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Cover Photograph: Covered Bridge, Constructed in 1861, the Alamuchee Covered Bridge for decades crossed the Sucarnochee River. The historical landmark was permanently relocated to The University of West Alabama campus in 1969.

Photo courtesy of: Ms. Meaghan Gordon, Director of Public Relations, The University of West Alabama, Livingston, AL 35470.

Editorial Comment:

On behalf of the Alabama Academy of Science, I would like to express my deepest gratitude and appreciation for the University of West Alabama for their generous hospitality in hosting the Eighty-sixth Annual Meeting of the Alabama Academy of Science.

Sajida Al-Hamdani

Editor, Alabama Academy of Science Journal

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ABSTRACTS

The 86th Annual Academy of Science Meeting
The University of West Alabama
Livingston, AL
March 25-27, 2009

Anthropology Paper Abstracts

Agency in Action: THE PUBLIC ARCHITECTURE AT HICKORY GROUND. *John W. Cottier, Department Sociology and Anthropology, Auburn University, Auburn, AL 36849.*

Recent archaeological investigations at the Hickory Ground site recognized an area of public usage associated with the late Tallapoosa Phase. Included in this location was an identifiable Historic Creek square ground, consisting of four cabins, a covered square area, and a rotunda. While some of this architecture was constructed during the 1700s, modifications of this square ground occurred in the early 1800s as a result of the movement of the Creek National Council from Tuckabatchee to Hickory Ground. The concept of agency recognizes that humans have ideas, make choices and take actions. At the square at Hickory Ground numerous choices directly related to Historic Creek affairs were made, and many of these choices had far reaching effects on Historic Creek society. The historically documented activities that occurred in this square ground clearly demonstrate the importance of this public area within the Creek Nation during the turbulent times of the early 19th century.

BAINS GAP SITE, ARCHAEOLOGICAL INVESTIGATIONS FROM 1999 TO 2008. *Harry O. Holstein, Department of Physical and Earth Sciences, Jacksonville State University, Jacksonville, AL 36265.*

The Jacksonville State University Archaeological Resource Laboratory, between 1999 and 2008, conducted six field seasons at the Bain's Gap Site, ICA625, Calhoun County, Alabama. Excavations revealed numerous storage pits, hearths, and post patterns dating from the Early Archaic up through the early Mississippian time periods. In addition, a portion of a palisade and associated 1.5 meter wide ditch were uncovered along the southeastern margin of the site. This feature is similar to and comparative with, another ditch feature uncovered along the margin at the nearby Late Woodland / early Mississippian Wright's Farm Site, ICA18. Both features indicate Late Woodland / early Mississippian Native American villages within the Upper Coosa Valley were being fortified at this time. Whether, the palisade was meant to keep people out, in, or both will require further investigations.

CANNIBALISM IN FIJI? *Sharyn Jones, Department of Anthropology, University of Alabama at Birmingham, Birmingham, AL 35294-3350.*

I review recent archaeological, ethnographic, isotopic, and human skeletal evidence for cannibalism in Fiji. This data was collected from several locations and archaeological sites, and includes four lines of evidence from which to examine this practice: 1) frequency data for human bones recovered from middens and evidence of conflagration; 2) isotopic signatures for reconstructing human diet; 3) worked human bones, and other tools; and, 4) human bones examined via macroscopic and/or histologic methods. In particular, attention is paid to sharp force toolmark locations and the types of implements used in the creation of the incised marks on bone. I discuss how anthropologists might identify and classify cannibalism as dietary or ritual cannibalism.

EAST ALABAMA AND THE SECOND CREEK WAR. *Hamilton Bryant, Department of Anthropology, Auburn University, Auburn, AL 36830.*

In the 18th and early 19th century what is today east Alabama represented a major frontier during the westward expansion of the United States. Beginning in 1825 and lasting for over two decades Creek Indian removal was one of the last obstacles for Anglo-Americans to overcome in what is today Alabama. Two disastrous wars were fought between the United States and the Historic Creek Indians. The First Creek War ended in the lost of a significance portion of the Creek Nation, and the Second Creek War furthered the lost of Historic Creek lands. The resulting violence during the Second Creek War led many settlers to flee the eastern portion of Alabama, and the end result of this war led to the final Historic Creek removal from most of Alabama. The locations of several frontier forts from this conflict are still present, including the Fort Henderson and the nearby Kinnebrew/Middlebrooks/Newell house, two significant landmarks in present day Lee County, Alabama. Any interpretations of this fort is only properly viewed from the perspective of the events of the Second Creek War and the lasting effects of this conflict.

LAMAR COMPLICATED STAMPED AND CARTHAGE INCISED CERAMICS ASSOCIATED WITH PROTOHISTORIC DOMESTIC STRUCTURES AT HICKORY GROUND. *Cameron W. Gill, Department of Anthropology, Auburn University, Auburn, AL 36830.*

Ceramic traditions are generally introduced into a culture through the mechanisms of trade, diffusion, and conflict, or a combination of these factors. The archaeological site of 1Ee89, the Historic Creek town of Hickory Ground, recovered evidence of 30 Protohistoric Period domestic structures. Nineteen of these structures contained clearly associated ceramic inventories. Initial observations of the ceramics associated with these structures demonstrate two distinct ceramic traditions; one influenced from Moundville and the other influenced from Lamar. Whereas the ceramic samples consist predominately of plain shell and plain

sand tempered fragments, the occurrence of both Carthage Incised and Lamar Complicated Stamped pottery sherds provides some insight into the lack of cultural homogeneity within the Protohistoric Period occupations at Hickory Ground.

PROVENIENCE, PROCUREMENT AND PRODUCTION: UNDERSTANDING LITHIC SOURCE USE FROM A WOODLAND SITE IN WILCOX COUNTY, ALABAMA. Megan Cox, and *Mary Lee Glass*, Department of Anthropology, Auburn University, Auburn, AL 36830.

This study assesses a measure of energy expenditure utilized by a Woodland Period population in present day Wilcox County, Alabama. The specific cultural emphasis explores the procurement and production of the lithic inventory at 1Wx15. The understanding of lithic procurement sources and the production of an artifact inventory from this material provides a relevance to the basic subsistence practices during the period of site occupation. The variability of lithic materials provides an understanding of the spatial locations of the various exploited sources. Information gathered from this study will assist in the establishment of sets of relationships in the internal organization of the aboriginal populations that once occupied this significant archaeological site.

SPONTANEOUS ORDER AND STRUCTURAL CHANGE IN SALEM, ALABAMA (1907-1939). *Joln A. Gullatte*, Department of Sociology, Anthropology, and Social Work, Auburn University, Auburn, AL 36830.

This paper synthesizes the frameworks and methodologies of Historical Archaeology and Austrian Economics in an effort to combat historical essentialisms. It is an effort to emphasize that private action, rather than public policy, can and was used to manipulate local resources and construct rational economic order underneath the stress of structural change. A survey of built forms constructed between 1907-1939 in Salem, Alabama demonstrates that individual actors were harnessing natural, local resources and accessing localized knowledge to construct and reconstruct the space around them in a patterned fashion. Individual choices and actions are highlighted as viable solutions to economic problems in an attempt to show that space is a highly dynamic variable in the reconstruction of human behavior.

STONEWALL PLANTATION. *Ashley N. Stewart*, Department of Anthropology, Auburn University, Auburn, AL 36830.

The Stonewall Plantation was located in present day Lee County, Alabama. This plantation developed during antebellum times and was almost completely self sufficient throughout much of its history. The present archeological evidence consists of scattered domestic

and utilitarian structure and facilities that document the lengthy history of this organized plantation. Included in the physical record are numerous domestic structures that represent the sharecropper period in Alabama history. Investigations of this record provide a limited glimpse of the sharecropper life.

THE HISTORICAL ECOLOGY OF HUMAN AND WILD PRIMATE VIVAX-TYPE MALARIAS IN AMAZONIA. *Loretta A. Cornuier*, Department of Anthropology and Social Work, University of Alabama at Birmingham, Birmingham, AL 35294..

The origin and subsequent proliferation of malarials capable of infecting humans in South America remain unclear, particularly with respect to the role of Neotropical monkeys in the infectious chain of *Plasmodium vivax*. First, the evidence to date will be reviewed for Pre-Columbian human malaria, introduction with colonization, zoonotic transfer from cebid monkeys, and anthroponotic transfer to monkeys. Second, the role of demographic and ecological changes following European contact in the proliferation of malaria will be addressed with attention to changes in the habitat of malarial vectors following the Amazonian "reforestation" between 1500-1750. Third, cultural behaviors of indigenous Amazonians, such as primate hunting and pet-keeping, will be addressed in terms of their role in the perpetuation of the contemporary enzootic cycle of vivax-type malarials.

Behavioral and Social Sciences Paper Abstracts

GENDER DIFFERENCES IN PERCEPTIONS OF ACADEMIC DISHONESTY: A COMPARISON OF STUDENTS AND FACULTY PERCEPTIONS. Margaret A. Mbilizi, Northern Illinois University, DeKalb, Illinois 60115. Uchenna N. Akpom, Tarrant County College, Arlington, TX 76018. Chris C. Obi, Federal College of Education (Technical), Asaba, Delta State, Nigeria.

Academic dishonesty is one of the most evasive student behaviors facing faculty and administrators in schools. Dishonest behavior in schools is an ethical issue of concern to the academic and business communities. Various methods have been used to try to combat academic dishonesty. In some cases, the punishments have been severe. Any policy that seeks to combat academic dishonesty will start with an understanding of students' perceptions about academic dishonesty. This study looks at student perceptions of academic dishonesty at a college and secondary school in Nigeria. It also evaluates how the perceptions of students may vary from those of teachers, and how the perceptions of male students and faculty vary from the perceptions of female students and faculty. This study based on a survey that was completed by both secondary school, and college

students in Nigeria. The objective is to identify those behaviors that students perceive to be academically dishonesty, and how these compare to the perceptions of their teachers. In addition to these, it seeks to identify some factors that predict students attitudes toward academic dishonesty.

PERIMORTEM AND POSTMORTEM FRACTURE PATTERNS IN DEER FEMORA. Catherine S. Wright, Department of Anthropology, University of Alabama at Birmingham, Birmingham, AL 35294-3350.

In bioarchaeology and in forensic work, there is a problem identifying perimortem from postmortem breaks in long bones. Aside from the two extremes of green stiek fractures in very fresh bones and perfectly transverse breaks in very dry bones, there is no set methodology to categorize all of the breaks between the two extremes. Therefore, the question remains unanswered as to whether or not there are specific criteria from which one can differentiate between perimortem and postmortem breakage patterns in femora. This question is pertinent to anthropology because the analysis of traumatic injuries can help us gain insight into human behavior (Walker 2001: 576). Bone fracture patterns may help accurately determine the cause and manner of death (Symes 2005: 203). The purpose of this experiment is to find out if certain values of a variable appear in one group (old bones) that do not appear in the other (new bones), and vice versa. With this in mind, I hypothesize that perimortem fracture patterns in deer femora will contain more acute angles at the break site than right angles, which are more prevalent in postmortem breaks. If a significant difference is found between the two groups, then we will have a refined methodology with which to categorize unknown bones as perimortem or postmortem.

RELIGIOUS FUNDAMENTALISM AND TABOOS: ATTENTIONAL BIAS AND PSYCHOPHYSIOLOGICAL EFFECTS. Joseph Castillo, Elizabeth Kelley, Joshua Holland, Deanna Rumble, William Ballew, Trent Walters, Whitney Thompson, Tiffany Wood, Kristen Fowler, Claire Bennett, Larry Bates, and Richard A. Hudiburg, University of North Alabama, Department of Psychology, Florence, AL 35632.

This study explores the relationship of religious fundamentalism and responses to taboo stimuli. This study utilizes behavioral and psychophysiological responses to perceived religiously taboo stimuli. Participants were computer administered the Religious Fundamentalism Scale – Revised (RF-R), Right-Wing Authoritarianism Scale – Revised, and the Intrinsic/Extrinsic-Revised Scale. Afterwards the participants completed a modified Stroop test using words in four font colors that had 2 neutral blocks and 2 taboo blocks with 12 slides each (24 different neutral slides and 24 different taboo slides). Correctness of response and reaction times were recorded. After completion of the Stroop test, the

participants were presented two blocks of photographic content for 10 seconds duration with 10 seconds blank slides preceding each stimulus. There were 12 photographs of neutral content and 12 photographs of religiously taboo content. The psychophysiological responses recorded while viewing the 24 slides were: heart-rate, skin conductance, and finger skin temperature. Results were analyzed for attentional bias comparing neutral to religiously taboo words on the Stroop test. Data were also analyzed by comparing neutral to religiously taboo photographs. Additionally, analyses of responses were performed based on classification (using the RF-R) into high fundamentalism and low fundamentalism. There was evidence for attentional bias based on correctness of responding to neutral versus religiously taboo words. There was evidence for differences in the psychophysiological responses to neutral versus religiously taboo photographs. There was lack of evidence of differences in responses in either the Stroop test or photographic images task as a function of religious fundamentalism. Correlation analyses of self-report questionnaires were reported as well. Suggestions for future research were offered.

THEORETICAL PERSPECTIVES TO UNDERSTAND KOREAN IMMIGRANT WOMEN'S MARITAL ABUSE Youn Mi Lee, Department of Psychology and Family Studies, Mississippi University for Women, Columbus, MS 39701.

Two theoretical perspectives that have anchored the research on marital abuse are symbolic interaction theory and ecological theory. The basic premise of symbolic interaction perspectives are that (a) behavior always takes place within a situation; (b) actors construct their behavior based on their definition of the situation; and (c) all situations involve the self and at least one other identity. According to symbolic interactionist, women's definition of the situation is a key to understand her actions and her responses within the context of abusive relationship. Based on this approach, researchers analyze women's identity negotiation and discourses as inherently active self. Bronfenbrenner's ecological model is useful in studying Korean immigrants' marital abuse. It posited four sub-systems: society, community, relationship and individual. At societal level which represents cultural norm, patriarchy, masculine aggression, and acceptance of interpersonal violence are important factors that predict marital abuse. At community level that represents institutions and social structure, immigration related stressors, low socioeconomic status, lack of formal services, and isolation are associated with marital abuse. At relationship level where immediate context places in intimate relationships, male control in decision making, marital conflict, and obligation to children are predictors. At individual level which represents biological and personal history, gender identity, self-esteem, language barriers, and husband's use of alcohol predict marital abuse. In the presentation, the theoretical conceptual framework for Korean immigrant women's experience of marital abuse and post-divorce adjustment will be discussed.

Behavioral and Social Sciences Paper Abstracts

ANALYSIS OF FACTORS ASSOCIATED WITH THE POTENTIAL MUNICIPAL BANKRUPTCY OF JEFFERSON COUNTY. Christopher Robin Kelley, Auburn University, Auburn, AL 36849.

Jefferson County, Alabama has teetered on the brink of becoming the largest governmental bankruptcy for much of the past two years. It is the most populated county in the State of Alabama and contains Birmingham, Alabama, which is also the largest city in the state. The county has accumulated bond debt that has reached a staggering \$4.6 billion. More than \$3.2 billion of the debt consists of bonds sold to fund court mandated sewer improvements. Major bond rating companies downgraded the county's bond rating to D which represents a position of Default. This downgrade initiated massive mandatory repayment provisions by the county to its creditors. At present, the county has an exposure of over \$5.4 billion on its sewer system. In 1994, Orange County, California became the largest governmental bankruptcy after losing \$1.6 Billion on interest rates. Jefferson County's debt is nearly three times that figure at the present time.

Bioethics, History, and Philosophy of Science Paper Abstracts

AFTER BOUNDARIES, DICHOTOMIES, AND SUCH: SOME CONTEMPORARY BIOETHICAL PERSPECTIVES ON THE HISTORY AND PHILOSOPHY OF SCIENCE. Connie C. Price, Department of Philosophy and Bioethics, Tuskegee University, Tuskegee, AL 36088.

Bioethical perspectives on the history and philosophy of science can be helpful for the future of science, and also of the society. The postmodern writers want to challenge the very distinction between "science" and "society," and to question the validity of many comparable dichotomies, as well. The insights of Donna Haraway and Roberto Esposito, to name two of many contemporary writers on the topic, are good examples. Haraway argues that the ethical issues are involved in the doings of science itself, rather than in sociological or theological projections of possible demographic outcomes of specific technologies or procedures. Esposito continues the path of exploring biopolitics, based on the insights of Foucault and Agamben. In particular, Esposito, like his forebears but with greater emphasis, discusses immunity. With immunity as a guiding conceptual base, the producers of the "power

knowledge” (again, a term from Foucault’s lexicon) have managed to reduce community to bare or meaningless proportions in actual civic life. The culminating thanatopolitics is Nazism, and far from having been defeated and ended, it perseveres, somewhat in keeping with Haraway’s views, at establishing itself in the immunizing mentalities of biomedicine in the present day. New communities must be forged, as the context for inventive sciences “of life,” i.e. originating in and re-problematizing life.

AFTER THE DOUBLE HELIX...WHAT? Gerard Elfstrom, Department of Philosophy, Auburn University, Auburn, AL 36849.

When Watson and Crick puzzled out DNA’s structure, everyone understood that science was poised to take a new direction. Watson and Crick knew that DNA controlled the creation of proteins, the building blocks of organisms, but they did not understand how it worked. They, and other researchers in the area, were aware that RNA played a critical role, but, again, they did not understand the relation between DNA, RNA, and proteins. In many ways, the search for the answers to these questions are as fascinating and revealing as the search for the structure of DNA. They faced a question that was completely new to science: How does an array of molecules somehow direct the assembly of a completely different set? They had to determine how to formulate the problem. Only then could they seek out the chemical processes that could give the answer they needed. The search gives a picture of talented, resourceful, and highly motivated people who struggled to formulate conceptions of the mechanism they sought, make decisions about which empirical data to seek, and try one idea after another until, with luck, hard work, and the passage of time, they worked out the answer.

ETHICS ENVISIONS SCIENCE: A PROACTIVE APPROACH. Leonard W. Ortmann, National Center for Bioethics in Research and Health Care, Tuskegee University, Tuskegee, AL 36088.

The project to map the human genome established a new acronym to characterize science’s broad impact on our lives, namely, ELSI. Originally, ELSI referred to the ethical, legal and social implications of the human genome project. However, the acronym increasingly has been used to describe the implications of a variety of other bioethical issues. This use captures two important features of bioethics: its gradual extension beyond the sphere of health to issues in emergent science and its reactive relation to emergent science. This first feature hints at the topic of how science and ethics have historically related to each other. The second raises the question of why bioethics’ stance toward science largely involves reactions to its implications. In thus reacting, bioethics typically combines a pragmatic risk assessment of the science with guidelines for preventing potential ethical or practical fallout.

This reactive stance partly follows, but ultimately falls short of, historical precedents. To address its shortcomings, I propose the notion of a proactive ethics that morally embeds emergent science within a future vision of humanity.

FORGETTING THE DEAD: DIGITAL EPITAPHS AND MEMORY IN THE 21ST CENTURY. Trisha N. Campbell, Department of English, Auburn University, Auburn, AL 36830.

This is a paper on the question(s) concerning technology and in so being will begin in the mode of revealing or the unconcealment of being. Specifically, I will reveal one girl's "remains" left on the Internet. Her epitaph is accidental in that she created a spirit or representation of herself before dying or knowledge of dying, but this picture of herself has nevertheless been left as an imprint on our own spirits. This paper examines the digital epitaph in terms of Hegel's Phenomenology of Spirit, where the spirit is comprised of what he called "picture-thinking." Further, it examines through the accidental epitaph the nature of memory and ontology in the 21st century-- if the "self" is merely a dialectical relationship between consciousness of itself and consciousness of the object—what, then, is our consciousness comprised of? I will take up issues of ownership and memory and the substance of memory in our web 2.0 world, where memory has become rhetoric's forgotten cannon. Memory has often been studied in terms of the internet and Wikipedia usually concluding that our memories, as Plato argued, are failing as information becomes immediately accessible. However, my research presents a dialectical relationship with memory, which opens up new doors for remembering in the 21st century.

SYNTHETIC BIOLOGY: A "SYNBIO-ETHICS" NEEDED. James T. Bradley, Department of Biological Sciences, Auburn University, Auburn, AL 36849.

Synthetic biology (Synbio) is the human construction of new life forms. Whereas genetic engineering simply manipulates existing life forms, Synbio aims to create organisms never before existing on Earth. Synbio's methods include the design and synthesis of new genes, human-made cells, new genetic codes, novel genetically informational molecules, and the construction of entirely new genomes by adding networks of designer genes to "minimal genomes," the smallest gene sets necessary for life. Some argue that Synbio poses no ethical problem not already present in other biotechnologies, e.g. safety, regulation and distributive justice issues. I argue that four factors conspire to create a major and unique ethical problem for the development and future use of Synbio technology: (1) pervasive commodification of Nature, (2) human exemptionalism, (3) the dominance of reductionist biology, and (4) the "sixth extinction." Convergence of these four factors with the rise of Synbio technology set the stage for literal replacement of the wisdom of 3.5 billion years of

biological evolution with the "wisdom" of human hubris. A new ethics is needed to infuse genuine wisdom into the actions of Synbio-Creators. Ideally, the project of developing a Synbio-ethics will be collaborative, engaging creative dialogue between biologists and other scientists, engineers, ethicists, business persons, public servants in politics, the lay public, and theologians. Examining Earth's biodiversity, its evolutionary history, its present structure, and our place in it could be a good starting place.

THE DEVELOPMENT OF PERSONHOOD. Samuel J. Hirt, Department of Biological Sciences, Auburn University, AL 36849.

A major complication of using a single developmental stage to distinguish between a person and non-person is the difficulty of determining a single point in development that affords all or none of the rights of personhood. I propose that rights develop at different stages and are also dependent on responsibilities of the parents and the intent of the creators. I outline stages and associated rights based on developmental traits, intent, and responsibility. For example, I used these criteria to make logical conclusions towards issues concerning non-human persons, criminals, and abortion. These criteria should be used more often when discussing ethical issues of personhood, and can be used as arguments for public policies, including bills, laws, and judicial decisions.

Biological Sciences Paper Abstracts

APHID VECTORS OF BARLEY YELLOW DWARF VIRUS IN ALABAMA AND PANHANDLE FLORIDA. Buyung Hadi, Kathy Flanders, Kira Bowen, John Murphy, Department of Entomology and Plant Pathology, Auburn University, Auburn, AL 36849.

Barley Yellow Dwarf is a major disease problem of wheat in Alabama and is estimated to cause yield loss of 21-42 bushels per acre. Barley Yellow Dwarf is caused by a complex of luteoviruses referred collectively as Barley Yellow Dwarf Virus (BYDV) and is transmitted by aphid. Aphids were surveyed in the beginning of planting season in several wheat plots throughout Alabama between 2005 and 2007 and in panhandle Florida from 2006 to 2007. Collected aphids were identified and bioassayed to detect their BYDV infectiveness to new plants. This survey was designed to identify the aphid species that serve as primary vector of BYDV. From 2005 to 2007, bird cherry - oat aphid, *Rhopalosiphum padi* (L. inn.), and rice root aphid, *Rhopalosiphum rufiabdominalis* (Sasaki), were consistently abundant on the sampled fields, especially between October and December. The aphid species and

their timing of appearance in wheat plots reported here are consistent with suction trap data collected in north Alabama between 1996 and 1999. Of the three sampling years, infective aphids were detected in 2005 and 2006. The species of infective aphids and the strains of BYDV were consistent for these two years. Low overall numbers of aphid collected throughout the sampling period and even lower proportion of infective aphid made it difficult to conclusively identify the primary vector of Barley Yellow Dwarf.

BORRELIA IN HOST-SEEKING TICKS IN WESTERN ALABAMA. D. Carlin Tighe and Tracy Duckworth, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470.

One-hundred and twenty host seeking-ticks were collected from white-tailed deer (*Odocoileus virginianus*) in Western Alabama during November and December of 2008. The ticks were identified as either *A. americanum* (lone star tick) or *Ixodes scapularis* (deer tick or black-legged tick). The tick specimens were tested for the presence of *Borrelia* species (spirochete) using PCR amplification. Infection rates of *Borrelia* among the ticks were low. Future investigations will involve collecting and testing host-seeking ticks at various intervals throughout the course of a year.

COMPARISON OF ABUNDANCE OF MARINE LIFE SPECIES AT ST. ANDREWS STATE PARK AND THE DRY TORTUGAS NATIONAL PARK. Livia Cara, Kristen King, Lindsay Kirkland, Dr. James Rayburn, and Dr. Frank Romano, Department of Biology, Jacksonville State University, Jacksonville, AL 36265.

As part of the tropical biology class offered by Jacksonville State University, the class stressed identification species emphasizing coral reef fishes and invertebrates. The class visited sites along the Florida Gulf Coast from the panhandle (St. Andrews Bay) to the Florida Keys and the Dry Tortugas. One of the main goals of this course was to identify marine species in several coral reefs and collect the data on abundance of different marine species. This course exposed us to over one hundred different species of animals in a ten day period. The purpose of this talk is to compare two sites from 2004 and 2008. We utilized Reef Fish Survey method available from Reef Environmental Education Foundation as a model for all surveys conducted. The Class snorkeled in these two sites and used the visual scoring system which is based upon the Roving Diver Technique. The abundance was scored as follows: Abundant =100 individuals, Many = between 11 and 100 individuals, Few = between 2 and 10 individuals, Single = only one individual seen. There were more species identified from the Dry Tortugas than found at St. Andrews Bay for both 2004 and 2008 trips. The number of specific species abundance was different between the two years. Overall this class introduced students to the importance of coral reefs and the diversity of life that live there.

DARTER ASSEMBLAGES OF SUMTER COUNTY STREAMS. R. Brian Mosley, Tyler Earwood, and John McCall, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470.

Darters (Percidae) are abundant and diverse in the streams of Sumter County in western Alabama, in part because of the wide range of stream systems found in the region. As part of a larger-scale sampling program investigating factors controlling darter distribution in the county, we sampled various streams to determine the darter community they contained. Sampling was typically conducted at road crossings, and employed a variety of methods. Streams were sampled across the breadth of the county, and included those running through a variety of landforms. When possible, collected darters were field identified and returned to the stream. In those cases where field identification was possible, specimens were returned to the laboratory for identification. A diverse group of darters was found to exist in Sumter County streams, with the most abundant species including the rock darter (*Etheostoma rupestre*), the redbfin darter (*E. whipplei*), the johnny darter (*E. nigrum*), and the blackbanded darter (*Percina nigrofasciata*). Large differences were found in darter assemblages between stream systems, with substrate playing a major role in determining the species composition.

DARTER MICROHABITAT UTILIZATION IN MILL CREEK (SUMTER COUNTY). Amanda Gravlee, Blake Meherg, Jeremiah Hembree, Lee Stanton, and John McCall, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470.

In nature, species distributions are often correlated with environmental conditions. To investigate how the environment shapes stream fish distributions, we examined darter utilization of different microhabitats in Mill Creek, a small tributary of the Suwannee River flowing primarily through pinelands in southern Sumter County Alabama. This was part of a larger study comparing darter microhabitat distributions in different Sumter County streams. To distinguish between microhabitats we measured substrate type, canopy cover, water depth, pH, temperature, current velocity, and dissolved oxygen concentrations. Distinct microhabitats were sampled 3 times weekly for 2 weeks using seine and dip nets. All captured darters were identified, recorded and released. Darter occurrence was then correlated to the environmental measurements taken within each microhabitat. A diverse darter assemblage was sampled, with as many as four species utilizing a single microhabitat. The johnny darter, *Etheostoma nigrum*, was abundant and found in a variety of microhabitats.

DARTER MICROHABITAT UTILIZATION IN SICOLOCCO CREEK (SUMTER COUNTY). Ayonna Procter, Carlin Tighe, Jared Worthington, Stacey Hudnall, Lee Stanton, and John McCall, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470.

In nature, species distributions are often correlated with environmental conditions. To investigate how the environment shapes stream fish distributions, we examined darter utilization of different microhabitats in Sicoloceo Creek, a small tributary of the Sucarnoochee River flowing primarily through pasturelands in central Sumter County Alabama. This study was part of a larger study comparing darter microhabitat distributions in different Sumter County streams. To distinguish between microhabitats, we measured substrate type, canopy cover, water depth, pH, temperature, current velocity, and dissolved oxygen concentrations. Distinct microhabitats were sampled 3 times weekly for 2 weeks using seine and dip nets. All captured darters were identified, recorded and released. Darter occurrence was then correlated to the environmental measurements taken within each microhabitat. Dominant darter species included the redbfin darter, *Ethostoma whipplei*, which was found in a variety of microhabitats.

DIAMONDBACK TERRAPIN HATCHLING ORIENTATION: TO SEA OR NOT TO SEA? THAT IS THE QUESTION. Andrew T. Coleman, Thane Wibbels, Ken Marion, Department of Biology, University of Alabama Birmingham, Birmingham, AL 35294-1170. John Dindo, Dauphin Island Sea Lab, Dauphin Island, AL 36528.

After nest emergence, several cues, ranging from brightness and color of ambient light to presence or absence of shapes and silhouettes, influence the orientation behavior of sea turtle hatchlings as they crawl toward the sea. Hatchlings use these cues to determine the position of the open horizon and move in that direction. Orientation behavior of another turtle, the diamondback terrapin (*Malaclemys terrapin pileata*), has not been as thoroughly examined. Hatchlings of this species encounter nesting habitat similar to sea turtles but seemingly choose to venture in the opposite direction to the safety of salt marshes. The current study utilized newly hatched diamondback terrapins to perform orientation trials so the strength of this innate behavior could be investigated and quantified. A hatchling was placed in a random direction in the middle of a six meter wide orientation ring constructed on the native nesting beach and was given ten minutes to pass through one of twelve available gates. The chosen gate and time were recorded. Of the sixty hatchlings tested, only one chose a seaward gate while fifty-three hatchlings chose a gate facing salt marsh. The results supported the hypothesis that terrapin hatchlings use similar visual cues that influence sea turtle orientation behavior but respond to them quite differently. The evolution of this intriguing dichotomy will be discussed. Funding was given by Alabama DCNR.

GENETIC VARIATION IN GREAT PLAINS AND MID-WESTERN WALLEYE POPULATIONS. Mahmoud Haytham Alami, Neil Billington, Sonia Lyle, Janet Gaston, and Jiangquan Zhu, Department of Biological and Environmental Sciences, Troy, AL, 36082.

Walleye (*Sander vitreus*) (Percidae) is a large predatory fish species that is common in the Great Plains and mid-west regions of Canada and the U.S. Walleye populations are regulated by fisheries management agencies because they are popular with anglers. Thus, information on their population genetic structure will be of importance to fisheries managers. Genetic variation was screened on 1270 fish from four Canadian and nine U.S. walleye populations by cellulose acetate gel electrophoresis. All fish were screened for two polymorphic protein-coding muscle loci: malate dehydrogenase (sMDH-3) and general muscle protein (PROT-3). Many populations were also screened for an additional polymorphic locus, esterase (EST). At sMDH-3, three alleles were found, 70, 100 and 120, while at PROT-3 two alleles were found, 100, and 160. Two alleles 100 and 105 were also found at EST, but the 105 allele was quite rare. Several populations showed significant Hardy-Weinberg deviations at sMDH-3 and PROT-3 that were due to heterozygote deficits. These deviations likely resulted from the Wahlund effect. There were no deviations from Hardy-Weinberg expectations at EST. Among population heterogeneity was found to be highly significant for walleye at both sMDH-3 and PROT-3, suggesting a high degree of differentiation among walleye populations. There was no significant differentiation at EST. Populations that show genetic structure should be managed separately because they may exhibit local adaptations.

GENETIC VARIATION IN PIKE COUNTY, AL, BALD CYPRESS POPULATIONS Puja Shrestha, Neil Billington, M. Wayne Morris, Department of Biological and Environmental Sciences, Troy University, Troy, AL 36082.

Bald cypress (*Taxodium distichum*) is a long-lived, deciduous, wetland species that is frequently dominant in alluvial swamp forests of the southeastern United States. This study aimed to determine the genetic structure of bald cypress populations in Pike County, southeastern Alabama. Bald cypress leaf samples were collected from five different sites with up to twenty four trees from each site. Samples were collected from Big Creek (CR6, Spring Hill), Big Creek (Spradley Drive, Troy), Walnut Creek (Hwy 231, Troy), the Pea River (SW Brundidge), and the Concub River (231 Hwy, Troy). Plant grinding buffer was used to extract proteins from the samples which were electrophoresed on cellulose acetate gels by using two buffer systems, Tris Glycine, pH 8.5 and Tris Citrate (CAAPM), pH 7.0. Nine enzyme systems were screened: PGM, GPI, IDH, MDH, SK, 6PGDH, LAP, AAT, and ME. Several systems had more than one locus with at least one locus being polymorphic for each system, except for ME. The number of alleles at each polymorphic

locus ranged from 2-3. Considerable genetic variation was found within and among these five bald cypress populations and mean heterozygosity was 0.160. Most populations showed no deviations from Hardy-Weinberg expectations, but the few exceptions to this were likely due to sampling considerations. Information on bald cypress population genetic structure will be useful for its management and conservation.

HALOTOLERANCE IN STAPHYLOCOCCUS AUREUS, ESCHERICHIA COLI, AND LISTERIA MONOCYTOGENES: A COMPARISON OF THEIR INTERACTIONS WITH NaCl. Lindsay N. Marks, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470.

In order to determine their relative halotolerance and response to salt, *Staphylococcus aureus*, *Listeria monocytogenes*, and *Escherichia coli* were grown for 24 h in four concentrations of NaCl. Growth was measured as absorbance via a spectrophotometer. A two-way ANOVA was used to analyze the effects of salt concentration, species, and the interaction between them. Individual one-way ANOVAs were used to compare salt concentrations within each species. Each of the three species showed a different pattern of salt interaction. Both *L. monocytogenes* and *E. coli* exhibited a salt tolerance threshold, though at different levels. In contrast, *S. aureus* did not show a threshold of salt tolerance. The results indicate that *S. aureus* is most halotolerant, *L. monocytogenes* is intermediately halotolerant, and *E. coli* is least halotolerant.

INVESTIGATION UPDATE OF WOODY PERENNIAL FLOWERING IN POPULUS DELTOIDES FOR TRAINING IN FUNCTIONAL GENOMICS. Ali Barak, John Carlson, Joseph Kennedy, Ketiá Shumaker, Shaquondra Williams, Department of Biological Sciences, University of West Alabama, Livingston, AL 35470.

The eastern cottonwood (*Populus deltoides*) is being investigated to determine the molecular basis of floral bud initiation in response to physiological signals in this perennial model plant. Hypothesized, the molecular basis of floral bud induction/initiation in response to physiological signals differs in perennial plants from the better studied plant annuals. To advance this study beyond the initial level of gene network regulation and provide training in functional genomics at The University of West Alabama, collaborations with Pennsylvania State University and Mississippi State University have been established and partially funded through a National Science Foundation Supplement Grant. With current knowledge of *P. deltoides* microRNAs and poplar microarray data sets, this collaborative research group is positioned to examine the roles of microRNAs in gene networks. The study will examine the steps in vegetative versus reproductive determination in buds that are regulated by the flowering timing one (FT1) and FT2 genes in *P. deltoides*. Research

has shown that FT1 genes are expressed in February and FT2 in May. Microarray studies revealed significantly different co-expression networks (transcripts) in FT1 and FT2, indicating that although FT1 and FT2 may both be involved in reproduction in poplar there is diverged function. The current project will determine the expression of microRNAs during the periods that FT1 and FT2 are differentially expressed to determine if they are involved in the regulation of genes co-expressed with FT1 and FT2.

IS RNA INTERFERENCE INVOLVED IN PLANT-FUNGAL SYMBIOSIS? Joy M. Agee, Avinash Sreedasyam, Geetika Trivedi, and Gopi K. Podila, Department of Biological Sciences. University of Alabama in Huntsville. Huntsville, AL 35805.

RNA interference (RNAi) is a conserved group of regulatory mechanisms in which small regulatory RNA molecules serve as guides for protein complexes to suppress expression of targeted nucleic acids. Argonaute is one of the key proteins in RNAi and is the catalytic cleaving component of the RNA induced silencing complex [1]. Argonaute and other RNAi components have been found to have a role in fungal gene silencing, known as quelling, and is similar to RNAi in animals. The biogenesis of small regulatory RNAs involved in RNAi in fungi have yet to be identified. Using ectomycorrhizal symbiotic fungus *Laccaria bicolor* as a model, my goal is to identify the genes for biogenesis of small regulatory RNAs and determine their role in gene regulation. I have identified three Argonaute sequences in the *L. bicolor* genome sequence. I have cloned and sequenced full length cDNAs of all three hypothetical Argonaute genes from RNA isolated from the fungus during this early interaction phase. I have also confirmed their interaction-specific high expression which suggests a possible regulatory role for them in symbiosis. It is possible RNAi machinery are involved in the production of small regulatory RNAs involved in symbiosis formation. Determining such data will enable me to elucidate the critical biological role played by RNAi machinery in *L. bicolor* and other fungi; and also if RNAi is necessary for the formation of symbiotic relationships.

PHYLOGENETIC DISTINCTIVENESS OF THE ENDANGERED ALABAMA RED-BELLIED COOTER (PSEUDEMYIS ALABAMENSIS BAUR). Thomas G. Jackson, Jr., Ashley B. Morris, and David H. Nelson, Department of Biology, University of South Alabama, Mobile, AL 36688.

The Alabama Red-bellied Cooter (*Pseudemys alabamensis*) was designated a federally endangered species in 1987. Given the restricted geographic distribution, conservation concerns, and unique life history of this turtle, it is extremely important to protect existing populations and their habitats. The morphological differences between *P. alabamensis* and species of turtles in the genus *Pseudemys* have been well documented. However, to date,

few genetic analyses have been conducted on *P. alabamensis*. We used mitochondrial DNA (mtDNA) sequence data to determine the phylogenetic distinctiveness of *P. alabamensis* within the context of the other members of the genus. A total of 91 specimens, including outgroups, were used in analyses revealing 36 different mtDNA haplotypes. Of the 39 samples of *P. alabamensis* examined, only 4 unique haplotypes were discovered. The genus *Pseudemys* forms a well supported monophyletic clade. However, only *P. gorzugi* (Rio Grande Cooter) was genetically distinct from all other members of the genus. *Pseudemys texana* (Texas River Cooter) was found to be distinct but nested within a clade containing all other *Pseudemys*. Due to limited genetic variation observed between *P. alabamensis* and the remaining 5 species in the genus, support for the monophyly of currently recognized taxa was lacking. These genetic findings only increase the need for further study to resolve the taxonomic relationships among members of the genus *Pseudemys*.

PILOT COMPARISON OF OXBOW LAKES MICROFLORA, "PERRY LAKES PARK," PERRY COUNTY, ALABAMA. Ashley Wigley, Thomas Wilson, Christine Sestero, Department of Biology, Judson College, Marion, AL 36756.

The types of microflora present in the four Oxbow Lakes of Perry Lakes Park in Perry County, AL have never before been identified or examined. The main focus of my research centered on quantifying coliforms, a commonly used bacterial indicator of sanitary quality of water, in the four lakes and how these quantities differed between the lakes. Water samples were taken from each, and the temperature and pH were measured at the time of collection. Gram-negative rods present in the water samples were cultured on Eosin Methyl Blue plants, and the numbers and types of colonies were compared and analyzed. Further research can now be planned and performed according to the results of this research.

PRODIGIOSIN PIGMENT OF THE BACTERIUM SERRATIA MARCESCENS MAY FUNCTION TO SPILL EXCESS CELLULAR ENERGY. Pryce L. Haddix, Sarah Jones, Pratik Patel, Sarah Burnham, Kaori Knights, Joan N. Powell and Amber LaForm, Auburn University Montgomery, Montgomery, AL 36124-4023.

Serratia marcescens is a gram-negative environmental bacterium and opportunistic pathogen. *S. marcescens* expresses prodigiosin, a bright red and cell-associated pigment which has no known biological function for producing cells. We present here a kinetic model relating cell, ATP and prodigiosin concentration changes for *S. marcescens* during cultivation in aerated broth. Cells were grown in a variety of media at temperatures which either promoted or essentially prevented pigmentation. Rapid growth rates were accompanied by large decreases in cellular prodigiosin concentration; slow growth rates were associated with rapid pigmentation. Prodigiosin was induced most strongly during limited growth as

the population transitioned to stationary phase, suggesting a negative effect of this pigment on biomass production. Mathematically, the combined rate of formation of biomass and bioenergy (as ATP) was shown to be equivalent to the rate of prodigiosin production. Studies with cyanide inhibition of both oxidative phosphorylation and pigment production indicated that rates of biomass and net ATP synthesis were actually higher in the presence of cyanide, further suggesting a negative regulatory role for prodigiosin in cell and energy production under aerobic growth conditions. Considered in the context of the literature, these results suggest that prodigiosin reduces ATP production by a process termed energy spilling.

INVESTIGATIVE STUDIES OF THE EFFECTS OF ULTRAVIOLET RADIATIONS (UVR) TO ARABIDOPSIS THALIANA PLANTS AND THEIR CALLUS. Kenny Reighard, Casie Sanders, Amanda Smith and Mijitaba Hamissou, Department of Biology, Jacksonville State University, Jacksonville, AL 36265.

The effects of ultraviolet radiation (UVR) on plants are complex and involve a mixture of acclimation and damage repair mechanisms. UVR comprises UVA, UVB, and UVC. UVA (320-400 nanometers) is believed to interfere with the induction of enzymes responsible for flavonoid biosynthesis and to cause a build-up of reactive oxygen and hydroxyl radicals that interact and damage DNA. UVB (280-320 nanometers) may interfere with plant growth and development. UVC, with wavelength shorter than 280 nm is the primary wavelength for induction of RecA protein, a photoproduct involved in DNA damage repair. In this research, UVR is used as a model stress to study the specificity of plants responses to the stress. The objectives of this research are to study the molecular and physiological mechanisms underlying plants adaptation and survival to increasing UV-rich environment by investigating and comparing the oxidative stress responses of *Arabidopsis thaliana* plants and their callus tissues to increasing UVR and by investigating the photosynthetic activities of isolated chloroplasts from UVR-treated plants. Plants were grown and maintained in a growth chamber for 4 weeks while the callus tissues were generated and maintained on Murashige-Skoog media. Adult plants and callus tissues were exposed to over various amounts of UVA, UVB, and UVC over 7 days Total soluble proteins were isolated and analyzed. Super-oxide dismutase (SOD) and Ascorbate peroxidase (APO) activities were quantified spectrophotometrically and by native- polyacrylamide gels. Chloroplasts were isolated from UVR-exposed plants and their photoreduction performances were measured. Preliminary data indicated that SOD activities decreased with increasing UVB doses but decreased with increasing doses of UVC. Higher APO activities were observed with increased UVR. UVR-treated plants had lower rates of DCPIP photoreduction than the control plants.

ROAD-KILL SURVEY OF ALABAMA RED-BELLIED TURTLES ON THE MOBILE BAY CAUSEWAY - VII. David H. Nelson, Department of Biology, University of South Alabama, Mobile, AL 36688 and Cynthia Scardamalia-Nelson, Providence Hospital, Mobile, AL 36608.

A systematic, road-kill survey was conducted on the Mobile Bay Causeway from April 2001 to December 2008 to assess the numbers of Alabama red-bellied turtles (*Pseudemys alabamensis*) that were killed by automobile traffic. A total of 581 of the endangered, Alabama red-bellied turtles were recorded over the eight-year study: 439 hatchlings, 125 adult females (most gravid), 13 juveniles, and 4 males. A majority of hatchlings (96%) over-wintered in their nests to emerge during following springs (March-May). Mortality of adult females was greatest during nesting seasons: May, June, and July. Each year, from 5 to 34 nesting females (mean = 15.6, most gravid) 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 elevated roadsides where they deposit eggs (and may incur mortality). Last year, sections of chain-link fencing (totaling 4.1 km) were financed and installed by the Alabama Department of Transportation to reduce roadway mortality of turtles along the eastern causeway. Since the construction of the fencing, turtle mortalities have declined significantly: from a total of 109 in 2007, to 28 in 2008. The monitoring of the fences and turtle mortalities is continuing. Research funding was provided by the Alabama Department of Conservation and Natural Resources and the U. S. Fish and Wildlife Service.

SEASONAL APPRAISAL OF PRESENCE OR ABSENCE OF FECAL INDICATOR BACTERIA IN WATER BEFORE AND AFTER TREATMENT. Benedict C. Okeke, Sue Thomson, Stephanie A Russell, Stefanie O Davis, Victoria Gunter, Natasha N. Bozeman. Department of Biology, Auburn University at Montgomery, Montgomery AL 36124 and Elica M. Moss, Department of Natural Resources and Environmental Science, Alabama A&M University, Normal, AL 35762.

Water pollution by microorganisms of fecal origin is a current serious world-wide public health concern. Presence or absence of fecal indicator bacteria are commonly used to assess the microbiological safety of waters resources. Although fecal contamination indicator bacteria such as *E. coli* and *Enterococcus* may not be pathogenic, their presence in water indicate the presence of disease causing microorganisms including viruses and parasites from the intestinal tract of humans and animals. In this study, pre- and post-treatment water samples were collected from two major water wells and a treatment plant from a black belt county of Alabama and evaluated for the presence or absence fecal indicator bacteria from winter to fall 2008. Presence, absence and abundance of coilforms were analyzed using IDEXX colilert. Enterococci were determined by IDEXX enterolert. Pre-treatment well water samples were free of coliform type organisms and enterococci. Pre-

treatment influent river water samples from a water treatment plant in the county were positive for *E. coli*, other coliforms and enterococci. Post treatment water samples from the treatment plant, the wells and consumers were free of detectable levels of coliform type bacteria and enterococci. Further studies will be conducted to track the sources of coliforms in the influent river water for the treatment plant. This study was supported by a grant from Alabama Commission on Higher Education through Alabama Agricultural Land Grant Alliance, to study "Presence and Abundance of Pathogenic Fecal Indicator Bacteria in Drinking Water Wells Located in Several Black Belt Counties".

TEMPERATURE AND RAINFALL TRENDS IN SOUTH CENTRAL ALABAMA AND WESTERN GEORGIA, 1948-2006. John J. Boncek and Siegfried B. Harden, Troy University Montgomery, Montgomery, AL 36103-4419.

Temperature and rainfall data for the Montgomery region in south central Alabama and western Georgia was evaluated for the years 1948-2006. The data revealed a slight decrease in average annual temperature and an increase in average annual precipitation over this time period. Further analysis of the data found a significant decrease in average spring temperatures and a significant increase in average fall rainfall. In addition, summer and winter temperature data were found to have a reasonable degree of correlation with several annual and seasonal weather factors.

THE GRAY BAT, MYOTIS GRISESCENS, AND ITS STATUS IN NORTH ALABAMA. Patricia R. Miller, Ronald J. Miller, and George Williams, Jr., Athens State University, Athens, AL 35611.

The success of *Myotis grisescens* in North Alabama is an example of how proper conservation measures can influence populations of endangered species. North Alabama is home to a diverse population of bats, thirteen to fifteen resident and migratory species, due to a wide range of habitats available. One of these species, the gray bat (*Myotis grisescens*), is a colonial bat, differing from most other North Alabama bats by living in caves year round. The gray bat has very specific roosting requirements for summer and winter habitats. Only a very small number of North Alabama's more than 2,000 caves are suitable roosts. The population reduction of the gray bat was first suspected in the early 1960's. The initial conclusion was that this reduction could be attributed entirely as human interference to the limited number of suitable cave habitats. Further field studies supported this conclusion and hinted to possible extinction if proper action was not taken quickly. The gray bat was included on the Federal Endangered Species list on April 28, 1976. This listing allowed for increased measures to protect caves containing historic populations. The results of current population studies have shown that the effort to protect this species has been successful.

Purchasing caves by responsible agencies, effective cave gating techniques, and improved monitoring methods have all aided in the current recovery of the gray bat populations.

TOXICITY OF VENOM FROM TWO TARANTULA SPECIES (*HAPLOPELMA LIVIDIUM* AND *GRAMMOSTOLA ROSEA*) ON EMBRYO/LARVAE OF *XENOPUS LAEVIS*. Kristin Shirey, Sunde Jones, and James Rayburn, Biology Department, Jacksonville State University, Jacksonville, AL 36265.

Tarantulas are the largest spiders in the world, belonging to the order Mygalomorph, which includes tarantulas, trapdoor spiders, and other less well-known groups. Tarantulas belong to the family Theraphosidae. As tarantulas are becoming more common in the pet trade, questions about the effects and components of their venom have arisen. This project explores the toxicity of tarantula venom. To obtain the venom for the experiment, the tarantulas from the species *Haplopelma lividium* and *Grammostola rosea*, were anesthetized using carbon dioxide. Their fangs were placed into a vile and electric stimulation was used at their fang base to produce a venom flow. The venom was stored in a container on ice and frozen at -20°C until used. *Xenopus laevis* embryo/larvae up to 4 weeks old were used for the experiment. Embryos/larvae were placed 1 per well in 24 well plates with 0.5 mls of FETAX solution. At least four treatments were performed one control and three others with venom concentrations ranging from 0.1-1.92%. Their heart rates, blood flow, and gill movement were monitored throughout the experiment. We recorded the mortality and the data was analyzed with PROBIT analysis using Tox tools. The tarantula venom has a LC50 (1 hour) of approximately 0.775% venom. We also noted cardiovascular changes in blood flow and heart rates.

***TOXOPLASMA GONDII* INFECTION RATES IN FERAL HOUSE CATS (*FELIS CATUS*) IN SUMTER COUNTY, ALABAMA. Domoneek McCoy, Tracy Duckworth, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470.**

As a result of the parasitic symbiosis between domestic cats (*Felis catus*) and the protozoan *Toxoplasma gondii*, unborn infants and immunocompromised individuals may be exposed to toxoplasmosis. Such exposure may lead to spontaneous abortion, neurological complications and even death. In an attempt to determine the prevalence of toxoplasmosis in the West Central region of Alabama twenty feral cats were captured and tested for *T. gondii* employing the ELISA serological methodology. Of those tested, 20% (4) were infected with the parasite. Future testing will compare infection rates of toxoplasmosis between feral felines and those of family pets.

UNPAVED ROAD-STREAM CROSSINGS IN PIKE COUNTY, AL: ASSESSED BY USE OF A SEDIMENTATION RISK INDEX (SRI). *Sumau Chitrakar, Neil Billington, Paul M. Stewart, Department of Biological and Environmental Sciences, Troy University, Troy, AL 36082.*

Unpaved road stream-crossings are a dominant source of sedimentation into the streams of southeastern Alabama. The abundance of unpaved road-stream crossings have contributed a significant amount of sediment into the streams of this region. There have been 882 unpaved road stream-crossings identified within the Choctawhatchee-Pea River watershed with limited assessment of potential sedimentation risk at these sites. A sedimentation risk index (SRI) model for unpaved road-stream crossings was developed at Troy University in 2007 based on sedimentation potential. In this index, stream crossings were evaluated for 12 risk metrics; for each metric, high risk was assigned 1, medium risk 3, and low risk 5, these scores were then summed for each site. Sites with the lowest SRI scores were at the highest risk of sedimentation. We used the SRI model to survey 69 unpaved road-stream crossings within the Choctawhatchee-Pea watershed and created priority listings of them in Pike County, AL. Some 23.5 % of unpaved road stream-crossings were at high risk for sedimentation, 54.41% of them were at moderate risk, and 22.05 % were at low risk. This study developed a comprehensive priority list of unpaved road-stream crossings for Pike County, which will allow prioritization of potential problem areas for the County Road Department.

Biological Sciences Poster Abstracts

A SUMMER ON THE ZONE DIET. *Daniel L. Ross and Tracy W. Duckworth, Department of Biological and Environmental Sciences, The University of West Alabama, Livingston, AL 35470.*

The Zone Diet is a highly successful concept created by Dr. Barry Sears. The key to this diet is controlling insulin levels. Dr. Sears believes that fluctuations in an individuals insulin levels can cause increases in weight gain as well as a decline in mental stimulation. The diet also claims that unstable insulin levels can lead to chronic disease. By following the Zone Diet, Dr. Sears claims, that certain foods eaten at the proper proportions can keep a person's body in proper state of health. The purpose of this research was to test wither the concepts put forth by Dr. Sears really results in an increase in fitness level and overall health. This diet was tested from June 13, 2008 to July 28, 2008 by eating meals recommended by the diet and taking regular health related measurements. While on the diet, increases in fitness were tested by a timed four mile run. Body weight was measured weekly to see if the Zone

Diet meals had any effect on weight. Results showed that there was some definite decrease in body weight over the research period and an increase in fitness level. There was also a noticeable increase in mental energy. This energy aspect of the diet was not measured but was an opinionated occurrence due to the diet. These results parallel what the Zone Diet claims to offer in regards to weight loss and increase in fitness.

CETUXIMAB DOES NOT SENSITIZE SQUAMOUS CELL CARCINOMA CELL LINES TO IONIZING RADIATION IN VITRO. *Corey Porter and Peter Kulesza, Department of Anatomic Pathology, University of Alabama at Birmingham, Birmingham, AL 35294. Zhi-Qiang Huang and Jeffery Sellers, Comprehensive Cancer Center, University of Alabama at Birmingham, Birmingham, AL 35294.*

Purpose: Epidermal Growth Factor Receptor (EGFR) stimulates proliferation, and been shown to be overexpressed in many cancers. Radiation, the typical treatment for cancer, has been shown to induce phosphorylation of EGFR, initiating downstream signaling. The chimeric monoclonal antibody Cetuximab (C225) blocks EGFR signaling, which prompted its use in combination with radiation. The potential of this approach has been shown at UAB by treating patients with squamous head and neck carcinoma with cetuximab, in addition to radiation. This resulted in prolongation of survival on average from 24 months to 56 months on average. However, the question of which individual patients will (or not) benefit from such therapy remains unanswered. Our main objective was to develop an assay which could differentiate on a molecular level between cell lines which can be sensitized to radiation by addition of cetuximab. Methods: The six cancer cell lines A431, Fadu, Sec-1, Hep-2, Hn19, and Cal27 were selected based on similar baseline sensitivity to radiation, but differential response to cetuximab. Cetuximab treatment was initiated 48 hours prior to radiation. Clonogenic assays were utilized to assess response. Results: Cetuximab plus radiation did not show significantly greater inhibition of cell growth than radiation alone. Conclusion: The addition of cetuximab does not seem to sensitize cell lines to radiation in vivo. More tests need to be done to determine why. .

DEVELOPMENT AND VALIDATION OF SEMI-QUANTITATIVE IMMUNOHISTOCHEMICAL ASSAY FOR EXPRESSION OF SURVIVIN PROTEIN. *Brooke Horton, Claire Midyette, Zachary Griffith, and Peter Kulesza, Department of Pathology, University of Alabama at Birmingham, Birmingham, AL 35294*

Purpose: Survivin is a protein which mediates resistance to apoptosis. The majority of human cancers have abrogated apoptosis checkpoints, and also over-express Survivin. Therefore, Survivin is a rational target for drug development: pharmacologic agents which decrease the

expression of surviving would hypothetically induce susceptibility to apoptosis in cancers. Anti-sense oligonucleotides (ASO) are a class of drugs designed to bind and degrade RNA, and recently a Survivin ASO have been introduced in Phase I trials by Eli Lilly. In order to know whether ASO has intra-tumor effects, an assay is necessary to determine the level of the expression levels of protein. The assay has to be suitable for clinical use in biopsy specimens, such that the postulated decrease of Survivin can be detected. The goal of our work was to develop a semi-quantitative immunohistochemical (IHC) assay for Survivin expression. **Materials and methods.** 25 human cancer cell lines (12 previously tested as positive), and human organ tissues (negative) were tested for surviving expression using 7 antibodies. 3 highest-expressing cell lines were chosen to obtain murine xenografts. The animals were sacrificed after 4-6 weeks, the tumors excised and processed in parallel for Western blotting, and formalin-fixed, paraffin-embedded blocks. The slides were stained using three different antigen recovery techniques, and 4 different antibodies. **Results.** On western blotting of in vitro cell lines 4 antibodies showed appropriate molecular weight band without significant background. The high expressing cell lines: FaDu, HCT116 and HT29 also showed high expression in xenografts by Western blotting. The IHC using 4 different antibodies showed no signal; only one antibody (NOVUS rabbit polyclonal) showed appropriate positive signal. **Conclusions.** 4 antibodies were suitable for detection of surviving in cell lysates by Western blotting. The IHC assay was validated using NOVUS rabbit polyclonal antibody, however the assay is not quantitative. Further work needs to be done to: 1). Increase the range of the current assay; 2) develop another assay using different antibodies. This work was funded by a contract with Eli Lilly and Co.

DEVELOPMENTAL TOXICITY OF IONIC LIQUIDS. *Jonathan Sherrill and Janis Beaird, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470. Jane F. Rasco, J.M. Sturdivant, M.B. Townsend, P.L. Jernigan, and R.D. Hood, Department of Biological Sciences, University of Alabama, Tuscaloosa, AL. R.P. Swatloski, R.D. Rogers, Department of Chemistry, University of Alabama, Tuscaloosa, AL. M.M. Bailey, Department of Biological Sciences, Emporia State University, Emporia, KS.*

Ionic liquids have gained attention in recent years as “green” alternatives to traditional industrial solvents. To date, no reports have been published regarding the safety of ionic liquids to the conceptus, although studies have indicated that some ionic liquids can be toxic. The current study was performed to confirm the developmental toxicity of the ionic liquid 1-decyl-3-methylimidazolium chloride ([C10mim]Cl). From gestation days(GD)6-15, mated CD-1 mice were orally dosed with 50, 75, or 100 mg/kg/d [C10mim]Cl. Dams were sacrificed on GD 17, and their litters were examined for adverse effects. The toxicity of ionic liquids is known to increase with increasing n-alkyl chain length. A comparative analysis of the toxicity levels between [C10mim]Cl and a shorter chained 1-butyl-3-

methylimidazolium chloride ([C4mim]Cl) at doses of 113, 169, or 225 mg/kg/d [C4mim]Cl is also examined. In a preliminary study, the lethal dosage for dams dosed with [C10mim]Cl was significantly lower than that for [C4mim]Cl. Fetal weight was significantly decreased in the two highest dosage [C4mim]Cl and [C10mim]Cl treated groups in comparison with the control. An apparent teratogenic effect was associated with both ionic liquids, with only the offspring of treated mice exhibiting certain uncommon morphological defects, such as craniorachischisis, ectopia cordis, and ablepharia. The present study indicates that two commonly used ionic liquid solvents may have adverse effects on development at relatively high maternal exposures and that increasing the primary carbon chain negatively affects development.

DNA METHYLATION IN SPATIAL LEARNING AND MEMORY. *Kelli M. Money, Jamie N. Keeton, J. David Sweatt, and Eric D. Roth, Department of Neurobiology, University of Alabama at Birmingham, Birmingham, AL 35294.*

Hippocampal pyramidal cells (i.e. place cells) play an important role in spatial learning and memory. These place cells fire in a specific location of the environment known as the place field. The different properties of place fields may be used to characterize spatial learning and memory mechanisms. In fact, when the spatial representation is out of register with the current environment, spatial performance is impaired, showing the firing patterns of place cells and spatial performance in spatial navigation tasks to have a functional relationship. Although much is known about the properties of place fields, little is known of how place fields remain stable over time in a given environment. Since epigenetic molecular mechanisms have been shown to alter some learning and memory processes, it is plausible that an epigenetic molecular mechanism, such as DNA methylation, may play a role in maintaining spatial learning and memory. In this study, we decreased global methylation levels in the brain with a DNA methyltransferase inhibitor and conducted hippocampal neurophysiological recordings while the animal performed a spatial task. Correlation comparisons of place field firing rates were used to determine changes in place field stability. The preliminary results indicate that global hypomethylation leads to a decrease in place field stability ($p < 0.005$) and suggest a potential role for epigenetic regulation in spatial learning and memory.

EFFECTS OF PINE TREE EXTRACT ON *XENOPUS LAEVIS*. *Sunde Jones, Kristin Shirey and James Rayburn, Department of Biology, Jacksonville State University, Jacksonville, AL 36265.*

Trees that are cut down and turned in to pulp for paper mills can produce chemicals that are harmful to the environment. The normal products of wood include tannins, resin acids,

stillbenes, and lignin among other compounds. These compounds are known to affect both humans and aquatic animals. *Xenopus laevis* embryos are a standardized test organisms for testing developmental toxicity and was chosen for its application to both human and environmental health. The objective of this experiment was to determine the developmental toxicity of the extract on *Xenopus laevis*. Pine tree extract was produced by placing 1 kg of pine tree wood in 10 liters of a standardized water solution (FETAX solution) at room temperature for 90 days. A Standardized Frog Embryo Teratogenesis Assay (FETAX) was used to determine the LC50, EC50 malformation and Teratogenic Index of the pine tree extract. We placed 8 ml of test solution to 60X15 mm plastic Petri dishes with 2 or 4 replicates per concentration. We added 20 embryos to each dish. Each day dead were recorded and solutions changed. Each pine tree extract concentration was diluted with FETAX solution. The test duration was for 96 hours. Our results lead to an LC50 of 4.333 and an EC50 of 2.291 with a TI of 1.89. These results indicate a potential teratogenic risk however there was some significant differences between replicate tests.

FLORISTIC SURVEY OF SELECTED SITES IN THE SHOAL CREEK RANGER DISTRICT, TALLADEGA NATIONAL FOREST, ALABAMA. *Michael Wayne Morris*, Department of Biological and Environmental Sciences, Troy University, Troy, AL 36082.

Floristic surveys of selected sites in the Shoal Creek Ranger District, Talladega National Forest, Alabama, were conducted from August to October, 2003. All sites investigated are in Cherokee and Cleburne Counties, and topographic maps were used to locate the sites. Special attention was given to those vascular plant species on the PETS Plant Species List provided by the Shoal Creek Ranger District office. The list includes proposed threatened and endangered species, regional forester's sensitive species, and locally rare species that are either state-tracked or forest rare taxa. In addition, the Bankhead Ranger District Locally Rare Species List was consulted, as was the National Forests in Alabama WATCH list. Information concerning these species was provided to the USDA Forest Service and included the following: location of the population(s), approximate size of population(s), reproductive vitality of populations, and possible threats to the population(s). These surveys revealed additional populations of special plant species already known to occur within national forest service boundaries and added three special plant taxa: *Arabis laevigata*, *Cheilanthes lanosa*, and *Disporum maculatum*. Overall, 37 populations of 21 species appearing on the special plant lists were located. These taxa represent the mosaic of habitats present in and adjacent to the study area and include the following: *Baptisia bracteata*, *Actaea racemosa*, *Lilium michauxii*, *Stenanthium gramineum*, and *Trillium catabaei*.

HEMOGLOBIN EXPRESSION IN THE HYPOTHALAMUS OF MICE FOLLOWING ATYPICAL ANTIPSYCHOTIC DRUG TREATMENT. *Sybil N. Sexton* and *Tim R. Nagy*, Department of Nutrition Sciences, Robert Kesterson, Department of Genetics, University of Alabama at Birmingham, Birmingham, AL 35294.

Atypical antipsychotic drugs (AADs) are the preferred and most effective treatments currently available for schizophrenia. However, these drugs induce a weight gain of 5 kg in 50% of patients. Mice (particularly the C57BL/6J strain) have proven to be a good model for studying these drugs as their metabolic response to the drugs is similar to that of humans. Gene expression studies have revealed that an increase in hemoglobin mRNA occurs in the hypothalamus—the control center for feeding—of mice treated with AADs for three days. The aim of this study was to determine if hemoglobin protein levels are increased in the hypothalamus of mice treated with AADs. Female C57BL/6J mice were treated with the AAD Olanzapine or placebo for three days. Food intake and weight gain were both determined over the three days of the experiment. The relative hemoglobin content of the hypothalamus was determined by a spectrophotometric assay, which included treatment with Drabkin's reagent commonly used to determine the hemoglobin content of blood samples. Hemoglobin levels were normalized according to total protein concentration. Weight gain was not significantly different between the two groups ($p=0.718$). Food intake values were increased in the Olanzapine group, although the result was not significant ($p=0.056$). Normalized hemoglobin concentration was not significantly increased in the hypothalamus of these animals following AAD treatment ($p=0.926$). According to these results, elevated hemoglobin mRNA levels did not result in a measurable increase in hemoglobin protein content. This disjunction points us to more quantitative determinations of hemoglobin content including measurements of hemoglobin fragments, such as hemorphins, using mass spectroscopy.

HUMAN PAPILOMAVIRUS: A SILENT KILLER. *Sandy C. Trail*, Department of Biology, Jacksonville State University, Jacksonville, AL 36265.

The Human Papillomavirus (HPV) is a virus in the family papillomaviridae and is the causative agent of 70% of cervical cancers as well as genital warts. The virus is spread through sexual contact of the epithelium. Once introduced into the skin, the virus invades the keratinocytes and takes over the cells. There are some strains that have a high risk of causing cancer of the cervix, anus, genitals etc. The high risk strains such as HPV 16 and 18 begin a transcriptional cascade after cell invasion occurs, and as the host keratinocyte begins to divide and become increasingly differentiated in the upper layers of the epithelium, this is known as cervical intraepithelial lesions and can be detected with a PAP smear. The

depth to which the virus has infected the skin is referred to as mild, moderate and severe dysplasia (carcinoma in situ). Vaccines like Gardasil and Cervarix are available to women between the ages of 9 and 26. Most strains, however, are harmless and can be arrested by the immune system. Also, there are many strains that cause squamous intraepithelial lesions (SIL) which are warts. An informative approach to sexually transmitted diseases and viruses, especially those which are life-threatening, is very important in educating individuals who are or who plan to become sexually active.

LEPTIN EVALUATION AND CYTOGENETIC PROFILES TO ELUCIDATE FACTORS AFFECTING REPRODUCTIVE PERFORMANCE OF THE CREME D'ARGENT - AN ENDANGERED RABBIT BREED. *Jacqueline U. Johnson, Jasma McDonald and Ebony Weems.* Department of Food and Animal Science, Alabama A&M University Normal, AL 35762. *Adriel D. Johnson, Sr.,* University of Alabama in Huntsville, AL 35899.

Leptin, the product of the *ob* gene, is believed to be involved in regulating neuroendocrine (both hypothalamic and gonadal) mechanisms of reproduction. It has been reported that animals lacking adequate leptin may become obese and infertile. The Crème d'Argent origins (mid- late 19th century) were France, bred for their unusual fur. The French Crème weighed on average 7 lbs and the England Crème maximum weight was 5 lbs. In the 1920's and 30's, Crème d'Argents were exported to the United States (from France, Germany and England) where breeders focused efforts on development of a meat type breed. As breed standards were modified, an increase in body weight for the commercial body type resulted in the American Crème averaging 10+ lbs. body weight. Since 2006, <1000 animals exist globally and fewer than 100 Crème d'Argents are registered annually in the United States. The breed has become extinct in all countries except the US & the United Kingdom and it's on the American Livestock Breeds Conservancy "Priority Watch" list. This study investigates rabbit leptin and evaluates karyotypes to determine whether genetic alterations of the breed are contributing factors to its diminished reproductive efficiency.

MALARIA VACCINE CANDIDATE *PLASMODIUM FALCIPARUM* MEROZOITE SURFACE PROTEIN 6: ASSESSING GENETIC DIVERSITY IN THE PERUVIAN AMAZON. *Aaron T. Neal,* Department of Biology, *Stephen J. Jordan, OraLee H. Branch,* and *Julian C. Rayner,* Department of Medicine, University of Alabama at Birmingham., Birmingham, AL 35205.

Malaria is responsible for 1-3 million deaths annually, mostly in children under age five. Of the four protozoan parasites that cause the disease, almost all deaths result from *Plasmodium falciparum* infection. With the spread of drug-resistant parasites hindering efforts to combat the disease, the development of an effective vaccine has become increasingly urgent. This

study focuses on *P. falciparum* Merozoite Surface Protein 6 (PfMSP6), a protein present on the surface of the *P. falciparum* parasite during the erythrocytic cycle. During this cycle, which is responsible for all of the clinical symptoms of malaria, PfMSP6 is exposed to the antibody-mediated immune system, a factor critical in the success of an antigen-based vaccine. While PfMSP6 is a promising vaccine candidate, little is currently known about the genetic variation of *P. falciparum* field isolates. We have addressed this question by utilizing samples from an ongoing longitudinal cohort field-study in the hypoendemic transmission environment of the Peruvian Amazon. PfMSP6 has been amplified from merozoite DNA isolated from over 600 *P. falciparum*-infections spanning 2003 to 2006. With allele-typing by agarose gel and sequence mutation screening by dHPLC, we have shown that PfMSP6 allele frequencies vary over time, but intra-allele diversity is limited with few SNPs. These results are important in assessing whether PfMSP6 should be advanced along the *P. falciparum* vaccine development pipeline.

MOLECULAR ANALYSIS AND ANTIBIOGRAM OF COLIFORMS ISOLATED FROM RIVER WATER SERVING A WATER TREATMENT PLANT. Iesha L. Barnes, Sue Thomson, Robson Andreazza and Benedict C. Okeke, Department of Biology, Auburn University at Montgomery, P. O. Box 244023, Montgomery AL 36124.

Coliforms contaminate water supplies through flood, sewage and animal waste matter. Nucleic acid techniques and analysis of antibiotic resistance patterns are current methods used for microbial characterization and source tracking. In this study, coliform bacteria isolated in spring, summer and fall of 2008 from river water serving a water treatment plant were identified by 16S ribosomal RNA gene sequence analysis. Five isolates were identified as *E. coli*, three as *Enterobacter spp.* and one isolate as *Klebsiella pneumoniae*. Analysis of sensitivity of the isolates to gentamicin, trimethoprim/sulfamethazole, ciprofloxacin, vancomycin, tetracycline, ampicillin, cefixime, and nitrofurantoin revealed a similar profile for the *E. coli* isolates. All the nine isolates were resistant to vancomycin. The *E. coli* isolates were most sensitive to ciprofloxacin (40 – 42 mm zone of inhibition) and cefixime (24 – 30 mm zone of inhibition). Similarity of antibiotic sensitivity pattern of the *E. coli* isolates suggests they may originate from a common source. Detection of fecal coliforms (especially *E. coli*) in water resources is a strong indication of human or animal waste pollution and suggests presence of potentially pathogenic agents.

PARASITES INFECTING FERAL HOUSE CATS (FELIS CATUS) IN SUMTER COUNTY, ALABAMA. Domoneck McCoy, Tracy Duckworth, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470.

Felis catus is a reservoir for several different types of parasites due in part to their diet, which includes infected rodents and polluted garbage. Twenty cats were captured in Sumter County located in the West Central region of Alabama and examined for the presence of internal parasites. Upon examination of the felids, 80% (16) were infected with the protozoan *Toxoplasma gondii*, the tapeworms, *Dipylidium canium* and *Taenia taeniaeformis*, or the nematode *Toxocara cati*. More than 50% of those infected had multiple parasites located in the gastrointestinal system. Bloodborne parasites will also be evaluated from peripheral blood smears made from all of the feral cats examined.

PULSED UV-LIGHT STERILIZATION- A NOVEL APPROACH TO ELIMINATING *E. COLI* O157:H7 ON RAW MEAT SURFACES. *Jacqueline U. Johnson*, Department of Food and Animal Science, Alabama A&M University, Normal, AL 35762. *Leonard L. Williams*, The North Carolina A&T State University, Center of Excellence for Post-Harvest Technologies, Kannapolis, NC 28081.

Food safety concerns intensify as the incidence of microbial contamination of raw meat escalates and food-borne diseases remain a potential threat to human health. Novel UV-radiation technology on food, food preparation surfaces and in slaughterhouses to reduce microbial contamination may minimize such risks. The effect of pulsed light (PUV) sterilization to reduce *E. coli* O157:H7 on the surface of beef at different pulsed times and distances was tested. Beef was inoculated with *E. coli* O157:H7, sterilized with UV light ranging 20 - 120 s, with control distances decreasing from 5.76 - 2.76 cm from a strobe (light source). Samples were stomached, plated on CT-SMAC & PCA, incubated 37°C overnight, and log₁₀CFU/g reductions in colony counts determined. PUV times of 20 - 60 s at treatment distances of 5.76 and 4.76 cm had significantly ($p \leq 0.05$) higher populations of *E. coli* O157:H7 surviving on the beef compared to samples treated for 80-120 s. Increasing PUV time and decreasing sample distance to strobe, significantly ($p \leq 0.05$) lowered populations of *E. coli* recovered from beef compared to untreated (control) samples (8.9 log₁₀ Cfu/g). Shorter treated sample distances (2.76 and 3.76 cm) for 20-40 s and 80-120 s respectively, inactivated *E. coli* O157:H7. Adapting UV-radiation protocol to eliminate *E. coli* O157:H7 contamination on raw meat surfaces by meat producers/packers is plausible.

RAMAN SPECTROSCOPIC ANALYSIS OF PANCREATIC ISLETS *Kimberly Hobbs*, Emanuel Waddell, Adriel D. Johnson, Sr., University of Alabama in Huntsville, Huntsville, Alabama 35899. *Jacqueline U. Johnson*, Alabama A & M University, Normal, Alabama, 35762.

Raman spectroscopy can be used as a method for characterizing chemical properties of cells.

Our studies explore the feasibility of Raman spectroscopy in differentiation and functional studies of pancreatic islet cells. Alloxan monohydrate was used to induce hyperglycemia in Sprague Dawley rats. Islets were isolated using a liberase enzyme prepared in HBSS buffer which was injected into the common bile duct to distend the pancreas. The distended pancreas was placed in a conical tube containing the liberase solution for tissue digestion. The pancreatic dispersion was removed and islet cells were purified using a Ficoll Purification gradient. Islets were handpicked using an inverted surgical microscope and plated in DMEM. Islet specificity was determined with dithizone (DTZ) stain, which binds to the Zn²⁺ molecule of insulin revealing a red color. Photomicrographs were taken of freshly isolated islets, alloxan treated islets, and the DTZ stained islets. Islets were placed on an excimer laser optic chip, examined using a Horiba Jobin Yvon HR 800 Confocal Raman Spectrometer, and scanned using a He-Ne 635 nm laser. Preliminary results using Raman spectroscopy revealed a significant peak analysis at a Raman shift of approximately 3000 cm⁻¹. To our knowledge, Raman spectroscopy has never been used to examine pancreatic islets under these conditions. These studies may lead to the discovery of novel information about pancreatic function and a better understanding of conditions such as diabetes.

SEDIMENT LOAD AND MACROINVERTEBRATE DIVERSITY IN FIVE MILE CREEK UPSTREAM AND DOWNSTREAM OF DOLCITO QUARRY. *Scottie M. Jackson, Kylie S. Harmon, Grant Gentry, and Elizabeth G. Dobbins, Department of Biological and Environmental Science, Samford University, Birmingham, AL 35229-2234.*

Increased sediment load and alteration of aquatic pH balance by mining and quarrying activities impact the health of stream ecosystems. Dolomitic limestone runoff from Dolceto Quarry was predicted to have negative impacts on Five Mile Creek. The creek was evaluated for pH, sediment load, and macroinvertebrate diversity above and below a runoff creek from the quarry. Instream and bed-load sediment samples were analyzed for total sediment, organic content, and inorganic content. The invertebrates were evaluated by the modified Family Biotic Index (FBI) and by percent Ephemeroptera, Plecoptera, Trichoptera (EPT). Sediment loads were higher and water pH values more basic downstream from the quarry runoff. Macroinvertebrate samples collected upstream and downstream of quarry runoff showed no significant difference in family populations, number of specimens, or FBI indices; however, both upstream and downstream sites had a low FBI and an extremely low percent EPT. In addition, there was a correlation between the number of macroinvertebrate families and the distance from the runoff both upstream and downstream. The increase in sediment and pH combined with the decrease in number of benthic macroinvertebrate families downstream from the runoff suggest that quarrying and subsequent sedimentation is damaging the natural ecosystem in Five Mile Creek.

STAPHYLOCOCCUS AUREUS SENSITIVITY TO AMPICILLIN AND PENICILLIN. *Stephen A. Cupit, Brian Burnes, Roger Campbell, and John McCall, College of Natural Sciences and Mathematics, University of West Alabama, Livingston, AL 35470.*

The microorganism *Staphylococcus aureus* is one of the more troublesome pathogens encountered in hospital surgical rooms and a leading cause of nosocomial infections. Such infections can be debilitating, and even lethal. *S. aureus*, however, is treatable with various antibiotics. This study examines the effectiveness of two antibiotics with regard to inhibition of *S. aureus* growth. After determining a growth curve for an uninhibited *S. aureus* culture, we observed the inhibition of *S. aureus* growth following inoculation with antibiotics. Antibiotics employed included penicillin and ampicillin. The two antibiotics demonstrate significantly different minimum inhibitory concentrations, with the MIC of penicillin being considerably lower than that of ampicillin.

STUDY OF PROTISTS IN THE ALABAMA, APALACHICOLA, CHOCTAWHATCHEE, TENNESSEE, AND TOMBIGBEE RIVERS. *Justin Kelley, Dr. Brian Burnes, and Michael Turner, Department of Biology, University of West Alabama, Livingston, AL 35470.*

Microscopic protists occur in all types of habitats in our ecosystem. There are an immense number of protists which inhabit the freshwater rivers of the Southeastern United States. The object of this study is to obtain data which represents the amounts of protists occurring in a few of the rivers which are in our region. The protists we will examine will be taken from samples which were drawn from the Alabama, Apalachicola, Choctawhatchee, Tennessee, and Tombigbee Rivers. Through this experiment we see that there are vast amounts of protists contained in the freshwater rivers of the Southeast. These amounts range from approximately 25,000 protists per mL to 100,000 per mL.

SURVEY OF MICROBIAL SOIL OF THE BACK BELT REGION OF ALABAMA. *Molly Jackson, University of West Alabama, Livingston, AL 35470.*

A survey of microbial growth in soil samples of the Black Belt was taken at 3 different locations. Individual colonies were isolated and gram stained. The variation in the types of bacteria and numbers ranged from 7-12 different types per location, and 30-50 numbers of bacteria per milliliter. In conclusion, distinct variations were found among the samples although the sites were in the same region, and roughly 30-45 minutes apart.

THE TEN MOST COMMON AUTUMN LIVESTOCK POISONING PLANTS OF SOUTHEAST ALABAMA. *Kaleb Dyess and Alvin Diamond, Department of Biological and Environmental Sciences, Troy University, Troy, AL 36082.*

Recognizing commonly occurring poisonous plants is crucial to livestock survival. Based upon information obtained from surveys of large animal veterinarians, herbarium specimens, and a search of the literature, the ten most common and widespread species occurring in the autumn in Southeast Alabama are presented in this study. Toxic principles, photographs, and county distributions are provided for each species.

USING SURROGATE METAL IONS TO PROBE IRON BINDING PROPERTIES OF FRATAXIN. *Matt Thacker and Laura Busenlehner, Department of Chemistry, University of Alabama, Tuscaloosa, AL 35487.*

Frataxin is an iron chaperone protein located in mitochondria. Friedreich's ataxia is a neurodegenerative disease caused by a deficiency of frataxin and an overload of iron in mitochondria. Currently, the stoichiometry of iron to frataxin is unknown, as is the exact iron binding sites. Surrogate metals are used to study iron binding to frataxin because Fe(II) is quickly oxidized to Fe(III) when exposed to oxygen. Titrations of frataxin with copper(II) and manganese(II) surrogates were monitored by UV/visible (UV/vis) spectroscopy and/or fluorescence spectroscopy to ascertain the amount of metal bound. With Cu(II), the UV/vis and fluorescence titrations indicated 2-3 copper ions per monomer frataxin. Fluorescence titrations with Mn(II) suggested two metal ions per protein. We also studied the Cu(II)-frataxin complexes by electron paramagnetic resonance (EPR). EPR suggested two spectroscopically-distinct binding sites, one of which contained ligation to histidine. To confirm this finding, His86 was mutated to an alanine and is currently being purified. If the EPR spectra of Cu(II)-bound H86A frataxin loses the signal for histidine coordination, this will indicate the location of one potential iron binding site.

Chemistry Paper Abstracts

INHIBITION STUDIES OF ANTI-OXIDANTS ON STAPHYLOCOCCAL NUCLEASE OXIDATION. *Jovonna L Hassell, Shernett R Schermer and Yun Ho Kim, Department of Physical Sciences, The University of West Alabama, Livingston, AL 35470.*

Proteins are well known to be sensitive to oxidative damage by a variety of oxidants, and

it has been suggested that protein oxidation is as a causative or contributory factor in many diseases. Biological aging is a fundamental process that represents the major risk factor with respect to the development of cancer, neurodegenerative, and cardiovascular diseases in vertebrates. The oxidation of methionine is of particular interest as it has been shown to occur in a wide variety of proteins and often reduces or eliminates biological activity. As preliminary results, the relative effects on four sites of methionine oxidation by hydrogen peroxide (H₂O₂) and comparison of oxidation stability effects on those of each mutated methionine to alanine, glycine, isoleucine, or leucine has been determined. In this research, commercially available anti-oxidants will be employed to examine the inhibitory effects of methionine oxidation upon the stability of staphylococcal nuclease, a well-characterized model protein.

MECHANISTIC STUDY ON THE DEGRADATION OF GASOLINE OXYGENATES BY ULTRASONIC IRRADIATION. Daniel Kim¹, Kevin E. O'Shea², William J. Cooper³, ¹Auburn University Montgomery, ²Florida International University, ³University of California Irvine.

Gasoline oxygenates (MTBE, methyl tert-butyl ether; DIPE, di-isopropyl ether; ETBE, ethyl tert-butyl ether; TAME, tert-amyl ether) are added to gasoline to boost octane and enhance combustion. The combination of large scale use, high water solubility and only minor biodegradability has now resulted in a significant gasoline oxygenate contamination occurring in surface, ground, and drinking water systems. Combination of hydroxyl radical formation and the pyrolytic environment generated by ultrasonic irradiation (665 kHz) leads to the rapid degradation of MTBE and other gasoline oxygenates in aqueous media. The presence of oxygen promotes the degradation processes by rapid reaction with carbon centered radicals indicating radical processes involving O₂ are significant pathways. A number of the oxidation products were identified. The formation of products (alcohols, ketones, aldehydes, esters, peroxides, etc) could be rationalized by mechanisms which involve hydrogen abstraction by OH radical and/or pyrolysis to form carbon-centered radicals which react with oxygen and follow standard oxidation chain processes.

SURFACE MODIFICATION AND CHARACTERIZATION OF POLY-DIMETHYL-SILOXANE. Emanuel Waddell, Department of Chemistry, University of Alabama at Huntsville, Huntsville, AL 35899 and Padma Dharmarajan, Department of Materials Science, University of Alabama at Huntsville, Huntsville, AL 35899.

PDMS (poly-dimethyl-siloxane) is an elastomer with repeating units of -OSi(CH₃)₂O- and has been a key material of interest, having a plethora of applications in various fields including Microfluidics. However, the presence of hydrophobic groups on the surface

diminishes the material's ability to wet itself easily. Thus, the surface has been modified by irradiating it with a 254nm Hg UV excimer lamp in an inert atmosphere. It has been reported earlier that this leads to the formation of carboxylic acid groups on the surface, thus making it more hydrophilic. It has also been reported previously that the hydrophilic nature limits itself at long exposure times and induces the formation of cracks on the surface. We have studied the changing trend of the critical wetting tension with the increasing irradiation times, using contact angle measurements and Zisman plots. Further, the concentration of carboxylic acid groups on the surface has been quantified as a function of exposure time, using absorbance measurements. Finally, electro osmotic flow measurements have been made to assess the effect of modified surface on the flow properties, which is important in Microfluidics.

THE EFFECTS OF TEMPERATURE ON THE SPECIFIC ROTATION OF ISOBORNEOLAND (S)-(-)-ENDO BORNEOLATASPECIFIC CONCENTRATION – PART II. Nagarajan Vasumathi and *Kristin Shirey*, Department of Physical and Earth Sciences, Jacksonville State University, Jacksonville, AL 36265.

The specific rotation of Isoborneol and (S)-(-)-endo borneol was studied under two temperature conditions, one at 0°C and the other at -5°C keeping the solution concentration as 0.01M. Measurements were made using an automatic polarimeter initially at room temperature and then at low temperatures. The experiment was monitored at different time intervals up to one hour and the results were compared to our previous studies*. At room temperature the specific rotation of isoborneol was 1.299. At 0°C, it became more positive, and steadied at 4.547 after twenty minutes. After thirty minutes, it decreased to -2.599 and stabilized at +2.599. At -5°C, the specific rotation showed a different pattern. Initially there was an increase from 1.299 to 1.949. But, after ten minutes, it started to decrease and became -10.394 at thirty minutes. At the end of one hour it reversed back to positive and stabilized at +7.796. This indicates that the % ee of the racemic mixture varies constantly. For the (S)-(-)-endo borneol, at 0oC its specific rotation changed drastically from -44 to -113.686 after 20 minutes, but, then stabilized to the original reading. At -5°C, it showed little change. Preliminary experiments conducted at much lower temperatures (-55 to -70oC) showed the specific rotation of Isoborneol to become negative as observed at higher temperatures*. However, the percent of (R) isomer is relatively low at lower temperatures. The conditions for complete isomerization or possible side reactions will be explored further.

Chemistry Poster Abstracts

CALORIC CONTENT OF FAST-FOODS. *Chris Hornbuckle, Livia Cara, Trisha Mantooth, and Alfred Nichols, Department of Physical and Earth Sciences, Jacksonville State University, Jacksonville, AL 36265.*

The caloric yields from the complete oxidation of fats, carbohydrates and proteins are about 9 kcal/g, 4 kcal/g and 4 kcal/g respectively (Berg et al., 2007). However, this information is often difficult to use in making fast-food selections. Such food products generally contain mixtures of these caloric categories in varying proportions. In this study, students used bomb calorimetry to determine the amount of energy stored in their favorite fast-foods. Ten fast-food samples collected from local restaurants were freeze-dried for a week. A weighed amount of each dried sample was compacted into pellet form and placed in a bomb calorimeter under an oxygen atmosphere. The instrument was standardized using benzoic acid. Computer software was used to determine the temperature change upon ignition of the bomb. Temperature changes resulting from the oxidations of the various foods were used to calculate the heats of combustions for the foods. These values were surprisingly similar for the samples relative to the mass of each sample. French fries had the lowest caloric content of the foods tested. The highest caloric content per gram was seen in a Wendy's junior bacon cheeseburger, probably due to a relatively high fat content.

EXPRESSION, ISOLATION, AND STRUCTURAL CHARACTERIZATION OF E. COLI DNA REPAIR ENZYME MUTM. *Drew Brooks and Laura Busenlehner, Department of Chemistry, University of Alabama, Tuscaloosa, AL 35487.*

The E. coli DNA repair enzyme, MutM, has been shown to remove 7,8-dihydro-8-oxoguanine (8-oxoG), an oxidatively damaged form of guanine nucleotide. 8-OxoG causes the a cytosine to adenine transversion. This causes a missense mutation in which a G-C pair is replaced by an A-T pair after replication. MutM excises 8-oxoG from the DNA strand for subsequent repair. This type of DNA repair is known to be inhibited by heavy metals. Our laboratory seeks to understand this mechanism through in vitro experimentation. To clone the gene for MutM, we used polymerase chain reaction (PCR) to amplify the gene from genomic DNA. Then we ligated our gene into a pET plasmid that also contained a gene for resistance to ampicillin. The plasmid containing the mutM gene was then inserted into a strain of BL-21 E. coli for protein expression - using isopropyl-beta-D-thiodgalactopyranoside (IPTG). After expression, we purified MutM using polyethyleneimine (PEI) precipitation, ammonium sulfate precipitation, cation exchange chromatography, and size exclusion chromatography. Liquid chromatography mass spectrometry (LC-MS) was used to sequence and positively identify MutM. The future goals of our research include

the utilization of fluorescence spectroscopy to monitor heavy metal binding to MutM and Hydrogen-Deuterium exchange mass spectrometry to examine structural changes that may occur upon metal binding.

INHIBITORY EFFECTS AND OXIDATIVE STUDIES ON SULFUR CONTAINING METHIONINE. *Shermett R. Schermer, Jovonna L. Hassell and Yun Ho Kim, Department of Physical Sciences, The University of West Alabama, Livingston, AL 35470.*

The biological activity of proteins is known to be sensitive to oxidative damage caused by oxidants. Biological aging is a fundamental process that represents the major risk factor with respect to the development of cancer, neurodegenerative, and cardiovascular diseases in vertebrates. The oxidation of methionine is of particular interest as it has been shown to occur in a wide variety of proteins and often reduces or eliminates biological activity. As preliminary results, the relative effects on four sites of methionine oxidation by hydrogen peroxide (H₂O₂) and comparison of oxidation stability effects on those of each mutated methionine to alanine, glycine, isoleucine, or leucine has been determined. The model protein staphylococcal nuclease is used to explore the inhibitive effects of various known antioxidants on protein structural stability after the methionine residues are exposed to the hydrogen peroxide.

ISOMERIC STABILITY AND PROPERTIES OF POLY-NITROGEN MOLECULES. *Geanee' B. Quinney, Jong H. Kim and Jamiu Odutola, Department of Chemistry, Alabama A&M University, Normal, AL 35762.*

Several isomers of poly-nitrogen molecules ranging from N₂₆ through N₆₀ were constructed and calculations carried out. The computational approach involves a quantum mechanical method to determine their stability and properties. The most stable conformation for each of the poly-nitrogen clusters is determined by geometry optimization and confirmed by frequency calculations using a DFT method (B3LYP) with the 6-31G(d,p) basis set. 6-311+G(3df,3pd) is used to calculate the single point energy for each optimized structure.

MERCURY UPTAKE BY EARTHWORMS WITH A SUBACUTE EXPOSURE. *Alfred C. Nichols and David A. Steffy, Department of Physical and Earth Sciences, Jacksonville State University, Jacksonville, AL 36265.*

Earthworms are reported to accumulate mercury (Hg) when grown in Hg contaminated soil (Ernst and Frey, 2007). Earthworms, *Lumbricus terrestris*, were grown in soils with five different levels of mercuric ions: no added Hg, 25 mg Hg per kg of soil, 50 mg/kg, 100 mg/kg and 200 mg/kg. Worms were harvested from each exposure group at two, three, and four weeks of soil exposure. Freeze-dried worm tissues were analyzed for total Hg tissue concentrations using a cold vapor atomic absorption Hg analyzer. At the 25 mg/kg soil exposure level, worm tissue concentrations remained relatively constant over the four week period with a mean of 11.17 micrograms of Hg per g of dry tissue. At the 50 mg/kg soil level, the tissue mean was 44.70 $\mu\text{g/g}$ after two weeks and 232.05 after four weeks. No live worms were found in the two highest exposure groups after three weeks of exposure. After two weeks, worms with the 100 mg/kg exposure had a mean tissue level of 53.88 $\mu\text{g/g}$, and worms at the 200 mg/kg exposure had a mean tissue level of 272.29 $\mu\text{g/g}$.

PHYTOCHEMICAL INVESTIGATION OF ZANTHOXYLUM SETULOSUM.
Tameka M. Walker and William N. Setzer, Department of Chemistry, University of Alabama in Huntsville, Huntsville, AL 35899.

In this work, the fractionation of active materials, cytotoxic activity, and determination of chemical structures of isolated compounds from *Zanthoxylum setulosum* were evaluated. *Zanthoxylum setulosum* was notably cytotoxic (100% kill at 100 mg/ml) on MCF-7, MDA-MB-231, and MDA-MB-468 cells in vitro. Therefore, the cytotoxic effects of isolated extracts from *Zanthoxylum setulosum* were tested against MCF-7 breast cancer cell lines. Two pure compounds of the isolated fractions (F14 and F37) exhibited high cytotoxic killing against MCF-7 cells at 100% and 86% kill at 100 mg/ml, respectively. LC50 values were determined for the pure compounds, with F14 having a value of 36.4 mg/ml and F37 46.4 mg/ml. The chemical structure of F29 was determined by X-ray crystallography and nuclear magnetic resonance spectroscopy (NMR) to be sesamin. The primary objective is to isolate fractions from *Zanthoxylum setulosum* and identify the active components for new potential chemotherapeutic drugs.

STRUCTURAL STUDIES OF HUMAN MITOCHONDRIAL ACONITASE.
Margaret A. Adams and Laura S. Busenlehner, University of Alabama, Department of Chemistry, Tuscaloosa, AL 35487.

Mitochondrial aconitase is the enzyme responsible for the isomerization of citrate to isocitrate in the tricarboxylic acid (TCA) cycle. Aconitase contains an iron-sulfur cluster [4Fe4S] that reacts directly with the substrate. However, the protein can lose one of its iron atoms from the cluster resulting in an inactive form [3Fe4S]. This inactivation may be linked to Friedreich's ataxia, a neurodegenerative disease characterized by a deficiency

of the protein frataxin. It is believed that frataxin can act as an iron chaperone to bind and deliver iron to reform the active [4Fe4S] cluster of aconitase and possibly guard against iron loss under oxidative stress. Our research goal is to study the three-dimensional structure of aconitase using amide hydrogen/deuterium exchange mass spectrometry (H/D exchange MS). We plan to examine the possible interaction sites between frataxin and aconitase. We are currently focusing on cloning (i.e. inserting) the gene for human aconitase into an *E. coli* protein expression vector using polymerase chain reaction (PCR), restriction endonuclease digestion, and DNA ligation. The protein will be expressed by *E. coli* and purified through chromatography. H/D exchange MS requires that aconitase be digested into peptides using the protease pepsin. We will use mass spectrometry to identify the amino acid sequences of each peptide and determine their orientation within the entire protein. Then the H/D exchange MS can be performed to examine the interactions between aconitase and its putative iron chaperone frataxin.

SYNTHESIS OF WATER-SOLUBLE PHOSPHINES AND THEIR APPLICATION TO RECYCLABLE, AQUEOUS-PHASE PALLADIUM-CATALYSTS. *Hannah Box, Dr. Kevin Shaughnessy, and William S. Brown. Department of Chemistry, University of Alabama, Tuscaloosa, AL 35401.*

The ability to do organic chemistry in the aqueous phase has become of great interest in the last several years in order to make these processes safer and less environmentally harmful. In particular, the ability to do metal-catalyzed coupling reactions in water has been a focus of much of this research. It is widely known and accepted that phosphine ligands have the ability to enhance the reactivity of many coupling reactions. To this point, there have been many attempts at making phosphines that have water-solubilizing groups attached, however the catalysts derived from these ligands have shown only modest activity. In effort to overcome these limits, our group has developed sterically demanding, electron rich water-soluble phosphines, such as DAPPS (3-(diadamantylphosphonium)propane sulfonate and DTBPPS (3-(di-tert-butylphosphonium)propane sulfonate. These new phosphine ligands provide more active palladium catalysts than 3-(di-tert-butylphosphino) ethyltrimethylammonium chloride (t-Bu-Amphos) in carbon-carbon bond-forming reactions. While both show relatively good activity, it has been the focus of our research to determine which ligand facilitates Suzuki couplings at a faster rate (DAPPS, DTBPPS, or t-Bu-Amphos). In addition to determining the rate of reaction, new water soluble phosphines are being synthesized in efforts to overcome the limitations of DAPPS and DTBPPS. The ability to recycle catalysts derived from these water-soluble ligands is also being explored.

THE EFFECTS OF TANNINS ON FREE RADICALS. *Twaskia S. Johnson and William N. Setzer, University of Alabama in Huntsville, Department of Chemistry, Huntsville, AL 35899.*

The use and search for natural drugs and antioxidant have been derived from plants with secondary metabolites. The content of this paper is to explore the effectiveness of tannins on the inhibition of free radicals and to discover the free radical scavenging abilities of tannins in unknown plant species. Free radicals are responsible for every known degenerating disease. Free radicals are also directly related to the aging process due to stress and over production nitric oxides present in the body. Secondary compounds are desirable for their anti- inflammatory, therapeutic uses, reduction in swelling, and prevention of heart disease, allergies, and other illnesses. Tannins are highly potent antioxidants which have the capability to neutralize free radicals. They are found in the cell walls of plants, in the stems, roots, leaves, and the bark of trees. The Modified Prussian Blue Assay is a general screen to actually determine what compounds are present in our unknown plant species *Inga Sierrae* and *Munca Urens*. After using the staining assay, quantization of the free radical scavenging capabilities is possible by using DPPH, a stable free radical to measure the antioxidant activity. Separation of these pure compounds whether being alkaloids or polar compounds will be separated on HPLC and characterized by NMR. This study was conducted to better understand the process of finding higher end plants with important medicinal properties which help aid in human discomfort. Understanding the healing properties of these secondary compounds will promote more of an interest in natural drug discovery.

Chemistry (Alabama Undergraduate Research Symposium)

THE ANTIOXIDANT LEVELS IN VARIOUS PARTS OF MANGO FRUIT: EFFECT OF REGIONAL GROWTH. *Ashley Casey, Jayne Lampley, and Nixon Mwebi, Department of Physical and Earth Sciences, Jacksonville State University, Jacksonville, AL 36265.*

There are various fruits and vegetables that are known to be rich in antioxidants. Antioxidants are said to be beneficial in the reduction and inhibition of oxidative reactions and therefore preventing their harmful effects in biological systems. Mangoes are a very good example of such a fruit; they contain various parts (peel, pulp, seed, and kernel) that are rich in antioxidants such as carotenoids and flavonoids. Mangoes are the most widely consumed fruit in the world and are grown in various regions, especially in the tropics. There is still much to be learned about the regional growth of the mango and how it affects the level of antioxidants. There are reports that address the levels of antioxidants in various

parts of the fruit but few have compared and identified which part contains the highest level of antioxidants. This is a systematic study that compares the level of antioxidants in the various mango parts, and the effect that the regional growth has on the level of antioxidants. A spectroscopic technique that involved ferric antioxidant reducing power (FRAP) was used to measure the antioxidant levels in the various parts of the mango fruit. High performance liquid chromatography was also used to ascertain the effect of regional growth on the levels of antioxidants in the fruits.

Engineering and Computer Science Paper Abstracts

EXTRACTING CO-EXPRESSION RELATIONS BETWEEN GENES USING GRAMMATICAL PARSING. *Richa Tiwari*, Department of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35294-1170.

It is hard manually, to keep track of all the new data being published in the field of biomedical research. It is essential to develop a system that is able to perform text mining on these publications and extract hypotheses and experimental results for interested parties. To get the relevant information from these resources, many techniques in text mining, including knowledge discovery, information retrieval, and information extraction, etc., are being developed. These techniques operate on a finer level and examine the relationships between entities contained within the documents. In this paper, we describe some of our ongoing work in the area of text mining and information extraction which will help this problem of information overload. This project aims at retrieving biomedical entities like 'genes' and relationships between them from diverse forms of publications, using a mixture of techniques in text mining and Natural Language Processing. Name-Entity Recognition is achieved by using statistical models and GENETAG corpus to extract gene names. For Grammatical parsing, we use Part of Speech Tagger developed by Stanford Natural Language Processing group. Grammatical Parsing of sentences give us an idea of how the relations are expressed, which can later assist us in preparing a graphical learning model (e.g. Conditional Random Field (CRF) Model). As this project is still on-going, in future we plan to develop a CRF-based classifier for identifying sentences with 'co-expression' relation between the genes. This project will help the users to retrieve all the papers that have a discussion about a particular gene being co-expressed with other genes.

JIBU: A TOOL FOR EFFICIENT AND RELIABLE CONCURRENT PROGRAMMING. *Srinivasarao Krishnaprasad*, Department of Mathematical Computing and Information Sciences, Jacksonville State University, Jacksonville, AL 36265.

Concurrent programming has gained mainstream attention with the advent of multi-core processors. Concurrency in applications is typically coded as multithreaded programs. Thread-level programming is often a low-level, platform dependent activity making application development challenging and difficult. Jibu (see www.axon7.com) is a library to facilitate multi-core programming for C++, Java, .NET, and Delphi platforms. Instead of dealing with low-level primitives and constructs like semaphores, mutex locks, monitors, condition variables and signals, Jibu provides to the developer a high-level abstraction for parallel and concurrent programming in a platform independent fashion. Jibu has predefined Parallel class with parallel For and parallel Reduce methods that simplify parallel programming. Jibu's concurrency is at the logical level of tasks as opposed to threads. The many tasks at the application level are seamlessly mapped to the available threads in the pool by the Jibu scheduler ensuring load balancing. Inter-task communication is simplified greatly using the abstractions of Channels and mailboxes. Every task has an integrated mailbox using which inter-task communication may be achieved using simple primitives. Channels provide communication and synchronization mechanism with either buffered or non-buffered links using simple primitives. Channels and mailboxes provide implied synchronizations thus greatly simplifying application development. Event coordination and synchronization are achieved via Choice facility. Choice object allows for prioritized selection or fair selection amongst predefined events. These high-level constructs effectively allow programmers to develop efficient and portable applications quickly and reliably.

KINEMATIC STRUCTURE AND EVOLUTION OF THE 9 MARCH 2006 MISSISSIPPI/ALABAMA BOW ECHO. *Calvin M. Elkins, Atmospheric Science Department, University of Alabama in Huntsville, Huntsville, AL 35899.*

Bow echoes are a common meteorological phenomenon and are responsible for many severe weather warnings and weather related damage. This is especially the case in the Southeast US during the cold season. On 9 March 2006, a severe cold season squall line formed over Louisiana and intensified just east of Columbus, MS, near the Mississippi – Alabama border, where it assumed a bow echo configuration and produced a long swath of damaging winds from eastern Mississippi to northern Alabama. While the storm exhibited several familiar earmarks of cold-season bow echoes, questions still remain as to why the bow formed exactly where it did and why it evolved from bow to break so quickly. This study specifically investigates the characteristics of this bow echo system (mesoscale and synoptic) during its passage near Columbus, MS, with special attention given to the kinematic structure and evolution of the system.

METAMODEL RECOVERY SYSTEM USING GRAMMAR INFERENCE. *Qichao Liu, Determent of Computer and Information Sciences, University of Alabama at Birmingham, Birmingham, AL 35205.*

With the rapid development of model-driven engineering and domain-specific modeling, modeling has become a widely used software development technique. In a general modeling tool, metamodels serve as the syntax of models and take charge of loading models into the tool. However, it is very likely that we may lose the metamodel due to a hard-drive crash or version conflicts, resulting in the failure of loading and applying existing model instances. Our solution to this problem is to infer the metamodel from model instances, that is, to recover the metamodel schema definition from instances which have been separated from their original defining metamodel. MARS (Metamodel Recovery System Using Grammar Inference) has been developed to infer a metamodel from a collection of instance models. The key contribution of this system is the application of grammar inference algorithms to the metamodel recovery problem. The main limitation of MARS is that only some basic and simple metamodels can be inferred. In order to enable more powerful and practical applications, our current work focuses on inferring the modularization of large metamodels, inferring not only single-tiered metamodels composed of a large number of elements but also metamodel element types and multi-tiered metamodels. In addition, MARS has focused specifically on recovering metamodels for GME, enabling the same process in other modeling tools such as metaEdit+ and Microsoft Domain Specific Language tools.

METHOD FOR SEMANTICS-BASED CONCEPTUAL EXPANSION OF ONTOLOGY. *Liping Zhou, Chengui Zhang, and Xin Chen, University of Alabama at Birmingham, Birmingham, AL 35205.*

A semantics-based method is proposed to extract concepts from a large corpus of text documents and expand the concepts of the known Ontology based on the semantic relations between two terms. The proposed method explores how to identify the candidate concepts, and how to give suggestions to knowledge engineers on where the concepts should be inserted in a given Ontology. The effectiveness of this approach is demonstrated by experiments on a Traditional Chinese Medicine (TCM) text corpus. The proposed method has several advantages: 1) it is based on semantic statistics instead of term frequencies. 2) It uses Universal Networking Language (UNL) expressions to formalize the structure of text, hence structuralize the Ontology representation. 3) It categorizes the relationships among concepts and assigns them different weights based on semantics. 4) We put forward two different approaches for calculating similarities among concepts. One approach is the calculation of similarities based on UNL network, while in the other method the similarity is calculated according to a conceptual semantic matrix. 5) Candidate concept selection and insertion is converted to a quadratic optimization problem that can be easily solved. In brief, we proposed a new approach of Ontology conceptual expansion based on the statistics of semantic information, which is different from term-frequency based approaches. TCM Ontology is used to verify the proposed algorithm. It is also worth mentioning that the proposed approach is domain-independent and can be applied to many other fields.

Health Science Paper Abstracts

DISASTER RESPONSE IN ALABAMA: STATE OF EMERGENCY DEPARTMENT PREPAREDNESS FOR TERRORIST ATTACKS AND NATURAL DISASTERS.

Corinne Wojner, University of Alabama at Birmingham, School of Nursing, Birmingham, AL 35205.

As the front-door to our nation's hospitals, Emergency Departments must be prepared at all times to deal with unexpected and often life threatening emergencies. This study proposes to describe the state of preparedness of Alabama Emergency Departments in wake of a natural disaster or terrorist attack. This was a descriptive cross-sectional survey study that utilized the Bioterrorism Emergency Planning and Preparedness Questionnaire for Healthcare Facilities. 5 hospitals containing an emergency department within the state of Alabama participated. The questionnaire was placed online for participants to fill out. All five hospitals polled, (100%) stated that their hospital conducted in-service training on biological weapons, and confirmed that their hospital's preparedness plan was integrated into the city's preparedness plan. All five hospitals plans address expanding staff availability and 2 hospitals confirmed participation in multiple facility credentialing procedures. 100% reported that their hospital's preparedness plans address mass casualty incidents involving biological agents. All 5(100%) participants did not know if their hospitals stockpiled antibiotics or knew how long it would take to replenish antibiotic supplies. The participant's overall view of their hospital's ability to identify specimens of biological terrorism were, 2(40%) fair, 1(20%) good, and 2(40%) very good. Among hospitals in Alabama, disaster preparedness appears limited primarily in biological preparedness by failure to stockpile adequate amounts and types of antibiotics as well as have the ability and or knowledge to manage victims of biological weapons.

EVIDENCE-BASED PROTOCOL TO DECREASE THE OCCURRENCE OF HEALTHCARE ASSOCIATED POSTOPERATIVE SURGICAL SITE INFECTIONS. *John M. Martin, University of South Alabama, Mobile, AL 36688.*

Based on Centers for Disease Control and Prevention figures, approximately 374,000 healthcare associated surgical site infections occur in the United States per year. A project protocol was developed to include evidence-based methodology, along with an educational component, to decrease the occurrence of HAI's after surgery. The Evidence-Based Multidisciplinary Practice Model provided the template for protocol construction. The two main goals of the project were: 1. Improve patient outcomes through the standardization of antibiotic prophylaxis regimens. 2. Improve organizational outcomes through better

asepsis and sterilization techniques. To accomplish the objectives, guidelines from the Surgical Care Improvement Project (SCIP) were included. Also, emphasis was placed on decreasing the use of flash sterilization along with the provision of inclusive surgical “packs” to minimize the need to open individual sterile supplies. Quantitative and Qualitative data was acquired through the use of a Qualitative Data Questionnaire along with numerical data based on patient encounters and infection rates. To date, outcomes of project implementation include an increase in compliance with SCIP guidelines and improved awareness of aseptic practices. Furthermore, project stakeholders, realizing the need for evidence-based practice, have established a multidisciplinary surgical oversight committee. The committee allows for continuous monitoring of the surgical environment, provides a venue for suggestions, and ensures project sustainability. The goal is to improve patient safety and decrease the occurrence of postoperative infections; utilizing current best practices and up-to-date evidence within the literature.

FACILITATORS AND BARRIERS TO LIVING KIDNEY DONATION IN AFRICAN AMERICANS: A COMPARISON OF PRE- AND POST-TRANSPLANT PERSPECTIVES. *Stephanie J. Ensminger* and *Ellen Buckner*, University of Alabama School of Nursing at the University of Alabama at Birmingham, Birmingham, AL 35294.

This study investigated the area of living kidney donation among African Americans and explored perceived facilitators and barriers to living kidney transplant within this population. The 22 participants were English-speaking African American pre- and post-transplant patients being seen in the renal transplant clinic of a southeastern state. Quantitative data was gathered from the pre-transplant participants through use of the 27-item Living Organ Donor Survey (LODS) tool created by Lunsford et al. (2007). Face and content validity and reliability of the LODS were previously established by its creators. The LODS tool looked at both willingness to donate and recipients’ concerns for potential donors. Qualitative data was gathered from both pre- and post-transplant participants by use of open-ended investigator-designed interview questions. Content validity of the interview questions was established by experts in the field of renal transplant. The interview questions focused on three aspects of living donation: thoughts about transplant, thoughts about donor organs, and asking for living donation. Results from the LODS indicated a higher willingness to ask friends than family for a living donation. In addition, the LODS revealed that many of the concerns participants expressed for the living donor were psychosocial concerns. Results of the interview questions revealed that pre- and post-transplant participants shared many of the same thoughts about transplant and donor organs. The reasons given by the post-transplant participants for not having had a living transplant are similar to those found in other comparable investigations: family history of disease precluding donation and lack of matches found among eligible donors. Acknowledgments: Ellen Buckner and the transplant clinic staff.

HEALTH LITERACY AND DIABETIC OUTCOMES IN A RURAL ALABAMA SETTING. *Matthew Stine and Ellen Buckner, School of Nursing, University of Alabama at Birmingham, Birmingham, AL 35205.*

The objective of this study was to understand the mediating factors of health literacy (e.g., knowledge, behavior) and their influence on health outcomes in an underserved and disadvantaged population. IRB approval was obtained. A correlational study design was used to examine the relationships between levels of health literacy and diabetes knowledge, diabetes self-management and diabetic outcomes in patients undergoing dialysis treatment at a rural southern dialysis clinic. Instruments utilized to quantify health literacy included an adapted version of the Literacy Assessment for Diabetes (AVLAD) (Nath, et al., 2001) and The Newest Vital Sign (NVS) (Osborn, et al., 2007). Tools chosen to measure diabetes knowledge and diabetes self-management were the Spoken Knowledge in Low Literacy in Diabetes (SKILLD) and an adapted version of the SKILLD respectively (Rothman, et al., 2005). Patient charts were reviewed for data pertaining to specific diabetic outcomes (HgbA1c, length of time on dialysis). Perceived barriers to self-management were evaluated through participant/investigator structured interviews. A total of eight participants were obtained for the purpose of this study. Seven participants had an estimated grade reading level of ninth grade and above (AVLAD). In contrast, NVS indicated six participants had a high likelihood of limited literacy. Mean SKILLD score was $46.3\% \pm 11.9\%$, indicating that diabetes knowledge is lacking in this population. No relationship was observed between health literacy levels and self-management. No relationship was observed between health literacy and the selected health outcomes. Proper nutrition was the most commonly expressed barrier to diabetes self-management.

ORGANIZATIONAL SUPPORT, PERCEIVED SOCIAL SUPPORT, AND INTENT TO TURNOVER AMONG PSYCHIATRIC NURSES: A MIXED-METHODS STUDY. *Beverly J. Myers, RN, MSN, MA, Kathleen C. Brown, RN, PhD, Andres Azuero, MBA, School of Nursing, University of Alabama at Birmingham, Nataliya V. Ivankova, School of Education, Henry Robertson, School of Public Health, University of Alabama at Birmingham, Birmingham, AL 35205.*

Purpose: To examine the relationship between perceived social support and psychiatric nurse intent to turnover from a broader perspective of the work-family social environment. Central Question: What is the best predictive model of psychiatric nurse intent to turnover using perceived organizational support and perceived social support from family, friends, and significant others? Background: Nurse Turnover compromises the quality of patient care and leads to an increase in organizational costs. Few studies have examined the relationship between social support received from the health care organization, family, friends, significant others and nurses' intent to turnover. Methods: Survey packets will

be mailed to a random sample of 900 psychiatric nurses derived from a mailing list of 1380 psychiatric nurses registered with the Alabama Board of Nursing. Participants will complete two self-report surveys and a demographic form. Up to 12 psychiatric nurses will participate in 45 minute interviews to expand on the quantitative results. Inclusion Criteria: a psychiatric nurse employment status and employment as a registered nurse in the State of Alabama. Results: Descriptive statistics, multiple regressions and binary logistic regressions will be calculated. Qualitative analysis will include verbatim transcription of the semi-structured interviews, followed by line-by-line data coding. Discussion: The qualitative findings will build on the initial quantitative findings.

PERSPECTIVE TRANSFORMATION IN RN TO BSN STUDENTS. *Arlene H. Morris and Debbie Faulk, School of Nursing, Auburn University Montgomery, Montgomery, AL 36124.*

Identification of effective teaching-learning activities can increase the evidence-base for nursing education. The purpose of this research was to examine whether there are resultant behavioral changes in professionalism for returning adult RN to BSN students, and to identify teaching-learning activities that stimulate transformative learning. Mezirow's (1991) Adult Learning Theory served as a theoretical guide for the study. A convenience sample of students enrolled in a RN to BSN completion program during two academic years was surveyed. Behavioral changes in nursing professionalism were measured using an online three-month post-graduation survey. The survey elicited qualitative and quantitative data regarding teaching-learning strategies perceived by students to stimulate transformative learning in an RN to BSN nursing program. Twenty six separate learning activities were identified as creating cognitive dissonance (conflict of values). Post-graduation changes in professional values were also identified in relation to the teaching-learning strategies. Changes in professional behavior three months post-graduation included increased collaboration with the healthcare team, increased patient advocacy, and increased confidence in the role as teacher of patients and families, transformation in professionalism. Measurement of behavior changes in the graduate professional nurse indicate that planned learning activities that stimulate cognitive dissonance can foster perspective transformation, resulting in increased professionalism.

Heath Science Poster Abstracts

A CLINICAL LADDER REVISION BASED ON THE EVIDENCE. *Valorie A. Dearmon, College of Nursing, University of South Alabama, Mobile, AL 36688 and Ellen Buckner, College of Nursing, University of Alabama at Birmingham, Birmingham, AL 35294.*

As hospitals face increasing demands to enhance patient safety and quality, organizations continue to search for ways to recruit staff support to meet today's unprecedented challenges. A well built clinical ladder program that acknowledges the talents of staff and engages registered nurses' support of organizational goals for quality is one means used by numerous organizations to enlist staff assistance. Evidence indicates that nurses ascending to higher levels on ladders demonstrate greater confidence, are more likely to base practice on evidence, and perceive care rendered as better in quality. For two sister hospitals in the Southeast, mounting demands for improved quality and financial performance, accompanied by a recognized need for professional development, spurred interest in revisiting an existing clinical ladder program. The process used to replace the outdated and underutilized clinical ladder program with an evidenced based program that encourages integration of best practice and rewards initiative to improve outcomes is discussed. The revised program, modeled after the University of Colorado's clinical advancement program is based on Benner's model and crafted to enhance professional autonomy and accountability, to increase nurse expertise and to disseminate best practice. Discussion includes the methods used during the change initiative to promote staff ownership of the revision, to incorporate best evidence, and to achieve consensus among stakeholders. The professional growth and maturity of contributing members during the change process is highlighted.

CAVITY PREVALENCE IN BOTTLE-FED AND BREAST FED INFANTS IN BLACK BELT COUNTIES. *Latigra Houston* and Tracy Duckworth, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470.

Differences in the rate of cavity development between breast-fed children and bottle-fed children were evaluated employing a series of surveys. Our study involved 92 kindergarten through fourth grade students living in Marengo, Sumter, Dallas, and Russell counties in the western part of the Black Belt Region of Alabama. Previous studies have tried to determine whether breast-feeding results in a reduced rate of early childhood caries as compared to that experienced in bottle-fed infants. Our study found that 50% of breast-fed children developed no cavities; breast-fed/bottle-fed children had 61.5% with no cavities, while bottle-fed children had a 45% no cavity rate. Of the breast-fed children that developed cavities, 33.3% and 16.7% developed one or two cavities respectively. Breast-fed and bottle-fed children had a 3.8% and 19.2% chance of developing one or two cavities respectively. 7.9% of the breast-fed/bottle-fed children developed three and four cavities. Eighteen percent of the bottle-fed children developed one to two cavities, 10% developed three, while 3% developed anywhere from four to eight cavities.

DRAIN CLEANER ACCIDENTS IN THE UNITED STATES: A RETROSPECTIVE EPIDEMIOLOGY STUDY. Ronald N. Hunsinger and Joy J. Al-Massaad, Department of Biological and Environmental Sciences and Ida V. Moffett School of Nursing, Samford University, Birmingham, AL 35229.

Many products designed to open clogged plumbing drains are available residentially and are marketed to the public in the form of concentrated caustics, i.e., either strong bases or acids. Alkaline drain openers (ALKDOs) are typically formulated as either sodium hydroxide (liquid or granular form) or sulfuric acid drain openers (SADOs). In this study, a retrospective analysis was conducted of drain cleaner accident data in the National Electronic Injury Surveillance System (NEISS) of the United States Consumer Product Safety Commission for years 1996 - 2006. Drain cleaner injury rates per 100,000 US population over the test period averaged 0.017 for all ages and 0.009 for victims under 20 YOA. These injury rates were low, compared to other reported injuries from items in common public use such as lawn mower accidents, which were associated with a rate of 11.1 injuries per 100,000 for 20 YOA or less, or golf cart injuries with a recently reported injury rate of 49.99/100,000. Seven deaths were associated with drain cleaner accidents over the 1996 - 2006 test period. Two age-related peaks for drain cleaner injuries were observed during the test period, one at < 2 YOA and one at 41 - 50 YOA. Body areas most involved in drain cleaner injuries were: head (16% of all injuries), trunk (28%), arms (28%) and legs (28%). Sixty-four percent of all head injuries involved the eyeball. From a comparative risk analysis standpoint, our study concludes that while the likelihood of drain cleaner accidents is low, the magnitude of consequences can be great. The weight of evidence argues for a periodic review of the use of these products and an emphasis on the proper use and storage of drain cleaner products.

Industry and Economics Paper Abstracts

IS THE PARTY OVER FOR CAPITALISM? James G. Alexander and Marsha D. Griffin, Alabama A&M University, Normal, AL 35762.

The current bad economic conditions are commonly being heralded as a crisis of capitalism. In the United States, there are certainly signs that the respite from the "era of big government" was short-lived. Several factors account for the re-emergence of expanding governmental influence in the economy: social philosophy; stimulus needs; shifting priorities; and "seniorization." A major legacy of the "Bush 43" administration is the removal of the social philosophy of limited government from its traditional institutional locus in the Republican Party. The broadly based support for major stimulative action cuts across a wide socio-political spectrum. The election of 2008 reflects the shifting national

priorities. And the expanding senior population will increase social insurance needs. Fortunately, a careful examination of history demonstrates that a substantial and active government is not inimical to successful economic performance. U.S. growth rates were more robust in the first half of our post-World War II experience than in the second half. Now that the economy is deeply recessed, clearly there is a need for systemic simulative action. However, the older and more puritanical view of recessions as a result of moral failure/excesses now resonates. The system needs re-balancing rather than replacing. The party is not over and the system can be revitalized, but only through bold policies and by ending the debauchery of unfettered catch-as-catch-can.

PRODUCTIVITY AND EFFICIENCY ANALYSIS IN FINANCIAL MARKET. *Joo Young Lee, Department of Accounting, Finance, and Economics, University of West Alabama, Livingston, AL 35470.*

This study will examine the relationship between the global stock market volatility and the cross-sectional dispersion of stock market returns among individual countries to the global market returns. Most previous studies had focused on the relationship between these two variables in one country showing positive relationship between them. In this study, the relationship will be extended to the global market context. Two different approaches will be used to measure the cross-sectional dispersion of stock market returns in individual countries. First, the traditional simple standard deviation for the relative dispersion among the stock market indexes of individual countries. Second, data envelope analysis (DEA) or stochastic frontier analysis (SFA) can be used to measure the relative dispersion. DEA or SFA usually measure efficiency or productivity of individual firms or institutions in the various industries. The second approach is more valid with the assumption that the global stock markets are integrated with the development of integrated international economy. With the use of the representative stock market indexes in each country, the world global stock market frontier will be estimated. After measuring the relative dispersion, regression analysis will be used to show the relationship between the global market volatility and the dispersion. The global market volatility will be measured by the standard deviation of world stock market composite index. The weights for each country will be based on the equivalent dollar value of trading volume of the stock markets.

TIPS FOR TEACHING GENERATION Y STUDENTS: SELECTED FINDINGS. *Marsha D. Griffin and James G. Alexander, Alabama A&M University, Normal, AL 35762.*

Today, the so-called traditional college student is a member of the Generation Y age cohort, commonly defined as those born in the period 1980 – 2000, although the age range varies, depending upon the source consulted. Since most college/university teachers face this group every school day, it is appropriate to study it and consider teaching strategies that

have worked for some of our peers. First, this paper highlights some of the differences between Generation *Y* and its predecessors, identifies several characteristics of the group, and underscores some of its shared experiences. Second, the paper offers guidelines that have proven beneficial to some teachers in various disciplines. In addition, several resources are identified, including numerous citations and a list of several relevant websites.

Physic and Mathematics Paper Abstracts

ANALYSIS OF TRACE ELEMENTS IN LIQUIDS USING LASER INDUCED BREAKDOWN SPECTROSCOPY. Akshaya Kumar, Prakash C. Sharma, Department of Physics, College of Engineering, Architecture and Physical Sciences, Tuskegee University, Tuskegee, Alabama 36088.

Laser induced breakdown spectroscopy (LIBS) is an online and real time measurement technique for detection of trace elements. This technique works for any liquid, solid or gas samples. In this technique, a laser beam is tightly focused on the surface of sample. Strong electric field of the laser light creates plasma of the sample in the focused area of the beam. The spectrum of the plasma plume created by laser beam gives signature of the elements present in the sample which is recorded using a spectrometer. Using calibration curve it is possible to detect the concentration of trace elements. The LIBS measurement of elements present in water sample would be presented.

DETECTION OF HUMAN INTERLEUKIN-8 (IL-8) USING A COMBINATION TAPERED FIBER-OPTIC BIOSENSOR PROBE. Chun-Wei Wang and Rakesh Kapoor, Department of Physics, University of Alabama at Birmingham, Birmingham, AL 35294.

We are reporting detection of human interleukin-8 (IL-8) using combination tapered fiber-optic biosensor (CTFOB) dip-probe. With these probes we could successfully detect IL-8, up to a concentration of 500 pM. Sandwich immunoassay was used as the detection technique. The specificity of the sensor was established by using two types of negative control probes. It is demonstrated that the developed CTFOB dip-probe is a highly specific detector as the signal from the non specific protein was not more than the background signal.

EDGEWORTH EXPANSION FOR LINEAR REGRESSION PROCESSES WITH LONG-MEMORY ERRORS. *Mosisa G. Aaga*, Auburn University Montgomery, Montgomery, AL 36124.

This paper provides an Edgeworth expansion for the distribution of the maximum likelihood estimators (MLE) of the parameter of a time series generated by a linear regression model with Gaussian, stationary, long-memory errors. Under some sets of conditions on the regression coefficients, the spectral density function, and the parameter values, an Edgeworth expansion of the density as well as the distribution function of a vector of centered and normalized derivatives of the PLL function of arbitrarily large order is established. This is done by extending the results of Andrews, D. and Lieberman [2002] who provided an Edgeworth expansion for the Gaussian stationary long-memory case to a linear regression processes with stationary Gaussian long-memory errors.

ELECTROSTATICS IN N DIMENSIONS WITH ILLUSTRATIVE EXAMPLES. *Arjunu Tau* and *Matthew E. Edwards*, Department of Physics, Alabama A&M University, Normal, AL 35762.

The principles of electrostatics are applied in n dimensional space. Specifically, Laplace's equation is solved in n dimensions to obtain the electric potential, and hence the electric field. It is observed that the one- and two-dimensional Laplace's equations correspond to the infinite plane and infinite line charge distributions, respectively. Laplace's equations in dimensions higher than 3 correspond to electric multipole fields of order l , where $l = n - 3$. The Panofsky and Phillips explanation of the multipole fields is extended to those of the infinite line and plane charge distributions. Finally, an alternative explanation of the multipole fields is advanced which shows that the electric fields are inversely proportional to the "surface areas" of the "spheres" in n dimensions.

OPTICAL PROPERTIES OF RARE EARTH DOPED GLASSES. *Hashim K. Samuel*, *Akshaya Kumar*, and *Prakash C. Sharma*, Department of Physics, Tuskegee University, Tuskegee, AL 36088.

Glasses doped with rare earth ions are easier to make than growing crystals. It is also easy to change the composition of glasses than crystals. We have studied the absorption and emission properties of Sm^{3+} ions doped in tellurium niobate glass. The composition of glass is $(70-x)\text{TeO}_2 - 23.75\text{ZnO} - 4.75\text{Na}_2\text{CO}_3 - 1.5\text{KNbO}_3 - x\text{Sm}_2\text{O}_3$. Where x is 0.5, 1, 1.5, 2 and 3 mole%. Concentration quenching has been observed.

TEMPERATURE EFFECTS ON SHOCK WAVE PROPAGATION IN PLASMAS. Nirmol K. Podder and Aaron C. LoCascio, Department of Math and Physics, Troy University, Troy, AL 36082.

Acoustic shock waves are launched in a steady-state glow discharge, pulsed discharge, and afterglow plasmas. Shock wave dispersion and velocity are analyzed as a function of the delay between the plasma on/off and the shock launch. In the igniting plasma, the changes in the shock-front velocity and dispersion are found to be a strong non-linear function of delay until a saturation point is reached. On the other hand, in the afterglow plasma the trend has been opposite and reversing towards the room temperature values. The observed shock wave properties in both igniting and afterglow plasmas correlate well with the inferred temperature changes in the two plasmas.

TEMPERATURE MEASUREMENT IN GLOW DISCHARGE PLASMA. William E. McCurdy, Nirmol K. Podder, and Shi Shi, Department of Math and Physics, Troy University, Troy, AL 36082. Kenneth C. Sloneker, Electronic Development Labs, Inc., Danville, VA 24540.

In this study we use an inexpensive thermocouple method to measure the gas temperature of glow discharge plasma. For simplicity we have used a K-type thermocouple to interpret the gas temperature from the sensor voltage. We investigate the gas temperature as a function of the gas pressure at fixed discharge current and as a function of discharge current at fixed gas pressure in three different gas species (Ar, N₂, and He). The measured gas temperature has similar nonlinear increasing trend in all three gasses.

Physic and Mathematics Poster Abstracts

A THEORTICAL CALCULATION OF CHARGE CARRIERS IN DOPED SEMICONDUCTORS. Akshaya Kumar and Prakash C. Sharma, Department of Physics, College of Engineering, Architecture, and Physical Sciences, Tuskegee University, Tuskegee, AL 36088.

The electron (hole) and phonon interaction process in semiconductor depends on the doping concentration. In low doping concentrations, the electron (hole) is bound to the impurity atom. Theory of bound electron (hole) phonon scattering is used to explain the conductivity in samples having low doping of impurities. On other hand, if the doping of impurities are very high free electron (hole) phonon model is used to explain the conductivity. However,

if doping is not too low and not too high it called as intermediate doping concentration region. No study has been made in this region of concentration. Present work is an attempt to study conductivity of semiconductors in the intermediate doping concentration region. The number of electrons in the bound and conduction band has been calculated using inhomogeneity model.

Blankits AND COVERS: FINDING COVERS WITH AN ARBITRARILY LARGE LOWEST MODULUS. *Amina Dozier, Charles Fahringer, Martin Harrison, Jeremy Lyle, Dr. Neil Calkin, Dr. Kevin James, and Dr. Dave Penniston, Computational Number Theory and Combinatorics 2006 REU, Clemson University, Clemson, SC 29634.*

In this paper we will look at different ways to find covers with a large lowest modulus. We found some conditions necessary for a collection of congruence classes to cover the integers. We determined that certain types of collections of congruence classes cannot cover the integers. To compute a cover we created a program that uses a greedy algorithm that will determine whether or not we have found a cover along with printing out the blankit that was constructed. In the end, we have a cover with lowest modulus 14.

FABRICATION AND CHARACTERISTICS OF ORGANIC VAPOR SENSORS BASED ON BINARY METAL OXIDES. *Jason Stephens, A. K. Batra, Padmaja Guggilla, M. D. Aggarwal, and M. E. Edwards. Department of Physics, Alabama A&M University, Normal, AL 35762.*

Gas sensors based on wide band semiconductor metal oxides are playing an important role in the detection of toxic pollutants (CO, H₂S, NO_x, SO₂, etc) and combustible gases (H₂, CH₄ and flammable organic vapors, etc.). Metal oxide materials such as SnO₂, ZnO, TiO₂, WO₂, Ga₂O₃, and others have been examined for gas sensing applications and for control of industrial processes. In this presentation, details of fabrication of sensors and testing set-up designed are presented including characteristics of sensors. The thick film sensors of binary mixtures of metal oxides: tin dioxide/zinc oxide; tin dioxide/indium oxide; and tin dioxide/tungsten oxide for isopropanol vapor detection were fabricated on alumina substrate via screen printing technique. The tin oxide/tungsten oxide thick films showed superior sensor properties (sensitivity and response time) at lower operating temperature (140°C). +The authors gratefully acknowledge the support through NSF RISE grant # HRD-0531183. One of the authors (MDA) would like to acknowledge support from NASA Administrator's Fellowship Program (NAFP).

INTRUDER DETECTION USING MANHATTAN METRIC. *Deirdre Watts and Peter Slater, AGEP, University of Alabama in Huntsville, Huntsville, AL 35816.*

There are two methods of detecting intruders in a plane: directional triangulation, where the direction of the target is known, but not the distance; and distance triangulation, where the distance from the detection device is known, but the direction is not. The latter method is the focus of this presentation. Manhattan metric, also known as the L_2 norm, measures distance similar to the Manhattan district of New York- where as typically in Euclidean metric, one can move in any direction a set distance from center in a circle, in Manhattan metric one can only move one unit north or south, east or west, resulting in a diamond shape. In the regular Euclidean metric, three non-linear circles are sufficient to precisely detect any point in the plane. However, this is not the case for Manhattan metric; infinitely many detection devices cannot precisely identify a point in the entire plane. Conversely, three detection devices do suffice in a finite space. This study was financed by the Alliance for Graduate Education and the Professoriate for the summer of 2008 and is continued with support by the Alliance of Minority Participation.

Science Education Paper Abstracts

APPLICATIONS OF PHYSICAL SCIENCE CONCEPTS IN THE TEACHING OF THE PHYSICAL SCIENCES. *Larry Brown, Troy University Dothan, Dothan, AL 36303.*

Concepts generic to the natural sciences may be applied in the teaching of courses in history and the social sciences at all levels of study. There is no need for formal programs in the application of scientific models in social science courses. Many textbooks in history, geography, sociology, political science and other social science disciplines contain such terms as inertia, momentum, friction, centrifugal and centripetal forces, and energy. Simple or rudimentary science equipment, preferably hand-held, allow for simple examination of important concepts while providing activities in interdisciplinary and interactive learning. Concepts in the natural sciences are included as a separate class component in a graduate course in international political geography at Troy University Dothan. Equations and other mathematical models adapted for social science instruction allow for a change of pace as well as providing examples of interrelationships among the various social and natural sciences.

DINOSAURS AND PSEUDOSCIENCE (A QUESTION ABOUT THE K-T BOUNDARY). *Edward Bosworth, College of Science, Columbus State University, Columbus, GA 31907.*

This talk is in response to a claim heard on a popular science-related television show. The argument is that "If the giant collision at the end of the Cretaceous Period killed all of the dinosaurs, then the K-T boundary layer ought to contain some dinosaur fossils. But it does not contain fossils. Thus the dinosaurs died before the end of Cretaceous". This pat answer, as well as the simplistic response "The dinosaurs just did not die in the right place" each have a flavor of what I call "pseudoscience". This talk will elaborate my belief that while the first argument is false, it has enough logical content to be taken seriously. The talk will point to the absolute necessity of examining the premises of the first argument, mainly that the K-T boundary layer ought to contain fossils. Such an examination might result in several interesting and fruitful lines of research. NOTE TO THE EDITORS: This should be considered a talk in the Philosophy of Science. If you decide to accept the paper, you may place it in any area you want. ANOTHER NOTE: I have just noticed the necessity of being a member of the Academy. I am not presently a member, but will apply immediately if that can be done on-line.

SCIENCE HOMEWORK AND PARENTAL INVOLVEMENT:FACTORS INFLUENCING BEHAVIORS AND ATTITUDES. *Dana Rolison Harwell, Kate Brown, Ann Caldwell, Walter Frazier, and Tony McGee, Department of Teacher Education, The University of West Alabama, Livingston, AL 35470.*

This article provides a report of the qualitative study to investigate potential factors associated with homework, parental involvement, and gender that may influence high achievement among 7th grade science students. While the findings identified little information about gender related factors influencing student achievement, other student and parent characteristics emerged. Parental involvement in the form of facilitative supervision was a consistent pattern among these students. Also the students in the study exhibited high qualities of independence, motivation, and structure. Among the students, parents, and teachers in the study, they all generally agreed upon the purpose of homework being a form of reinforcement or practice.

SUPER-SIZE IT! A LOOK AT LARGE-SCALE ANATOMY EXHIBITS IN INFORMAL SCIENCE EDUCATION. *James Cormier, Spring Valley School, 605 Hagood St., Birmingham, AL 35213-2116.*

This paper is an examination of the use of large-scale anatomy exhibits in informal science

education. A number of examples in various museums will be viewed and described through a PowerPoint presentation. Additionally, we will examine the process behind the development of a large-scale interactive model of the human brain for informal science education. Questions posed will focus on the effectiveness of various scales as applied to anatomical exhibits regarding interactivity, educational value and knowledge retention. Evaluation methodology will be proposed to answer these questions in general, and specifically regarding the large-scale brain model in development.

TEACHING SCIENCE AND EVOLUTION IN ANTHROPOLOGY. *Bruce P. Wheatley, Department of Anthropology, University of Alabama at Birmingham, Birmingham, AL 35294.*

In my 30 years of teaching evolution at UAB, I have added more lecture material on both science and evolution. Times have changed since five students protested my first lecture on evolution by appealing to the Provost. Most of you are aware of the "Alabama Inscrt" mandated by the State Board of Education and the statements on evolution by our many Governors. Perhaps as a consequence, students simply lack basic knowledge in both science, hypothesis testing, and evolutionary theory. This is especially unfortunate in a state with an increasing emphasis in scientific research. This Academy, however, is, and can continue to be a strong voice in correcting the misinformation on evolutionary theory.

THE MEDICAL AND SOCIAL IMPACT OF CHOLERA IN THE 19TH CENTURY AND BEYOND. *Heather Guy, Department of History, University of Alabama at Birmingham, Birmingham, AL 35294.*

My proposal is an undertaking very unique to the scientific and medical study of cholera. I have written about cholera from the perspective of the Birmingham epidemic of 1873. I use the Birmingham example to describe the illness and how it spreads to become epidemic. Most importantly, I answer the question of why cholera continued to be a threat before its ultimate disappearance after the 19th century. Several important social and health factors are evident in determining what caused cholera to be so deadly. Also, medical theory is discussed in order to explain how cholera was treated and eventually eradicated. It can be argued that cholera had a direct impact on American society and medicine in the 19th century. However, the fact that Americans today benefit from the impact of cholera is all but forgotten. The Reynolds Historical Library proved a number of primary and secondary sources pertaining to cholera and the Birmingham epidemic of 1873. The library houses the original report of the Birmingham epidemic, written by Dr. Mortimer Jordan. Another primary resource used in my research came from the U.S. House of Representative's report on the 1873 epidemic. Classic research books about cholera written by Charles Rosenberg

are also used. All of these primary sources as well as appropriate secondary sources are used in my research. This paper would contribute to any session that the Alabama Academy of Science deems appropriate.

Science Education Poster Abstracts

ANTHRO-TEACH: DEVELOPING SCHOLAR-TEACHERS AND STUDENT SCIENTISTS USING ALABAMA NATIVE AMERICAN COLLECTIONS. *Loretta A. Cormier*, and *Sharyn R. Jones*, Department of Anthropology, University of Alabama at Birmingham, Birmingham, AL 35294.

We describe the initiation of a senior capstone course in the Department of Anthropology at the University of Alabama (UAB) in the Fall of 2009 where students will engage in scientific research, hands-on-learning, and public outreach focusing analysis of Alabama Indian archaeological materials. Students will be involved in the analysis of a little known, but valuable resource held at UAB, the Josselyn Archaeological Collection, that consists of over 100,000 artifacts including stone tools, an array of pottery styles, grinding stones, ornaments, and arrowheads from all of the major periods in Southeastern archaeology; it also contains fauna, soil samples, maps, and meticulous field notes from excavations at 100 sites from all of Alabama's counties. Data can also be combined with ethnohistorical records from local Native American groups in Alabama. The archaeological material is valuable because many of the original sites have been either destroyed or covered by roads, strip malls, and housing developments. While a rudimentary cataloguing of the artifacts was conducted in the 1970's, the material has never been analyzed in a scientifically meaningful manner. Students will be involved in both analysis of the collection and in outreach to educate the general public about Alabama Native American history from past to present. Plans include the development of a permanent exhibit on the UAB campus with an associated website and the development of teaching kits to be used in local schools.

Gorgas Competition Paper Abstracts



IRON OXIDIZING BACTERIA: OPTIMAL GROWTH CONDITIONS IN LOCAL STREAM. *Ankita Patel, Hoover High School, Hoover, AL 35244.*

Although bacteria are not visible to the naked eye, they contribute an unprecedented amount to the environmental sustainability or degradation of biotic life. With the mentoring aid of Jane Mahon and Janet Ort, a study was conducted to establish baseline data about iron oxidizing bacteria in a local stream located directly behind the Hoover High School Senior Campus (33°20'47 N, 86°50'10 W). The research is essential because this stream flows directly into the Cahaba River, which is prominent in Alabama for its biological diversity and its contribution as a drinking water source. Initially, the general observations that were procured led to our hypothesis that the bacteria thrive in areas that have low water depth, a low stream flow rate, low dissolved oxygen level, near neutral pH levels, and high ferrous iron levels. Water chemistry protocols from Alabama Water Watch were adhered to respectively collect data about pH and DO levels at the selected bacteria and control sites. A spectroscopy test was conducted to determine the iron level at the site. We obtained observational data before and after intense rainfall in an attempt to correlate the bacterial proliferation to low water levels and low stream flow. Results overall supported the hypothesis that the bacteria flourish in low water depth, a low stream flow rate, and low dissolved oxygen levels. More research is needed to correlate high iron levels to optimal growth. We progress to inquire whether the bacteria are constructive in biodegradation and bioremediation.

PLANARIA HYSTERIA: DOES RED LED LIGHT AID IN THE REGENERATION OF PLANARIA AND PROMOTE WOUND HEALING?, *Carley E. Andrews, Deshler High School, Tuscumbia, AL 35674.*

This experiment was conducted in order to determine if exposure to red LED light aided in the regeneration of planaria. Thirty whole planaria were cut in halves, and the 60 cut

planaria were separated into six different groups that received varying amounts of exposure to the red LED light. Groups 1 and 2 were the control and received no exposure to the red LED light. Groups 3 and 4 were exposed to the red LED light for 60 seconds once per day. Groups 5 and 6 were exposed to the red LED light for 60 seconds twice per day. After a seven day period, the average daily growths and the average total growths of each group were compared. The groups receiving no LED exposure grew a total average of 0.85 mm and a daily average of 0.12 mm. The groups receiving LED exposure once per day grew a total average of 1.60 mm and a daily average of 0.23 mm, while the group exposed twice per day to the red LED light grew a total average of 3.01 mm and a daily average of 0.43 mm. These results show that exposing planaria to red LED light significantly aids in their regeneration, and these results could possibly be applied to the healing of human wounds.

TO BUILD A BETTER MOTOR: THE CONTINUED ANALYSIS OF PROPELLANT ADDITIVES AND THEIR EFFECTS ON COMBUSTION. *Bryant Finney, Covenant Christian Academy, Huntsville, AL 35803.*

The goal of this project was to improve the performance of a model rocket propellant through the addition of other chemicals while retaining the safety and castability of the propellant. The original propellant consisted of potassium nitrate as the oxidizer and sucrose as the fuel, and the ingredients added came from other popular propellants. Five propellants were formed by mixing elements of three different formulas. The first propellant was made using aluminum as an additive that replaced some of the sucrose fuel. Three additional propellant formulas were based upon blackpowder. In the first two, sulfur replaced sucrose in different amounts to reduce the risk of ignition and so that the new propellant was as easy to cast as the original propellant. The fourth formula was to find any benefit sulfur provided to the propellant (aside from easy ignition). A fifth formula used a different, more powerful oxidizer. Safety tests, pressurized burn strand tests, and static tests were conducted on the propellant. Safety tests included friction testing, impact testing, spark testing, and heat testing, and largely determined whether or not the propellant was to continue being tested. Pressurized burn strand tests were conducted to find the burn rate of the propellant at various pressures. Then, the formula with the highest burn rate was compared to the original formula during static testing, in which the propellants were cast into motors and tested on a static test stand. The specific impulse (a good measure of performance) was determined from static testing. The testing results clearly demonstrated that a variant of blackpowder drastically improved the performance of the original propellant, while greatly increasing the safety over the original blackpowder formula.

Gorgas Competition Poster Abstracts

A SOLAR STIRLING RENEWABLE ENERGY POWER SYSTEM FOR EARTH AND SPACE APPLICATIONS. *Nathau Tiuker, Covenant Christian Academy, Huntsville, AL 35803.*

Lightweight, reliable power system designs are needed for portable earth-based applications and future space missions. The purpose of this project was to investigate electrical power generation of a solar-powered Stirling engine fitted with lightweight thin-film and acrylic concentrators. The concentrators provide focused solar energy to heat the engine, and enable the system to be lightweight. The Stirling engine was adapted for generating electricity by installing a lightweight linear alternator. Different solar concentrators were tested to discover the effects of concentrator parameters on energy collected. Experiments were also performed with 15.24 cm diameter acrylic Fresnel lenses to determine the effect of lunar dust simulant on concentration performance. Full system tests in ambient sunlight were performed with the concentrators and the modified Stirling engine. The lightweight concentrators were effective for heating the Stirling engine. The best performing concentrators were the 46 cm acrylic Fresnel lens and thin-film parabolic reflector, having concentration ratios of 92 and 58, respectively. A 50 g/m² layer of lunar dust simulant on a Fresnel lens caused an 83% loss of concentrated energy. System output voltage increased consistently with increasing engine operating temperature, magnetic field strength, and coil length. The results achieved in this project indicate that the solar Stirling system with Stirling engine and lightweight Fresnel lenses or thin-film concentrators shows considerable potential for earth applications and future lunar missions. However, further development is needed for lunar applications to prevent the accumulation of dust on the concentrator.

IN THE FACE OF INTERFACE: NANO-INDENTATION OF VARIOUS COMPOSITES TO DETERMINE MECHANICAL STRENGTH. *Sarah Smith, Brian Pillay, University of Alabama at Birmingham, Birmingham, AL 35294-1210.*

In this paper a study into composites will be made as well as an attempt to discover the mechanical properties of the sample particularly the strength by using nano-indentation to perform a push out test on the samples. Depending on the load vs. displacement curve and the GPa modulus and hardness the average ability of the sample's fibers to withstand a load on the fiber interface structure will be measured. If the load is not placed on the fiber center the interface may be preliminarily damaged and result in a low load and high displacement at that load. A push out machine was not available for use but the indentation was hoped to produce a similar test using the resources available. Also a rounded head should be used for further testing to create an even loading mechanism as the Newtons are increased on

the fiber as to not create a single point of pressure and overload the interface preliminarily. After the data was analyzed there was not a clear stronger composite but this may be due to the limitations and a continuation should be made using the suggestions for improvement. Acknowledgments must be made to the University of Alabama at Birmingham specifically the Material Engineering Department and Brian Pillay for the use of the lab as well as the opportunity to work with the department.

LEAD LEVELS IN DRINKING WATER. *Rebecca Duron, Jefferson County International Baccalaureate, Birmingham, AL 35210.*

This research seeks to determine whether or not lead pollutes Birmingham's surrounding cities' tap water and how the age of the water's supplying fixture and pipes affects the amount of lead in the water. Experimentation included the detection of lead by spectrophotometry and the comparison of absorbencies in samples to a standard curve. First, unfiltered tap water samples were collected from the homes of volunteers who filled out a survey of the area from which the sample was taken, age of home, fixture, and pipes, and any changes or improvements to the original system. The water samples were reacted with sodium sulfide (Na_2S) to produce lead II sulfide (PbS) if lead was present in the water. The reacted sample was analyzed in a spectrophotometer at the found wavelength of maximum absorption for PbS , 340nm. Absorbency ranged from 0.001 to 0.058. A standard curve of absorbency vs. molarity PbS was created by reacting lead II nitrate ($\text{Pb}(\text{NO}_3)_2$) with Na_2S . Using this standard curve as a means of comparison, the molarity of lead in tap water ranged from $6.3578\text{E-}8$ to $3.6875\text{E-}6$ mol/L. These values were found to be greater than the lead levels reported by the supplying water company. Water samples taken from fixtures and pipes older than 30 years contained higher lead levels than those from newer supply components. The age of the home (and therefore its pipes and major water supply constituents) is directly related to the amount of lead in its tap water.

**MINUTES OF ALABAMA ACADEMY OF SCIENCE
 SPRING 2009 EXECUTIVE COMMITTEE MEETING
 THE UNIVERSITY OF WEST ALABAMA
 WEDNESDAY, MARCH 25, 2009; PRIVATE DINING ROOM,
 BELL CONFERENCE CENTER**

Call to order 7:43 pm - welcome

Attending meeting: Safaa Al-Hamdani, Janis Beaird, Ellen Buckner, Brian Burnes, Brian Toone, Mijitaba Hamissou, Richard Hudiburg, James Rayburn, Bettina H. Reley, Ken Roblee, P.C. Sharma, and DB Thompson.

Agenda A. Call to order

.....Call to order and review/approval of minutes of the Fall 2008 Executive Committee Meeting

	<i>Action Item</i>	<i>Action Taken</i>	<i>Person Responsible</i>	<i>Due Date</i>
B3	Establish protocol for filling positions on the following committees: Junior Academy, Regional Science Fairs, and Science Olympiad.	See below motion	Exec. Comm.	
B3	Delineate procedure for appointing Alabama Junior Academy of Science Officers	None	Exec. Comm.	
B3	Delineate procedure for appointing Regional Counselors and identify individuals to fill vacancies on committees and for officer positions	None	Exec. Comm.	
B4	Determine nominees for remaining vacant positions	Done	Exec. Comm.	
B3	Develop standard operating procedures (SOPs) for all committees and offices to be filled out by the current chairs of the position (no longer than 1 page) to presented to the first vice president by June 1, 2009 Brian Burns motion - Thomson 2nd - passed -	Motion	All officers	6/1/2009
B6	Elect a new Treasurer	Done	Academy	
B7	Submit one page biographies of selected scientists from Alabama universities.	None	Academy members	Open
B7	Solicit advertisements for inclusion in Journal issues	None	Academy members	Open

	<i>Action Item</i>	<i>Action Taken</i>	<i>Person Responsible</i>	<i>Due Date</i>
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B3	Delineate procedure for appointing Alabama Junior Academy of Science Officers	None	Exec. Comm.	
B3	Delineate procedure for appointing Regional Counselors and identify individuals to fill vacancies on committees and for officer positions	None	Exec. Comm.	
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B6	Elect a new Treasurer	Done	Academy	
B7	Submit one page biographies of selected scientists from Alabama universities.	None	Academy members	Open
B7	Solicit advertisements for inclusion in Journal issues	None	Academy members	Open
B10	Action to be taken if West Regional Science Fair does not submit their payment Motion = Table until Fall 2009 exec meeting	Done	Exec. Comm.	
B12, 1	Recommendation to modify the student competition awards for section 1 Ellen Buckner moved to accept James Rayburn 2nd - Recommended, this be available to all sections if and when they achieve these levels.	Motion Passed	Exec. Comm.	3/25/2009
B12, V1	Establish a protocol for systematically informing members and potential members of the Academy's activities	Done	Exec. Comm.	3/25/2009

B12, VI	Consider listing of the Journal in Cabell's Directory, http://www.cabells.com/ .	Done	Safaa Al-Hamdani	4/20/2009
C5	Realign the sections as recommended by the Long-Range Planning Committee (Amendment to C&B) Presented to membership as possible to consider for the fall section	Done	Exec. Comm. and Academy	Fall 2009
C5	Future awards be constructed relative to the objectives of the Academy (Amendment to C&B)	Done	Exec. Comm. and Academy	Fall 2009
C5	New awards be establish only when sufficient funds are in place or will be available in a regular manner (Amendment to C&B)	Done	Exec. Comm. and Academy	Fall 2009
C11	Obtain photographs of members of the Executive Committee and forward to Archives	Agreed		
C11	Obtain copies of committee reports, minutes of Executive Committee meetings and forward to Archives	Done		
C11	Obtain photographs of annual meeting attendees and forward to Archives	Agreed		
C18	Motion to allow (Gorgas committee) develop a grant application to create the Alabama Science Competition Teacher Network Motion	Approved	Exec. Comm. and Academy	3/26/2009

Agenda B. Officers' Report

1. Board of Trustees, Ken Marion, No Report Submitted

2. President, Kenneth Roblee,

I have continued contacting people to fill and renew various positions. As of this report, we still need other positions filled. I have also been in contact with various officers and committee members to get ready for our annual meeting, and wrote the welcome letter for the program. Just recently, we received a grant proposal idea from Ellen Buckner to create an Alabama Science Competition Teacher Network to get teachers to be involved in sponsoring science competitions all across the state. I have read this proposal, and believe this is a wonderful initiative. We would just need to find an appropriate grant source, some of which Ellen suggested.

3. President –Elect, Brian Thompson

Ken Roblec and I have been working to fill committee vacancies. Larry Krannich is updating committee information in an excel file, to make this work less difficult in the future.

I would like some guidance for how to fill positions on the Committee on Junior Academy, the Committee on Regional Science Fairs, and the Committee on Science Olympiads. Similarly, I would like to know how people were appointed as Alabama Junior Academy of Science Officers, and as Regional Counselors.

Action Items:

1. Protocol for filling positions on the following committees: Junior Academy, Regional Science Fairs, and Science Olympiad.
2. Delineate procedure for appointing Alabama Junior Academy of Science Officers
3. Delineate procedure for appointing Regional Counselors
4. Second Vice President, Brian Burnes

As Chair of the Nominating Committee, I contacted the Section Chairs, who are the Nominating committee members, and requested nominations for the following positions:

Nominating Committee Member	Position to fill [Current Office holder]	Nominee
Brian Burnes	Second Vice-President: [Brian Burnes (2009), Dept. of Biology, University of West Alabama, Livingston, AL 35470, (205) 652-3442, bburnes@uwa.edu] Trustee: Anne Cusie (2009), Dept. of Biology, University of Alabama at Birmingham, Birmingham, AL 35294-1170, (205) 934-9686 acusie@uab.edu	Mickie Powell Need nominee
Mickie Powell	Secretary: James Rayburn (2009), Dept. of Biology, Jacksonville State University, Jacksonville, Alabama 36265, (256) 782-5803, jrayburn@jsu.edu	Need nominee 1 more year until replacement
Daniel K. Kim	Treasurer: Taba Hamissou (2009), Dept. of Biology, Jacksonville State University, Jacksonville, Alabama 36265, (256) 782-5040, taba@jsu.edu	Taba Hamissou (although he has indicated in his report that he wants to be replaced)

Greg Gaston	Editor: Safaa Al-Hamdani, (2009) Dept. of Biology, Jacksonville State University, Jacksonville, Alabama 36265, (256) 782-5801, sah@jsu.edu	Safaa Al-Hamdani
Akshaya Kumar	State Counselor to the Junior Academy: B.J. Bateman (2009), Dept. of Math and Physics, Troy University, Troy, AL 36082, (334) 670-3572, bbateman@troy.edu	Henry L. Barwood
Marsha Griffin	Associate Counselor to the Junior Academy: Henry L. Barwood (2009), Dept. of Math and Physics, Troy University, Troy, AL 36082, (334) 670-3574, hbarwood@troy.edu	Need a nominee
Karen Utz	Associate Counselor to the Junior Academy: Wanda Phillips (2009), Brooks High School, 4300 Highway 72, Killen, AL 35645, (256) 757- 2115	Need a nominee
Richard Hudiburg (Virginia Valardi)	Coordinator of State Science Fairs: Virginia Valardi (2009), Wetumpka High School, 1251 Coosa River Parkway, Wetumpka, AL 36092, (334) 799-0104, home (334) 514- 1770, virginia.vilardi@elmore.k12.al.us	Virginia Valradi
Bettina Riley	Coordinator of State Science Olympiad: Jane D. Nall (2009), 31110 Wakefield Drive, Spanish Fort, AL 36527, (251) 621-2911, dsmall@hotmail.com	Need a nominee
Brian Toone (Brian Toone)	Trustee: B.J. Bateman (2009), Dept. of Math and Physics, Troy State University, Troy, AL 36082, bbateman@troy.edu	Brian Toone

Harry Holstein	Trustee: Ellen B. Buckner (2009), 204 School of Nursing, University of Alabama at Birmingham, Birmingham, AL 35294, (205) 934-6799, bucknere@uab.edu	Need a nominee
Michelle Ann Sidler	Trustee: Stephen Watts (2009), Dept. of Biology, University of Alabama at Birmingham, Birmingham, AL 35294-1170, (205) 934-2045, sawatts@uab.edu	Need a nominee

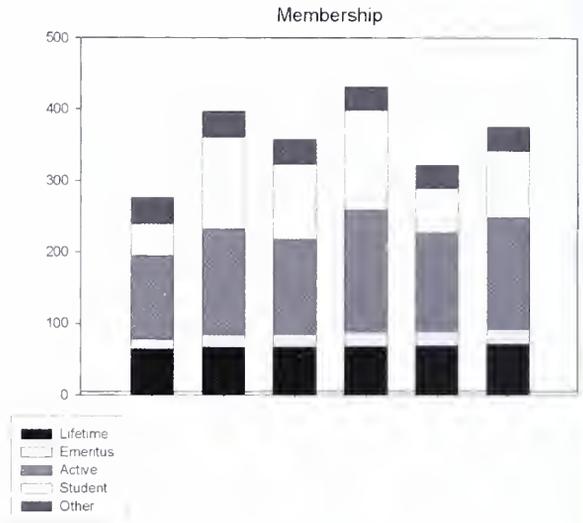
Action Item: Determine nominees for vacant positions

5. Secretary, Jim Rayburn

1. In early December I sent out first reminder to current members who are not paid for 2008.
2. I updated list for AAS and sent to Editor for publishing
3. I mailed a 2rd reminder to members who were not paid for 2009 yet. I did not send to libraries during this 2rd reminder.
4. I failed to send a 3rd reminder this year.
5. I have prepared minutes from October meeting and forwarded to Executive director and the Editor.
6. As of March 6, 2008 we have 374 members (of which 244 are paid for 2008) members including library and other members. As of March 13, 2008 we have taken in approximately \$4,255 in dues for 2009 memberships. I have also received about \$200.00 in dues for future years.
7. We have received first members paying online and incorporated in our data base. We need to work on this. We have discovered a few problems but they are minor right now. The amount \$1360 in dues were paid into pay pal and is included in the 4,255.00 total.
8. Active members (158; 47 not paid), emeritus (20, 3 not paid), lifetime (71). Student (92; 49 not paid), other members (34, 32 not paid)

9. Membership by section

Section #	Total #	Not paid
1	129	36
2	35	12
3	6	1
4	6	2
5	36	11
6	5	5
7	9	1
8	17	7
9	41	9
10	13	2
11	10	2
12	4	2
77(other)	34	32
None selected	29	8
Total	374	130



6. Treasurer, Taba Hamissou

The treasurer’s report consists of the following:

- All account balance as of March 13, 2009
- All financial assets report, as of March 13, 2009
- Incomes and Expenses statement as of March 13, 2009

The quarterly income for the Academy is \$7,940.00. The expenses totaled \$5,226.23. The two cds generated \$650.32 in interest. The printing of the last two journal issues was paid by Auburn University. Several library supports were received this quarter. These two actions generated an increase in the Academy assets. This increase is \$3,371.25.

The Treasurer request that a replacement be elected.

Action Item:

1. Elect a new Treasurer

In memory of Dr. Barrett	100.00
TOTAL INFLOWS	7,940.00

OUTFLOWS

Honoraria	
Exe. Director	2,500.00
JAAS Editor	1,200.00
JAAS Secretary	800.00
JAAS mailing and stamps	676.23
Bank Charges	50.00
TOTAL OUTFLOWS	5,226.23

7. Journal Editor, Safaa Al-Hamdani

The following has been accomplished since the last meeting:

- The Alabama Academy of Science Journal Vol. 79 #3-4 has been successfully released. This issue had a great number of articles with a significant contribution to science at large.
- The Alabama Academy of Science Journal Vol. 80 #1 has been successfully released. This issue had a great number of articles with a significant contribution to science at large.
- I would like to invite each university in Alabama to submit a 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.

Action Items:

- Submit one page biographies of selected scientists from Alabama universities.
- Solicit advertisements for inclusion in Journal issues.

8. Counselor to AJAS, B. J. Bateman; No Report Submitted

9. science Fair Coordinator, Virginia Valardi

The ISEF 2008 was held in Atlanta Georgia. The following is a breakdown of the costs for each regional group:

North Alabama	\$7131.25
\$6125.00 + \$1006.25 (teacher's hotel)	
UAB	\$3500
Talladega	\$1750
Mobile	\$675
West	\$975
State	\$3500

The total reimbursement due to the Academy was \$ 17630.25

Those in attendance at the 59th International Science and Engineering Fair in Atlanta, Georgia May 11th -16th 2008, included: 19 Student Finalists, 1 Student Observer and a host of Parents/Teachers from across Alabama. Over 1500 students from 51 countries around the globe attended this event which is the world's largest precollege science and engineering competition.

Alabama had four student projects that won awards at the international competition. One student, Nicholas Christensen won two awards.

Special Awards Received by Alabama Students:

Acoustical Society of America; Second Award of \$500, in addition the student's school will be awarded \$200, and the student's mentor will be awarded \$100. Each winner will also receive a one-year ASA membership. *CS040 Do You 'ear Wha' I 'ear? Redigitizing Voice Signals into Lower Frequencies Revolutionize Hearing Assistance Technology*, Nicholas Mycroft Christensen, 16, Wetumpka High School, Wetumpka, Alabama

Patent and Trademark Office Society: Promotes the US Patent and Trademark system's growth and well-being, fosters a true appreciation of these systems, recalls our rich heritage of innovation and commerce, and cultivates the highest standards of professional ethics among patent practitioners. The Special Awards given at the Intel ISEF encourage young inventors to develop new and useful products, and to pursue careers in science and technology.
Second Award of \$200

Quest for Affordable Bio-Diesel: Characterizing Microbes for Conversion of the Bio-Diesel By-Product Glycerol, Sarah Elizabeth Stahl, 17, Huntsville High School, Huntsville, Alabama

Grand Awards Received by Alabama Students

Computer Science - Presented by Intel Foundation
Fourth Award of \$500

CS040 Do You 'ear Wha' I 'ear? Redigitizing Voice Signals into Lower Frequencies to Revolutionize Hearing Assistance Technology, Nicholas Mycroft Christensen, 16, Wetumpka High School, Wetumpka, Alabama

Materials Science & Bioengineering - Presented by Intel Foundation
Third Award of \$1,000

EN031 Carbon Fiber Makes a Pointe, Part Deux, Harper-Grace Niedermeyer, 17,
Catholic High School, Huntsville, Alabama

Fourth Award of \$500

EN034 The Kudzu Question: A Useful, Renewable Resource?, Kathryn Ann
LeCroy, 17, Jefferson County International Baccalaureate School, Birmingham,
Alabama

Action Item:

1. The West Fair is having financial difficulties and their payment may not be made.

10. Science Olympiad Coordinator, Jane Nall

At this time we are between regional and state tournaments in the junior and high school divisions. A breakdown of the Olympiad program for 2008-09 can be found in the program booklet for the 86th annual meeting of the Academy. One more elementary tournament will take place soon. Our totals are: 87 B (jr high) teams, 63 C (high school) teams and 69 A2 (elementary) teams.

RE: National Science Olympiad Tournament. With the decline in C teams, I feel that we will be able to send one team, but two teams should be invited for B division.

Host this year is Augusta State University, May 15-16, 2009, <http://www.aug.edu/nso/>. Imagine 120 teams attending! Each team consists of 15 students, each school usually sends as many as 10 students to help and as many as 25 parents and teachers/coaches.

We are in need of AAS members to encourage their campus departments currently not involved in ASO to consider hosting a Science Olympiad tournament, workshop for coaches, and judges!

Alabama Science Olympiad web page: <http://aso.jsu.edu/>

National Science Olympiad web page: <http://soinc.org/about>

11. Counselor to AAAS, Steve Watts; No Report Submitted

12. Section Officers

1. Biological Sciences, Mickie Powell

The Biological Sciences section usually has a large number of presentations entered in the student competition program. Thus, the students are at somewhat of a disadvantage relative to those in the student competitions in the other sections. Therefore, the section recommends that that one award be given for each group of twelve (12) participants in the student presentation competition.

1-12 students 1 award

13-24 students 2 awards

25-30 students 3 awards

31-36 students 4 awards

etc

All students would be judged as a group and when multiple awards are given there would be no designation of rank. All will be awarded as outstanding presentation. The Biological Sciences section requests that the Executive Committee approve this modification in the awards for the student competition.

II. Chemistry, Daniel Kim

The Chemistry session will be held at Bibb Graves Hall, Room 211 for paper presentation, and 2nd Floor Hallway for poster presentation. Paper presentation starts from 9:00 AM till 10:20 AM and poster session from 11:00 AM till 12:00 noon, Thursday, March 26, 2009. There will be five paper and nine poster presentations. Of these three papers and five posters are in the student competition. Three travel awards were submitted. The session of paper presentation will be chaired by Daniel Kim.

III. Geology & Earth Science, Mark Puckett; No Report Submitted

IV. Geography, Forestry, Conservation & Planning, vacant No Report Submitted

V. Physics & Mathematics, Akshaya Kumar

I am pleased to report that a total of twelve presenters would discuss their research work in the Physics and Mathematics Section, this year. Eight of these will be oral and four poster presentations.

Two student papers for oral presentations and three poster presentations have been entered in the student award competition.

VI. Industry & Economics, Marsha Griffin

Nine papers were submitted for presentation at the 86th annual meeting: none of which is from a student.

The following are suggestions for improving the value of the Academy to members

and potential members:

1. Even though doing things electronically saves money, we seem to be promoting the meeting to ourselves. That is, new faculty members are not systematically informed of what is going on. Please consider publishing hard copies of the call for papers and a general AAS brochure. Alternatively, electronic items could be sent to all faculty members of all AL schools of higher education.
2. Our journal needs to be listed in Cabell's Directory. Many Schools of Business use that as a standard for "counting" a publication for accreditation purposes.

Action Items:

1. Establish a protocol for systematically informing members and potential members of the Academy's activities.
2. Consider listing of the Journal in Cabell's Directory, <http://www.cabells.com/>.

VII. Science Education, Karen Utz, No Report Submitted

VIII. Behavior & Social Sciences, Richard Hudiburg

There are six papers and one poster scheduled for presentation in Section VIII – Behavioral and Social Sciences for the 86th annual meeting of the Alabama Academy of Science. Election of a section chair is slated for the business meeting of the section.

IX. Health Sciences, Bettina Riley

In response to the Annual Meeting of the Alabama Academy of Science's 2009 call for paper and poster titles, nine paper titles and three poster titles were received. All were accepted. Six papers are entered into the student competition. Two posters are entered into the student competition. The overall number of respondents was consistent with last year's level.

The Committee would like to recognize Ellen Buckner for her continued enthusiasm and efforts to boost participation in the Health Sciences Section activities as well as for the Alabama Academy of Science membership and activities in general.

The paper and poster presentations will be held on Thursday, March 26, 2009 in Bibb Graves Hall. The papers will be presented in Room 204 and the posters with authors will be available in the second floor hallway. The business meeting will be conducted during the intermission at 10:15. The primary agenda item will be to elect a Vice Chair for the 2009 – 2011 term.

Having assumed the Chair position from Vice-Chair on short notice, I look forward to participating as Chair for the full term. I would like to set as a goal for the next annual

meeting to increase the number of paper and poster presentations for this section. This should have an added benefit of increasing membership. I would also like to achieve a broader representation from agencies across the state of Alabama.

I wish to thank Larry Krannich for all of his excellent organization skills and patience, as well as the technological guru, Brian Toone, who managed the technology so I could accomplish the duties of Chair in a “user-friendly” environment. Thanks to all of the rest of the Executive Committee for their hard work and I look forward to meeting all of you at the annual meeting.

X. Engineering & Computer Science, Brian Toone

I have prepared the program for the upcoming annual meeting. There were 6 paper and no poster presentations submitted for the 86th annual meeting of the Alabama Academy of Science. Out of those, 2 papers were entered into the student paper competition. Lastly, three students applied for travel awards.

XI. Anthropology, Harry Holstein No Report Submitted

XII. Bioethics & History/Philosophy of Science, Michelle Sidler As Chair of Section XII,

I have worked to promote greater attendance and participation in Section XII over the last year, contacting likely participants from schools such as UAB and Tuskegee University. As a result, the number of presenters has risen from 5 to 7, including participation from 3 different institutions. We look forward to a fine Section meeting this year, including a Plenary Address from James Bradley, entitled “Synthetic Biology: A “Synbio-Ethics” Needed.”

13. Executive Officer, Larry Krannich

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

1. Coordinated with Brian Toone to have on-line submission of paper/poster titles and abstracts and executive committee reports for the annual meeting. The submission site included check-off boxes for students to enter the paper/poster competitions and request travel awards without having to proceed to another site.
2. Worked with the President and Vice President to update all committee appointments.
3. Worked with section chairs and the local arrangements chair in the development of the program and program booklet for the 86th annual meeting of the Academy.
4. Forwarded a draft version of the program booklet to Brian Toone for posting on the web (March 3, 2009) and notified presenters, Academy members, and Executive Committee of its availability.

5. Worked with presenters and the local arrangement chair in making changes to the program booklet.
6. Forwarded the final version of the program booklet to Brian Toone for posting on the web on March 10, 2009 and forwarded the program to the local arrangements chair for printing.
7. Sent e-mails to all paper/poster presenters thanking them for their participation and notifying them of poster guidelines and the posting of the program on the web site.
8. Designed and printed certificates for the Carmichael Award and all Section paper/poster competition winners.
9. Prepared the program for the banquet.
10. Developed a doodle.com site for intended participation in the Executive Committee dinner and banquet.
11. Prepared the committee chair report compilation and action items for distribution at the Spring Executive Committee meeting.

Agenda C. Committee Reports

1. Local Arrangements, Brian Burnes

As Chair of the Local Arrangements Committee, I made on-site arrangements for the 2009 Annual Meeting at the University of West Alabama (see hand-out).

2. Finance, Ken Marion

The assets of the Academy as reported at the Fall Executive Committee meetings 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	\$71,403	-\$794	1/1 – 12/31/2003	\$74,800	\$1,987
1/1 – 10/26/2004	\$74,265	\$2,862	1/1 – 12/31/2004	\$74,610*	-\$ 190
1/1 – 10/26/2005	\$63,895	-\$10,370	1/1 – 12/31/2005	\$65,561*	-\$9,049
1/1 – 10/26/2006	\$62,162.12	-\$1,733	1/1 – 12/31/2006	\$67,555*	\$1,994
1/1 – 10/31/2007	\$34,004	-\$28,158	1/1 – 12/31/2007	\$36,435*	-\$31,120
1/1 – 10/10/2008	\$25,618	-\$8,386	1/1 – 3/13/2009	\$28,989	-\$7,446

*estimated

The financial assets of the Academy continued to decline during most of 2008. However, the assets of the Academy have increased by \$3,371 since our interim fall meeting. The increase was primarily the result of renewed use of the support from the AU library for printing of the Journal. This support should help to stabilize our financial resources to a significant degree. However, our total assets are still near a decade low, and the Academy should be prepared to consider steps (i.e., dues increase, increased meeting registration fees, etc.) to increase revenue should assets decrease in the near future.

3. Membership, Mark Meade

I have no new business to report to the committee. Refer to B-5 (Secretary's report) for info on participation and dues.

4. Research, George Cline, No Report Submitted

5. Long-Range Planning, Adriane Ludwick

The Long-Range Planning Committee had two assignments from the last Annual Meeting. One was to examine the sections to determine if any changes were appropriate. The second was to examine the named awards and recommend policy on this. The following comprises the recommendations of the committee:

1. **Evaluation of Sections of Alabama Academy of Science**

The sections of the Academy are dynamic. Hence they need to be evaluated periodically. This committee has attempted to do so towards the consideration of deletion, addition, and/or restructuring of existing sections. Suggestions for consideration by the Executive Committee of the Academy are presented at the end of this report.

The table below summarizes the number of presentations, symposia and/or panels by the sections at the Annual Meetings from 2003 to 2009. For 2003, Section XII (Bioethics, History, & Philosophy of Science) did not exist.

Section	2009	2008	2007	2006	2005	2004	2003
I Bio Sci	24 oral 23 post	40 oral 39 post	34 oral 29 post (+symp)	44 oral 13 post (+symp)	30 oral 5 post (+symp)	43 oral 9 post	40 oral 16 post
II Chem	5 oral 7 post	10 oral 26 post	10 oral 15 post	6 oral 13 post	6 oral 10 post	7 oral 5 post	8 oral 2 post
III Earth Science	---	See VIII Post/jt	---	---	---	---	---
IV Geography, Forestry,	---	See VIII Oral & Post/jt	8 oral 2 post (+symp)	6 oral 1 post	7 oral	12 oral 1 post	22 oral

V Physics & Math	8 oral 4 post	22 oral 8 post (+symp)	14 oral 9 post (+panel)	19 oral	9 oral	5 oral	5 oral 2 post
VI Industry & Economics	---	---	7 oral	5 oral	13 oral	12 oral	16 oral
VII Science Education	6 oral	5 oral 2 post	4 oral (+panel) (+symp)	15 oral (+symp)	16 oral 1 post	11 oral (+symp)	9 oral 2 post
VIII Behavioral & Soc Sci	6 oral 2 post	7 oral 7 post	6 oral	9 oral 3 post	13 oral	17 oral 1 post	17 oral
IX Health Sciences	9 oral 3 post	12 oral 6 post	20 oral 2 post (+symp)	20 oral 2 post	25 oral 3 post (+symp)	23 oral 7 post	34 oral 8 post
X Engineering & Comp Sci	6 oral	5 oral 3 post (+symp)	15 oral 2 post	8 oral	27 oral 2 post	22 oral	19 oral 1 post
XI Anthropology	9 oral	10 oral	7 oral	13 oral	14 oral	12 oral	14 oral
XII Bioethics, History, & Phil of Sci	7 oral	5 oral	4 oral	6 oral	8 oral (+symp)	10 oral	NA

Four of the twelve sections lack complete leadership (as reported at the 2008 Annual Academy Meeting. These are Section III (Earth Science; no vice chair), Section IV (Geography, Forestry, Conservation and Planning; no chair or vice chair), Section VI (Industry and Economics; no vice chair), and Section IX (Health Sciences; no vice chair). Of these sections, Section IX (Health Sciences) is relatively strong, although the number of papers has decreased from 42 in 2003 to 12 in 2009. Section III (Earth Science) is the weakest, with no sessions during the entire period of the above table, other than participation in a joint poster session in 2008.

Based on the above and an examination of the content of the sessions at the Annual Academy Meeting,

The Long-Range Planning Committee recommends the following changes.

- *Section III (Earth Science) be deleted.*
- *A new section (Social Sciences) be formed to include Economics, Behavioral Science, and Sociology; the formation of this section would affect Sections VI and VIII.*
- *Another new section (Industry and Environmental Science) be formed; this section would include aspects of the current Section IV (Geography, Forestry, Conservation and Planning) and of Section VI (Industry and Economics).*

The Sections of the Academy would need to be renumbered as follows.

I Biological Sciences

II Chemistry

III Physics and Mathematics

IV Engineering and Computer Science

V Social Sciences

VI Anthropology

VII Science Education

VIII Industry and Environmental Science

IX Health Sciences

X Bioethics, History, and Philosophy of Science

The Committee reasons that these adjustments will better equalize the strengths and potential for development of each of the sections.

2. Named Awards of the Alabama Academy of Sciences

A limited number of named awards exist in the Academy. Each of these awards is named for an individual who had been very devoted to the Academy. Additionally, each of these awards is directly connected to the objectives of the Academy. The William H. Mason Science Teaching Fellowship is in honor of the late Dr. Mason's dedication and leadership in the Academy. Fellowships have been awarded annually since 1990, except for 1994, 2002, and 2004. The award was established to encourage scientifically trained students (at least a B.S. degree) to enter the teaching profession. The \$1,000 award is tenable at any institution in the state of Alabama offering a teacher certification program.

The Wright A. Gardner Award is in honor of the first president of the Academy. Recipients are selected for their outstanding contributions to science while in residence in Alabama. The first award was presented in 1984; awards have been presented annually except for 2008.

This Emmett B. Carmichael Award is made annually by the Academy for the outstanding paper published in the Journal of the Alabama Academy of Science during the previous calendar year. Emmett Carmichael was Editor of the Journal from 1942 to 1948.

The objectives of the Academy are to:

- Promote the development of interest in scientific matters in the state
- Provide means for publication of papers and abstracts
- Provide opportunity for increased cooperation and fellowship among its members
- Cooperate with other organizations having similar aims
- Render public service in scientific matters
- Promote the interest in and study of science by the youth of Alabama
- Provide for and award scholarships to deserving youth of Alabama

In fulfilling these objectives the Academy is devoted to nearly all aspects of science and science education.

It is recommended by the Long-Range Planning Committee that future awards be constructed similarly. Additionally, there should be sufficient funds in place, or thought to be available in a regular manner, before a new award is established.

Action Items:

1. Realign the sections as recommended by the Long-Range Planning Committee
2. Future awards be constructed relative to the objectives of the Academy
3. New awards be establish only when sufficient funds are in place or will be available in a regular manner.

6. Auditing, Senior Academy, Sergey Belyi, No Report Submitted
7. Auditing, Junior Academy, Henry Barwood, No Report Submitted
8. Editorial Board & Associate Journal Editors, Thane Wibbels, No Report Submitted
9. Place and Date of Meeting, Mark Meade, No Report Submitted
10. Public Relations, Roland Dute

There is nothing to report.

11. Archives, Troy Best

We need to obtain photographs (especially of members of the Executive Committee), committee reports, minutes of the AAS Executive Committee meetings, and any other materials that may be of interest to our membership. Items that may not seem of interest at present may be of great interest in the future. Photographs of officers and members at meetings are of special interest.

If you have items that you believe may be worthy of inclusion in the AAS Archives, please send them to me or to Dr. Dwayne D. Cox, University Archivist, Auburn University Ralph B. Draughon Library, 231 Mell Street, Auburn University, AL 36849.

Access to our AAS Archives is available 7:45-4:45 Monday-Friday. Dr. Cox has provided the following information relative to access. Archives materials do not go out on interlibrary loan. Patrons can come in and use them according to the donor specifications. Some require special permission from the donating office or persons who made the donation or sometimes the archivist. Materials to be used at night or weekends need to have special arrangements made so they can be pulled before 4:30 in the afternoon (Friday afternoon for weekend use). Copies can be made in most cases and that can be done either by going through InfoQuest or contacting Dr. Cox or the reference desk at 334/844-1732.

I encourage all officers and members of the AAS to donate significant documents, photographs, etc. to the archives.

Action Items:

1. Obtain photographs of members of the Executive Committee
2. Obtain copies of committee reports, minutes of Executive Committee meetings
3. Obtain photographs of annual meeting attendees.

12. Science and Public Policy, Scott Brande, No Report Submitted

13. Gardner Award, Prakash Sharma

There were no nominations made to the committee for the Gardner Award this year. There were nominations for the "Fellow of Alabama Academy of Science (F. A. A. S.)" designation. Two fellows have been selected and elevated to the status of "Fellow of Alabama Academy of Science (F. A. A. S.)". All winners are of the highest quality in terms of their contributions to science and dedication to the Academy. The names of the winners will be officially announced during the Banquet of the "86th Annual Joint Meeting of Senior & Junior Academy of Science" on Thursday, March 26, 2009.

14. Carmichael Award, Richard Hudiburg

The winner of the Emmett B. Carmichael Award for 2008 is the following article. Valerie M. Johnson, Craig Guyer, Matthew D. Shawkey, and Sharon R. Roberts. Abundance, Identification, and Prospective Participation of Bacteria on Gopher Tortoise Shell Degradation, *The Journal of Alabama Academy of Science*, 79(3,4), 190-199. There were seven articles reviewed by the committee. These articles were either in the January 2008 (3 articles) or July/October 2007 (4 articles) issues of volume 79 of *The Journal of the Alabama Academy of Science*.

Appreciation is extended to the other members of the committee for reviewing and rating the articles: Robert Pitt of University of Alabama and James Bradley of Auburn University.

15. Resolutions, Mark Meade

The committee has written resolutions for three of its past members who passed recently (William Barrett, William Bowen, and Dan Holliman). These will be presented at the annual business meeting of the Academy on March 26, 2009. Copies of these are included under New Business for the Executive Committee meeting.

16. Nominating Committee, Brian Burnes

The following is a list of nominees for the indicated positions to be filled:

Second Vice-President	Mickie Powell
Secretary	Vacant
Treasurer	Vacant
Editor	Safaa Al-Hamdani
State Counselor to the Jr. Academy	Henry L. Barwood
Assoc. Counselor to the Jr. Academy	Vacant
Assoc. Counselor to the Jr. Academy	Vacant
Coordinator of State Science Fairs	Virginia Vilardi
Coordinator of State Science Olympiad	Jane Nall
Trustee	Brian Toone
Trustee	Vacant
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The committee has written resolutions for three of its past members who passed recently (William Barrett, William Bowen, and Dan Holliman). These will be presented at the annual business meeting of the Academy on March 26, 2009. Copies of these are included under New Business for the Executive Committee meeting.

16. Nominating Committee, Brian Burnes

The following is a list of nominees for the indicated positions to be filled:

Second Vice-President	Mickie Powell
Secretary	Vacant
Treasurer	Vacant
Editor	Safaa Al-Hamdani
State Counselor to the Jr. Academy	Henry L. Barwood
Assoc. Counselor to the Jr. Academy	Vacant
Assoc. Counselor to the Jr. Academy	Vacant
Coordinator of State Science Fairs	Virginia Vilardi
Coordinator of State Science Olympiad	Jane Nall
Trustee	Brian Toone
Trustee	Vacant
Trustee	Vacant

17. Mason Scholarship, Mike Moeller

In November, as we have done in previous years, notice of the opportunity for a 1000 William H. Mason Scholarship was sent electronically to deans in colleges of arts and sciences and deans of college of education throughout Alabama. I regret to report that we had no applications for the graduate scholarship.

18. Gorgas Scholarship Program, Ellen Buckner

I. Gorgas Competition 2009

The 2009 Gorgas Scholarship Competition received numerous applications this year and thirteen finalists were chosen. Finalists were named from the following schools:

High School	City	Teacher-Sponsor
Deshler High School	Tuscumbia	Emily Stafford
Ramsay High School	Birmingham	Dasi Mosley
Mountain Brook High School	Mountain Brook	Wanda Burns
Brooks High School	Killen	Vicki Farina
Wetumpka High School	Wetumpka	Virginia Vilardi
Jefferson County International Baccalaureate	Birmingham	Catherine Shields
S.S. Murphy High School	Mobile	Debbie Anderson
Covenant Christian Academy	Huntsville	Lisa Sudeiha
Hoover High School	Hoover	Rhonda Lisauckis Janet Ort

The Gorgas Committee would like to commend the teachers from these and other schools for their outstanding work with students to encourage their scientific work and entry into the competition. Please come by Room 206 Bibb Graves Hall between 11:30 and 2:00 to view the displays on Friday. Awards will be announced at the reception at 4:00 in the Bell Conference Center.

II. New initiatives 2008 & 2009

As you recall in 2008 we initiated a new program, the Gorgas-AJAS Teaching Fellow to develop the network of teachers participating a sponsors for students in the AJAS and Gorgas competitions. We had three outstanding candidates and hired Dr. Catherine Shields. The monies came from monies dedicated to the AJAS and Gorgas programs. Dr. Shields is doing an excellent job contacting teachers, identifying a regional coordinator for each area and encouraging participation in the AJAS and Gorgas. The other two applicants, Dr. Mark Jones from Auburn and Mr. Michael Hallman from Tuscaloosa, have volunteered to continue to assist and will be judging the competitions in Livingston. Dr. Shields' report will be available at the Executive Committee meeting.

As you may have heard there are new initiatives to support science education nationally and in the state. I would like to propose a grant application to create the **Alabama Science Competition Teacher Network** with the overall goal to increase involvement by teachers state-wide in sponsoring student participation in competitions. Drs. Shields, Jones and Mr. Hallman are willing to develop this grant application and several of the committee members may be appropriate to assist. I believe some of these monies are being channeled through the NSF so the grant application could go that agency. There could also be special opportunities from the State Department of Education, the Governor's office or from special procedures set up through the America Reinvestment and Recovery Act (stimulus legislation).

Because the AAS is a 501c3 non-profit agency it can make grant applications. We are in a particularly strong position since we have an infrastructure for the competitions already in place and the program would encourage higher utilization of the existing structure. It is also strong because it offers an excellent mechanism for highly competitive outcomes for our top science students in the state. The network could link students in rural areas through technology and generally support K-12 science education at the highest levels. The tentative goals are to

1. Create a network of Alabama HS teachers who actively support the state-wide science competitions through AJAS, JSBS and Gorgas Scholarship Competitions.
2. Increase the number of Alabama students participating in regional paper competitions, regional science fair and national competitions.
3. Strengthen the existing regional system to have a coordinator a co-coordinator (or chair and vice-chair) and at least 3-10 schools actively participating in each region.
4. Utilize communication and classroom technology to support competition candidates, linking AAS scientists to teachers and students across Alabama, particularly in rural geographically distributed schools.
5. Develop leadership training and support for officers in each AJAS chapter school at state AJAS officers.
6. Connect students and teachers through technology to online resources for competitions (regulations, national competitions, etc.)
7. Provide ready-access to grant opportunities publicized by Congressmen Artur Davis and Jeff Sessions's offices that offer opportunities for high school educators to receive funding for science and technology initiatives.
8. Offer orientation sessions and easy-to-read user guides for classroom technology so that application of these services provides the greatest and most efficient benefit to the students.

I have received support from a majority of the Gorgas Committee. We therefore put forward this motion for the Executive Committee meeting on March 25th:

The Gorgas Committee proposes development of a major grant application to create the Alabama Science Competition Teacher Network. The grant application would be approved by the Executive Director and steering committee prior to submission.

Action Item:

Motion to develop a grant application to create the Alabama Science Competition Teacher Network

AJAS/Gorgas Expansion Activities

Expansion of the AJAS/Gorgas program is progressing, with participation of four regions this year, doubling the participation of recent years. Mary Thomaskutty from Decatur High School is coordinating the North Region and Virginia Vilardi from Wetumpka High School is coordinating the South Central region. Vicki Farina from Brooks High School is now coordinating the Northwest region and Dr. Catherine Shields from Jefferson County International Baccalaureate School continues to coordinate the Central region. Janet Ort from Hoover High School is sponsoring students for the first time in the Central Region. Dr. B. J. Bateman continues to serve as the State Coordinator. We hope for a continuation of this growth in both quantity and quality of projects presented.

The expansion of the program was accomplished through many efforts including establishment of an AJAS website by Dr. Brian Toone, hosting an AJAS/Gorgas booth at the Alabama Science Teachers' Association (ASTA) meeting in September/October 2008, presenting an information session both days during ASTA, mailing a letter and fliers to 450 science teachers throughout the state in Fall 2008, calling 30 schools to talk with teachers, e-mailing 150 science teachers, and distributing fliers to winners at the Central Region Science Fair at UAB in March 2009. Talks were initiated with Stan Hart of Alabama Science in Motion to use the relationships already established between Science in Motion personnel and science teachers around the state to promote the AJAS/Gorgas program.

Future goals include continuation of efforts to locate a high school science teacher to serve as the regional coordinator for each of the state regions. We plan to distribute AJAS and Gorgas fliers to winners at the State Science Fair in Huntsville in April 2009 and locate Science Fair coordinators in other state regions to distribute fliers to winners in 2010. In spring 2009 we hope to submit a grant proposal to create the Alabama Science Competition Teacher Network to support the work of AJAS/Gorgas. In 2009-2010 we will utilize existing contacts between Science in Motion personnel and teachers throughout the state to promote AJAS/Gorgas in all state regions. We will also involve key contacts in different state regions to assist in advertising the program.

For more information contact Dr. Catherine Shields at Catherine.Shields@alabamaacademyofscience.org or (205) 379-5356

19. Electronic Media, Brian Toone

Website:

I have made a number of routine updates to the website (announcements, etc...) as well as these below:

Annual Meeting Title and Abstract Submission for 2009

No major changes to the submission process.

Spring Executive Report Submission Page

I updated the report submission page to gather reports for this Spring 2009 executive meeting.

Online Membership Application

I implemented the Online Membership Application and PayPal process for paying membership dues online. As of Friday, March 6, exactly 50 people had created membership accounts using the online form (see below) and of those 50 people, we had the following dues breakdown:

- 17 professional 1 yr memberships
- 1 professional 1 yr membership (renew)
- 2 professional 2 year memberships
- 1 professional 3 year membership
- 1 professional lifetime membership
- 22 student 1 year memberships
- 6 non-paying

Current paypal balance: \$1,292.67 USD

Note: there is still ongoing work to collect more information on the membership form and smooth the transition between members who sign up via the website or via the traditional mail-in form.

Also, Paypal has placed a limitation on our account while they verify our non-profit status and bank account ownership. I am working to resolve this limitation and hope to have it resolved by the time of our spring meeting.

Agenda D. Old Business, None

Alabama Academy of Science Membership Registration

We are now accepting membership dues payment online.

Start Here

Whether you are an existing member or signing up for the first time, please start here to create your online membership account by filling out the requested information below:

Required fields are shown in **bold**

First name: _____

Initial: _____

Last name: _____

Address 1: _____

Address 2: _____

City, State, Zip: _____

Phone: _____ include area code

Fax: _____ include area code

Email: _____

Password: _____

Confirm: _____

Your email address and password will allow you to login to the website to access membership information (such as online journal access) available to members only.

Select your affiliation from the following **SECTIONS OF THE ACADEMY**

- I. BIOLOGICAL SCIENCE
- II. CHEMISTRY
- III. EARTH SCIENCE
- IV. GEOGRAPHY, FORESTRY, FISH/SH/INVERTEBRATE
- V. PHYSICS AND MATHEMATICS
- VI. INDUSTRY AND ECONOMICS
- VII. SCIENCE EDUCATION
- VIII. BEHAVIORAL AND SOCIAL SCIENCE
- IX. HEALTH SCIENCES
- X. ENGINEERING AND COMPUTER SCIENCE
- XI. ANTHROPOLOGY
- XII. EDUCATION & HISTORY & PHILOSOPHY & SOCIOLOGY

Submit

Agenda E. New Business

1. Resolution in honor of Dr. William J. Barrett

Resolution in honor of William J. Barrett

To honor and recognize DR. WILLIAM J. BARRETT for his outstanding efforts and contributions to science, education, and the academy.

Whereas, Dr. Barrett earned a Master's degree in Chemistry from Mercer University, and a Ph.D. from the University of Florida.

Whereas, Dr. Barrett Worked for the Navy during World War II and received the Distinguished Civilian Award for his work on submarines.

Whereas, Dr. Barrett worked for and eventually became the Director of Research in Applied Science at Southern Research Institute where he specialized in environmental pollution and the disposal of and protection from chemical weapons.

Whereas, Dr. Barrett was a member of the Alabama Academy of Science for 53 years, serving as President, Executive Director, and Trustee.

Whereas, Dr. Barrett was awarded the Wright Gardner Award from the Academy in 2004 for his accomplishments in the field of science.

Now, therefore,

Be it resolved by the Alabama Academy of Sciences Resolution Committee, its executive committee concurring:

That the membership of the Alabama Academy of Sciences, by this resolution, honor and recognize Dr. William J. Barrett for his outstanding contributions to science and environmental awareness and protection and convey sadness upon his passing.

Be it further resolved that a copy of this resolution be forwarded to the Barrett family.

2. Resolution in honor of Dr. Dan C. Holliman

To honor and recognize DR. DAN CLARK HOLLIMAN for his outstanding efforts and contributions to science, education, and the academy.

Whereas, Dr. Holliman retired as the Ada Rittenhouse Snavely Professor of Biology at Birmingham Southern College in 2000 after teaching and performing research for 44 years.

Whereas, Dr. Holliman also taught college classes at numerous other institutions including the University of Alabama at Birmingham, the University of Alabama at Tuscaloosa, and Dauphin Island Sea Lab.

Whereas, Dr. Holliman taught in the Galapagos Islands and in the Amazon River Valley at the first International rain forest symposium in Peru.

Whereas, Dr. Holliman worked with various state and government agencies, including the Alabama Department of Conservation and Natural Resources, the U.S. Fish and Wildlife Service, the National Science Foundation, and NASA. Whereas, Dr. Holliman authored 35 scientific papers, including studies on rare and endangered species, avian and mammalian ecology, and red-cockaded woodpeckers.

Whereas, Dr. Holliman was awarded several honors, including ODK's Excellence in Teaching Award (1992), Alabama Wildlife Federation's Wildlife Conservationist of the year (1996), Birmingham Southern College's award for Outstanding Contribution to Environmental Education (2006), and most recently the Alabama Academy of Science's Wright Gardner Award for his accomplishments in the field of science.

Now, therefore,

Be it resolved by the Alabama Academy of Sciences Resolution Committee, its executive committee concurring:

That the membership of the Alabama Academy of Sciences, by this resolution, honor and recognize Dr. Dan C. Holliman for his outstanding contributions to science, education, and the environment and convey sadness upon his passing.

Be it further resolved that a copy of this resolution be forwarded to the Holliman family.

3. Resolution in honor of Dr. William Bowen

To honor and recognize DR. WILLIAM R. BOWEN for his outstanding efforts and contributions to science, education, and the academy.

Whereas, Dr. Bowen earned a Bachelor's of Arts degree in biology from Grinnell College in 1960, and a M.S. and Ph.D. in botany from the University of Iowa in 1964.

Whereas, Dr. Bowen taught botany/biology for Western Illinois University, Ripon College, and eventually joined the faculty of the University of Arkansas at Little Rock in 1975.

Whereas, Dr. Bowen joined Jacksonville State University in 1990 as it's Department Head.

Whereas, Dr. Bowen was instrumental in the modernization of the JSU biology department, and in creating the Little River Canyon Field School and the Little River Canyon Center.

Whereas, Dr. Bowen was an avid photographer, wildlife gardener, and nature lover in general.

Now, therefore,

Be it resolved by the Alabama Academy of Sciences Resolution Committee, its executive committee concurring:

That the membership of the Alabama Academy of Sciences, by this resolution, honor and recognize Dr. William R. Bowen for his outstanding contributions to science, education, and the environment and convey sadness upon his passing.

Be it further resolved that a copy of this resolution be forwarded to the Bowen family.

Agenda F. Adjournment; 10:30 pm

Joint AJAS/AAS Annual Business Meeting

3-26-2009

Call To Order 6:03 PM

Attending: Safaa Al-Hamdani, B.J. Bateman, Janis Beaird, Ellen Buckner, Brian Burns, Megan Gibbins, Mijitaba Hamissou, Richard A. Hudiburg, Larry Krannich, Gene Omasta, David Nelson, Mickie Powell, James Rayburn, Bettina H. Riley, P.C. Sharma, Ketia Shumaker, D. Brian Thompson, Stephen Watts.

Summary of Executive Business Meeting (see minutes from 3-25-2009)

Motion to allow Gorgas committee to develop a grant application to create the Alabama Science Competition Teacher Network. Passed.

Reading of Resolutions in honor of William J. Barrett, Dan C. Holliman, and William Bowen.

Resolution committee to draft a resolution thanking for Brian Burnes and local arrangement committee for their hard work.

Nominations Committee

Voting as a slate for all suggested nominations for open offices as stated.

Passed

New Business

Thank BJ Bateman for service his service

Announced ASB

Adjourn 6:36.

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- The correspondent author 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.

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