurses must be prepared to play a crucial role in assisting with family coping during this time. Nurses must be available for counseling, assistance with resource needs, defining medical terms, and follow-up care. This study reinforced how family centered-care by the health care team is essential during the entire process. Focus should be placed on the family as a whole, not just on the child.

Isoagglutinin Titers in Group O Apheresis Platelets. Virginia C. Hughes, Division of Clinical Laboratory Science, Auburn University at Montgomery, Montgomery, AL 36124. Jeremy Westry, Clinical Laboratory Science, Montgomery, AL 36124.

According to AABB Standards, patients transfused with platelets, either random donor or single donor, are done so without restrictions on the ABO group unless the patient has undergone a transplant. In this study, 5 group O platelets were tested for Anti-A and Anti-B titers. Platelets were collected from normal volunteer donors using apheresis instrumentation and ACD (acid citrate dextrose) as an anticoagulant. The instrument used name was Amicus. An aliquot of plasma was used to perform serial dilutions of 1:2 to 1:512. A1 red cells and B cells were added to respective dilutions and incubated at room temperature for 30 minutes. tubes were centrifuged for 15 seconds at 3000 rpm and read for agglutination on a scale of 0 to 4+. The Anti-A titer ranged from 4 to 32 and the Anti-B titer ranged from 2 to 32. Further studies to focus on correlating antibody titers with ABO transfusion reactions with platelets should be revisited.

Adolescents Adopted from the Former Soviet Union: A Study of Problem Behaviors. Kristina M. Schneider, Whiddon Scholars Honors Program, University of South Alabama College of Nursing, Mobile, AL 36688-0002. Teena M. McGuinness, PhD, APRN, BC, Department of Community Mental Health Nursing, University of South Alabama College of Nursing, Mobile, AL 36688-0002.

International adoption is a means for thousands of children around the world to come to

the United States, and the former Soviet Union continues to be a primary source country for international adoption. However, concerns have surfaced regarding the harmful effects of institutionalization and its effects on problem behavior. The objective of this study is to evaluate those concerns and the effect of the family environment in mediating the problem behaviors of adolescents adopted from the former Soviet Union. A cohort of 105 children adopted by U.S. families has been followed since 1998. Mailings were sent to adoptive families recruited from five adoption agencies in 1997-98 inviting them to participate in an initial study (time I) and follow-up studies (times II and III). Data were collected via telephone and mail survey. These children have experienced multiple early adversities such as prenatal alcohol exposure and institutionalization. Now at time III (n=30, mean age 15.1), the participants are entering the difficult time of adolescence. At mid-adolescence, nine participants had problem behaviors severe enough to be referred for psychiatric care. Male adolescents had significantly more total, internalizing, and externalizing problem behaviors when compared to female participants. Significant predictors of problem behavior were low birth weight and lower levels of cohesion as measured by the family environment scale. However, the adoptive family environment, including an increase in family cohesion, and a decrease in family conflict, help to mediate the problem behaviors of the adolescents adopted from the former Soviet Union. The authors would like to thank UCUR for the funding of this research.

Physical Fitness Testing Trends Compared to National Norms from a Five Year Project (2002-2006) at a Pike County School. Gayle L. Bush, Candice Howard-Shaughnessy, Department of Kinesiology and Health Promotion, Troy University, Troy, AL 36082.

The Presidential Physical Fitness Award that began in 1966 is now The President's Challenge. The fitness testing program includes five events: curl-ups, shuttle run, endurance run/walk, pull-ups or right angle push-ups, and sit-and-reach. Children are compared with the 1985 School Population Fitness Survey national norms, set at the 85th percentile and the 50th percentile. Since fall of 2002, the Kinesiology Department at Troy University has facilitated an IRB approved statistics class project that conducts the program for a local elementary school. Before the fitness testing begins each semester, the college students are taught proper testing methods. Data collection forms include fitness tests and demographic data of height, weight, age and gender. There are also three questions regarding athletic background. From 2002 through 2006, weight was the only consistent demographic predictor ($p<.05$) for a child placing in the 85% for shuttle run, the test of agility and speed. During the first three years, none of the children made the 85% of the run/walk. But in 2005 and 2006, 30% and 45% respectively, made the 85%. The increase is attributed to the employment of a part-time physical educator, and training for the tests. The data collected is analyzed by the class each semester, and then given to the school. This provides students the opportunity to practice fitness testing procedures and statistics in a service learning capacity.

Stakeholder Perceptions of Community Based Support for Diabetics in a Rural Alabama Community Leana D. Mitchell and Ellen Buckner, University of Alabama School of Nursing, University of Alabama at Birmingham, Birmingham, AL, 35294-1210.

The purpose of this study is to use Bandura's social cognitive theory, and stakeholder perceptions to determine the need for a community-based support group for diabetics in rural Alabama. Areas isolated physically have numerous barriers to adequate care for which innovative strategies are needed. Community involvement and collaboration are crucial in developing culturally sensitive and relevant intervention strategies. This project obtained community stakeholder perceptions about needs of residents with diabetes, use of support groups to improve outcomes, community efforts, potential for partnerships, and resources to sustain a nurse-led support group. A student mentorship was initiated with the Black Belt Action Commission (BBAC), a state-wide commission to address needs in southern Alabama rural areas. An interview guide was developed and reviewed for content validity by community nurse educators and clinicians. The research proposal was approved by the IRB, and amended to include focus groups. A qualitative, descriptive design study uses key community stakeholder interviews and an in-person focus group to assess community perceptions and involvement. Interviews were transcribed and analyzed for content on community based approaches to healthcare. Preliminary findings from monthly BBAC meetings and two initial stakeholders interviews from Macon County, AL, reveal a strong community identity based on its history. The community organized for growth in the previous decade creating a Community Health Center but which is underutilized today. One leader in that development described the influence of community leaders on its establishment. A community health nurse analyzed the gap between potential and actual benefits from the Center, concluding that opportunity exists to increase effective utilization. The BBAC has conducted local town hall meetings in Perry County, which resulted in a grant proposal to provide community education and awareness of diabetes, development and funding of programs to provide one on one education, diabetic support groups and diet education for diabetics within the community. Data collection is in progress with additional stakeholder interviews and a focus group planned.

The Antioxidant Potential of Sweet Potato Greens in Reducing Cardiovascular Disease Risk in Hamsters. Seokjoo Yoon, Norma L. Dawkins, Baowu Wang, Zhiliang Huang and Ralphenia D. Pace Department of Food and Nutritional Sciences, Tuskegee University, Tuskegee, AL 36088.

Sweet potato greens (SPGs) contain antioxidants such as vitamin C (1.29 mg/g) and total phenols (41.80 mg/g gallic acid equivalent), which may enhance biomarkers for reduced cardiovascular disease risks. Therefore, this research evaluated the role of SPGs in preventing CVD risk. Sixty male Golden Syrian (4-wks old) hamsters, divided into six groups, were fed for 4 weeks a normal fat (NF-12% of calories) or high fat (HF-45% of calories) diet each with three levels of SPGs: no SPGs (NSG), low SPGs (LSG) and high SPGs (HSG). After 4-weeks of feeding, hamsters consuming HSG diet on both fat

levels showed a significantly lower weight gain compared to the NSG and LSG groups. The LSG and HSG groups on the NF diet showed significantly higher plasma antioxidant capacity compared to the NSG group. Plasma concentrations of total cholesterol (NF diet only), LDL-C + VLDL-C (NF diet only) and TAG were significantly lower in the HSG group, and that of HDL-C was significantly higher in the LSG and HSG groups for both fat diets. In conclusion, SPGs showed potentiality for preventing risk factors for CVD through significantly altering plasma lipids and reducing weight gain in hamsters fed the HSG diets for both fat levels. Supported from the NIH Grant (#1P20MD001195-03)

Technology Communication Needs as Perceived by Adolescent and Young Adult Cancer Survivors. Chrystal L. Sullivan, Richard Brown, Ellen Buckner, Univ. of Ala. School of Nursing, Univ. of Ala. at Birmingham, Birmingham, AL, 35294-1210

Adolescents and young adults find the diagnosis of cancer difficult when they are already struggling to accomplish developmental tasks. For adolescents with cancer the ensuing treatment courses and illness tend to isolate them from friends. A technology revolution over the past decade has dramatically increased the ease of communication with friends despite patients being confined by treatment or illness. The purpose of this study was to explore the needs expressed by adolescent and young adult cancer survivors concerning use of technology to stay in touch with friends and their opinions of benefits to others currently undergoing treatment. This IRB approved study used an investigator-designed mixed method questionnaire, reviewed for content validity by a panel of nurse educators and clinicians. Privacy and safety issues were addressed through questions about screen names and disclosure issues. Participants ($n = 8$) were recruited from a survivor's clinic and retreat. Results indicate that preferred methods of technology use were internet, e-mail, cell phones and instant messaging. More participants recommended personal websites than had an existing website. Blogs, patient support sites, camera phones, facebook and listservs were infrequently used. Respondents said the most needed equipment were cell phones and laptops, especially during hospitalizations. All participants believed that using technology is beneficial to those undergoing treatment. Participants noted that social support dwindled over time and technology could also be beneficial after therapy was completed.

Psychometric Evaluation of an Intuition Instrument. Anita J Smith, College of Nursing, Univ. of South Ala., Mobile, AL 36688.

The purpose of this study was to evaluate the psychometric properties of the Smith Intuition Instrument in a sample of experienced nurses. The instrument was developed initially to measure intuition use by nursing students. A cross sectional design was used. The Smith Intuition Instrument (27-items), the Subscale of the Miller Intuitiveness Instrument (18-items), and demographic questions were mailed through the U.S. postal system to 1,000 registered nurses in Southern California (January 2006). Construct validity, convergent validity, and reliability were examined using SPSS. With a response rate of 7.9% ($n=79$), findings are exploratory. Principal component analysis with orthogonal varimax rotation resulted in four factors accounting for 70.8% of variance: Spiritual Connections (37.3%),

Reassuring Feelings (14.6%), Physical Sensations (12.5%), and Bad Feelings (6.2%). Eigenvalues ranged from 1.1 to 6.7 and factor loadings ranged from .705 to .887. An 18-item instrument emerged and demonstrated an overall Crombach's alpha of .896 and a range of .806 to .892 for each factor. Pearson's correlation between the two intuition measures was .520. Construct validity, convergent validity, and reliability were demonstrated. Resulting factors validate the original conceptualization of intuition. The measure offers an objective method of comparing intuition use of novices and experts and determining the factors favored by each group. Continued psychometric testing is necessary in large, diverse samples of experienced nurses from different specialties and regions.

The Relation Between High Blood Pressure, Diabetes and Ocular Impairment. Kelli Hudson, Wendy Gregory, and Dr. Safaa Al-Hamdani, Dept. of Biology, Jacksonville State University, Jacksonville, AL 36265.

This survey was carried out to examine possible relation between high blood pressure, diabetes, and ocular impairments, education status of the student in optical related issues, and the correlation between ethnic group, gender, age, and optical diseases and education. A total of 360 randomly selected samples were included in this study. The selected samples were included approximately equal representation of male and female. In addition selected ethnic groups were also represented in this study. Among the findings in this study there was a strong correlation between High Blood pressure, diabetes, and glaucoma in family history of the survey individual. In addition 85 % of those who had high blood pressure were also nearsighted. This survey showed that, diabetes was significantly higher in those individuals who were of African American descent in comparison to Caucasian and Hispanic. Among all the ethnic groups, 86.9% of those who had a family history of both High Blood Pressure and Diabetes also had a family history of Glaucoma.

Writing as Therapy: Feasibility and Expressivity in Teens with Cystic Fibrosis. Christine Feeley, Ellen Buckner, Univ. of Ala. School of Nursing, Univ. of Ala. at Birmingham, Birmingham, AL 35294-1210.

The purpose of this study was to explore the feasibility of writing in adolescents with cystic fibrosis, whether or not teens enjoy writing, recurring themes in the writing samples, and whether or not age affects expression of thoughts on mortality and hopelessness. For safety, provision was made to report information that could imply risk or significant negative feelings and to protect participants from unintentional disclosure. IRB approval was obtained. Participants were fourteen adolescents diagnosed with CF, ages 12-19, stable, and hospitalized in a southeastern pediatric hospital. The teens were given investigator-designed prompts and asked to write about one topic of their choice, once a day, for three days, with no specified length. Teens also completed a short pre and post questionnaire gauging any coping techniques and their thoughts and attitudes about writing. Writing samples were reviewed by the primary investigator and a second reader. The major theme expressed was one of perseverance in face of illness, with a very positive outlook for

the future. Two sub-themes that emerged dealt with the frustration of missing home, friends, and events while frequently undergoing long hospital stays, and also, the desire and appreciation of doctors and nurses who included them in their care, and listened. The adolescents responded favorably to writing, and feasibility was established, as many participants expressed appreciation for something that broke the boredom.

Health Sciences Poster Abstracts

Selected Case Reviews for Determination of Novel Biomarkers of Functional Gastrointestinal Disorders. Bryce L. Roberts, Carol A. Leitner, Keith Roberts, School of Public Health, University of Alabama at Birmingham, Birmingham, AL 35233.

Functional gastrointestinal disorders (FGID's), such as irritable bowel syndrome, functional dyspepsia, and non-cardiac chest pain, are the most commonly diagnosed gastrointestinal illnesses in the United States. These illnesses are not simple motility disorders of the gut, but rather they represent an aberration in the mind-gut interaction that cannot be measured with any laboratory test, X-ray, or endoscopy. As with many diseases, FGID's may be part of a patient global disorder with expression and biological markers outside the organ system primarily affected. The high co-morbidity of irritable bowel syndrome (a form of FGID) with major psychiatric disorders (94%) suggest that such dispositions, which can be assessed with the SCL-90-R, may prove useful as a biomarker for FGID when correlated with symptoms of functional gastrointestinal abnormalities. This project will administer the SCL-90-R, an instrument used to help evaluate a broad range of psychological problems and symptoms of psychopathology, to patients with functional gastrointestinal disease. Information gained from this testing will be used for identification of a biological marker in the brain for functional gastrointestinal disorders, will aid in accuracy of diagnosis, suggest novel ways to treat the central (psychological) as well as peripheral (gastrointestinal) defect in patients with FGID's, and provide an objective measure for adequacy of treatment.

Industry and Economics Paper Abstracts

Analysis of Factors that Impact Growth and Productivity in the Black Belt Counties of The State of Alabama, Fesseha Gebremikael, and Eric Rahimian, Department of Economics, Finance, and Office Systems Management, Normal, Alabama 35762.

The black belt counties (BBC) of Alabama comprise one of the nation's most improvised rural areas. Studying the data of BBC, one will notice the following characteristics: High concentration of African Americans, high concentration of female-headed households and single parents, scarcity of jobs and low incomes, outflow of small businesses, high concentration of children and elderly, low level of human capital, spatial and social isolation of communities, and low availability of services and public goods. Considering the reasons and complexity of the poverty problem in BBC, an all-out effort by the federal, state and local governments is needed to engage the communities of this area in improving their education and skill training, which will lead to increasing capacity for employment and enhanced households' income. Based on the nature of this area, the effort to bring a change may start with rural development followed by incentives to motivate the private sector to invest in manufacturing and industrialization that leads to faster economic growth. The government at all levels can support the change by providing sufficient and conditional incentives to business and industry, which invest in BBC to bring the level of investment to the average per capita in the state. The government must also provide proper training which creates employment opportunities and hence to an increase in the household income. Since some impoverished nations and regions have succeeded in changing their economic status through investing in education and economic development, we remain optimistic that the problem of the BBC can also be solved through an organized national, state, and local effort.

Comparative Advantage: Trade Growth or Trade Decline. Oluseyi Kuforiji, Ph.D., Tuskegee University, Tuskegee, AL 36088.

Abstract Ricardo's theory of comparative advantage states that countries of the world will benefit from world trade if each country specializes, produces, and exports the products it has the highest relative opportunity cost; and then imports the products it has least relative opportunity cost from other countries. The assumptions underlying Ricardian trade model include: (a) The existence of perfect free trade - an idealized market model, in which commodities were exchanged across political lines with unrestricted government-imposed limitations. (b) The existence of general equilibrium model – in which all world markets are perfectly competitive. (c) Consumers all over the world are utility maximizers subject to their income constraint. (d) Resources, including production technology, differ across countries – which accounts for different opportunity costs among the countries of the world. The benefits of Ricardian trade model include: (a) Higher standard of living; (b) competition and innovation; (c) economic growth; (d) stronger institutions and infrastructure; and (e) peace; in the world. This study provides some evidence that is contrary to Ricardo's trade theory. The world trade data suggested that less developed countries are worst-off

by international trade. Factors responsible for this include: (a) After the World War II, multilateral treaties such as GATT and WTO created a globally regulated trade structure. (b) International regional trading and customs blocs advocated free trade only within each bloc. (c) Protectionism policies of the advanced developed countries are not very helpful to the less developed countries in the area of agriculture where the latter have comparative advantage.

Impact of Economic Incentives of the No Child Left Behind Act on Public Education.
Eric Rahimian and Fesseha Gebremikael, Dept. of Economics, Finance, and Office Systems Management, Alabama A&M University, Normal, Alabama 35762.

During the last five years the No Child Left behind Act (NCLB) has been used to officially keep the public schools and teachers accountable for the students' performance. Although the goal of providing high-quality education is very noble, achieving it depends on realistic assessment of teaching and learning outcomes in the public schools. No doubt, some improvement in education may occur if sufficient incentives and punishments are used over a relatively long period. Some educators, such as William J. Mathis (2003), fear that the federal government is asking too much and giving too little. Judge Greg Mathis in Special to BlackAmericaWeb.com writes that "If bush's no child left behind act gets renewed, let's be sure to properly fund it this time" (2007). Some others, such as Audrey Amrein and David Birliner, 2002, believe the scores on state-administered tests should not be analyzed for evidence of academic achievement because such scores are easily manipulated through test preparation, alignment of the received curriculum with the test, exclusion of special education and limited English proficient (LEP) students, and so forth. It is probably too early to observe significant impacts from the NCLB act. In this study, however, we have reviewed the changes in mathematics, science, reading and writing scores of the 4th- and 8th-graders to see if there is a noticeable difference in performance after the NCLB Act. Although there has not been a significant impact, we expect with additional funding and better control of the assessment process, public education can improve with considerable impact on economic well being of the future generation.

Post-Katrina Record High Gasoline Prices: Effects on University Students' Buying Behavior.
Marsha D. Griffin and James G. Alexander, Alabama A&M University, Normal, AL 35762.

In 2005, Hurricanes Katrina and Rita caused more than 10% of the U.S.A.'s refining capacity and 25% of its oil production to be closed. Also, two major pipelines that supply gasoline to key terminals and distribution centers within the eastern U.S. were shut down due to power outages. In September 2005, gasoline prices peaked to a U.S. average of \$3.07/gallon, an all-time high. During the Spring 2007 semester, questionnaires were administered to a convenience sample of students at Alabama A&M University and the University of North Alabama, yielding 116 usable surveys. The primary areas investigated were what, if any, changes in buying behavior were precipitated by the gasoline price anomaly, students' predictions about the direction of future gasoline prices, and whether their plans to save

money were affected by the gasoline price abnormality. For those students who made some changes in their buying behavior (59%), the top box answers were: Drive less to save gas (67%), combine trips (67%), dine out less often (58%), eat at less expensive restaurants (43%), and carpool more (40%). Regarding students' predictions about the trend of future gasoline prices, 27% of Black students predicted that prices will drift downward; no other race students felt that way. For the students who planned to make adjustments to their saving rates (43%), men were more likely than women to change their saving habits and most indicated plans to save more; a higher percentage of males than females also planned to reduce their saving rates.

Rethinking Consumer Sovereignty. James Alexander and Marsha Griffin, Alabama A&M University, Normal, AL 35762.

Economists have long relied on the refrain of consumer sovereignty to reassure others – and themselves – that the market system is ultimately beneficent. Clearly, there are some distortions of price signals by externalities, some degree of unresponsiveness to signals resulting from market power, and an unrepresentative distribution of sovereignty related to economic inequalities. Still, economics assures us that consumers are profoundly, even if imperfectly, in charge. Recognition of the complexities of the modern and intertwined economy – especially as it becomes increasingly global – draws more attention to the existence of the multiplicity of stakeholders affected by a host of decisions. For example, “free trade” can be “slave promoting,” even if benignly based. Or one may be mindful of the culturally and/or environmentally degrading effects of retailers, but easily rationalize the efficacy of purchasing from them – after all, the individual action of voting (purchasing) differently will have no effect. The argument here is not that consumer interests are irrelevant, but rather that modeling the consumer as sovereign in a way that assures good private sector performance is no more rational than is equating political voting with assurance of good public sector performance. The simplicity of both models may provide an elegance that comes at the expense of usefulness. The argument that markets are useful economic instruments is better served by analyses that recognize the consumer interest and other interests (worker, community, etc.) as legitimate participants in the economic process. Consumer sovereignty is an inadequate proxy for economic democracy.

Sam's Stores. James G. Alexander and Marsha D. Griffin, Alabama A&M University, Normal, AL 35762.

“Sam's Stores” is the story of a small business grown to enormous scale and import while adhering proudly to the vision of its founder. In a basic sense, it is the story of the American Dream. But there is another part of the story. While the business initially was embraced for the opportunities and abundance it spread, it ultimately became the focus of great concern for many. The business is Wal-Mart. Sam Walton opened the first Wal-Mart in 1962, and from that small seed grew the \$300-plus billion retailer that dominates so much of the contemporary retailing space. Walton, or “Mr. Sam,” was such a personable and “hands on” retailer – or “shopkeeper” as he styled himself – that his identity and that of Wal-

Mart became practically inseparable. In reality, Wal-Mart represents little more than half of Walton's aggressive, experimental, and successful business career. After incorporation in 1969, however, Wal-Mart grew dominant not only for Mr. Sam, but also increasingly for American retailing. As it did, the aggressive management and near obsessive focus on cost limitation manifested themselves in observable ills: destruction of small businesses, harm to communities and suppliers, weakening of labor, cost shifting to taxpayers, and often degradation of product quality. The point is not that Wal-Mart is inherently bad, but rather that size matters and business responsibilities change as a business grows. "Mr. Sam." became more than a "shopkeeper," and Wal-Mart cannot properly be modeled as just a shop.

Physics and Mathematics Paper Abstracts

Algorithms for Antipodal-Like Theorems in Euclidean Spaces. Jan P. Boronski, Dept. of Math. and Stat., Auburn University, Auburn, AL 36849. Marian Turzanski, Fac. of Math. and Nat. Sci., Cardinal Stefan Wyszynski University, 01-815 Warsaw, Poland. In 1955 Floyd announced the following theorem. Suppose that X is a unicoherent locally connected continuum and that T is a map of period 2 on X without fixed points. Suppose A is a subset of X which (i) is closed in X , (ii) is invariant under T , and (iii) separates x from $T(x)$ for any x which is not in A . Then, there is a connected subset B of A having properties (i), (ii), (iii). We discuss two geometric algorithms which can serve for an approximation of such a symmetric separator in the case when X is the euclidean 2-cube or the euclidean 2-sphere. We also show how this constructive approach can be used to approximate antipodal points guaranteed by Borsuk-Ulam antipodal theorem.

Basic Problems of Realization Theory. Sergey Belyi, Dept. of Mathematics & Physics, Troy University, Troy, AL 36082.

The major part of realization theory concerns the identification of a given function as a transfer function of a system or a linear fractional transformation of such a function. Systems whose main operator is bounded have been investigated thoroughly, and original results go back to the works of M.S. Brodskii and M.S. Livsic. However many realizations in different fields including system theory, scattering theory, and electrical engineering involve unbounded main operators and a complete theory is not yet available. The aim of the present discussion is to expose the audience to basic ideas of realization theory as well as to discuss two main problems (direct and inverse) that arise in the theory of operator realizations. These ideas will be illustrated using simple examples of electric four-pole devices.

Bulk Crystal Growth of Cerium Based Cesium Cerium Bromide (Cs_2CeBr_5) and Potassium Cerium Bromide (K_2CeBr_5) Scintillatoes. R. Hawrami, M.D. Aggarwal, F. Kochary, A.K. Batra, U. Roy a and A. Burger a. Department of Physics, Alabama A&M University, Normal, AL 35762, a Department of Physics, Fisk University, Nashville, TN 37208.

There is a renewed interest in sensitive scintillator materials for use in medical and homeland security applications. Recently many halide scintillator materials such as lanthanum bromide have been discovered. These materials are highly hygroscopic and hence techniques are needed to reduce the hygroscopic nature. In this paper, we have attempted crystal growth of a relatively new bulk single crystal of cerium based cesium cerium bromide Cs_2CeBr_5 , and potassium cerium bromide K_2CeBr_5 scintillator material. Crystals are being grown from melt using vertical Bridgman-Stockbarger technique. These crystals are used for x-ray, gamma ray spectroscopy and medical imaging. In comparison to high performance, $LaBr_3$ or $LaCl_3$ crystals, cerium based alkali halides crystals: Cs_2CeBr_5 , K_2CeBr_5 , could have similar scintillation properties, while being much less hygroscopic. Furthermore,

-potassium and cesium produce low level of self activity. In this paper, details about the versatile Bridgman-Stockbarger system developed and processing recipe for growing crystals shall be described. †Work was supported under NSF HBCU-RISE program HRD-0531183. One of the authors (MDA) would like to acknowledge support from NASA Administrator's Fellowship Program (NAFP) through United Negro College Fund Special Programs(UNCFSP) Corporation under their contract # NNG066C58A.

Laser Induced Breakdown Spectroscopy in Liquid and Solid Media. Akshaya Kumar and P. C. Sharma, Department of Physics, Tuskegee University, Tuskegee, AL 36088. Laser Induced Breakdown spectroscopy is very simple real time measurement technique. It has been used to monitor the trace elements in different media. It has been shown that LIBS technique can be used for the detection of trace toxic elements in water. Single and double pulse LIBS techniques have been tested in this work to enhance the limit of detection of trace elements in water. It has also been used to monitor malignant and normal tissue from the liver of a dog. Potential future application of LIBS for detection of trace elements in human hair and nail has been presented. Acknowledgements: The authors will like to thank Dr. Eugene Zakar and acknowledge Army Research Laboratory, Adelphi, MD, for providing funds to support this work through contract # 30-22154-006.

Microwave Plasma Diagnostics with Electrical Probes. Anastasia V. Tarasova and Nirmol K. Podder, Department of Math and Physics, Troy University, Troy, AL 36082.

Microwave plasma properties have been diagnosed with electrical probes. Microwave plasmas in argon are generated inside a Pyrex tube by a 6-kW magnetron power supply. The microwaves are guided through waveguides to a resonant cavity, where a low pressure gas tube is housed to produce the plasma. The operating gas pressure varied from 200 mTorr to 4 Torr, depending of the microwave output power level from 1320-1600 Watts. Using a single Langmuir probe, a floating double probe, and an emissive probe, plasma parameters were determined from the voltage-current characteristic curves. Electron temperature was found to be in the range of 1-3 eV, electron number density $8 \times 10^9 - 2 \times 10^{11} \text{ cm}^{-3}$, and plasma potential 12-23 Volts. The presentation includes some of the probe designs, theory, data analysis, and results.

Optical Tweezers: Current Status and Future Prospects. D. Brian Thompson, Megan E. Stout, and Martin S. Heimbeck, Univ. of North Alabama, Florence, AL 35632.

The UNA optical tweezers first built in 2003 has undergone a series of equipment upgrades that transform it from an instrument designed to teach us how to optically trap microscopic particles into a research-grade instrument. These upgrades provide several enhancements that I review here. I also outline a new project in which the optical tweezers is no longer the object of study, but instead is one piece of an integrated set of experimental tools. In this project, we plan to examine the spectroscopy of whispering-gallery-mode (WGM) resonances in microspheres doped with fluorescent dye. WGM resonances arise in a

microsphere from light that propagates nearly undiminished around the surface of the sphere via total internal reflection; in an isolated microsphere acting as a single resonance cavity, WGM resonances represent standing-wave fields of light propagating along the circumference. The resonance wavelengths of light are determined by those wavelengths that, after propagating around the circumference of the sphere, add in phase with the incident light.

Parameterization of Chaotic Behaviors in Nonlinear Systems. Ralph B. Wilson IV and Nirmol K. Podder, Department of Math and Physics, Troy University, Troy, AL 36082.

With the increasing advance of computer processing, mathematicians have had more freedom to explore, with high resolution, the parameter dependent nonlinear behaviors of many iterated numerical functions. These investigations have led to the understanding of just how ubiquitous chaotic behavior and fractal structures are in nonlinear systems. The mandelbrot set might be the most well known instance of this. Physical systems with controlled parameters, which exhibit nonlinear behaviors may also be rendered into similar representations. A discussion of rendering a glow discharge plasma system is presented.

Prime Numbers Connected to the Stirling Numbers of the Second Kind. Carolyn H. Gathright and Herman L. Windham, Department of Mathematics, Tuskegee University, Tuskegee, Alabama, 36088.

The arithmetical method of Eratosthenes, known as the sieve of Eratosthenes, is still the major procedure used today for finding long sequences of prime numbers. In this paper, an overview of the Stirling numbers of the second kind is presented. This is followed by procedures on how to use the Stirling numbers of the second kind as an algebraic prime number sieve for generating long strings of prime numbers consecutively. Pros and cons on how such an algebraic sequence might be more suitable for future research about prime numbers than the sieve of Eratosthenes will be discussed.

Shock Wave Structure and Velocity in Glow Discharge Plasma. Nirmol K. Podder, Anastasia V. Tarasova, and Ralph B. Wilson IV, Department of Math and Physics, Troy University, Troy, AL 36082.

A shock wave is characterized by its Mach number, i.e., the ratio between the shock speed and the local speed of sound. At Troy Laboratory for Plasma Physics, Mach 1.5-2.2 shock waves are produced in argon over a range of pressures 3-15 Torr by a fast capacitor discharge. The shock waves are allowed to traverse through a glow discharge plasma inside the shock tube, where the deflections of the laser beams, caused by the density jump at the shock front, are recorded on a fast oscilloscope. An average shock wave velocity in plasma is determined from the time history of the laser deflection signals. Shock wave speeds in plasma are found to be dependent on the plasma discharge current. Shock wave speeds increase by 18% for the plasma at 3.6 Torr over a range of plasma discharge current I = 0-

150 mA and by 46% for the plasma at 15 Torr over I = 7-150 mA. In addition, shock wave amplitudes are attenuated in plasma.

Some Properties of Twice Continuously Differentiable Functions. Aaron Benson,
Dept. of Mathematics, Tuskegee University, Tuskegee, AL 36088. Hussain Elalaoui-Talibi, Dept. of Mathematics, Tuskegee University, Tuskegee, AL 36088.

We prove some nice facts concerning continuously differentiable and twice continuously differentiable functions. In particular, we show that if for all numbers x in the interval $[0,1]$, the tangent line to the graph of a twice continuously differentiable function $f(x)$ from $[0,1]$ to the real numbers, intersects the graph of $f(x)$ only at the point $(x,f(x))$, then the function is either concave up on $[0,1]$ or concave down on $[0,1]$.

Synthesis, Growth and Properties of Piezoelectric Lead Magnesium Niobate-Lead Titanate Single Crystals. F. Kochary, M. D., Aggarwal, R. Hawrami, A. K. Batra, and D. Lianos, Department of Physics, Alabama A&M University, Normal, AL 35762. U.S. Army Space and Missile Defense Command, P.O. Box 1500, Huntsville, AL 35807.

The lead magnesium niobate-lead titanate single crystal is a new generation of piezoelectric material with outstanding properties. However, the applications of PMN-PT single crystals are limited by the lack of a simple and reproducible growth technique. By using the high temperature flux method, we have grown PMN-PT single crystals in our laboratory. The size of the obtained crystals varied from 1 to 4 mm, mostly showing regular prismatic shape. In order to get bigger size PMN-PT single crystals, we have successfully used a modified high temperature method with no flux using congruent melt. The size of the grown crystals by this method was relatively big and varied from 5 to 20 mm. The microstructure and the growth mechanism of the as-grown single crystals were investigated by scanning electron microscopy. Piezoelectric properties were measured using piezo d33 meter. The electrical capacitance and the dielectric loss ($\tan \delta$) were also measured using an LCR meter at a frequency of 1 kHz and an applied electric field of 10 V/cm. From simultaneous differential calorimetry and thermogravimetric analysis (SDT) measurements, we have found that PMN-PT melts at 1264.12°C. The long wavelength optical modes in PMN-PT single crystals have also been investigated using Raman scattering measurements. * This work was supported by U.S. Army Space and Missile Defense Command, contract W9113M-04-C-0005. One of the authors (MDA) would like to acknowledge support from NASA Administrator's Fellowship Program (NAFP) through United Negro College Fund Special Programs (UNCFSP) corporation under their contract # NNG066C58A.

Team-Math: A Partnership of School Systems and Universities to Improve Mathematics Education in East-Alabama. Gayle Herrington (Auburn University), Catherine Jones (Wetumpka High School), W. Gary Martin, (Auburn University), Mohammed A. Qazi (Tuskegee University), Chris Rodger (Auburn University), Marilyn Strutchens (Auburn University), Steve Stuckwisch (Auburn University), Nancy Washburn (Alexander City Schools), Judy Welch (Wetumpka Elementary School), Phil Zenor (Auburn University).

TEAM-Math (Transforming East-Alabama Mathematics) is a National Science Foundation funded Math and Science Partnership among Auburn University, Tuskegee University and 15 school districts in east-Alabama with the common mission to improve mathematics education across the region's educational system. The session will outline the collaborative efforts of a diverse partnership team consisting of mathematics teacher educators, mathematicians, graduate students and K-12 school personnel to fulfill the mission of the partnership along with its impact.

The Planetary Status of Pluto by a Quantitative Analysis. A. Tan, T.X. Zhang and M. Dokhanian, Dept. of Physics, Alabama A&M University, Normal, AL 35762.

In August 2006, the International Astronomical Union (IAU) revoked the planetary status of Pluto by a majority decision. While its action was deemed justifiable, the IAU's definition of a planet lacked any quantitative or mathematical basis. In this study, we have performed a quantitative analysis of the planets called the Cluster Analysis, by taking into consideration the five measurable quantities of volumetric radius, mean density, mass, equatorial gravity and equatorial escape velocity. The following results were obtained: In the first round, Venus and Earth clustered to form VE; In the second round, Neptune and Uranus clustered to form NU; In the third round, Mercury and Mars clustered to form MM; In the fourth round, MM clusters with VE to form the Terrestrial Planets TP; In the fifth round, Saturn joins Jupiter to form SJ; In the sixth round, NU and SJ join to give the Jovian Planets JP. In the next round, TP and JP join to form an 8-planet cluster, leaving Pluto out. The demotion of Pluto from the planetary family is, found to be, justified from a quantitative point of view.

Physics and Mathematics Poster Abstracts

Biophysical Mechanism of Ion and Dipole Transport across Bilayer Lipid Membranes. Albert J. Osei, Department of Mathematics and Computer Science, Oakwood College, Huntsville, AL 35896. Alexandre G. Volkov, Department of Chemistry, Oakwood College, Huntsville, AL 35896.

The solubility-diffusion model is presented to describe solute permeation of lipid bilayers. The model depicts the lipid bilayer membrane as a thin static slab of a hydrophobic medium that separates two aqueous phases and acts as a diffusion barrier. In order to get from one aqueous phase into the other, the permeating particle must dissolve into the hydrophobic phase, diffuse across it, and dissolve into the second aqueous phase. The total Gibbs free energy required to transfer a dipole or ion from an aqueous to a hydrophobic phase is calculated as the sum of the energy terms that include electrostatic, hydrophobic

and specific interactions. Permeability coefficients were estimated using the total Gibbs free energy, the diffusion coefficient of the permeating particle in the hydrophobic phase, the partition coefficient of the permeant between water and the hydrophobic interior of the bilayer and the thickness of the hydrophobic region of the bilayer. We estimated permeability coefficients of different ions and molecules as a function of bilayer thickness and ionic/dipolar radius and found a good agreement with experimental data. This work was supported by NASA grant NAG8-1888.

Heat Conduction in Pure Semiconducting Systems. Akshaya Kumar and P. C. Sharma, Department of Physics, Tuskegee University, Tuskegee, AL 36088.

Essential to our program, jointly conducted by Army Research Laboratory and Tuskegee University, is to devise means and ways to control the temperature of devices fabricated by semiconductors. Main reason for failure of a device is lack of expertise in managing the access thermal energy. In this presentation the problem of heat management and thermal conduction in pure semiconducting system has been addressed from following two points of views. (a) the flow of heat energy within the device, and (b) the flow of heat energy out of the electronic device to mounting material. The result shows that for explaining temperature dependence of heat conduction in pure semiconducting system is totally due to phonons. The phonons are scattered at low temperatures by the crystal boundaries and the point defects and dislocations present in the semiconducting crystal where as at high temperatures phonons are scattered by phonons. Acknowledgements: The authors will like to thank Dr. Eugene Zakar and acknowledge Army Research Laboratory, Adelphi, MD, for providing funds to support this work through contract # 30-22154-006.

Optical Properties of Rare Earth Doped Glasses, Erica N. Nelums, Fransua Thomas, Akshaya Kumar and Legand L. Burge, Department of Physics, Tuskegee University, Tuskegee, AL 36088.

In this work optical property of Eu³⁺ ions doped in telluride glass has been presented. Absorption, fluorescence and excitation spectra have been recorded. Judd-Ofelt parameters have been compared with other glasses. Stimulated emission cross-section and branching ratio of different transitions have been calculated. Stark broadening of different energy levels has been reported in the telluride glass. Effect of concentration on the lifetime of the excited state has been monitored. Acknowledgements: The authors will like to thank Dr. Eugene Zakar and acknowledge Army Research Laboratory, Adelphi, MD, for providing funds to support this work through contract # 30-22154-006.

Radiated Pressure Field Calculations of Axisymmetric Ultrasonic Disc Transducers. Albert J. Osei and Victoria Poole, Department of Mathematics and Computer Science, Oakwood College, Huntsville, AL 35896.

Theoretical investigation on the radiated pressure fields of disc ultrasonic transducers has been performed using a method that can predict the pressure distributions from disc radiators with uniform vibration characteristics otherwise called plane piston vibrators. To

investigate non-uniform vibrational characteristics, the method was extended so that any axisymmetric vibration variation across the front face of the disc could be examined without the need of expressing this variation mathematically. The method relies on the assumption that any axisymmetric vibrational distribution may be approximated by a combination of a finite number of plane vibrators differing in size and vibrational amplitude. The predictions of the technique indicate that the field from a uniformly vibrating disc is characterized by a tendency for side-lobe generation and marked variations in near-field pressure amplitudes, which may be reduced by causing the amplitude of vibration to decrease across the disc's face in a variety of configurations. Conversely, undesirable features in acoustical imaging (such as side-lobe predominance and near-field ripples) occur when the vibrational amplitude is increased with radius. This work has been supported by NASA grant NAG8-1888.

Science Education Paper Abstracts

Teaching Science: Formal and Informal Science Teaching in an Upgraded Planetarium.

Laura M. Weinkauf, Dept. of Physical & Earth Science, JSU, Jacksonville, AL 36265.

In 2003, Jacksonville State University upgraded its planetarium with a Digistar 3SP, all-digital projection system. The three years since the planetarium has been used as a casual setting for teaching about astronomy and other science. From formal school groups to scouts to retired educators to members of the general public, over 100 groups with 3000 people have visited the facility. We will briefly describe some of our successes and challenges for the future.

Mathematics, Computers and Biosciences -- A New Course for Biology Majors. John Bales, Dept. of Mathematics, Helen H. Benford, John P. Davidson, and Douglas R. Hileman, Dept. of Biology, Tuskegee Univ., Tuskegee, AL 36088.

Modern bioscience inquiry increasingly incorporates mathematical and computational analysis, yet the need for expanded integration of quantitative skills into their training is not always apparent to biology majors. Moreover for some, deficits in mathematics and study skills undermine confidence, performance, and career progression. The relevance of traditional mathematics courses to biology is not clear to students, and transfer of mathematics concepts into biology courses is limited. Mathematics and biology faculty have developed a team-taught course for biology majors, Mathematics, Computers and Biosciences (MCB), that helps establish crucial linkages between biology and mathematical and computational concepts. Modules developed for MCB include standard curves, spreadsheets, solution-making, statistical tests, genetic testing and false positives and negatives, bioinformatics, and phylogenetic trees. Modules are taught as a balanced mix of lecture and in-class exercises, with regular homework for reinforcement. The focus is on increasing students' problem-solving ability, confidence, and interest with the goal of motivating them to integrate mathematics and computers more fully into their course electives, selection of internships, and career planning. The MCB course has been field-tested twice with a small numbers of students. Student attitudes and self-assessed skills have been analyzed via pre- and post-course surveys. Measures of course quality received high marks from the students, who felt that MCB should be required of all sophomore biology majors, possibly in place of part of the traditional mathematics requirement.

Rockets - Blasting Off to a Bright Future with Stem Students. Albert E. Russell, Kyle Willian, Pamela M. Leggett-Robinson, and Gregory Pritchett, Department of Chemistry, Tuskegee University, Tuskegee, AL 36088 .

ROCKETS (Research in Organic Chemistry Kindling Excellence in Tuskegee Scientists [and Engineers]) is a component of a National Science Foundation funded Tuskegee University HBCU-UP project (Enhanced Communication and Collaboration among STEM Disciplines through Undergraduate Curriculum Development and Research

Opportunities). The ROCKETS program is designed to be an intensive introduction into organic chemistry. Twelve students are selected from various STEM disciplines and are required to have completed two semesters of general chemistry. Students are rigorously engaged in an eight week curriculum that involves an organic lecture course, an advanced organic laboratory course and a course which introduces them to the methods and ethical concerns of conducting research. ROCKETS demonstrates that a diversified approach to teaching organic chemistry via implementation of the integration of teaching and research is a viable teaching method. The ROCKETS program increases the students' science literacy and the ability to become intellectually independent thus, creating an engaging experience for women and underrepresented minorities in STEM.

Science Education Poster Abstracts

Using Current Research Themes to Teach Cell Biology Concepts. Roberta M. Troy, Marcia Martinez and Pamela Leggett-Robinson. Departments of Biology and Chemistry, Tuskegee University, Tuskegee, AL 36088.

Students can gain a deeper understanding of cell biological concepts if these concepts are linked to current research in the field. This study used the approach of studying cell biology concepts through the theme of T-cell inactivation by HIV. Students participated by presenting current research articles related to the overarching theme. Student groups presented not only the research in the article but the relationship to cell biology concepts. Written summaries of the research paper were also required. This approach provided students with an opportunity to be interactive in their learning of specific concepts while seeing how these concepts related to real world problems. Laboratory exercises mimicked experiments from the papers thereby allowing students to fully appreciate the parameters of the research. Furthermore, students gained an understanding of the scientific method and how to analyze research articles. The population for the study included 12 undergraduate and 2 graduate students. Students were placed in groups of 3 (undergraduate) or a group of 2 (graduate). Research articles were presented by each of the student groups and evaluated by instructors and students. Students were further assessed of their learning progress by examinations. A questionnaire administered to students after completion of the course revealed that over 90% felt that they had learned a great deal and that they gained a better appreciation for biology. Furthermore, 80% of the respondents liked the approach used.

Reports for February 2007
Alabama Academy of Science
Executive Committee Meeting
Tuskegee University, Tuskegee, AL
By James Rayburn

Call to Order: 7:30 pm

Attending meeting; Safaa Al-Hamdani, Sergey Belyi, Ellen Buckner, Brian Burns, Houston Byrd, George Cline, Roland Dute, Mijitaba Hamissou, Richard Hutiburg, Larry Krannich, Akshaya Kumar, Adriane Ludwick, Mike Moeller, David Nelson, James Rayburn, B.K. Robertson, Kenneth Roblee, P.C. Sharma, D.B. Thompson.

Approval of Minutes from October meeting.

Officers Reports (B)

1. **Board of Trustees**, Eugene Omasta. – No Report

2. **President**, David Nelson

Most of my activities during the past year have focused on completing all committee vacancies and preparing for the symposium: "Hurricane Impacts along the Gulf Coast." Last year we experienced what appeared to be a large number of committee resignations. My goal was to fill all of these openings to begin this year with a full slate. That was not possible. One committee (Resolutions) was declined by more than 40 different people. Some committees have not met for several years. Presently we have vacancies on 4 different committees that still need to be filled (after many weeks of numerous emails and telephone calls). The Academy needs a more effective system of locating good, potential committee members. The Section Chairs would seem to be one good source. However, additional recruitment measures are needed. If you know of someone appropriate for one of the following vacancies, please let me know.

a. **Committee on Research:** (5 people, staggered 5-yr. terms)

1 vacancy

b. **Committee of Place and Date of Meeting:** (5 people, staggered 5-yr. terms)

3 vacancies

c. **Committee on Public Relations:** (4 past-presidents, staggered 4-yr. terms)

1 vacancy

d. **Resolutions Committee:** For some time the Resolutions Chair has operated as a committee of one. There is no description of this committee in the by-laws. We probably need to formulate one.

1 vacancy

e. **Mason Scholarship Committee:** (3 members, staggered 3 - yr terms). One member must be from the Science Education Section)

The by-laws specify the composition of the mason Scholarship Committee as 3 members with staggered 3-year terms. One member **must be** from the Science Education section. Just recently, I appointed Loretta Cormier (Anthropology) UAB to a vacant term which will expire in 2008. This appointment needs to be added to the current listing.

The chair of the committee, Mike Moeller (UNA), has requested that the committee be increased to 4 members having 4-year, staggered terms. If the executive committee will approve this recommendation, Mike has suggested Dr. Jane Roy (Education, UAB) as the additional committee member. If the executive Committee approves this proposal, I will appoint Dr. Roy to the Committee.

Proposed Mason Committee Membership:

Dr. Michael B. Moeller (2006)

Dept. of Chemistry and Industrial Hygiene

University of North Alabama

Florence, AL 35632

(256) 765-4479

mbmoeller@UNA.edu

Dr. Charles Eick (2007)

Department of Curriculum and Teaching

College of Education

Auburn University

Auburn, AL 36849

(334) 844-6887

Eich@Auburn.edu

Dr. Loretta Cormier (2008)

Dept. of Anthropology

University of Alabama at Birmingham

1212 University Boulevard

Birmingham, AL 35294-3350

(205) 975-6526 or (205) 934-3508

lcomier@uab.edu

Dr. Jane Roy (2009)

School of Education

University of Alabama at Birmingham

EB 232N

Birmingham, AL 35294-1250

(205) 934-1757

jroy@uab.edu

Some of our committees probably need to meet more frequently. Some people consent to accept re-nomination repeatedly and may suffer “burnout.” The effectiveness of our committees will be determined by the energy and enthusiasm of their members. The AAS will benefit from broader participation of its membership. I encourage every member of the Executive Committee to continue to suggest potential committee members to the president and vice-president. Some committee chairs are appointed and others are elected; please become familiar with your particular committee. The bylaws are posted on the AAS web page.

Discussion during Report:

Do we need a Resolution committee? The Mason Scholarship Committee needs one more member, for a total membership of four.

New business:

Ellen Buckner suggested inviting an Honors student group to meet with the AAS – Larry (Krannich) said he would extend an invitation.

Motion to invite the group was approved and Larry Krannich will extend an official invitation.

3. President –Elect, George Cline

- a. I helped David Nelson trying to find members to serve on various committees.
- b. I helped obtain speakers for the Spring Symposium.
- c. I have been speaking with our Graduate College (JSU) about recruiting at AAS. There is interest in having a booth at AAS for 2008.
- d. I have been assisting the Secretary on matters of protocol and policy.

New Business

- a. Ideas for next year's Symposium: - Undergraduate Research
- b. Are we actively using Gorgas to recruit for our Science programs? I will contact Science Deans at state colleges/universities for more feedback. Can we give 1 year membership in AAS to Gorgas winners? Does anyone have data on how effective the program has been? Where are Gorgas winners now?

4. Second Vice President, Kenneth Roblee

As 2nd Vice President (and nominating committee), my responsibilities have been to find a 2nd Vice President for 2007-08 and to fill the four vacancies created by the outgoing Board of Trustees members. I found Brian Thompson of The University of North Alabama, who has agreed to be the 2nd Vice President for 2007-08, if elected. The following four have agreed to serve, if elected:

- a. Adriane Ludwick (Tuskegee University, and current outgoing Board member),
- b. Richard Hudiburg (The University of North Alabama, and former President),
- c. Roland Dute (Auburn University, and former President), and
- d. Brian Burnes (Judson College, and current Biology section chair).

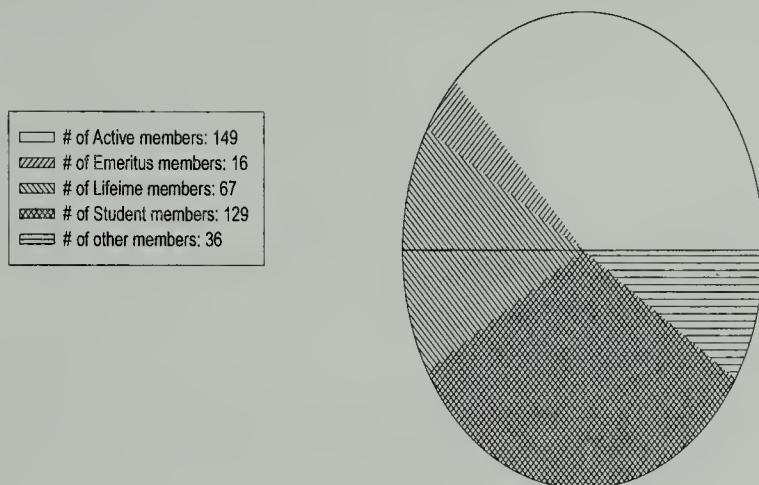
5. Secretary, James Rayburn

- a. November I sent out second reminder to current members who are not paid for 2007.
- b. November 29-Dec 1, I sent out call for papers for the AAS meeting in Spring in email and regular mail for those without email address.
- c. In the last week of January I updated list for AAS and mailed a 3rd reminder to members who were not paid for 2007 yet. I did not send to libraries during this 3rd reminder.
- d. I have prepared minutes from October meeting. Many members did not send me electronic copies, and I scanned in their reports. This may lead to errors in the minutes. I have copies here for approval.
- e. As of Feb 23, 2007 we have 397 (of which 289 are paid for 2007) members including library and other members. As of Feb 23, 2007 we have taken in approximately \$5,970.00 in dues. This is almost \$500.00 more than dues taken in for 2006.
- f. 149 Active members (112 paid; 36 not paid), 16 emeritus (16 paid), 67 lifetime, 129 Student (93 paid; 36 not paid), 36 other members (1 paid; 35 not paid).

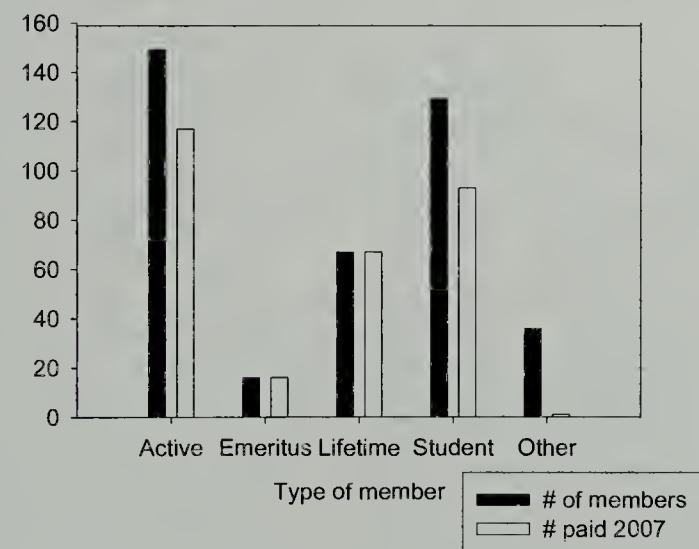
g. Membership by section

Section #	Total #	Not paid
1	117	28
2	34	5
3	2	0
4	6	1
5 (50 are new student)	88	5
6	4	0
7	8	3
8	15	3
9	48	12
10	10	2
11	7	3
12	2	0
77 (other)	16	15
None selected	19	12

Membership Breakdown AAS Feb 23, 2007



Paid members through 2007 as of Feb. 23, 2007



New Business:

Secretary to provide email address of members to executive committee -
Membership - cost to pay email or pay pal was brought up.

6. Treasurer, Mijitaba Hamissou

October 2006 – February 21, 2007

Accounts summary; Cds, Money Market, Checking, Saving

October 20, 2006

cd(1) + cd(2) +cd(3) + cd(4)

\$56,560.38

Saving account

\$1,259.50

Money Market

\$2,833.36

Checking account

\$791.05

Assets all accounts (010/20/06)

\$61,444.29

Feb 21, 2007

cd(1) + cd(2) +cd(3) + cd(4)

\$56,560.38

Saving account

\$1,259.80

Money Marke

\$2,837.58

Checking account (as of Feb. 21, 2007)

\$10,012.60

Academy's assets, all accounts (02/21/07)

\$70,670.36

Alabama Academy of Science

October 2006 – February 2007

Previous Balance (10-20-2006)

\$ 282.17

A. Income

November 2006

Membership	2,035.00
Conference reimbursement	5,758.19

December 2006

Membership	490.00
Royalty Gayle Thompson	71.79
Gorgas	10.00

January 2007

Conference reimbursement	855.90
Membership	2,320.00
Journal PUB revenue	100.00

February 2007

Membership	660.00
Total revenue this quarter	12,300.88

Total (Previous + Revenue)

12,583.05

B. Expenses

November 2006

Honorarium (Sept. Oct.)	700.00
Reimbursement mailing	27.76
Stop payment and charge	20.00

December 2006

AAS Journal Editor's Honoraria	1,000.00
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January 2007

Journal Mailing & labels	472.69
Honorarium	350.00
Total expenses	2,570.45

Balance (Income – Expenses) 12,583.05 – 2,570.45 =	10,012.60
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New Business:

One stopped payment on check by member.

7. Journal Editor, Safaa Al-Hamdani

The following has been accomplished since the last meeting:

- The Alabama Academy of Science Journal Vol. 77 #3-4 has been successfully released. This issue had a great number of articles with a significant contribution to science at large.
- We have changed the printing company to Davis Published to Commercial Printing Company. The recent company has been very cooperative.
- We are one month behind in releasing the first issue of the journal for 2007. I am planning to send all the articles to the publisher by the end of March.
- I would like to bring to the attention to the members of the academy to become more active in submitting papers to the journal and volunteering to submit manuscripts.
- I would like to invite each university in Alabama to submit one page biography for a selected scientist of their choice to be included in each issue of the journal.
- I encourage examining the idea of including advertisements in the journal to increase the revenue.

New Business

Dr. Al-Hamdani wanted to acknowledge people who resigned. Resolution and plaque for Sue Bradley. This brings the need for Resolution committee.

Taba Hammisou proposed Larry Krannich, B.K. Robertson, plus one for the resolution committee with the stipulation that Larry Krannich not be chair.

8. Counselor to AJAS, B. J. Bateman – No Report

9. Science Fair Coordinator, Virginia Valardi – No Report

10. Science Olympiad Coordinator, Jane Nall – No Report

11. Counselor to AAAS, Steve Watts – No Report

12. Section Officers

I. Biological Sciences, Brian Burnes

Biological Sciences has 34 papers and 29 posters entered in the 2007 Annual meeting. The total, 63, is approximately one third of the 184 total submissions. Only 2 Biological Sciences submissions are entered in the paper competition.

Judson College sent a letter of invitation to AAS to host the 2009 Annual Meeting and the invitation was accepted by AAS. Although commercial lodging is in short supply near Judson College, dormitory space is available and may be offered.

Mickie Powell from UAB is the new Biological Sciences Section Chair and Juan Luis Mata from USA is the new Biological Sciences Section Vice-Chair.

II. Chemistry, Houston Byrd

1. Papers/Presentations:

- a. In 2006 we had 19 papers/posters presented with 15 of these participating in the Statewide Chemistry Undergraduate Research Symposium.
- b. In 2007, we have 25 papers/posters that will be presented with 15 of these participating in the Statewide Chemistry Undergraduate Research Symposium.
2. This is the 3rd year of the Statewide Chemistry Undergraduate Research Symposium with co-sponsorship by 4 (up from 3 in previous 2 years) local sections of the ACS. The symposium distributes \$450.00 in 1st, 2nd, and 3rd place prizes in the papers and poster categories with the funds coming from the 4 local sections.
3. A section vice-chair will be selected at the business meeting.

III. Geology & Earth Science, Mark Puckett – No Report

IV. Geography, Forestry, Conservation & Planning, Greg Gaston – No Report

V. Physics & Mathematics, Brian Thompson – No Report

VI. Industry & Economics, Marsha Griffin – No Report

VII. Science Education, Lori Cormier – No Report

VIII. Behavior & Social Sciences, Cheryl Bullard – No Report

IX. Health Sciences, Virginia Hughes – No Report

X. Engineering & Computer Science, Marietta Cameron – No Report

XI. Anthropology, Harry Holstein – No Report

XII. Bioethics & History/Philosophy of Science, Keith Gibson – No Report

13. Executive Officer, Larry Krannich

Since the last Executive Committee Meeting, my activities have focused on the following:

1. A “snail” mail and e-mail distribution list of all department chairs and selected faculty and a list of departmental URL’s at Alabama colleges and universities for those departments appropriate for the 12 Sections of the Academy was distributed to all Section Chairs to aid them in developing e-mail contact lists for the Academy sections, solicit new members, and develop meeting programming.
2. During January and February, I worked closely with Dr. Prakash Sharma, local arrangements chair, to develop the program schedule for the 84th annual meeting of the Academy.
3. January and February were spent coordinating with section chairs, symposium chair, state counselor to the junior academy, and general program chair in the development of the program and program booklet for the 84th annual meeting of the Academy. The program booklet for the 84th annual meeting was constructed, sent to all section chairs and paper/poster presenters to proof, posted on the web (February 14, 2007), and printed.
4. E-mails were sent to all paper/poster presenters thanking them for their participation and notifying them when the final program was posted (February 19, 2007) on the web site.
5. A co-sponsorship agreement was signed with the American Chemical Society for the Alabama Statewide Chemistry Undergraduate Research Symposium.
6. Certificates for the Carmichael Award, all Section paper/poster competition winners, participants in the Alabama Statewide Chemistry Undergraduate Research Symposium, and symposium competition winners were designed and printed.
7. A template was designed for the banquet program for use at future meetings.

C. Committee Reports

1. Local Arrangements, Prakash Sharma – Verbal Report only

2. Finance, Eugene Omasta

The Alabama Academy of science continues to be in excellent financial condition with total assets of \$67,561* at the end of 2006. This is an increase of \$1,944 as compared to a year ago. The assets of the academy as reported at the fall executive committee meeting and annual spring meetings since 2001 are listed below:

Period	Assets (end of period)	Change	Period	Assets (end of period)	Change
1/1-10/12/2001	\$71,763		1/1 12/31/2001	\$75,813	
1/1-10/12/2002	\$72,197	\$434	1/1 12/31/2002	\$72,813	\$-3,000
1/1-10/12/2003	\$71,197	-\$794	1/1 12/31/2003	\$74,800	\$1,987
1/1-10/12/2004	\$74,265	\$2862	1/1 12/31/2004	\$74,610	-\$190
1/1-10/12/2005	\$63,895	-\$10,370	1/1 12/31/2005	\$65,561*	-\$9,049
1/1-10/12/2006	\$62,162	-1,733	1/1 12/31/2006	\$67,555	\$1,994

The increase in academy assets in 2006 is encouraging for two reasons. First dues Receipts are approximately \$500 higher than last year according to Dr. Rayburn. This increase is probably due in part to Dr. Krannich sending out post card reminders in December, 2005, and Dr. Rayburn Sending out post card reminders in November, 2006. Second, Dr. Krannich indicated that the 190+ papers and posters being presented at this years meeting continues a slightly increasing trend during the past three years.

*estimated.

3. Membership, Mark Meade – No Report

4. Research, Steve Watts – No Report

5. Long-Range Planning, Adrian Ludwick

The October 2006 meeting of the Executive Committee Generated considerable discussion n the use of the Internet to advertise the Academy and recruit membership. Recruiting membership by this, and other means, should be the primary goal of the academy.

There was also discussion on the use of a list-serve in order to connect regarding the science Olympiad, the Junior Academy, and Mason Scholar ship. The Computer of an Internet “chat room”, possibly leading to more effective linkage to rural areas on issues and activites related to the academy, was discussed in October. Certainly these methods could be effective approaches to advertise the many facets of the academy and should be explored futher.

There was discussion on the usefulness of a list(spread sheet) that describes the

membership completely (name, address, section, classification, (student, faculty, government, industry)). This list should be created.

A summary of long range planning committee reports for the period 1998 to 2005 was presented at the October 2006 executive committee meeting. The item that received the most attention during this seven year period was that there be a “Central Location for annual meeting”. This should certainly enter into the Place and Date of Meeting considerations of the Academy.

Summary of Previous reports									
Item/date	10/ 98	3/ 99	3/ 00	3/ 01	10/ 01	3/ 02	3/ 03	10/ 04	3/ 05
Raising annual dues and/or registration fees.	X	X							
Ad hoc committee to monitor journal expense	X		X	X		X	X		
Journal on the internet		X	X	X		X			
2-year presidency		X	X						
Change meeting schedule – no Friday banquet								X	X
Ad hoc committee for membership recruitment	X		X			X	X		
Continue Friday October meeting prior to Saturday Executive committee meeting			X	X		X			
Central location for Annual meeting		X	X	.X	X	X			X
Explore joint meeting with other societies			X	X	X	X			
Expand membership categories (2-3 year)			X						
Maintain/utilize web site			X	X				X	
Have regularly appearing newsletter			X	X					
Revise Constitution							X		
Ad hoc committee to recruit Monetary support for Academy endeavors							X		
Popular symposium topics							X	X	
Abstracts online before annual meeting									X
Undergraduate symposia/research competitions									X
Periodic mass information e-mails to members and prospective members.									X

- 6. Auditing, Senior Academy**, Sergey Belyi – No Report
- 7. Auditing, Junior Academy**, Govind Menon – No Report
- 8. Editorial Board & Associate Journal Editors**, Thane Wibbels – No Report
- 9. Place and Date of Meeting**, Mark Meade – No Report
- 10. Public Relations**, Roland Dute
Our committee is collaborating with Dr. Ellen Buckner, Chair of the Gorgas Scholarship Program, on a grant to the Alabama Power Foundation t encourage high schools to participate in the Gorgas program.
- 11. Archives**, Troy Best – No Report
- 12. Science and Public Policy**, Scott Brande – No Report
- 13. Gardner Award**, Prakash Sharma – No Report
- 14. Carmichael Award**, Richard Hudiburg
The article selected for the E.B. Carmichael Award for the 2006 is James O. Bukenya, Ericka Branch, and Constance Wilson, “Examining the relationships between sprawl and neighborhood social conflicts in Alabama:” This article appeared in the January 2006 issue of The Journal of the Alabama Academy of Science, 77(1):1-12.
There were eight articles reviewed by the committee. These articles were either in January 2006 (3 articles) or July/October 2006 (5 articles) issues of volume 77 of The Journal of the Alabama Academy of Science.
- 15. Resolutions, --- – No Report**
- 16. Nominating Committee**, Kenneth Roblee
See B4
- 17. Mason Scholarship**, Mike Moeller
- William H. Mason Scholarship Committee**
- We had four complete applications for the William H. Mason Fellowship this year. After considering the application material, the committee selected Mr. Michael Hallman for the \$1000 fellowship. Mr. Hallman was notified of the award, has accepted the Fellowship and will be attending the banquet tomorrow night. Mr. Hallman in received a B.S. with a major in Chemical Engineering from the University of Alabama in 2004. He is returning to the University of Alabama for an M.A. in Education with certification in general science.

18. Gorgas Scholarship Program, Ellen Buckner

In 2006, the Gorgas Scholarship Competition successfully made many changes. The Alabama Science Scholar Search and Gorgas Scholarship Competition website was set up at www.GorgasScholar.org. A direct application process was initiated with entrants in 2007 from 11 Alabama high schools. In 2006-2007 extensive publicity was done to advertise the competition. This year, two of the Gorgas Finalists were semi-finalists in the national Intel Science Talent Search. The Gorgas Committee welcomed new member Dr. Shane Sharpe, Director of Computer-Based Honors program at the University of Alabama. Numerous scientists participated as judges in paper reading preliminary scoring and others will be judging the final competition. Thanks to all for their efforts on behalf of the Gorgas Scholarship Competition.

A new checking account was opened for the Gorgas Competition. Financial reports will be given at the fall Executive Committee Meeting. New procedures for scheduling the competition were implemented in 2007, including recognition of finalists at the banquet Thursday evening. The finals of the Gorgas Competition will be held Friday, March 2nd, in Luther Foster Engineering Building on the Tuskegee University campus. The competition will begin at 10:00 and awards announced at the Awards reception at 4:00 pm. Members of the AAS are invited to view the Gorgas Exhibits from 12:00-2:00 in rooms 404-405. The Committee would like to thank Dr. Adriane Ludwick for her excellent assistance in preparations for the Gorgas competition and recruitment of judges from Tuskegee University.

The Committee would like to recognize the outstanding teacher-sponsors of these students. Their work in encouraging students to enter the competition is instrumental to both the success of the program and to the success of the students. These are as follows:

Tonya Mills

Paul W. Bryant High School, Tuscaloosa

Mary Dalrymple

Auburn High School, Auburn

Catherine Shields

Jefferson County International Baccalaureate

Virginia Vilardi

Wetumpka High School, Wetumpka

Vicki Farina

Brooks High School, Killen

Wanda Phillips

Brooks High School, Killen

Kathy Finch

Shoals Christian School, Florence

Donna Kentros

The Altamont School, Birmingham

Debbie Anderson

Jefferson County International Baccalaureate
Birmingham

Quincy Jones

Wetumpka High School, Wetumpka

Ryan Reardon

Alabama School of Fine Arts, Birmingham

Catherine Lowe

Mountain Brook High School, Mountain Brook

Beth Andrada

Virgil I. Grissom High School, Huntsville

J. Michael Wyss

UAB CORD, Birmingham

Business Meeting
Combined AAS and Junior Academy
March 1, 2007

Call to Order: 6:09 pm.

Attendance: Safaa Al-Hamdani, R/T Ayers, Hannah Black, Brittney Bradford, Brian Burns, Houston Byrd, George Cline, Meredith Daniels, Rebecca Daniels, Larry Davenport, Roland Dute, Vicki Fauna, Mijitaba Hamissou, Richard Hudiburg, Veronica Hughes, Linda Kanipe, Larry Krannich, Akshaya Kumar, Adriane G. Ludwick, Ken Marion, Mike Moeller, David Nelson, Gene Omasta, Wanda Phillips, James Rayburn, Kenneth Roblee, Billy Sanders, P.C. Sharma, Jessica Swinea, DB Thompson.

Introduction by President, David Nelson

Business –

1. Proposed By-laws change on the Nominations committee to specify the membership to include the president, first vice president and second vice president, with the second vice president serving as chair.

Moved and Seconded

The motion passed unanimously.

2. Proposed By-laws change on the Mason committee to add an additional (4th) member. This results in 4 members having staggered, 4-year terms. At least one member must be from the Science Education section.

Moved and seconded

The motion passed unanimously.

(See President's report from Feb 28 for more details.)

3. Nominations

A. AAS Trustee Elections - replaced 4 trustees whose terms expired

People Recommended:

Adrian Ludwick

Richard Hudiburg

Brian Burns

Roland Dute

The vote passed unanimously.

B. Second vice President

Brian Thompson, North Alabama

The vote passed unanimously.

4. Taba Hammisou moved to increase the honorarium for the Executive Director (Larry Krannich) from \$ 350 to \$ 500 per month, for an annual increase of \$1800 per year for the Executive Director.

The vote passed unanimously.

5. Present Committee Vacancies:

Committee on Research.	1
Committee on Place and Date of Meeting	3
Committee on Public Relations	1
Resolutions Committee	1 (Chair)

Announcements:

Recruitment is needed.

George Cline - Potential symposium topics for next year: Undergraduate research, Water resources (Wars), Land - use Management. If you have other thought please contact Dr. Cline.

Safaa Al-Hamdani - We need more manuscripts and a revised reviewing process for the journal.

Small groups are welcome to meet with AAS at the annual Spring meeting. Please bring to their and our attentions.

Introduction of new president, Dr. George Cline

Adjournment. ~6:40 pm.



Gorgas Scholarship Competition

Gorgas Scholars compete for over \$10,000 in Scholarships and most Alabama Colleges and Universities offer additional scholarships.

The Gorgas Scholarship Program is named for General William Crawford Gorgas, the Alabama physician who conquered yellow fever in the Panama Canal Zone and later became the Surgeon General of the United States Army. The purposes of the Gorgas competition are to promote interest in science and to aid in the education of promising students.

The Alabama Science Scholar Search and Gorgas Scholarship Competition is a program of the Alabama Academy of Science and the Alabama Power Foundation. For information, contact Dr. Buckner, Chair, at bucknere@uab.edu or (205) 934-6799.

2007 Winners and Finalists:

The winner of the first-place tuition grant of \$4000:

Rahul Ram Goli, The Altamont School, 4801 Altamont Road, Birmingham, Alabama, 35222, Teacher-Sponsor Donna Kentros.

First alternate and winner of a tuition grant of \$3000:

(S) Andrew Thomas Timberlake, Mountain Brook High School, 3650 Bethune Drive, Mountain Brook, Alabama, 35223, Teacher-Sponsor Catherine Lowe.

Second alternate and winner of a tuition grant of \$2000:

Linnea Pepper, Jefferson County International Baccalaureate School, 6100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Catherine Shields.

Third alternate and winner of a tuition grant of \$1500:

Ashley Cockrell, Jefferson County International Baccalaureate School, 6100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Catherine Shields.

Fourth alternates and winners of a tuition grant of \$500 (each):

(S) Marshall Everett, Shoals Christian School, 301 Heathrow Drive, Florence, Alabama, 35633, Teacher-Sponsor Kathy Finch.

Christopher Thomas Phare, Jefferson County International Baccalaureate School, 6100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Debbie Anderson.

(S) National Intel Semi-Finalist

Unranked Finalists:

A'Lester Allen, Paul W. Bryant High School, 6315 Mary Harmon Bryant Dr., Tuscaloosa, Alabama, 35404, Teacher-Sponsor Tonya Mills.

Jessica Angel, Auburn High School, 405 South Dean Road, Auburn, Alabama, 36830, Teacher-Sponsor Mary Dalrymple.

Meredith Daniels, Brooks High School, 4300 Hwy. 72, Killen, Alabama, 35645, Teacher-Sponsor Vicki Farina.

Shweta Naran Patel, Jefferson County International Baccalaureate School, 16100 Old Leeds Road, Birmingham, Alabama, 35210, Teacher-Sponsor Catherine Shields.

Ellen Yea-Yi Wang, Virgil I. Grissom High School, 7901 Bailey Cove Road, Huntsville, Alabama, 35802, Teacher-Sponsor Beth Andrada.

Alabama Academy of Science Journal

Scope of the Journal:

The Alabama Academy of Science publishes significant, innovative research of interest to a wide audience of scientists in all areas. Papers should have a broad appeal, and particularly welcome will be studies that break new ground or advance our scientific understanding.

Information for the Authors:

- Manuscript layout should follow the specific guidelines of the journal.
- The authors are encouraged to contact the editor (E-mail: sah@jsu.edu) prior to paper submission to obtain the guidelines for the author.
- At least one author must be a member of the *Alabama Academy of Science* (except for Special Papers).
- The author(s) should provide the names and addresses of at least two potential reviewers.
- Assemble the manuscript in the following order: Title Page, Abstract Page, Text, Brief acknowledgments (if needed), Literature Cited, Figure Legends, Tables, Figures.

What and Where to Submit:

The original and two copies of the manuscript and a cover letter should be submitted to the following.

Dr. Safaa Al-Hamdani
Editor-Alabama Academy of Science Journal
Biology Department
Jacksonville State University
700 Pelham Road North
Jacksonville, AL 36265-1602

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Manuscripts will be reviewed by experts in the research area. Manuscripts receiving favorable reviews will be tentatively accepted. Copies of the reviewers' comments (and reviewer-annotated files of the manuscript, if any) will be returned to the correspondent author for any necessary revisions. The final revision and electronic copy are then submitted to the *Alabama Academy of Science Journal* Editor. The author is required to pay \$100 for partial coverage of printing costs of the article.

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