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Cover Photograph: Founder's Hall on the campus of Athens State University, Athens, Alabama, site of the 76th Annual Meeting of the Alabama Academy of Science. Photograph provided by Tom Jandebeur.

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ABSTRACTS

Papers presented at the 76th Annual Meeting
Athens State University
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BIOLOGICAL SCIENCES

DO CRICKET NUAGE BODIES CONTAIN DETERMINANTS FOR EMBRYOGENESIS?

M. Falany[1], M. Kloc[3], K. Wolfe[2] and J. T. Bradley[1], Department of Biological Sciences, College of Science and Mathematics, Auburn University, AL 3849, Department of Anatomy, School of Veterinary Medicine, Auburn University, and University of Texas M.D. Anderson Cancer Center, Department of Molecular Genetics, Houston, TX 77030.

Developing oocytes in many groups of invertebrates and vertebrates contain a compact, perinuclear aggregation of organelles variously called the nuage body (NB), Balbiani body, mitochondrial cloud, and Dotterkern. Strangely, well organized NBs have not been reported in insects, and in the few cases where oocytes have been examined for them they have been absent. Here we report the identification of two well organized NBs in previtellogenic oocytes of the cricket, *Acheta domesticus*. Nomarski optics revealed anterior and posterior NBs in the oblong follicles; both appear to emerge from the large germinal vesicle and then migrate toward opposite poles of the elongating oocyte. By fluorescent microscopy, mitochondria and α-tubulin were localized to the anterior NB. TEM confirmed the presence of hundreds of tubular mitochondria in this NB and microtubules at its periphery. These organelles have not been identified in the posterior NB. By *in situ* hybridization, cDNA probes against RNAs found in the mitochondrial cloud of *Xenopus* oocytes were shown to react with RNA in the anterior cricket NB. In *Xenopus* these RNAs (Xcat-2, Xwnt-11, and Xpat) become localized to the vegetal cortex of the egg and are eventually segregated into the germ cell lineage. Our results suggest that cricket NBs contain embryonic determinants that are highly conserved evolutionarily. Supported by the Alabama Agricultural Experiment Station, the Dean's Research Initiative (COSAM), Auburn University, and the NIH.

SEXUAL DIMORPHISM OF TERRAPENE CAROLINA. Jacqueline Carter and Dr. George R. Cline. Jacksonville State University. Jacksonville, AL.

Through evolutionary time most animals have displayed sexual dimorphism. For the box turtle, they are sexually dimorphic based upon their plastron. However, other sexually dimorphic traits may be present that have also aided in survival and reproduction potential in the environment. Specimens of *Terrapene carolina carolina* and *Terrapene carolina bauri* were sampled and measured from Auburn University, Jacksonville State University, University of South Alabama, Carnegie Museum of Natural History, and the Smithsonian Institution. Measurements of carapace length, carapace width, carapace height, and plastron width were taken to assess other sexually dimorphic traits between the sexes besides the basic length, width, and height measurements that have been surveyed. A DIFF value has been assigned to determine any differences between the anterior and posterior sections of males compared to females. The DIFF value was defined as carapace height anterior minus carapace height posterior. Hypothetically, the female's posterior section would have a large negative DIFF value and the male would have positive anterior DIFF value. For *T.c.carolina*, there were 101 males sampled and the DIFF value was -2.76 and the females of 103 had a DIFF value of -1.81. For *Terrapene carolina bauri*, the males had a sample size of 58 and the DIFF value was -3.31. The females had a DIFF value of -2.36 for a size of 51 turtles.

LOWLAND PLANT COMMUNITIES OF THE CENTRAL COOSA RIVER BASIN. Althea Thompson, H.A. Jackson, L.R. Brodeur, S.J. Threlkeld, J. Teats, and R.D. Whetstone. Jacksonville State University, Department of Biology, Jacksonville, Alabama 36265.

Lowland plant communities along the central Coosa River have been greatly impacted by impoundments. Remaining old growth communities are dominated by several *Quercus* sp. including *Q.nigra, Q phellos,* and *Q. laurifolia.* Within these old growth communities the canopy is dominated by large individuals, and a reduced number of companion species. Successional communities within this region include many open bogs that are dominated by *Cephalanthus occidentalis, Acer rubrum* (transgressives) and *Scirpus* sp. Loss of suitable habitat has led to an increase in the number of successional communities. This survey was conducted during the summer of 1998 over a period of six weeks. The purpose of this study was to both enumerate species within the survey area, and identify specific plant communities.

COMPARISON OF UPLAND TREE COMMUNITIES ON FORT MCCLELLAN, AL. George Cline, Jason Adams, Steve Threlkeld, David Whetstone, Frank Romano, Biology Dept., Jacksonville State Univ., 700 Pelham Road North, Jacksonville, AL 36265-1602, and Victor Wu, Geography Dept., Samford University, Birmingham, AL 35229-2229.

In 1994, we received a grant from the NASA EPSCoR program to study landuse changes in northeastern Alabama. Since receiving the grant, the Pentagon announced the closure of Fort McCLellan, 7 miles south of Jacksonville. This talk presented data comparing upland plant communities as part of the NASA EPSCoR grant, and JSU's efforts to analyze biotic communities prior to closure of the Fort. Four transects were run approximately 500m apart. Five study sites (each 50m long by 20m wide) were located 100m apart along each transect. Each site was subdivided into ten 10m x 10m quadrants. Within each quadrant, each tree greater than 5cm Diameter Breast Height (DBH) was identified and DBH recorded. Relative Abundance, Relative Dominance, Relative Frequency and Importance Value (IV) were calculated for each site. Tree communities were named by ranking the species by IV, and adding species to the name until the cumulative IV was $\geq 69\%$. Community similarity was measured by using Stander's Index of Similarity (SIMI). The two transects that had southern exposures had lower diversity indices than the two transects that had southeastern exposures. SIMI indices for sites within exposure types were generally higher than comparisons between exposure types. These data are compared with spectral data from satellite images.

BRYOPHYTES OF THE ALABAMA BLACK BELT. Donna H. Miller and Harvey A. Miller. Dept. of Biology and Environmental Science, Univ. of West Ala., Livingston, AL 35470.

The black belt soils area extends across central Alabama including portions of Pickens, Sumter, Green, Marengo, Hale, Perry, Dallas, Lowndes, Montogomery, Bullock, Macon and Russell counties. Although considerable bryology has been done in the northern part of the state and in the area around Mobile, the central part of the state has not been well collected. The only counties with more than twenty reported species are Montgomery (28) and Hale (24). Recent collections within the black belt soils area which is underlain by chalk and where chalk exposures are common have resulted in many new county records. Among recent discoveries is *Sphaerocarpos texanus* previously known from single collection by Mohr without locality. The presence of *Forrstroemia*, *Cryphaea* and *Frullania* on the red cedars characteristic of shallow black belt soils on the chalk is of interest because they usually are not found on gymnosperms. Other unusual associations are expected to be discovered as the work progresses.

MOVEMENT PATTERNS OF THE ALABAMA REDBELLY TURTLE (PSEUDEMYS ALABAMENSIS) AS DETERMINED BY RADIOTELEMETRY. David H. Nelson, Sean P. O'Hare and William M. Turner, Department of Biological Sciences, University of South Alabama, Mobile, AL 36688.

The Alabama redbelly turtle (Pseudemys alabamensis) is an endangered species endemic to the delta of the mobile and Tensaw Rivers. Turtles were captured, tagged and released near Gravine Island on the Tensaw River in Baldwin County, Alabama. Each of the 79 turtles (54 females, and 25 males) were equipped with a radiotransmitter constructed in the laboratory to emit a pulsed signal on 26.760 - 28.200 MD. The turtles were dispatched in four separate groups from August of 1996 to October of 1998. Field trips were conducted from 1 to 3 times a week throughout the study. Turtles were tracked until telemeters failed from battery exhaustion (up to 6.8 months). Most turtles exhibited signs of dormancy during the winter months, although some specimens moved significant distances despite water temperatures near 11 C. During the four releases of telemeters, 77 turtles were tracked for mean periods of 147.3, 113.7, 156.5 and 101.8 days. Average straight-line movements recorded during these 4 releases ranged from 42 m to 19069 m ($\bar{x}$=6673.4m). Although most specimens remained in the vicinity of Gravine Island, 21 specimens (15 females, 6 males) moved distances greater than 10 km (6.2 miles).

BRYOPHYTES OF THE ALABAMA BLACK BELT. Donna H. Miller and Harvey A. Miller, Dept. of Biology and Environmental Science, Univ. of West Ala., Livingston, AL 35470.

The black belt soils area extends across central Alabama including portions of Pickens, Sumter, Green, Marengo, Hale, Perry, Dallas, Lowndes, Montgomery, Bulloek, Macon and Russell counties. Although considerable bryology has been done in the northern part of the state and in the area around Mobile, the central part of the state has not been well collected. The only counties with more than twenty reported species are Montgomery (28) and Hale (24). Recent collections within the black belt soils area which is underlain by chalk and where chalk exposures are common have resulted in many new county records. Among recent discoveries is Sphaerocarpos texanus previously known from a single collection by Mohr without locality. The presence of Forrstroemia, Cryphaea and Frullania on the red cedars characteristic of shallow black belt soils on the chalk is of interest because they usually are not found on gymnosperms. Other unusual associations are expected to be discovered as the work progresses.

THE POSSIBILITY OF USING *SALVINIA* AS A BIOLOGICAL AGENT TO REMEDIATE CHROMIUM. James D. Couch, P. Brent Nichols, and Safaa Al-Hamdani. Department of Biology, Jacksonville State University, Jacksonville, AL 36265.

This study was designed to evaluate the response of *Salvinia minima* (Willd) growth, carbohydrate accumulation, pigment concentration, light harvesting capacity, and remediation potential to 1 and 2 mg l^{-1} of Cr (VI). Salvinia growth was significantly reduced in the presence of chromium. The same result was obtained for the chlorophyll a, chlorophyll b, and carotenoid concentrations. In addition, starch and total nonstructural carbohydrate concentrations were significantly increased. Furthermore, the reduction in growth was correlated to the reduction in CO_2 assimilation that was directly influenced, by the reduction of chlorophyll concentration and the light harvesting capacity, specifically at the blue and red light wavelengths. Also, increasing Cr concentrations in the growth media significantly increased chromium uptake by salvinia.

A FUNCTIONAL STUDY OF ZIP, THE ZETA INTERACTIVE PROTEIN. Ivy Samuels, Kim W. Neidigh, Marie W. Wooten. Department of Zoology, Auburn, AL 36849.

Atypical Protein Kinase C zeta/iota is involved in the regulation of cell growth, differentiation, and survival. Our lab has previously documented the activation of the aPKCs by NGF, and we now demonstrate NGF-dependent interaction of aPKC- zeta/iota with ZIP. Immunoprecipitation of ZIP from pheochromocytoma (PC12) cells and Western blotting with PKC isoform specific antibodies to α, δ, or ι revealed that ZIP coassociates with PKC-ι (in an NGF dependent manner). The coassociation of ZIP and PKC-ι at the nucleus/nuclear membrane is likewise observed with immunofluorescent microscopy of PC12 cells treated with 100 ng/ml NGF for 0, 30, 60 minutes staining with ZIP antibody and Texas Red secondary antibodies. In parallel, PC12 cells were also treated with 100 ng/ml NGF for 0, 5, 10, 15, 30, 60, 120 minutes followed by the immunoprecipitation of ZIP followed by Western Blot analysis with PKC-iota, TrkA, and ZIP antibodies. NGF treatment stimulated the formation of a Zeta-TrkA-ZIP complex. In parallel, immunofluorescent microscopy confirmed colocalization between ZIP and TrkA. Pretreatment of the cells with either Genistein, Herbimycin, or K252A, inhibitors of tyrosine kinase activity or TrkA receptor, blocked transport of ZIP to the nucleus. These results suggest that ZIP acts as a transport molecule or scaffolding protein that may be involved in targeting of PKC-ι/TrkA to the nuclear membrane. This work was funded by the Howard Hughes Future Life Science Scholars Program and by an undergraduate Research Grant-In-Aid from the Truelove Fund for Excellence.

BODY-WALL EXTRACTS OF *ASTROCYCLUS CAECILIA* (ECHINODERMATA) INHIBIT BROWN ALGAL SPORE SETTLEMENT ON VARIED SUBSTRATES. Jason P. Stanko, Stephen P. Greer, James B. McClintock, and Charles D. Amsler, Dept. of Biology, Univ. of Al. at Birmingham, Birmingham, Al 35294.

Polar and non-polar body-wall extracts of the basket star *Astrocyclus caecilia* (Echinodermata: Opiuroidea) from the northern Gulf of Mexico exhibited a significant inhibitory effect on the settlement rate of spores of the sympatric brown macroalga, *Ectocarpus siliculosus*. Aqueous and organic metabolites were extracted using deionized water and acetone, respectively. Crude extracts were fractionated through Whatman sep-pak columns using MeOH : H_2O at increasing increments of 20% MeOH. Both crude and fractionated extracts were tested for capacity to inhibit the settlement of spores of *E. siliculosus* on positively charged, negatively charged, and hydrophobic substrates. At an estimated concentration of 100 ug/ml, both aqueous and organic crude extracts caused a decrease in the number of settled spores compared to controls, with the aqueous fraction having greater activity. At approximately 1 mg/ml, the 80% and 100% MeOH fractions of both extracts had greater inhibition of spore settlement when compared to other MeOH elution's and controls. The capacity to inhibit fouling is particularly important in *A. caecilia* as it is a filter feeder that relies on unfouled ambulacral grooves for efficient particle capture and transport.
Supported by Mississippi-Alabama Sea Grant Consortium grant numbers R/MT-32 and R/MT-40.

CALOGLOSSA LEPRIEURII, A RED ALGA: OBSERVATIONS OF TETRASPORE PRODUCTION FROM TENNESSEE RIVER MATERIAL USING CULTURE TECHNIQUES SUITABLE FOR THE CLASSROOM. Aaron R. Irons and Paul G. Davison, Dept. of Biology, University of North Alabama, Florence, AL 35632.

Caloglossa leprieurii is found primarily in marine habitats and has only recently been reported as widely occurring in the Tennessee River from Chattanoga, TN to Sheffield, AL (Davison and Wujek, 1999, Castanea vol. 64, No. 3, in print). Tennessee River material is invariably sterile yet when cultured in saline solution produces tetraspores (see Beasley et al. 1998, ASB Bulletin 45: 131). Given that material from throughout the species' range in the Tennessee Valley has produced tetraspores in culture, we suspect that all Tennessee River populations are tetrasporophytes. Sterile tetrasporophytes of Caloglossa have proven to be perennially available in the Tennessee Valley (observations since 1997) and have been used regionally in the teaching laboratory for the demonstration of reproductive structures in the complex red algal life cycle. To refine and develop simple protocols that would yield reproductive structures held in common by many red algae, we tested several variables in cultures of freshly collected material for their effects on tetraspore production. Our optimum conditions produced mature tetraspores in 12 - 14 days and consisted of plastic Petri dishes with 35 ml of 14 - 16 ppt saline solution (made with distilled water and Instant Ocean ®) maintained under constant light at 25-27 degrees Celsius. Although tetraspores germinated, we were unsuccessful in producing mature gametophytes.

PKC DEPENDENT MODULATION OF CALCIUM FLUXES IN RAT AORTIC VASCULAR SMOOTH MUSCLE CELLS. Jonathan E. Shelton, Richard B. Marchase, and C. Roger White. University of Alabama at Birmingham, Depts. Of Physiology, Cell Biology, and Medicine Birmingham, AL 35294.

Capacitative calcium influx (CCI) plays an important role in refilling intracellular Ca^{2+} (Ca^{2+}_i) storage sites after agonist stimulation. Evidence suggests protein kinase C (PKC) modulates Ca^{2+} homeostasis in rat aortic vascular smooth muscle cells (VSMC). Experiments were designed to test the effects of phorbol-12-myristate-13-acetate (PMA), a PKC activator, on VSMC Ca^{2+} fluxes using the fluorescent probe Fura-2. We used a Ca^{2+} removal/addback protocol to isolate Ca^{2+}_i release from Ca^{2+} influx pathways. In nominally Ca^{2+} free buffer, the peak increase in $[Ca^{2+}_i]$ in angiotensin II (AII)-stimulated VSMCs was 122 ± 8 nM. The re-addition of Ca^{2+} to extracellular buffer resulted in a prominent influx of Ca^{2+} via CCI which peaked at 115 ± 9 nM. In PMA-treated (1μM) VSMCs, the peak increase in $[Ca^{2+}_i]$ and CCI were reduced 70% and 50% respectively. The inhibitory effects of PMA on $[Ca^{2+}_i]$ were reversed by the PKC specific inhibitor bisindolylmalemide II. Additional experiments demonstrated no inhibitory effects of an inactive phorbol ester. When PMA-treated VSMCs were exposed to the sarcoplasmic reticulum Ca^{2+}-ATPase inhibitor thapsigargin, CCI was diminished by 33% while Ca^{2+}_i release was unaffected. These results suggest that PKC plays a role in the regulation CCI in VSMCs. This work was supported in part by NIH grant HL-54815 and Grant-in-Aid from the American Diabetes Association.

RAPID DETECTION OF *Corynebacterium jeikeium* USING PCR. Michael L. Myers and Asim K. Bej, Dept. of Biology, Univ. of Alabama at Birmingham, AL 35294-1170.

Corynebacterium jeikeium is an opportunistic pathogen known to cause endocarditis (inflammation of the heart valve) in humans who have had open-heart surgery or are otherwise immunocompromised. Endocarditis caused by *C. jeikeium* has a high mortality rate due to the unreliable and relatively slow (7-10 days) detection methods that are currently available. In this study, a polymerase chain reaction (PCR)-based rapid detection method was developed to help alleviate this problem. Total genomic DNA from *C. jeikeium* was purified and PCR amplification was performed under low-stringent conditions using degenerate oligonucleotide primers selected from the conserved regions of the thymidylate synthase (TS) gene from various bacterial species. The resulting PCR amplified DNA fragments (~250-906 bp) from *C. jeikeium* genome were subjected to nucleotide sequence analysis. Oligonucleotide primers were designed from the unique nucleotide sequences found within these fragments. Two strains of *C. jeikeium* from ATCC and 19 isolates from human patients were successfully amplified using these selected oligonucleotide primers. Several bacterial species other than *C. jeikeium* were also used to test the specificity of detection. The sensitivity of PCR-based detection was determined by addition of various concentrations of *C. jeikeium* cells to 0.5 ml blood samples. A minimum of <10 target *C. jeikeium* cells was detected in the presence or absence of $>10^6$ non-target cells by the PCR method. This method is therefore reliable and efficient as PCR-based detection can be completed in one day. Accurate and early detection of this pathogen by using the PCR method could facilitate timely treatment with appropriate antibiotics, thus saving lives.

SPORE SETTLEMENT IN THE BROWN ALGA *HINCKSIA IRREGULARIS*: THE EFFECTS OF IRRADIANCE AND SURFACE HYDROPHOBICITY. Stephen P. Greer and Charles D. Amsler, Biology Dept., Univ. of Ala. at Birmingham, 1300 Univ. Blvd. Birmingham, AL 35294-1170.

A method for releasing spores in *Hincksia irregularis* has been developed giving typical yields of up to 1.85 x 10^5 spores per ml in solution. We examined the effects of growth irradiance, settlement surface hydrophobicity, and presence of light during settlement on the rates of spore settlement over 30 min. The presence of light during settlement significantly effected the rates of spore settlement, perhaps due to a phototactic response. There were no significant effects of surface hydrophobicity or growth irradiance on spore settlement.

HURRICANE GEORGE: MASS MORTALITY EFFECTS ON A *MELONGENA CORONA* (GASTROPODA; MOLLUSCA) POPULATION IN THE GULF ISLANDS NATIONAL SEASHORE AT PERDIDO KEY, FL Jennifer M. Walker and Thomas S. Hopkins, Department of Biological Sciences, Univ. of Ala., Tuscaloosa, AL. 35487.

In July 1997, Mobile and Baldwin counties AL, and western Escambia county in FL were subjected to winds and periods of prolonged rainfall by Hurricane Danny. A post hurricane biological survey of a grassy habitat at Johnson's Beach, Perdido Key revealed little in the way of physical damage to the study site, and no measurable impact on a population of the "King Crown Conch", *Melongena corona* Gmelin. In early September, 1998, we completed a 16 month long mark and recapture census of this population (N=266 marked), gathered data that described the number of individuals numbered, and established a size frequency distribution for the marked population. (Part of that study is revealed in a "paper" abstract submitted for this meeting.) In late September, 1998, Hurricane George struck the study site and caused evident physical damage to the habitat, and extirpated at least 250 individuals whose moribund remains were found as soon as we were allowed in the area. Of all the individuals recovered, 25 carried the distinct numbers applied during the previous year. In the 1st year of study, we did not make extensive observations on the degrees of variations in shell morphology except to note presence/absence of the corollary whorl of spines used to characterize the invalid subspecies, *Melongena corona johnstonei*. Data collected from the shells after Hurricane George indicates a variable range in the appearance and nature of the corollary row. These findings suppress earlier conjectural hypotheses concerning ecophenotypic variation. We suggest that a new hypothesis, "allelic variation", underlies the morphological variations in the shell structure of *Melongena corona*.

ANALYSIS OF ESTRADIOL METABOLISM IN THE NILE TILAPIA DURING EARLY DEVELOPMENT.

C. B. Rowell, G.A. Hines, G.C. Mair, T. Wibbles and S.A. Watts, Dept. of Biology, Univ. of Ala. at Birmingham, 35294-1170.

Recognizing that sex steriods are involved in the natural sex differentiation process has led to the development of protocols to increase commercial production of tilapia. These protocols involve the use of steroid agonists to produce male monosex populations. To better understand how endogenous steroid levels may act on the differentiation events we have analysed the ability of tilapia to metabolize steroids and examined the products formed during sexual differentiation. Previous research (RIA) has demonstrated that there is little or no detectable estradiol present in tilapia tissues prior to gonadal development. Using monosex populations, including families of genetic males, genetic females and YY-males, we investigated the ability of tilapia to metabolize estrogen during the proposed period of gonadal differentiation. Incubations with ^{3}H-17ß-Estradiol were performed on whole animal homogenates of 8-14 day post fertilization (dpf) fish. Estrogen is readily metabolized during the proposed period of gonadal differentiation. At least five major organically-extracted metabolites could be resolved by thin-layer chromatography (TLC). Estrone has been positively identified by TLC and microchemical reactions, however, the identity of the other metabolites is unknown. Overall metabolism of estradiol increases from 8 to 14 dpf and estrone production peaked around 11dpf. This peak of estrone production corresponds to a time immediately prior to an increase in the synthesis of several other unknown estrogen metabolites. This research was supported by grants from the AAS and the USDA.

GROWTH COMPARISON OF SALT-TOLERANT AND SALT-REQUIRING BACTERIA ISOLATED FROM AN INLAND SALT SPRING.

Randy Sterling, and Donald Salter, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470

We are studying the adaptability of aquatic organisms inhabiting an inland saline habitat located in Clarke County, Alabama. Aquatic organisms living in this area are subjected to wide variations in salinity as high salinity water emerges form the ground and mixes with freshwater from nearby streams and as the area is alternately inundated by flooding from the nearby Tombigbee river. We isolated two species of bacteria, RS6 and RS10, from a fresh water stream and a high saline spring in this area, respectively, using a selective complex medium containing 25% NaCl, 0.5% KCl , 1% $MgSO_4 7H_2O$, and 0.02% $CaCl_2 6H_2O$. We then compared the growth of these two microorganisms to microorganisms with known saline requirements. Growth comparisons were made in a complex medium containing the indicated concentrations of KCl, $MgSO_4 7H_2O$, and $CaCl_2 6H_2O$ and NaCl concentrations from 0% to 25%. RS6 and RS10 grew optimally at 10% and 3% NaCl, respectively, but RS10 grew much better than RS6 at the higher NaCl concentrations. In addition, only RS6 could grow, although suboptimally, in a medium free of added NaCl. These facts would seem to classify RS6 as halotolerant and RS10 as halophilic with both being able to grow at the variable NaCl concentrations found in this inland salt spring.

A PRELIMINARY DETERMINATION OF THREE DIGESTIVE ENZYMES IN THE SEA URCHIN LYTECHINUS VARIEGATUS. Hugh S. Hammer and Stephen A. Watts. Dept. of Biology, Univ. of Ala. at Birmingham, Birmingham Al, 35294-1170.

The sea urchin Lytechinus variegatus is a common nearshore inhabitant of the Gulf of Mexico and has recently received attention as a potential species for commercial fishing and aquaculture of sea urchin roe. A better understanding of the sea urchin's nutritional requirements and digestive physiology may help to maximize the commercial potential of sea urchin roe production. Eight sea urchins were held in each of two 76 liter recirculating aquaria at 19 °C and 33 ± 3 ppt artificial seawater. The urchins were initially starved for a period of eight weeks, one tank was then fed a formulated diet ad libitum for 2 weeks while the other tank remained unfed. At the end of 2 weeks three individuals from each tank were dissected, the gut of each animal was removed, weighed, homogenized in general enzyme buffer, sonicated and centrifuged. The supernatant was assayed for the presence of nonspecific esterase, α-amylase, and trypsin. The gut indicies of fed individuals were ca. 5-fold greater than that of starved individuals. Nonspecific esterase activity was detected in the esophagus, stomach and intestine of fed individuals; specific activity (U/gww) in the total gut was ca. 75% greater in the fed individuals than in starved individuals. A-amylase activity was detected in the esophagus and stomach but not in the intestine of fed individuals; α-amylase specific activity was not substantially different between fed and starved individuals. Trypsin activity was not detectable in any of the gut tissues. The total activity (U/indiv) of nonspecific esterase and α-amylase was 3.6- and 7-fold higher, respectively, in fed individuals when compared to starved individuals.

CHARACTERIZATION OF AMYLASE FROM A SALT-TOLERANT BACTERIUM ISOLATED FROM AN INLAND SALT SPRING. Reese Boulware, and Donald Salter, Department of Biological and Environmental Sciences, University of West Alabama, Livingston, AL 35470

We have previously identified halophilic and halotolerant microorganisms from an inland saline habitat located in Clarke County, Alabama. These microorganism are subjected to wide variations in salinity as high salinity water emerges form the ground and mixes with freshwater from nearby streams. Furthermore, this area is alternately inundated by flooding from the nearby Tombigbee river. These microorganism are also exposed to various kinds of nutrients due to decaying plant and animal debris. We sought to fully characterize the production, regulation and characteristics of an exoenzyme, amylase, from one of these salt-tolerant/requiring microorganisms. Microorganisms were screened for the ability to produce amylase using the iodine-starch assay on agar plates containing 10% NaCl, 0.5% KCl, 1% $MgSO_4 7H_2O$, 0.02% $CaCl_2 6H_2O$ and 1% soluble starch in a complex medium. One halotolerant isolate, RS6, produce a good zone of hydrolysis indicating adequate amylase production and excretion. Various amylase assays have been tested in order to find a sensitive assay to more fully characterize the exoenzyme being produced under these growth conditions. In addition, preliminary results indicate starch degradation by this microbe has complex regulation for amylase to degrade amylose and the debranching enzyme for amylopectin degradation.

A PLANT ECOSYSTEMATIC STUDY OF LIMESTONE COUNTY, ALABAMA.

Timothy L. Hofmann and R. D. Whetstone, JSU Herbarium, Jacksonville, AL 36265.

A survey of the vascular plant life of Limestone County was begun in 1997. Nearly 2,000 collections have been made documenting about 900 species of plants. A number of new records for the county have been documented along with several significant known range extensions for the State of Alabama. *Sium suave* Walter (Water-parsnip, Apiaceae) is reported as new to the flora of northeast Alabama. *Trifolium carolinianum* Michaux (White wild clover, Fabaceae) is reported as new to northern Alabama. *Rumex patientia* Linnaeus (Dock, Polygonaceae) is reported as new to Alabama. *Carex louisianica* Bailey (Sedge, Cyperaceae) is new to northeast Alabama. *Carex swanii* (Fernald) Mackenzie (Sedge, Cyperaceae) new to the Interior Low Plateau of Alabama. *Onosmodium molle* Michaux (False-gromwell, Boraginaceae) is an addition to the known flora of northern Alabama.

DOES VITAMIN C ENHANCE IMMUNE SYSTEM FUNCTION THROUGH AN ENDOCRINE PATHWAY?

P. Samuel Campbell and Matthew P. O'Keefe, Dept. of Biological Sciences, Univ. of Alabama in Huntsville, Huntsville, AL 35899.

Vitamin C supplements have been proposed to treat or prevent colds, cancer, and cardiovascular disease. However, the pathway(s) that permits vitamin C to have its putative beneficial effects on the immune system is unclear. It is proposed that vitamin C may act by reducing adrenal production or secretion of glucocorticoids, steroids that particularly suppress the immune system under conditions of stress. Megadoses of 100 mg or 200 mg vitamin C per day were administered in sugar solution by gastric gavage to Harlan Sprague-Dawley rats for a period of three weeks. One phase of the research studied the effects of vitamin C treatment on basal physiologic parameters of the endocrine and immune system. A second phase studied the effect of vitamin C supplementation on the same parameters under conditions of chronic immobilization stress. The spleen, thymus, and adrenal glands were weighed, the adrenal ascorbic acid content was determined, and blood samples were used to measure IgG and glucocorticoid levels. The results indicate that vitamin C supplementation increases the serum IgG fraction and lowers adrenal ascorbic acid under basal physiologic conditions. Furthermore, vitamin C treatment appears to alleviate many of the symptoms of chronic stress, including adrenal hypertrophy, elevated serum glucocorticoid titers, weight loss and thymus involution. The results of this research suggest that vitamin C may serve to prevent many of the debilitating effects of chronic stress associated with immune system dysfunction through an endocrine pathway.

THE EFFECT OF LONG-TERM STARVATION ON FECUNDITY AND SURVIVORSHIP IN TWO PROCAMBARID CRAYFISH SPECIES. Mickie L. Powell and Stephen A. Watts. Dept. of Biology, Univ. of Alabama at Birmingham, Birmingham, AL 35294-1170.

In managed crayfish ponds the summer reproductive season coincides with the draining of the ponds for control of aquatic predators as well as the planting of rice forage crops. During this period crayfish retreat to burrows to avoid predation and dessication. Crayfish have limited access to nutrients while in the burrows during the energetically-demanding process of egg production and maturation. We examined the effect of long term starvation on fecundity and survival in Procambarus clarkii and P. zonangulus. Crayfish (N = 400) were held individually in small 1 L containers and were either fed or starved for five months. Females of both species continued to extrude eggs during the first two months of starvation. However, the time of peak oviposition was delayed approximately two weeks in the starved individuals of both species. The total percentage of females extruding eggs did not differ between the starved and fed groups for the two month starvation period in either species. After five months, survivorship was greatest for females in both species. Survivorship for males was slightly lower than females but was greatly reduced in starved males. These data suggest starvation has a limited effect on ovipositon in females. Furthermore, P. clarkii and P. zonangulus are able to survive extended periods of reduced nutrient availability.

DEVELOPMENT OF AN ENZYME-LINKED IMMUNOSORBENT ASSAY (ELISA) FOR VITELLOGENIN OF THE MOSQUITOFISH (*Gambusia affinis*). Joseph F. Tolar, R. Douglas Watson, and Robert A. Angus, Biology Dept., University of Alabama at Birmingham, Birmingham, AL 35294.

Vitellogenin (VTG) is a glycolipophosphoprotein precursor produced in female fish in response to circulating estradiol levels. It is produced in the liver and carried in the blood to the ovaries where it is taken up by oocytes. Though its production is normally sex-limited, it can be induced in males by compounds with estrogenic activity. An objective of our research was to develop an enzyme-linked immunosorbent assay (ELISA) for VTG in *G. affinis* blood. VTG has been identified according to accepted criteria, purified by gel filtration chromatography and non-dissociating PAGE, then electroblotted to nitrocellulose. Rabbits were used to produce antibodies and specificity was determined by Western blot. Antibodies were purified by affinity chromatography. The ELISA will be used to investigate estrogenic activity of potential endocrine disrupting chemicals by assessing their capacity to induce VTG in the blood of male mosquitofish. Supported by USEPA grant R 826130-01-0.

STRUCTURE OF NONFUNCTIONAL PIT MEMBRANES IN POPULUS DELTOIDES.
Roland R. Dute, Department of Botany and Microbiology, Auburn University, AL 36830

A method was developed to determine whether intervascular pit membranes of Populus deltoides become more porous as they age. This process involved attaching preserved wood sections to a coverslip, removing the embedding resin, and viewing the specimen with a scanning electron microscope. Such treatment provided support for the fragile pit membrane. As previously reported, pit membranes from conducting wood appeared as intact fibrillar mats perforated by openings of 80 nm or less. Recent observations of pit membranes from non-functional wood showed an identical substructure. The only damage observed was associated with pit membranes not properly attached to the coverslip and was probably induced by processing. Thus, pit membranes do not appear to accumulate damage and become porous with time. This research was supported by the Alabama Agricultural Experiment Station.

MICROHABITAT DELINEATION OF TURKEY CREEK.
Luke A. Roy, Teresa Young, and Dr. Paul Blanchard. Department of Biology, Samford University, 800 Lakeshore Drive, Birmingham, AL. 35229.

Etheostoma chermocki, the vermilion darter, is an Alabama endangered species native only to Turkey Creek. The vermilion darter is dispersed throughout microhabitats within the watershed. This study compares and contrasts microhabitats of two sites on Turkey Creek. The "Narrows" site served as the control, whereas the "Falls" was the experimental site. Theoretically, the darter should inhabit both sites. However, *E. chermocki* was found only at the "Falls," as determined by extensive seining. Discovering a possible link between the presence of the darter at the "Falls" and its absence at the "Narrows" was a primary objective. Using a GPS unit, the two sites were delineated and maps of both sites were constructed utilizing ArcInfo and ArcView GIS software. Microhabitats were selected within each site and water quality tests were performed. The following parameters were selected for testing: dissolved oxygen, turbidity, temperature, pH, total suspended solids, phosphates; nitrates, and stream flow. A substantial finding was the vermilion darter's total suspended solids range of tolerance. The "Narrows," possessed a significantly higher level of total suspended solids as compared to the "Falls" site. This finding suggests that *E. chermocki* prefers areas where total suspended solids is minimal and demonstrates the importance of studying aquatic ecosystems at the microhabitat level.

THE EFFECTS OF PHOSPHATES ON GROWTH AND FEEDING OF THE COMMON NEARSHORE SEA URCHIN *Lytechinus variegatus*. S. Anne Boettger & James B. McClintock, Dept. of Biology, The University of Alabama at Birmingham, Birmingham, AL 35294-1170. Thomas S. Klinger, Dept. of Biol. Sci. Bloomsburg University, Bloomsburg, PA 17815-1301.

Coastal marine communities are exposed to point sources of phosphate pollutants and their effects on marine invertebrates are poorly understood. Adult *Lytechinus variegatus* were collected from St. Andrew Bay, Florida. Fifteen individuals were dissected upon collection and their body indices determined. An additional 112 animals were divided into 7 treatments: artificial sea water control, and three inorganic (800, 1600 and 3200 μg /L sodium phosphate) and organic (10, 100, 1000 mg/L triethyl phosphate) phosphate concentrations. Individuals were fed a prepared diet *ad libitum*, and feeding and fecal production rates recorded. After one month, all individuals were dissected and body indices determined. Compared to the initially sacrificed individuals, gut and gonad indices increased significantly ($p<0.05$) in individuals held in the control sea water and the lowest concentrations of both phosphates. Gonad indices decreased significantly in individuals held in the highest organic and inorganic phosphate concentrations ($p<0.05$). Feeding and fecal production rates declined significantly ($p<0.05$) in individuals held in all phosphate treatments. These results indicate that the growth and nutrition of sea urchins in near-shore phosphate polluted waters may be significantly impaired.

NESTING OF THE BLACK SKIMMER (RHYNCHOPS NIGER) ON DAUPHIN ISLAND, ALABAMA. William M. Turner, David H. Nelson and Stephanie A. Alexander. Department of Biological Sciences, University of South Alabama, Mobile, AL 36688.

From 1996 to 1998, black skimmers (Rynchops niger) were observed nesting during the summer months on gulf-side beaches on the uninhabited western end of Dauphin Island, Alabama. The skimmers formed three colonies in 1996 and in 1997, although in 1998 there was only one. Skimmers shared nesting areas with least terns and laughing gulls at one location. Each nest contained between one and six eggs. The average clutch size was three eggs. Every year nesting was interrupted by at least one hurricane, causing significant natal mortality. Another significant source of mortality has been motorized beach traffic, which, although illegal, was frequent in 1996. Skimmers were generally successful in fledging their first clutches, although in all three years, hurricanes interrupted their second clutches. In 1998, after Hurricane Earl, skimmers were observed beginning to nest again, although their former colony had been destroyed.

PROTEIN KINASE C-ZETA BINDING PROTEINS. J. L. Roehm, W.O White, M. L. Seibenhener, and M. W. Wooten, Department of Zoology, Auburn University, Auburn, AL 36849.

Atypical protein kinase C-zeta (PKC-ζ) participates in nerve growth factor (NGF) signaling and is required for NGF-induced differentiation of PC12 cells. The biological activity of PKC-ζ is likely mediated by interaction with PKC-ζ binding proteins. Affinity column chromatography with GST-PKC-ζ regulatory domain coupled to glutathione agarose was employed to search for binding proteins. Lysates of PC12 cells were bound to the column. Fractions were collected and run on a SDS-polyacrylamide gradient gel (7-20%). The gel was Coomassie stained, and a doublet ~60kDa was consistently observed in several experiments. An SDS-polyacrylamide 10% gel was run on pooled fractions which contained the 60kDa proteins. Western blotting was done in an attempt to identify the proteins which eluted from the column. Four antibodies to proteins which all have molecular weights around 60kDa were used: tubulin, src, zip, and paxillin. The autoradiograph was positive for tubulin and src. Using purified tubulin and src Far Western blotting was employed to map the domain of PKC-ζ (V1, CYS-V2, and V1-CYS-V2) to which these proteins bind. Both tubulin and src bound to the V1 region of PKC-ζ. This work was supported by The Howard Hughes Future Life Sciences Scholars Program and by an undergraduate Research Grant-In-Aid from the Department of Botany and Microbiology, Auburn University.

VARIABILITY IN BENTHIC MACROINVERTEBRATE COMMUNITY INDICES IN URBANIZED STREAMS TRIBUTARY TO THE CAHABA RIVER NEAR BIRMINGHAM, AL. Elizabeth Corn, Robert Angus and Ken Marion, Dept. of Biology, Univ. of Alabama at Birmingham, Birmingham AL 35294.

In order to assess the factors influencing the habitat/water quality conditions of the upper Cahaba River near Birmingham, AL, we investigated the status of the benthic macroinvertebrate community in seven tributaries in 1998. In addition, two mainstream sites on the extreme upper reaches of the river were researched. Sites were selected to reflect various degrees of watershed urbanization and sediment problems. Samples were collected in riffle areas with a kick net during summer and fall and preserved in EtOH. One hundred specimens were randomly selected from each site per season and identified to genus level. Macroinvertebrate community indices were calculated for each tributary or site. Preliminary results indicate a variability in most indices roughly reflective of the degree of urbanization or land disturbance in the watershed surrounding the site. Streams assessed to be primarily affected by sedimentation generally scored higher on indices than those streams classified as general urban (streams located in areas of long-term urbanization).

THE EFFECT OF JASMONIC ACID AND WOUNDING ON PROTEINASE INHIBITOR ACTIVITY IN TOMATO IN VIVO AND IN VITRO. K. Farque, J. Rudder, C. Terry, A. Williamson and C. Olander, Department of Biology, Jacksonville State University, Jacksonville, AL 36265.

Plant responses to injury includes gene activation both at the wound site and systemically in non-damaged leaves. Jasmonic acid has been shown to activate signal transduction pathway that regulates the expression of a variety of genes in plants in response to environmental and developmental cues. In an attempt to evaluate the signal transduction pathway which transmits the information to distant leaves, we have compared the effect of exogenous jasmonic acid at 10 -4 M and wounding on the accumulation of proteinase inhibition in cell extracts 48 hours after treatment . Both wounding and jasmonic acid application significantly enhanced proteinase inhibitor activity in vivo. Jasmonic acid had no significant effect on proteinase inhibitor activity on tomato callus in vitro.

COLOR VISION THRESHOLDS IN GOLDFISH (CARASSIUS AURATUS). Charlene M. Roberts and Michael S. Loop Dept. of Physiological Optics, Univ. of Ala. at B'ham, B'ham, AL 35294-4390.

Three goldfish (~20cm) were collected from Highlands Golf Course lake (before 'renovations' began).Under light adapted conditions,an autoshaping procedure was used in which 5sec light (531nm/'green'or 648nm/'red') presentations were followed by a food pellet dropped onto the water's surface. This resulted in the fish 'pecking' an illuminated response key. *Detection* thresholds were established for the both 'red' and 'green' light by determining the intensity which reduced responding by 50 percent. All three fish were slightly more sensitive to the 'red' (14.23 log photons/sec) than the 'green' (14.45 log photons/sec) light. Next, with brightness matched according to each fish's detection thresholds, 'red' flashes were followed by food but 'green' flashes were not. The fish responded only to the 'red' light across a wide range of intensities, including detection threshold intensities. Thus, the fish could discriminate between the two wavelengths at their threshold for seeing them.

It is universally agreed that wavelength opponent retinal ganglion cells are essential for wavelength discrimination, e.g. color vision. There is disagreement as to whether this makes color vision more, or less, sensitive than achromatic vision. Since humans, and here goldfish, can detect the color of spectral flashes, if they can detect them at all, wavelength opponency appears to convey both color vision *and* best sensitivity. This sensitivity advantage may have been the initial evolutionary advantage of 'color vision'.

HOST SPECIALIZATION ON A NICKEL HYPERACCUMULATOR. Michael A. Wall and Robert S. Boyd, Dept. of Botany and Microbiology, Auburn University, AL 36849

The peculiar chemical nature of serpentine soils provides a unique habitat in which organisms can evolve. In a previous study of the insects associated with Streptanthus polygaloides (Gray), the only Californian Ni hyperaccumulating serpentine endemic, we discovered an undescribed species of Melanotrichus (Hemiptera: Miridae) that contained over 700 ug/g Ni (dry weight). The objective of this study was to use field surveys and choice experiments to document food preferences in Melanotrichus sp. Documenting the diet of Melanotrichus is the first step in revealing how this species deals with nickel-based plant defenses. We use a hierarchical design of food preference experiments to allow us to distinguish the taxonomic level at which Melanotrichus sp. recognizes potential hosts. First, we compared the generic-level feeding preferences of Melanotrichus to a broadly polyphagous member of the Miridae, Lygus sp. We then documented species-level and population-level feeding preferences by adults of Melanotrichus. Our field surveys and feeding trials support the premise that Melanotrichus sp. is monophagous on S. polygaloides. Melanotrichus sp. is the only insect reported to be monophagic on a nickel hyperaccumulator.

PHYTOPLANKTON GROWTH AND CHLOROPHYLL ACCUMULATION IN A PHYTOPLANKTON COMMUNITY OF THE MIDDLE COOSA RIVER. Kirby C. Swenson, Safaa Al-Hamdani, Frank A. Romano and P. Brent Nichols Department of Biology, Jacksonville State University, Jacksonville, AL 36265.

Phytoplankton are microscopic autotrophs that float near the surface of bodies of water. These communties can be used to evaluate the health and amount of productivity of these bodies of water. A recent study was conducted along the middle Coosa River to guage the phytoplankton growth and other parameters of water quality including turbidity, pH, temperature, and several chemical components. Also measured was spectral reflectance from the water surface. Three sites were chosen to conduct these survey experiments on main tributaries of the Coosa River: Akers Creek, Trout Creek and Broken Arrow Creek. A site on the Coosa River upstream of each tributary was also chosen giving six total study locations. Each site was surveyed weekly from June 1 until August 28 of 1998. This presention concerns the phytoplankton growth and chlorophyll a concentrations measured for the duration of the study. Preliminary data analysis suggests a inverese correlation between temperature and phytoplankton growth and chlorophyll a concentrations for all sites. Also, an increase in pH seems to have a positive effect on the growth of phytoplankton and chlorophyl a concentrations. Data analysis on photyplankton concentrations and reflectance is in progress. This project has been funded by a grant to Jacksonville State University by NASA EPSCoR.

NESTING OF THE LOGGERHEAD SEA TURTLE (CARETTA CARETTA) ON DAUPHIN ISLAND, ALABAMA. David H. Nelson and Stephanie A. Alexander, Department of Biological Sciences, University of South Alabama, Mobile, AL 36688.

Field surveys for nests of loggerhead sea turtles were conducted from June to September 1998 along the gulf-side beach of Dauphin Island (Mobile Co.), Alabama. The beach was monitored three times a week by all-terrain vehicle to identify, locate, protect and mark individual nests. Specific coordinates of nests and false crawls were recorded using a hand-held GPS unit. In 1998, we confirmed 8 nests, 4 false crawls and 2 strandings of dead, adult sea turtles. Hatchling turtles were recorded at 4 of the nests before the interruptions of Hurricanes Earl and Georges. The hurricanes prevented the determinations of clutch size or hatching success from all but one nest. Data from that nest revealed 82.6% hatching success (90/109). In 1997, we confirmed 3 nests, 4 false crawls and 2 hatchings. In 1996, we documented 2 nests, 4 false crawls and 1 hatching. In 1995, we found 2 nests, 2 false crawls and no hatchings. Last year was the most successful nesting season for loggerhead sea turtles on Dauphin Island during the last four years.

ISOLATION AND CHARACTERIZATION OF GENES EXPRESSED DURING REGENERATION USING PCR-BASED SUBTRACTIVE HYBRIDIZATION IN AN ECHINODERM MODEL SYSTEM. M. C. L. Vickery, M. S. Vickery, C. D. Amsler, and J. B. McClintock, Biology Dept., Univ. of Alabama at Birmingham, Birmingham, AL 35294-1170.

We recently reported that many echinoderm larvae are capable of complete body regeneration in a matter of days after surgical bisection, which makes them ideal models for the study of regeneration genetics. Little is known of the cellular mechanics and genetics that control regeneration, although the developmental genes are believed to play an important role in this process. In order to ask if there are novel genes involved in regeneration, perhaps initiating or regulating expression of the developmental genes, we examined gene expression during early regeneration in echinoderm larvae. Larval cultures of the sea star *Luidia foliolata* were obtained from laboratory fertilizations and raised to the late bipinnaria stage. Total RNA was isolated from surgically bisected regenerating and uncut control larvae at timed intervals from the bisection, and a PCR-based method was used to generate and amplify cDNA from total RNA extracted 6 hr after bisection. The cDNA was then used for PCR-based subtractive hybridization to generate a subtracted cDNA library representing genes specifically up- and down-regulated during early *L. foliolata* larval regeneration. Library clones were screened and sequenced, and the nucleotide sequences were compared to known gene sequences. Additional subtractive hybridizations and RT-PCR screenings are being performed at other stages of regeneration. We believe these data will be of great use in understanding regeneration genetics.

SPECIES WITHIN A REGENERATING LONGLEAF PINE COMMUNITY RESPOND DIFFERENTLY TO ELEVATED ATMOSPHERIC CO_2. Milam E. Saxon, Roland R. Dute, Seth G. Pritchard, Steven A. Prior, Robert J. Mitchell, Micheal A. Davis, and Hugo H. Rogers, Auburn University and Joseph W. Jones Ecological Research Center

Atmospheric CO_2 levels are rising and are predicted to double in the next century, due mostly to fossil fuel consumption. Since plants utilize CO_2 as a substrate for photosynthesis, changes in atmospheric CO_2 levels can potentially affect the growth and productivity of plants. Our study's goal was to assess how increased CO_2 would affect plants at the individual species and community levels. Five species were chosen to represent a model regenerating longleaf pine community like that found in the Coastal Plain region of the southeastern US. The samples were grown in outdoor experimental plots using open-top chambers to deliver either ambient atmospheric CO_2 concentrations, 365 ppm, or elevated, 720 ppm. After a four month period, photosynthetic activity and plant morphological characteristics such as number of leaves, stem height, and leaf dry weight, were measured. Longleaf pine (*Pinus palustris*) showed significant increases in all but one morphological category when grown under elevated CO_2. Sand post oak (*Quercus margaretta*), rattlebox- a legume (*Crotalaria rotundifolia*), and a C_4 wiregrass (*Aristida stricta*), all showed no significant morphological or growth changes between the treatments. Photosynthesis measurements made with a LICOR 6400 portable photosynthesis system showed no significant differences between CO_2 treatments for wiregrass, oak or rattlebox. Pine, however, showed an increase in photosynthesis in the elevated CO_2 plants. These preliminary results indicate that the pine responds positively to increased CO_2 while the other species show limited response in these particular measurements.

RESPONSE AND TOLERANCE OF TOXIGENIC *Vibrio cholerae* O1 TO COLD TEMPERATURES. Jeffrey W. Carroll and Asim K. Bej. Department of Biology, University of Alabama at Birmingham, Birmingham, AL 35294-1170.

Tolerance and adaptive nature to cold temperatures along with the cellular protein profile, and level of cholerae toxin were evaluated in a toxigenic strain of *Vibrio cholerae* O1. Cultures of *V. cholerae* when exposed to 5°C directly from 35°C exhibited non-culturable dormant state with distinct coccoid morphologies. Cultures first exposed to 15°C for 2 h followed by incubation at 5°C failed to exhibit adaptive response and became rapidly non-culturable. Western blot analysis showed the absence of a major cold shock protein, CS7.4, and decreased level of cholera toxin for the cultures exposed to 5°C or 15°C. However, total cellular proteins labeled with ^{35}S-methionine exhibited elevated expressions of a 8 kDa and a 26 kDa protein, and decreased expression of a 28 kDa protein of *V. cholerae* cultures exposed to 15°C for 2 h. Relatively rapid entrance into non-culturable dormant state following exposure to cold temperatures with the manifestation of coccoid cell morphologies in this pathogen could be regulated by these differentially-expressed cold-inducible proteins. Further analysis of these proteins and their genes are currently being investigated in our laboratory.

ELECTROPHORETIC ANALYSIS OF POLYMORPHIC ENZYME SYSTEMS AMONG TILAPIA POPULATIONS. Cynthia Wilson and Mark Meade. Department of Biology, Jacksonville State University, Jacksonville, AL 36265.

The African Cichlids comprise one of the oldest fish species known. Historical records confirm that Tilapia species have been exploited by humans for centuries. Tilapia were first introduced to the United States in the late 1950's and are now indigenous to southern California and Florida. Because Tilapia are known to interbreed, there is concern over the potential loss of genetic diversity among modern species. The purpose of this study was to determine the genetic diversity among several Tilapia species by examining electrophoretic profiles of conserved enzyme systems. Brain, muscle, and liver tissue samples were extracted from three species of Tilapia, *Oreochromis niloticus*, *O. mossambicus*, and *O. honorum*, and examined for a variety of enzyme systems using a combination of electrophoretic and histochemical staining procedures. Among the enzyme systems examined were phosphoglucomutase (PGM), phosphohexose isomerase (PHI), hexokinase (HK), phosphofrucokinase (PFK), glucose-6-phosphate dehydrogenase (G-6-PDH), and malate dehydrogenase (MDH). Liver samples demonstrated the highest activity in enzyme staining among tissue samples. The majority of enzyme systems examined demonstrate similar electrophoretic profiles suggesting that the Tilapia species are genetically similar. Statistical indices of genetic diversity/similarity are to be calculated upon final analysis of further enzyme systems.

WOLF SPIDERS OF THE BEACHES OF DAUPHIN ISLAND, ALABAMA. Ronald L. Jenkins and W. Mike Howell, Dept. of Biology, Samford University, Birmingham, AL 35229. Heather B. McNatt, Dept. of Biology, Univ. of Ala. at Birmingham, Birmingham, AL 35294.

Dauphin Island, a barrier island situated approximately 5.5 miles off the coast of Alabama, supports a diversity of araneid fauna. Wolf spiders (Lycosidae) constitute a large portion of this diversity. The principal species found on the island represent four genera and include Hogna carolinensis, Lycosa punctulata, Lycosa sp. (possible hybrid awaiting identification or description), Arctosa littoralis, Arctosa sanctaerosae, and Geolycosa escambiensis. The topography of this fourteen-mile island (which varies considerably from one end to the other), in conjunction with the life history of these spiders, delineates where each species typically occurs. Members of Hogna and Lycosa usually can be encountered almost anywhere on the island. Members of Arctosa and Geolycosa, however, seem to be restricted to specific areas. A. littoralis occurs on beach and dune areas on both the gulf and bay sides of the island. A. sanctaerosae and G. escambiensis occur on secondary and tertiary dunes in stable beach areas on the gulf side only. The area of greatest concentration of these two species is in those stable dunes adjacent to and within the Audubon Bird Sanctuary. Our study has led to a query (through Dr. S. Marshall of Miami University in Ohio and Dr. G. B. Edwards of the Florida State Collection of Arthropods) into the possible threatened status of A. sanctaerosae and G. escambiensis due to coastal development. This study was funded by the Birmingham Audubon Society.

A POPULATION STUDY OF *MELONGENA CORONA* GEMELIN ON PERDIDO KEY, FLORIDA. Jennifer M. Walker and Thomas S. Hopkins, Department of Biological Sciences, Univ. of Ala., Tuscaloosa, AL. 35487.

Populations of two alleged sub-species of *Melongena corona* Gmelin , *Melongena corona corona* and *Melongena corona johnstonei*, were studied at several locations along the Gulf Coast of Florida and Alabama. The primary study site, Johnson's Beach on Perdido Key, FL is located about 10 nautical miles east of Little Lagoon, Alabama. Field observations (abiotic and biotic parameters) were conducted over a period of 16 months (May, 1997 - September, 1998) at the primary site. Secondary sites, located at Port St. Joe, Panacea, Cedar Key, Clearwater, Fort Myers, and Sanibel Island, FL, were sampled one time. Analysis of shell height and width for all populations sampled revealed significant differences amongst the population sites sampled; size increased with increasing latitude. Using a Bray-Curtis clustering procedure, sites clustered by habitat homogeneity as opposed to sub-species designation. Assessment of the results leads to the conclusion that there is no valid reason for maintaining sub-specific rank for *Melongena corona* within the geographic zone examined. It is concluded that the differences observed in external shell morphology (the presence of a corollary row of spines, height, and width) are more related to ecophenotypic variation than geographic boundaries, each "sub-specific" growth form may occur in individuals from any site.

ALGAE TURF FILTRATION IN A MARINE AQUARIUM FOR A COMMUNITY OF *ASTROSCOPUS Y-GRAECUM*. Keith L. Roberts, Altamont School & Carol Leitner M.D. Dept. of Surgery, University of Alabama at Birmingham 35233.

The purpose of this project was to develop a successful marine aquarium for a community of *Astroscopus Y-graecum* (Southern stargazer, a native Gulf of Mexico fish). Phase 1, completed February 1996, studied the habits and requirements for captive maintenance of one *Astroscopus Y-graecum*. The addition of two more stargazers exceeded the recommended bioload for the 75-gallon aquarium, making necessary supplemental filtration and oxygenation of the water. Algal scrubbing and surging were selected for use on the aquarium to meet these needs. Algae scrubbers, developed and employed by Dr. Walter Adey at the Smithsonian Institute, mimic algae filtration in the ocean. The algae remove ammonia, nitrates, and nitrites from the aquarium water and utilize them as nutrients for growth. The algae produce oxygen during photosynthesis which is dispersed into the tank with the aid of a dump bucket, a form of water surge device. Two additional water surge devices were built. One, designed by Devon Bolt, worked on the principle of a toilet flush valve. It proved technically difficult to build and did not function. The second device, designed by Bruce Carlson of the Waikiki Aquarium, is a gravity siphon which was built to increase water flow and oxygen distribution in the aquarium. In summary, algae scrubbing in combination with surging produced a sufficiently high oxygen level and a low enough nitrate level to support a higher than predicted biomass.

CHEMISTRY

Chemical Kinetics Studies in a Flow System Using a Glass Electrode. M. B. Moeller and J. T. Gautney, Dept. of Chemistry and Industrial Hygiene, University of North Alabama, Florence, AL 35632.

Controversy exists about the nature of the bonding which causes the gelation of poly(vinyl alcohol) solutions by borate ion. Certain di-, tri-, or poly-alcohols are known to form complex ions with borate, presumably by covalent bonding. The formation of these complexes in solution is indicated by a decrease in the pH of a boric acid-borate buffer system upon the addition of the complexing alcohols. It has been suggested that the rheology of PVA-borate gels, however, is more indicative of hydrogen bonding. The research being reported here current reported attempted to measure the reaction rate of the complex ion formation by monitoring the pH of the product stream in a rapid flow system. The results indicate that pH equilibrium occurs in less than 0.02 seconds after mixing, suggesting that covalent boding could produce the observed rheology A significant diffusion boundary layer at the pH electrode would cause the reaction rates estimated from experiments in our present apparatus to be too great. Further work is being planned to circumvent this problem in the technique.

PARALLEL, SOLUTION-PHASE SYNTHESIS OF PHENOLIC ETHERS AS INHIBITORS OF INFLUENZA NEURAMINIDASE. Mr. Eric S. Johnson, and Dr. Wayne J. Brouillette, Department of Chemistry, University of Alabama at Birmingham, Birmingham, AL, 35294. Dr. Shanta Bantia, Biocryst Pharmaceuticals, Birmingham, AL 35244.

Neuraminidase (NA) is one of two surface glycoproteins on the influenza virion which are necessary for the life cycle of the virus. Inhibitors of this enzyme are currently undergoing clinical trials as drugs to treat influenza in the U.S., and at least one member of this class has been approved for use in other countries. Most influenza NA inhibitors are carbohydrate derivatives which suffer difficult syntheses and stereochemical complexity. We have designed a class of inhibitors in which an aromatic ring serves as the scaffold for introducing the appropriate functionality in the correct orientation for binding with the NA active site. Using directed combinatorial chemistry, we have produced a small library of simple compounds in this class which has been used to optimize the interaction with hydrophobic residues within the active site. Work toward extending these methods to other, more potent classes of aromatic influenza NA inhibitors is currently under way. The synthesis and biological activity of the initial library, as well as the current status of the extension of this methodology to other aromatic analogs, will be presented.

Characterization of Adenosine Nucleosidase from *Lupinus luteus L.* Nancy McDonald, Department of Chemistry, Athéns State University, Athens, AL 35611.

Adenosine nucleosidase (EC 3.2.2.7), a key enzyme in metabolism of purines and plant growth regulators, catalyzes the irreversible hydrolysis of adenosine to yield adenine and ribose. Adenosine nucleosidase was characterized utilizing several experimental approaches. One method was the measurement of kinetic isotope effects (KIEs) using stable isotopes of adenosine with the label in the ribose moiety. Kinetic isotope effects were determined for [1'-^{13}C] and [1'-^{2}H] adenosine using gas chromatography/mass spectrometry (GC/MS). The samples were analyzed using the SIM mode set on line pairs, m/z 158/159, 187/188, and 217/218. The BEBOVIB-IV program was used to calculate kinetic isotope effects to match the experimentally determined values. These calculations indicated an early transition state characterized by substantial bond order to the C1'-N9 bond. The data from isotope trapping experiments using the pulse-chase method indicated a low commitment to catalysis. Substrate trapping data showed that product release is the rate limiting step rather than hydrolysis. From specificity studies it was determined that certain structural features in the substrate are crucial to activity. Purines lacking an exocyclic nitrogen in the 6-position, a nitrogen in the 7-position, or a hydroxyl group in the C3' position are poor substrates or do not react. The hydrolytic reaction can be reversed to give an experimental equilibrium constant of 263 M. Hydrolysis is preferred over synthesis.

CHROMOPHORES--CHEMISTRY OF AN ACAC LIGAND ANALOG CONTAINING $[(bpy)Re(CO)_3(py)]^+$. John D. Kestell, Mirka Bergamo, Season Scott and Juan Pablo Claude*. Dept. of Chemistry, Univ. of Ala. at Birmingham, Birmingham Ala, 35254.

Polynuclear coordination compounds provide an interesting venue of research in the area of mixed valence complexes, photo redox catalysts and non-linear optical materials. Many factors give rise to the photophysical properties such as fluorescence, polarizability, and absorbance maxima. It is our prediction that these properties could, to a large degree, be tuned through the prudent choice of metal centers, and also by synthesizing non-symmetrical molecules. Another avenue of research may be to use metals with which a change in geometry accompanies the photo induced charge transfer process.

A new ligand, bppd, is a potential building block for a host coordination complexes that would have both non-linear properties and metal to ligand charge transfer energies in the visible region of the spectrum. The redox potentials of the coordinated ligand was determined by cyclic voltametry, and other properties such as absorbance maxima and sample purity were determined using techniques such as ^{1}H NMR and IR spectroscopy. We will present evidence that indeed the compound (bppd) can be used as a ligand. Synthesis of the free and coordinated ligand will be explained briefly, and potential uses of this interesting new compound will be discussed as well.

THE POWER BEHIND POWERPOINT 97 ADVERTISING. **T. Morris Jones, Donna Yancey and Paulette Alexander, College of Business, University of North Alabama.**

Advertising has been used by business to promote their products and companies. Advertising makes up a significant portion of some companies' budgets. Many different media have been used for advertising: television, newspapers, magazines, telephone, radio, direct mail and other means. All of these media usually require a great deal of time and expense. Relatively new on the horizon is advertising via computer-driven software, an inexpensive and efficient development tool and presentation medium. The current research focuses on the use of Microsoft PowerPoint 97 to demonstrate how this advertising can be developed and presented on nearly every computer used by a business. Microsoft PowerPoint 97, through its many different tools, options and settings, can be used to automatically and continuously display advertising. Various types of audio and video can be integrated with the custom animation and transition effects of Microsoft PowerPoint 97. Microsoft PowerPoint 97 may be an untapped resource that can be used to greatly influence the development and presentation of advertising.

Synthesis of Potential Inhibitors of Prokaryotic NAD Synthetases. Stephanie T. Weiss and Wayne J. Brouillette*, Department of Chemistry, University of Alabama at Birmingham, Birmingham, AL 35294

Bacillus anthracis, which causes anthrax, is a suspected part of the biological weaponry arsenal of several nations, including Iraq. The bacterium's life cycle includes a spore stage, during which it is relatively resistant to environmental insults but is still infectious. Since most of the population is not vaccinated against this bacterium, it is necessary to develop an antibiotic that could be used to treat victims of exposure to anthrax. To this end, we are designing, synthesizing, and screening novel compounds to serve as inhibitors of the prokaryotic enzyme NAD synthetase. This enzyme performs an essential step in the metabolic pathway for the biosynthesis of nicotinamide adenine dinucleotide (NAD), an important cofactor in cellular energy metabolism. Since humans also possess an isozyme of NAD synthetase, it is necessary to design a compound that will selectively inhibit the prokaryotic enzyme but not the eukaryotic one. In order to competitively inhibit the nicotinic acid adenine dinucleotide (NaAD) binding site on NAD synthetase, we are synthesizing chemically simple analogs of NaAD. The design, synthesis, and biological data of several compounds will be presented.

A 3D QSAR MODEL FOR THE BINDING OF LIGANDS TO THE NEURONAL SODIUM CHANNEL. Congxiang Zha[†], George B. Brown[✣], and Wayne J. Brouillette[†*], †Department of Chemistry, and ✣Department of Psychiatry and Behavior Neurobiology, The University of Alabama at Birmingham, Birmingham, AL 35294.

The neuronal voltage-gated sodium channel is a major communication path between the inside and outside of nerve cells. It has been shown to be involved in several nerve system diseases such as epilepsy, arrhythmia, and ischemia. Therefore, the sodium channel has become a primary target for design of drugs for those diseases. However, due to the lack of the crystal structure for the channel protein, all design has to be carried out in a black box manner. An alternative to the crystal structure is a model of the binding of ligands to the sodium channel. In this study, a 3D QSAR model was developed based on ^{3}H-BTX-B binding data of compounds synthesized in this lab and compounds from the literature. The model was tested with several compounds which are not included in the model, showing the powerful predictive capability of the model. Several new ligands were designed and synthesized according to the model. The predicted activities of those compounds are very close to the observed activities.

MATCHING CHAMBERS OF COMMERCE PROGRAMS TO PARTICIPANTS NEEDS. Keith Absher, University of North Alabama, Marketing and Management Department, UNA Box 5176, Florence, AL 35632.

This is an applied research study that was designed to evaluate the preferences of Chamber of Commerce members. A survey was designed and mailed to Chamber of Commerce members. A total of 1400 questionnaires were mailed and 196 were returned. This questionnaire asks member to rank the level of importance that they placed on thirty-three Chamber programs, publications, and activities. Respondents ranked the programs on a scale of from one to five. One was indicating that the program was not important and five indicating that it was very important. The respondents were then asked to rank the same thirty-three programs based on importance. These two rankings allowed the researcher to categorize each of the programs, publications and activities into four groups. Group one are those activities that are important and performed well. Group two are those programs that are important and are not performed very well. Group three are those programs that are not important to members and are performed well. Group four are those programs that are not important and are not performed well. Strategies are suggested for each of the four groups.

SILICON AND CARBON - ARE THEY KISSING COUSINS?

Gantasala Naga Srinivas, Department of Chemistry, 901, 14th St, So., University of Alabama at Birmingham, Birmingham, AL 35294.

In spite of silicon belonging to the same group as carbon, there are many anomalies between carbon chemistry and silicon chemistry, as Josef Michl expresses "*Silicon and Carbon - are they kissing cousins? They are alike in so many ways and yet they are so different*" (Chem. Rev. **1995**, *95*, No. 5). Here we discuss the differences in structural properties between hydrocarbons and silicon hydrides. The potential energy surface of $Si_3H_3^+$ contrasts dramatically with that of $C_3H_3^+$. Though the classical 2π electron delocalized trisilacyclopropenium is the global minimum for $Si_3H_3^+$, there are many bridged structures which are close to the global minimum and these are more stable than the other classical structures. Similar studies on Si_3H_3X and A_4H_4 (A=C and Si) show that, structures derived from organometallic complexes are found to be stable than the classical structures derived from carbon chemistry. Some of these studies are extended to heavier analogs of group 14 (Ge, Sn and Pb) as well.

FLUORESCENCE SPECTROSCOPY OF p-N,N-DIMETHYLAMINOCINNAMIC ACID.

Steven Arnold, Department of Physical Sciences, Auburn University Montgomery, Montgomery, AL 36124

The fluorescence of p-N,N-dimethylaminocinnamic acid in several solvents was investigated. The aim is to measure the approximate change in the dipole moment between the ground and excited states as a measure of the extent of charge transfer in the transition. The Lippert-Mataga equation correlating the Stokes' shift with the solvent orientation polarizability is used in the evaluation. Preliminary measurements give a range of Stokes' shifts from 4241 cm^{-1} in diethyl ether to 8034 cm^{-1} in water.

DESIGN AND SYNTHESIS OF RETINOIC ACID ANALOGS: DERIVATIVES OF UAB30. Kimberly K. Vines, Wayne J. Brouillette, Donald D. Muccio, University of Alabama at Birmingham, Birmingham, AL 35294

Retinoic acid (RA) has been used in the treatment of cancer due to its involvement in cell processes such as differentiation, proliferation, and apoptosis. RA causes these cell processes to occur by binding to nuclear receptors. There are two types of nuclear receptors (RXR and RAR) and each receptor exists as three isoforms (α, β, γ). The natural ligands for these nuclear receptors are (all-E) and (9Z)- RA. The (9Z) isomer binds RAR and the all-trans isomer binds RAR and RXR. The RA/ receptor complex binds DNA which leads to transcription and translation to provide the genetic code for the production of certain proteins. These expressed proteins lead to differentiation, proliferation and apoptosis. Unfortunately, RA is relatively toxic at therapeutic doses. This toxicity is caused by the receptor subtype non-selective binding of RA to retinoid nuclear receptors. By altering the structure of RA, receptor selectivity can be obtained. Our group designed and synthesized analogs of RA and developed a selective RXRα agonist – UAB30. The synthesis of UAB30 analogs containing increased steric bulk, which is anticipated to increase potency and selectivity, will be described.

EARTH SCIENCE

DISTRIBUTION OF MOUNDS WITHIN BANGOR LIMESTONES IN NORTHERN ALABAMA. Scottie Hanson, Chris McGowan, Douglas Haywick, Geology Dept, Uni. South Alabama, Mobile, AL 36688, and David Kopaska-Merkel, Geol. Survey of Alabama, Tuscaloosa, AL, 35486

The Mississippian (Chesterian) Bangor Limestone consists of several intertidal and shallow marine tropical carbonate facies. It also contains an abundant fauna including rugose corals. The majority of the corals are transported allochems, however, *in situ* patch reefs of the rugose coral *Caninia flaccida* up to 10 m across have been observed at some outcrops. We are attempting to document the importance of these bioherms in Alabama by determining the facies make-up at as many Bangor outcrops as feasible. Relatively undeformed exposures of Bangor Limestone crop out as a belt stretching eastward from the Mississippi-Alabama state line to Guntersville Lake. To date, we have visited outcrops from Red Bay to Guntersville, but we have only observed *in situ* rugose coral colonies at a handful of locations. A layer or lens of *in situ* corals occurs at an exposure of Bangor Limestone adjacent to Interstate 65 near Lacon. Outcrop exposed along State Highway 157 near Moulton, AL is best described as a mound complex as it contains numerous rugose colonies distributed within skeletal packstone-wackestone. Peter Andronaco described two additional rugose coral patch reefs near Blount Springs in his 1986 MS thesis.

Most of the limestone that we have examined so far is typically oolitic grainstone or bryozoan-crinoidal wackestone-packstone. We are extending our survey to include less accessible areas such as river exposures.

PETROGRAPHIC CHARACTERIZATION OF A CARBONATE MOUND WITHIN THE BANGOR LIMESTONE, NORTHERN ALABAMA. Douglas Haywick, Geology Dept, Uni. South Alabama, Mobile, AL 36688, David Kopaska-Merkel, Geol. Survey of Alabama, Tuscaloosa, AL, 35486, Laura Quinn, Geology Dept., Louisiana State Uni, Baton Rouge, LA 70803

We have identified a well exposed rugose coral-bryozoan-echinoderm mound complex situated within shallow marine\intertidal shelf carbonates near Moulton, in northern Alabama. The mound has some topographic relief (ca. 45 cm) and is composed in part of *in situ* rugose coral colonies (*Caninia flaccida*). The colonies are best described as "patch reefs" and generally comprise less than 20% (by volume) of the total mound. The majority of the mound is crinoid-bryozoan packstone. Surrounding flank areas are typically composed of wackestone with intervals of coral rubble packstone. Crinoids, ooids and bryozoans are dominant components in these facies.

Thin-section petrography and cathodoluminescence indicate that the mound complex experienced several phases of early diagenesis. The first (syndepositional) included marine cementation. Later stages of meteoric diagenesis involved cementation by calcite, dissolution of skeletal remains and dolomitization. The dolomite is largely localized beneath a subaerial exposure surface. A very early diagenetic origin of the dolomite is supported by the presence of meteoric calcite cement-filled rootlets in the wackestone, and dolostone clasts within a breccia atop the subaerial exposure surface.

SINKHOLES AND SUBSIDENCE IN ALABAMA. Dorothy E. Raymond, Geological Survey of Alabama, Tuscaloosa, AL 35486

A prerequisite for subsidence is the presence of underground openings in rocks or unconsolidated materials. In karst areas in Alabama, these openings occur as solution cavities in carbonate rocks. Movement of ground water along joints or fractures in soluble rocks results in solution of the rocks and the formation of cavities.There are four basic mechanisms behind subsidence: (1) loss of support, (2) roof collapse, (3) raveling or soil erosion into openings, and (4) stratum thinning. Some significant change in the local environment affecting the soil and rock mass initiates sinkhole collapse and subsidence. This change is called the "triggering mechanism." Water, either surface or ground water, is generally the most important agent effecting environmental changes causing subsidence. These changes can be natural, such as the lowering of the water table during a drought, or can be caused by man (induced). Many sinkholes in Alabama are induced by water well pumpage, construction activity, blasting, or impoundment of water.

EXPLORATION OF A POSSIBLE HEMATITE PROCUREMENT SITE AT 1MR165 IN MARION COUNTY, ALABAMA. Rebecca Turley, Panamerican Consultants, Inc., Tuscaloosa, AL 35404

Site 1MR165 is a multicomponent prehistoric site located in Marion County, Alabama that was likely associated with the procurement of pigment-bearing minerals such as hematite, limonite, and psilomelane. A random sample of the pigment-bearing minerals was analyzed and separated by type and various properties. In addition to the three minerals mentioned above, a fourth variety was encountered which appeared to be part limonite and part hematite. It was concluded that this mineral is weathered hematite. Of the specimens sampled, 58 percent is hematite; 37 percent is limonite; 5 percent is weathered hematite; and <1 percent is psilomelane. The primary objective of this study is to familiarized archaeologists with the properties of pigment-bearing minerals in order to facilitate analyses and interpretations in future investigations.

MAPPING LAND-USE CHANGES USING AIR PHOTO INTERPRETATION AND GIS IN THE WEEKS BAY WATERSHED OF SOUTHERN BALDWIN COUNTY, ALABAMA. Elizabeth Johnston and Anthony Fisher, Department of Geology and Geography, University of South Alabama, Mobile, AL 36688

Air photographs have historically been employed to monitor long-term changes in urban\rural land use and to mitigate short-term environmental events (e.g., incidents of point source pollution, forest fires, floods). The Fish River (Baldwin County) flows into the northern end of Weeks Bay and is the major influx of water and sediment into this embayment. Some local residents have suggested that sediment influx into the bay has increased over the last several decades, presumably due to enhanced runoff within the Weeks Bay watershed. We felt that it would be fruitful to determine if aerial photographs supported this hypothesis.

Two sets of enlarged aerial photographs from 1949 and 1986 were examined, the only years readily available to us during the study. Land use was separated into 4 categories 1) vegetated (undeveloped), 2) cleared (agricultural land), 3) populated (urban) and 4) roads/highways. We employed GIS and CAD techniques to record land use changes. In 1949, roughly half of the area examined had been cleared for agricultural use. Roads and populated areas accounted for no more than 5% of the portion of the watershed that we examined. By 1986, 60% of the land had been cleared for agriculture and 8% had been cleared for urban use and highways. These data suggest that enhanced runoff to Weeks Bay is possible, but confirmation will require additional remote sensing data (e.g., air photos) done in conjunction with an ongoing sediment study of the bay.

AQUIFERS OF SOUTHERN MOBILE COUNTY, ALABAMA. Daniel J. O'Donnell, PG, Volkert Environmental Group, Inc., 3809 Moffett Road, Mobile, Alabama 36618.

The population of rural Mobile County is dependent on groundwater for its drinking water supply. Historically, the search for potable drinking water has followed no rational method for identifying potential well sites, but has largely depended on the hit and miss drilling approach and well spacing determined using oversimplified generalizations of area aquifers. The hit and miss approach can be economical when the first test well site proves to be successful. However, if not, hit and miss groundwater exploration becomes less economical with each additional miss. A hydrogeologic approach to groundwater exploration can be beneficial to water systems by using existing subsurface information to identify promising locations for future wellsites, evaluating both economic and hydraulic concerns when establishing appropriate well spacing requirements, evaluating risks to the aquifer in use by potential contaminant sources and, through the addition of more subsurface information with each additional boring, defining a clearer understanding of area aquifers. These benefits should result in a more efficient use of the water system's limited financial resources as they expand their systems to meet future demands.

TWO AND THREE DIMENSIONAL BATHYMETRICAL MAPPING OF WEEKS BAY, ALABAMA. David Allison, Anthony Fisher, and Douglas Haywick, Department of Geology and Geography, University of South Alabama, Mobile, AL 36688

Gulf Coast estuaries, including Weeks Bay in southern Alabama, are typically shallow, but there are significant variations in water depth depending upon proximity to river mouths and tidal inlets. Water depth variations in Weeks Bay (corrected for tides) were determined at 400 points using a specially designed probe. Our study confirms that Weeks Bay is shallow (generally less than 2 m deep) and remarkably flat-bottomed. The deepest water (up to 4 m deep) occurs just in front of river mouths and a tidal inlet leading into Mobile Bay. To graphically display our data, we incorporated water depth measurements into a digitized topographic map of the Weeks Bay watershed. We used AutoCAD Map GIS software to produce this map. Two-dimensional water depth contouring of Weeks Bay was initially done by hand. These results were then digitized as a specific layer within the sample location base map. Three-dimensional modeling of water depth (and adjacent topography of the Weeks Bay watershed) was achieved using SURFER software. Both maps were added to a formal map sheet summarizing overall bathymetry of the bay and the topography of the southern-most portion of the Weeks Bay watershed.

We recognize that bathymetric maps of estuaries produced in this manner are transitory. Every storm has the potential of shifting sediment and hence changing a bay's depth profile. GIS techniques can be used to monitor these short-term bathymetric changes.

GRAIN SIZE VARIATION WITHIN WEEKS BAY, ALABAMA Anthony Fisher, David Allison and Douglas W. Haywick, Department of Geology and Geography, University of South Alabama, Mobile, AL 36688

In late 1997, we began an undergraduate student directed studies project to map out bottom sediment in Weeks Bay. Over 400 samples were collected by grab sampling. Each sample was processed for particle size analysis using the pipette and sieve method. The data that we collected was used to devise the following sediment composition maps: 1) grain size distribution, 2) percentage sand (2mm to 63 μm particle size), 3) percentage silt (63 to 4 μm), 4) percentage clay (< 4 μm). GIS techniques were then used to produce a single map sheet that would summarize all of these data.

We have now entered a second phase of sedimentological study in Weeks Bay that will concentrate on historical changes in sedimentation (from 6,000 years BP to the present). The data produced in this study will assist us to assess past and future changes in estuarine sedimentation in Weeks Bay. Large storms may leave evidence of their influence in a region in the sediment that fills coastal embayments. Our initial sampling of Weeks Bay occurred approximately 6 months after Hurricane Danny crossed our coastline. A storm-related sand bed was produced in Weeks Bay during that event. A new period of bottom sampling in Weeks Bay (post Hurricane Georges) has just been concluded. We have not yet had a chance to process these new data, but we are confident that we will be able to map out changes in bottom sediment composition of Weeks Bay between the two hurricane events.

SCUBA AS A MEANS OF CONDUCTING GEOLOGICAL EXPLORATION IN CAVES. David A. Trimmier, University of South Alabama Children's and Women's Hospital, Mobile, AL 36604

Cave diving is an exhilarating hobby, but it can also be a useful technique by which to obtain important geological and biological information that would otherwise be inaccessible. The Florida Panhandle has excellent underwater caves that comprise part of the Florida Aquifer system. Caves within Jackson, Calhoun, Holmes and Washington County are accessible through springs that feed into lakes and rivers. Individual dives last from 30 minutes up to about 90 minutes excluding decompression time. Long dives may necessitate employing staged gas bottles to supplement air supply. This is a firmly established procedure that is used to increase bottom times in cave dives and deep water exploration.

Geological information is gathered through physical sampling and bottom photography. Under-water mapping also provides information about the nature of the aquifer system and its relationship to sedimentology and stratigraphy of limestone successions. This poster session will summarize some of the data collected during the author's cave dives over the last several years.

RESPECT FOR LIVING ORGANISMS: TEACHING A MORE CONSERVATION-BASED FIELD BIOLOGY. L. J. Davenport, W. Mike Howell and Ronald L. Jenkins, Dept. of Biology, Samford University, Birmingham, AL 35229.

The teaching of field courses (vertebrate zoology, invertebrate zoology, and plant taxonomy) usually involves the killing of organisms and their preservation as specimens. Often, these specimens are merely discarded at semester's end. In the process, students often question the low value placed on animal and plant life.

At Samford, we have modified the requirements of our undergraduate field courses to reduce, if not completely eliminate, the killing of organisms. In Vertebrate Field Zoology, a simple teaching-photographic tank is used to photograph aquatic organisms, such as fishes, which are then released to their original environment. Students receive copies of these photographs, and are required to research and write life histories to be incorporated into their notebooks. Preserved study specimens, mostly collected in the 1960s and 1970s, are used for keying practicals. A similar strategy is utilized in Invertebrate Zoology, with insects caught in nets and photographed prior to release; again, study specimens are used for keying tests. While a plant collection is still required for Plant Taxonomy and Local Flora, the number of specimens has been cut in half, with group lists and short papers substituted; study specimens are used for keying tests, and field recognition quizzes are emphasized. It is hoped that these changes in our courses will engender a greater conservation ethic in our field biology students.

U-TH-PB-SYSTEMATICS IN MINERALS FROM THE MCALLISTER PEGMATITE, COOSA COUNTY, ALABAMA. Michael G. Bersch, School of Mines and Energy Development & Department of Geology, The University of Alabama, Tuscaloosa, AL 35487-0164

Heavy mineral separates from the McAllister Pegmatite contain a number of U-Th-Pb bearing phases: uraninite, uran-microlite, zircon, and other unidentified phases. Assuming that the minerals have remained closed systems and that they contained little or no original Pb, electron microprobe measurement of U, Th, Pb can be used to obtain the age of crystallization. Analyses of uraninite yield an isochron (best fit line of data points of U*[U+equivalent Th] versus Pb) of 353 $\pm$ 13 Ma. Analyses of uran-microlite yield an isochron of 397 $\pm$ 72 Ma, but when combined with uraninite data fall along a 354 Ma isochron. Zircons have a wide range of U, Pb, and Th contents. Some grains show symmetric zonation in major elements with HfO_2 contents from 1 wt. % to > 30 wt. %. Alteration (hydration?) is preferential along some zones. However, there appears that there is no unambiguous correlation between major element content and U, Th, Pb content. Calculated dates from zircon grains range from) (Pb not detected) to > 3500 Ma. U* versus Pb, for non-zero Pb zircon analyses, may indicate two isochrons, one of about 340 Ma and another of 1500-1600 Ma., but these values are difficult to interpret. In general, these results are compatible with isotopic age determinations for the Rockford granite and indicate late Devonian emplacement of the McAllister pegmatite.

WRIGHT'S FARM, 1Ca18, 1992-1998 OVERVIEW. Harry O. Holstein, Ph.D., Dept. of Earth and Physical Sciences, Jacksonville State University, Jacksonville, Alabama, 36265.

Wright's Farm, 1Ca18, is a multicomponent prehistoric Indian village situated along Cane Creek in Calhoun County, Alabama. Seven field seasons yielded over 160 Aboriginal features revealing Archaic through Mississippian occupations. Radiocarbon dates ranged from 490 B.C. - A.D. 1100. In addition a wealth of botanical and zoological data has been gained documenting an diverse adaptation to regional environment. The archaeological data obtained from the Wright's Farm excavations will provide an excellent data base for comparing regional Aboriginal cultures.

GEOGRAPHY, FORESTRY, CONSERVATION, AND PLANNING

REGIONAL DIMENSION OF DEVELOPMENT POLICIES AND STRATEGIES IN ALABAMA: Chukudi V. Izeogu, Ph.D., Dept of Community Planning and Urban Studies, Alabama A&M University, Normal, AL 35762

Alabama's twelve Regional Development Councils (RDCs), established by Legislative Acts between 1963 and 1971, are unique entities within the framework of the state local government structure to help, guide, and accommodate regional growth and development in the state. The RDCs function as regional planning and economic development organizations for the state's sixty-seven counties and their respective urban centers. On behalf of member local governments, they address issues and problems of regional concerns in local economic development, environmental management, transportation services, management of services for the elderly, and city, county and regional planning services. This paper examines the RDCs' regional development policies and strategies, and highlights the disparities in key demographic, social and economic indicators and the problems the regions face. In addition, it offers some recommendation for present regional challenges. The paper shows that the regions vary substantially in the nature of resources available to them and the pattern of programs and services that they provide their member governments. Although they have similar development goals, e.g. reduction of unemployment, improvement of local economies and the general well-being of citizens, significant disparities exist within and between the regions in employment, family incomes and poverty. To reduce these problems, requires resolving the RDCs' institutional problems, conflicts between goal, policies and interests, and lack of adequate conceptual structure for regional development policies.

THE ROLE OF POLLINATTION IN THE CONSERVATION OF RARE PLANTS: A CASE STUDY. Michael. A. Wall and Robert S. Boyd, Dept. of Botany and Microbiology, Auburn University, AL 36849

Until recently most conservation efforts have focused on protecting plant populations without considering the ecosystem level processes necessary to maintain these populations. Many have suggested that interspecific interactions that benefit endangered plants (i.e. pollination) must be maintained in order to ensure the long-term survival of these species. Unfortunately the pollinators of many endangered plants are not known. Even when known, it is often the case that there is little information on the habitat, behavior, and life history of these pollinators. The purpose of this study was to survey floral visitors, determine the visitation frequency of insect species, determine the pollination efficiency of major floral visitors, describe floral rewards, and document seasonal timing of flower and achene production in wooded and roadside population of Clematis socialis. In four years of research, only five species were observed visiting the flowers of C. socialis. Anthophora ursina (Hymenoptera: Apidae) was responsible for 85% of all observed visits to C. socialis in 1996. On the other hand, Bombus pennsylvanicus (Hymenoptera: Apidae) constituted all of the observed legitimate visits in 1997. This variation between years may have been related to extreme variation in the weather patterns between the two years. This particular study illustrates the importance of: 1) multi-year studies of plant pollinators, and 2) that resource managers can not expect one pollinator to meet all of a their pollination needs.

STUDENT SATISFACTION WITH MANDATORY ADVISING. Priscilla Holland, Office of Research, Gerald Crawford, Dept. of Management & Marketing, Amy Hester, Student, University of North Alabama, Florence, AL 35632-0001

The role of academic advising at all institutions of higher education continues to demand the attention of administration as the Institution focuses on ways to provide a more personal and individual experience for students. Effective academic advising strategies, while used for retention or recruiting, must be assessed to ensure that "we are doing what we say we are doing." The purpose of this study was to gain insight into the student's satisfaction with the mandatory advising system. A random sample of students from each of the four Colleges, including graduate students, was surveyed. The survey included 13 questions ascertaining the student's major and classification, if the student had an advisor, how much time was spent with the advisor, any suggestions on the improvement of the current advising system, and rating the advisor. The overall results are positive in nature with antidotal evidence for improvement.

A COMPARATIVE ANALYSIS OF WEST ALABAMA AND ALABAMA TOMBIGBEE REGIONAL PLANNING DISTRICTS: Robert Davy, Jr. and Chukudi V. Izeogu, Ph D.; Dept. of Community Planning & Urban Studies, Alabama A&M University, Normal, AL 35762

This study provides a brief comparative analysis of the economic and social disparities in the West Alabama and the Alabama Tombigbee Regional Planning and Development Districts. The analysis is based on county level data derived from the 1980 and 1990 U.S Census, and Alabama County Data Books. Consideration is given to disparities in population, employment, income, poverty and health, and the needs which exist in the two regions. The analysis indicates that between 1990 and 1997, the West Alabama region's population increased by 4.0% while that of the Alabama-Tombigbee region declined by 6.2% Percentage of families in poverty increased in both regions between 1980 and 1995 The percentage increase ranged from 7.0% to 11.0% above the state average respectively in the West Alabama and Tombigbee regions. While the median family income grew by 53.8% in West Alabama region, the figure for the Alabama-Tombigbee region was 47.8% for the period 1980 to 1990. The two regions also differ in coefficient of advantage ranging from 0.91 for West Alabama and 0.79 for Alabama-Tombigbee. Also, in both regions, disparities in health measured by indicators such as death rates from cancer and heart disease, and percentage of births to teenage mothers were higher than U.S., Alabama and Madison county rates. The pattern of disparities briefly suggests the presence of social and economic polarization and the need for policies to reduce the inequalities between and within the regions

THE CHANGING REGIONS OF ALABAMA TOURISM. Tom L. Martinson, Dept. of Geography, Auburn University, Auburn, AL 36849

Alabama's tourism regions have been portrayed in many ways in pamphlets and brochures produced by the state as well as regional, county, and local tourism organizations. This presentation illustrates how these organizations have exhibited themselves to the traveling public, and how the state may now attempt to impose some regularity on its tourism regions.

AN ACCESSIBILITY-BASED MODEL FOR ADMINISTERING LITERACY EDUCATION PROGRAMS IN URBAN AREAS: THE CASE OF TUSCALOOSA, ALABAMA. William Couch, Dept. of Geography, Univ. of Ala., University, AL 35487. Jeffrey P. Richetto, Dept. of Geography, Univ. of Ala., University, AL 35487.

The American Library Association has as one of its stated goals the education of illiterate people. As an important public service the planning of this function falls within the preview of urban geography. In particular, it is key that public-sponsored literacy programs are cost effective inasmuch as a community's identifiable literacy needs are `maximally' linked with the minimal cost provision and location of literacy classes. Critical to establishing such a link are criteria that emphasize the basic geographic concepts of distance, accessibility and relative location. These three principles, combined with GIS, form the basis for the development of an accessibility-based model for cost effectively administering literacy education programs. The city of Tuscaloosa, Alabama serves as a case study.

RECONSTRUCTION OF BEIRUT'S CENTRAL BUSINESS DISTRICT: A PUBLIC/PRIVATE DEVELOPMENT APPROACH. Tony Maalouf, Dept. of Civil Engineering, Univ. of Ala., University, AL 35487. Jeffrey P. Richetto, Dept. of Geography, Univ. of Ala., University, AL 35487.

Since the late 1960s central city revitalization and reconstruction have been at the forefront by an increasing number of both large and small U.S. cities. Planning elements emphasized in these efforts have included infrastructure improvement, architectural design, housing rehabilitation, property development, and market accessibility. These and other restorative functions have been orchestrated almost wholly within the domain of the public sector. While this approach has resulted in only moderate success, other development strategies exist. Under the auspices of Lebanon's government, a private corporation (SOLIDERE) was formed in 1994 and mandated full responsibility to coordinate and manage all reconstruction efforts in Beirut's central business district. It is within this context that this paper examines the key planning elements and outcomes of Beirut's successful reconstruction efforts.

GIS USE IN PLANNING AGENCIES IN ALABAMA, MISSISSIPPI, AND TENNESSEE

William K. McAllister, Department of Community Planning and Urban Studies, Alabama A & M University, Huntsville, Alabama 35811

This research reports on a survey of urban planning agencies' use of geographic information systems (GIS) both within and external to the agency. The mid-1998 survey was mailed to all local and areawide planning agency directors in the states of Alabama, Mississippi, and Tennessee in order to determine the possible effectiveness of this technology for improving the kinds and quality of decision-making. Sixty-two out of 103 respondents indicated they were in various stages of GIS use, while forty percent reported no direct use. More than half of the GIS users shared systems with other users in their organization. Executive support for GIS was less than staff support, but more than citizen support. Also, citizen group involvement with GIS through planning agencies was rated low. Recent published research suggests that this use will increase. The three states surveyed here seem to be lagging in GIS use, especially in rural areas, as compared with other empirical studies. Also, GIS are not always being used to enhance client decision-making in a dynamic way, given its potentially powerful visual analysis qualities. Overall, agency directors were encouraged that GIS helps make stronger arguments. Also, GIS was just beginning to influence the way agencies operate, such as encouraging the use of public "one stop shopping" for mapping information.

NATURAL RESOURCES STATUS AND USE IN THE 5TH CONGRESSIONAL DISTRICT.

Wilbur B. De Vall, President, Proxy Services, Ltd. Auburn, AL 36830.

The 5th Congressional District of Alabama includes the six counties of Colbert, Jackson, Lauderdale, Limestone, Madison, and Morgan. All are bordered on the south by the Tennessee River with the exception of Colbert and Morgan which lie south of the river. Land use is predominantly agricultural, with forests and urbanization accounting for a significant uses. Local resources produce such major commodities as broilers, eggs, cattle, dairies, hogs, nurseries, cotton, peanuts, vegetables, soybeans, fish, and timber. Counted among the industries dependent on forests are two pulp and paper mills, nine softwood and 17 hardwood sawmills, four treating plants, and one hardwood flooring plant. Pine lumber production in all counties is less than 20 million board feet per year while hardwood lumber is less than 3 million board feet in five of the counties: only Jackson county is considered a major hardwood producer of 10-50 million board feet. Pine pulpwood production is less than 50 thousand cords per year in five counties: only Colbert county exceeds this. Hardwood pulpwood production is less than 40 thousand cords in five counties: Colbert county exceeds this amount. Growth is expressed in cubic feet. In all counties, pine growth is under 100 million cubic feet from natural stands while only one county exceeds 130 million cubic feet in hardwood stands. Pine plantations add to the total growth.

PRESERVING BLACK HISTORY: A CASE STUDY OF THE JAMES H. WILSON BUILDING AND THE STATE BLACK ARCHIVES RESEARCH CENTER AND MUSEUM. Arjang R. Ehsan, Department of Community Planning and Urban Studies., Alabama A&M University, Normal AL 35762

This Research explores the historical significance of the James H. Wilson Building and the role and function of the State Black Archives Research Center and Museum which is housed in the James H. Wilson Building on the campus of Alabama A&M University. The James H. Wilson Building is listed on the National Register of Historic Places. The building was erected in 1911 at a cost of twenty thousand dollars and is historic for its benefactor Robert R. McCormick, editor and publisher of the Chicago Tribune, whose family donated the funds in 1909 for the construction of the Domestic Science Building as it was originally named. The Building, historic for its architecture is of the Greek Revival Style, which gives the structure a formal imposing grace, which is uncommon in modern day academic architecture. Alabama's State Black Archives Research Center and Museum serves as a repository of source materials on African American history and culture. The museum displays on loan traveling exhibits as well as permanent exhibits in a manner that enhances the general public awareness of the achievements and contributions of African Americans and the role they have played throughout history. The mission of the State Black Archives Research Center and museum is outreach oriented and statewide in scope and therefore consistent with the land grant concept of the university.

MANAGED GROWTH IN SOUTH FLORIDA: A CASE STUDY OF PALM BEACH COUNTY. Frederick D. Gardiner and William K. McAllister, Department of Community Planning and Urban Studies, Alabama A & M University, Normal AL 35762

This research report is a case study of the implementation of a growth management strategy in Palm Beach County, Florida, which is one of the fastest growing counties in the United States with a estimated 22,000 new residents per year. Growth management has introduced important new concepts and given meaning to old concepts central to planning, including consistency, concurrency, and urban growth boundaries. The purpose of the Managed Growth Program in Palm Beach County is to provide strategies to protect the county's diverse lifestyle choices, its viable existing neighborhoods and communities, and the location and timing of future development. Palm Beach County has proposed a Managed Growth Tier System, which addresses the specific needs of the distinct geographic sub-areas throughout the county. These sub-areas consist of the Urban/Suburban Tier, Exurban Tier, Rural Tier, Agricultural Reserve Tier and the Glades Tier. This program emphasizes mandated plans and implementation strategies that are aimed at limiting urban sprawl, creating quality of live values, and protecting the environment. This concept and how its being utilized in Palm Beach County is critical to the understanding of how to manage growth while accommodating an ever increasing population.

FLOMATON NATURAL AREA: REBIRTH OF A VIRGIN LONGLEAF PINE STAND.
John S. Kush, J. Morgan Varner, and Ralph S. Meldahl, Longleaf Pine Stand Dynamics Laboratory, Auburn University School of Forestry, 108 M. White Smith, Auburn University, AL 36849-5418

Prior to settlement of the southeastern United States, longleaf pine stands once covered an estimated 90 million acres. Today it occupies less than 3 million acres. Only a few examples of the pre-settlement longleaf pine forest exist. One of these is the Flomaton Natural Area located just east of the city of Flomaton, AL. It is a 60-acre tract owned by Champion International Corporation and the only reported virgin stand of longleaf pine remaining in Alabama. The Alger-Sullivan Lumber Company, one-time owner, dedicated the stand to preservation in the first half of the century. The stand was regularly burned until some time in the 1950's when the lumber company was sold. The 40+ year absence of fire permitted a substantial hardwood understory and midstory to develop and allowed for an accumulation of a thick litter layer at the expense of longleaf pine regeneration and herbaceous vegetation. Fire is critical for the maintenance and survival of longleaf pine ecosystems. In 1995, fire was re-introduced to the Flomaton Natural Area to begin the "re-birthing" process. Two more prescribed fires have been carried out since. Prior to the 1995 fire, there was only one herbaceous species and no longleaf pine seedlings in the stand. A 1998 survey of the stand found 33 herbaceous species and nearly 2,700 longleaf pine seedlings per acre. These efforts are being conducted to preserve a small reminder of an important part of the southern cultural and ecological heritage. Plans are to use the Flomaton Natural Area for research, educational, and demonstrative purposes.

AGE AND STAND STRUCTURE OF AN ALABAMA GRANITE OUTCROP TREE COMMUNITY.
J. Morgan Varner[1], Robert S. Boyd[2], John S. Kush[1], and Ralph S.Meldahl[1], [1]School of Forestry and [2]Department of Botany and Microbiology, Auburn University, AL 36849.

Granite outcrops in the southeastern US contain numerous shallow depressions, termed "soil pools," that are colonized by spatially and temporally discrete natural communities. Granite outcrop community succession progresses from communities dominated by mosses to annual herbs to perennial herbs to shrubs, climaxing with a shrub-tree community. In Alabama, the shrub-tree community is dominated by two tree species: eastern redcedar (*Juniperus virginiana* L.), and loblolly pine (*Pinus taeda* L.). Within 15 undisturbed and non-fissured soil pools at the Wadley Granite Outcrop in Randolph County, Alabama, we investigated the relationships between tree age/diameter and soil pool depth, width, and volume. No significant relationships were found between soil pool characters and tree age or diameter. Eastern redcedar was significantly older, exceeding 122 years, whereas the oldest loblolly pine was 22 years old. In 1998, no eastern redcedars died, however, mortality of loblolly pine was 29%, ranging from 0-100% within individual soil pools. Loblolly pine mortality was caused by drought combined with defoliation by redheaded pine sawfly, *Neodiprion lecontei* (Fitch.). Our results suggest that periodic drought and insect defoliation create differential selection enabling eastern redcedar to maintain dominance over loblolly pine in Alabama granite outcrop tree communities.

INDUSTRY AND ECONOMICS

LOTTERY LEGALIZATION TO SUPPORT STATE EDUCATION: HOW IT COMPARES WITH A FAIR TAX SYSTEM. **Eric Rahimian, Dept. of Economics, Finance, and Office Systems Management, Alabama A&M University, Normal, AL 35762**

Devolution of responsibilities from the federal government to the state government implies that the state government's revenue including taxes should increase. Hence, it is imperative to study the structure of our local and state taxes as well as other revenues of the state government. Particularly, it is important to understand the impact of the techniques used for enhancing the government's revenue on the welfare and income distribution within the state. In this paper the structure and composition of the state and local taxes are studied. It is found that the state and local taxes are regressive. This is mainly due to heavy reliance on sales, excise and property taxes as sources of revenue and collecting low income taxes. During the last two decades state lotteries, which we consider a voluntary tax system, have gained popularity as an alternative source of revenue for the government. Alabama like other states that do not yet have a lottery system like to legalize it to capture the revenue going to other states. In many states the legalization of lottery system has been justified as a remedy for shortage of funds for education. Due to high rate of returns on investment in education, there is no debate on the necessity of more support. This paper, however, addresses the question of fairness of the present tax system as well as the fairness of a lottery system to supplement the tax revenues. Though the principles of ability-to-pay and benefits-received are the theoretical extremes for a tax structure, our tax system can be changed only through a political process. The fairness of lottery is judged on the bases of the available information on who buys the tickets, how much is the pay-out, and how tax is paid on lottery money and prizes. Lottery is considered a more profitable source of revenue than taxes on alcohol and tobacco products. Also, regularly buying lottery tickets is less harmful than addiction to tobacco or alcohol. Nevertheless, using a long-run perspective and heuristic analyses of the available information about the fairness of the tax and lottery systems, I have concluded that the lottery system is an easy but short-run solution to the funding problem of the state government. But, it will negatively distort the distribution of income and may cost more than a fair tax system for those who choose to participate in lottery.

OF RISING ECONOMIC TIDES AND THE LIFTING OF BOATS. James G. Alexander, Alabama A&M University, Paulette Alexander, University of North Alabama, and Marsha D. Griffin, Alabama A&M University.

Americans historically have accepted, almost as an article of faith, the sharing of material prosperity as part and parcel of the concept of a classless society and as a bonding mechanism for a disparate and now large population. Alexis de Tocqueville, early in our national history, observed the cooperative aspect of the national character. This sense of mutuality, of sharing the nation's fortunes, has played a major role in the framing of public policy during the latter half of the Twentieth Century. The concept of the sharing of prosperity has come commonly to be expressed via the imagery of the rising tide -- economic growth -- and its capacity to lift all boats -- those of the rich, the poor, and those in between. This metaphor was popularized by President Kennedy in the 1960s, resurrected by President Reagan in the early 1980s, and has recently been referenced by President Clifton. The evidence suggests that Kennedy was on firm ground with respect to the then recent historical experience, but that since the 1970s the relationship between national prosperity and the condition of those at the lower end of the income spectrum has become more tenuous. Among the factors potentially decoupling macroeconomic growth from poverty reduction is the well-documented rise in national income inequality. Nevertheless, examination of the relationship between economic growth rates and changes in poverty rates indicates that in fact the two remain closely associated. Robust growth still tends quite strongly to reduce poverty rates, though slow growth in the past two decades has tended to be more permissive of poverty rate increases than was previously the case. The continuous data series for measured poverty dates from 1959 forward. This period was divided in half for analysis, into 1959-78 and 1979-97 subperiods. The correlation between GNP growth rates and rates of change in the poverty rate were negative and of moderate magnitude for the entire period and for each of the subperiods. This relationship was only slightly weaker for 1979-97 than for the previous two decades. Examination of year-by-year changes, however, is revealing. During 1959-78 robust growth (3% or greater) was consistently matched with poverty rate declines. Only once during 1979-97 did robust growth coincide with a poverty rate increase. More notable, in the first subperiod even modest growth was more often than not associated with poverty rate reductions whereas in the second subperiod nonrobust growth was associated with increases in the poverty rate in two-thirds of the cases. For those concerned about poverty, the inference might well be drawn t hat robustness of growth has come to be increasingly essential as other factors have recently become more disadvantageous to the poor.

THE ECONOMIC THEORY OF REGULATION: EVIDENCE FROM THE UNIFORM CPA EXAMINATION RE-VISITED. Sekhar Anantharaman and Rohit Jain, Department of Accounting, Alabama A&M University, Normal, AL 35762-0429.

This paper reexamines the evidence presented by S. David Young (Young, 1988) in his article on the economic theory of regulation. The economic theory of regulation says that the reason behind enacting occupational licensing laws is to advance the interests of licensed practitioners. Young (1988) investigates this possibility using time series data of the pass rates from the Uniform CPA Examination for California and Illinois. His results indicate that after adoption of the AICPA's Advisory Grading Service, no statistical relation exists between failure rates and general economic activity. Our study, using the same data, but two different statistical models, replicates Young (1988). However, our results are contrary to Young's findings. Our findings are explained by the different models used and several methodological shortcomings of the Young (1988) article.

RISK MEASURES AND RATES OF RETURN: AN EMPIRICAL STUDY. Sekhar Anantharaman and Rohit Jain, Department of Accounting, Alabama A&M University, Normal, AL 35762-0429.

Parametric statistical tests on a sample of NYSE stocks over the 1893-92 period support the theory that companies that have a higher risk, (as measured by market adjusted beta), on average, yield greater accounting returns than companies that have lower risk. Firms in different risk classes as measured by another market measure (unadjusted beta) and two book measures (financial leverage and interest coverage capacity) do not exhibit any differences in accounting or market rates of return. On the other hand, nonparametric analyses of the same data provides support only to the belief that firms that have a lower interest coverage ratio (more risky), on average, yield greater accounting returns than firms with a higher interest coverage ratio (less risky)

POVERTY IN ALABAMA IN THE LAST THREE DECADES. **Fesseha Gebremikael and Eric Rahimian, Dept. of Economics and Finance, Alabama A&M University, Normal, AL 35762.**

This paper studies the poverty status of Alabama in the last three decades. Demographic data on population growth, income, employment, and poverty have been analyzed to show the trend in the poverty status of Alabama. For over two decades, considerable resources have been devoted to improving the quality of life for families in poverty. In spite of the accomplishments achieved thus far, the problem of poverty is unresolved. Over the last eight years American and Alabama's economies have boomed. More recently, the state has instituted the mandated welfare reform, putting more people to work and off welfare rolls. But, the poverty data for children in Alabama have deteriorated. Indeed, the overall poverty also has become more prevalent in large cities and rural poor neighborhoods. According to new Census Bureau estimates the number of Alabama children living in poverty continues to increase, even as the state's overall poverty rate declines. Using population surveys, income tax returns and food stamp records, the Bureau estimates that 26.4 percent of Alabama children under age 17 and nearly a third of those under age 5 were living in poverty in 1995. The state's 1993 children poverty rate was 26.2 percent. The Bureau estimates that 752,097 of Alabamians, or 17.6 percent of the state's total population were below the 1995 federal poverty line of $15,569 for a family of four; a slight improvement over the state's poverty rate of 18.3 percent in 1989 and 18.8 percent in 1993. Among states with the highest poverty, Alabama ranked eight in 1993 and ninth in 1995. We recommend a targeted welfare program for single-parents and needy families with children. Such a program should be tailored to the needs of children, single-parents in poverty, and other needy families with children. Free food in schools for the needy has helped ease the problem of low nutrition for ages six to seventeen. A similar program for smaller children in poverty, who are taken care by community or cooperative childcare systems will help in solving the problem of low nutrition and may reduce the children's poverty rate. Education of parents about the parenthood responsibilities and the proper size of the family will also help reduce the social problems of early and multiplicity of pregnancy, divorce, and lack of care on the part of divorced fathers.

THE IMPACT OF PLUNGING OIL PRICES ON PRODUCING NATIONS.

Charles Briggs AND Eric Rahimian, Department of Economics, Finance and Office Systems Management, Alabama A&M University, Normal, AL 35762

The price of oil is important to the world economy because it is the main energy source and the largest traded natural resource. Falling oil prices have benefited the importing nations and have reduced the revenues of the exporters. Producing nations have sometimes stimulated the price fall by increases in production to support their development plans, and yet have faced further reduction of revenues. Naturally the dependence on oil exports as the major export implies that a price fall puts enormous pressure on fiscal and monetary systems of the exporting countries. In desperation, these nations have reacted by increasing their oil exports, devaluation of their currencies, increasing their taxes and reducing their subsidy programs. Briefly, in the early 1970s the increased revenues from oil sales enabled oil-exporting countries to initiate investment in other industries to diversify their economy. The high oil prices then, created several problems for importing nations such as inflation, drop in economic growth, and unemployment. This hardship lead to search for and discovery of other oil deposits in Caspian Sea and of the rest of the world. The decline in oil price that followed reduced the revenues of exporting countries. In the case of Nigeria, oil plays an important role in the economy. In the early stages of production and export, there was a sharp increase in revenue and GNP and a fall in inflation. Later, the fall in real price of oil during the 1980s and 1990s caused the oil revenue to drop. Now, the exploration and production of oil in Nigeria are undertaken in joint ventures. The country's four refineries produce large amounts of oil, but the welfare of people who leave in the regions where oil extractions take place has not improved. We recommend that OPEC and other oil exporting nations unite to stabilize the price of oil through rational and controlled production. We also recommend that the governments of these countries diversify their productions and exports to reduce their reliance on oil exports. Long-run planning and sustainable growth is essential, particularly for the less developed nations.

ETHICS IN ACCOUNTING & BUSINESS.

Rohit Jain and Sekhar Anantharaman, Department of Accounting, Alabama A&M University, Normal, AL 35762-0429.

This paper discusses the importance of ethical behavior for business in general and the accounting profession in particular. First, business ethics is defined and then various levels of business ethics are discussed. The importance of ethical reasoning in business is presented. Next, the paper examines whether ethics can be taught and the current research results on how best ethics should be taught. The role and standards of ethical conduct for public accountants as well as management accountants are discussed next. The paper concludes by stressing the need for ethics education for accounting and business students.

A SURVEY OF EMPLOYERS AND COMPUTER SKILLS FOR ENTRY LEVEL POSITIONS.

Margie S. Crocker, Tommie Singleton, College of Business, University of North Alabama, Florence, AL 35632.

In the fall of 1998, sixty-seven businesses were investigated to determine the extent to which computers and other office equipment were utilized. Specific computer applications, such as web-sites, E-mail, internet, software and electronic organizers were determined. Beginning educational levels, beginning salary ranges, required performance levels, desired office skills and desired personal qualities were included in the study. The businesses were categorized according to size and type.

Data were gathered by University of North Alabama business students using a questionnaire which was completed during an interview with a company official. Most of the businesses considered high school graduates most appropriate for their situation with junior college or two years of college second and four years of college third. While there were some exceptions, in general, entry-level employees with college training earned more than high school graduates. Most businesses did not require a specific speed for keying documents or for taking dictation. When compared to an earlier study (fall 1997) there was a high degree of consistency as to the relative importance of various office skills and of various personal qualities.

When compared to the results of the earlier study there appears to be an increase in the use of computers through the use of the internet, E-mail, and new computer software programs.

THE POWER BEHIND POWERPOINT 97 ADVERTISING.

T. Morris Jones, Donna Yancey and Paulette Alexander, College of Business, University of North Alabama.

Advertising has been used by business to promote their products and companies. Advertising makes up a significant portion of some companies' budgets. Many different media have been used for advertising: television, newspapers, magazines, telephone, radio, direct mail and other means. All of these media usually require a great deal of time and expense. Relatively new on the horizon is advertising via computer-driven software, an inexpensive and efficient development tool and presentation medium. The current research focuses on the use of Microsoft PowerPoint 97 to demonstrate how this advertising can be developed and presented on nearly every computer used by a business. Microsoft PowerPoint 97, through its many different tools, options and settings, can be used to automatically and continuously display advertising. Various types of audio and video can be integrated with the custom animation and transition effects of Microsoft PowerPoint 97. Microsoft PowerPoint 97 may be an untapped resource that can be used to greatly influence the development and presentation of advertising.

THE SIZE OF REAL-ESTATE AGENCIES AND THEIR VIEW OF RECAD.

Bruce Gordon & Keith Absher, University of North Alabama, Marketing and Management Department, UNA Box 5176, Florence, AL 35632.

The intent of this study is to evaluate the acceptance of RECAD based on the size of the real-estate agency, the dollar value of property sold, and the population of the area where the real-estate agency is located. Alabama enacted RECAD (Real Estate Consumer's Agency and Disclosure Act) on October 1, 1996 to more clearly define the types of allowable agency relationships in real estate transactions. It also prescribed how those types of relationships are to be disclosed. RECAD has been widely debated and criticized but its intent was to correct several perceived flaws in the practice of real estate. Smaller more rural agencies with smaller volume sales are less willing to accept and embrace RECAD hold heatedly. They find it to be a greater inconvenience and are less likely to abide by the letter of the law. This should be a key to the Alabama Real Estate Commission on where RECAD training should be provided. The Alabama Real Estate Commission may have to more heavily market RECAD to these groups to bring about acceptance.

THE CHANGING ROLE OF WOMEN IN MAGAZINE ADVERTISEMENTS.

Michelle Cameron & Keith Absher, University of North Alabama, Marketing and Management Department, UNA Box 5176, Florence, AL 35632.

This study reviews magazine advertisements from the decades of the 50's, 60's, 70's, 80's and 90's to identify women's roles portrayed in advertisements. This study addresses the age-old question or criticism of advertising. "Does advertising reflect society or does society reflect advertising?" Women from the 1950's were mainly seen only in domestic situations or as secretaries. That portrayal continued in the 60's even though more women were working outside the home. However, this was the beginning of breaking away from the 50's "housewife" image. Women begin to be seen in more social scenes and settings. Women in the 1970's were portrayed as more relaxed, fun-loving, and less formal. The 70's woman might be a mother and homemaker; however, she was also now a "career woman". In the 1980's women began to be used in advertising for a wider variety of products outside the home, and women and men were portrayed as having equal power. Women are also coming out of the kitchen and being portrayed more glamorously in ads. They have become professional mothers. In the 1990's women are portrayed as independent and professional. In the 90's women and men are portrayed as both having the power to do anything they want. Women and men play the same role in society. Women are totally liberated. Ads stress working mothers, not stay-at-home moms. There is really no such thing as a man's profession any more—or even a woman's. Advertisements in women's magazines appeal to working women as well as to homemakers, with an elaborate, high-tech look.

NONVERBAL VARIABLES AFFECTING THE WORKPLACE COMMUNICATOR. Bryan Kennedy and Dahlia B. Newton, School of Business, Athens State University, Athens, AL 35611

While attention is rightly given to the words people choose for communication, another significant form of communication is sometimes overlooked. Organizations, professions, and individuals communicate significant messages nonverbally. These messages may be intended or unintended. Organizations communicate with both employees and customers through such things as the appearance of buildings and entrances to structures. Professions communicate with symbols and procedures. Individuals communicate through the workspaces that they create for themselves as well as through their dress and behavior. An individual's interpretation of nonverbal communication, whether it comes from organizations, professions, or other people, is influenced by personality preferences.

SCIENCE EDUCATION

INTEGRATING SCIENCES IN THE MIDDLE SCHOOL. Jennifer Robinson, Larry Rainey Ph.D., Nancy Earnest, David Roycroft, and Dane Blumthal. Center for Communication and Educational Technology, University of Alabama, Box 870167, Tuscaloosa, AL 35487.

The *Integrated Science* program is designed around thematic integrating concepts incorporating the perspectives of biology, chemistry, physics, and earth/space science. The curriculum is designed as a three-year continuum moving from the concrete aspects of the integrating concept in 6th grade to the more abstract aspects of the integrating concept in 7th and 8th grades. *Integrated Science* emphasizes mastery of key concepts and the development of problem-solving skills rather than rote memorization. First implemented in the 1991-92 school year, the program is currently used by over 150,000 students in 16 states and Quebec, Canada. A recent student impact study conducted by the SouthEastern Regional Vision for Education (SERVE) compared *Integrated Science* and non-*Integrated Science* students in matched samples. They reported that *Integrated Science* students performed significantly better on standardized tests, have a greater liking and interest in science, and performed better in a test of science process skills. Telecasts, hands-on activities, Internet links to current research, student books, assessment tools, on-line communication, and continuing teacher professional development are all critical components of *Integrated Science*. We are currently exploring ways to provide more resources over the Internet as well as constructing tutorials and simulated experiments for CD-ROM.

THE EVOLUTION-CREATIONISM CONTROVERSY: ATTITUDES OF UAB UNDERGRADUATES. **Dail W. Mullins, Jr., Dept. of Curriculum and Instruction, University of Alabama at Birmingham, Birmingham, AL 35294.**

In the wake of renewed interest in the topic of biological evolution and its instruction in public school classrooms in Alabama, I recently taught a three-semester hour Honors seminar titled "The Evolution-Creationism Controversy." As a class project in partial fulfillment of course requirements, students in the seminar developed a brief survey form relevant to the course theme which was subsequently administered to 118 UAB undergraduates. In addition, the Gladding, Lewis and Adkins Scale of Religiosity (GLASR) was included as an addendum to the survey form, although data from the GLASR have not yet been compiled or correlated with responses to the students' own survey. The most striking finding to emerge thus far from this small study was the fact that fully two-thirds of the respondents definitely agree or slightly agree with *both* a Darwinian interpretation (65.5%) and a biblical account (66.7%) of the appearance and diversity of lifeforms on earth. The most likely explanation for this phenomenon is what Harvard paleontologist Stephen Jay Gould has termed "fallen creationism," which is the notion that, while the evidence for evolution itself seems incontrovertible, it has not occurred by "natural" selection but rather--at least in the case of human beings--by a kind of "divine" selection via the actions of a supreme intelligence or deity. Such a view allows individuals to believe in the fact of evolution without having to accept Darwin's theory that it is a mindless process void of purpose or direction. This thesis, and other findings from the survey, will be discussed.

DESCRIPTION, SIMULATION, AND APPLICATION: A THREE STEP TEACHING STRATEGY FOR UNDERGRADUATE NEUROSCIENCE COURSES. Vishnu Suppiramaniam, Solomon Yilma, Dept. of Biology, Tuskegee Univ., Tuskegee, AL 36088.

The three step teaching technique, Description, Simulation, and Application (DSA), has proven to be an effective teaching strategy for undergraduate neuroscience laboratories. The technique involves a brief lecture at the beginning of each laboratory session, followed by an interactive computer simulation that mimics the actual experiment. This simulation functions as a bridge between the lecture and the hands-on wet-laboratory exercise. This activity-based approach creates a high level of interaction between students and the instructor. It also creates an environment where critical thinking and active learning go on, as opposed to passive listening to the instructor. The presentation of knowledge using different models seems to reduce the level of anxiety and frustration that students experience while learning new concepts. It also aids the students to visualize the actual experiment and to predict results. Armed with insight from the ideal results of the simulated experiments, students can better explain discrepancies in the data obtained during the wet-laboratory sessions. In conjunction with DSA, a strategy known as "problem dissection" is sometimes employed. The idea is to dissect the given problem into verbal, pictorial, and graphical representations. Some representations are more effective than others. The use of computer simulation as the interface between the description of a phenomenon and its application has had a clear and direct impact on the students' understanding of various concepts in neuroscience.

MULTIMEDIA PRESENTATIONS--USING HTML TO AUTHOR CD-ROMs FOR BIOLOGY INSTRUCTION. H. Wayne Shew, Dept. of Biology, Birmingham-Southern College, Birmingham, AL 35254.

CD-ROMS are effective tools for multimedia presentations. However, the pre-packaged commercial CD-ROMs available on the market are often limited in their direct applicability for use in a particular course. The World Wide Web (WWW) offers another method to produce multimedia presentations for class use. Both CD-ROMs and the WWW have advantages and disadvantages as tools for multimedia presentations. I will briefly consider the advantages and disadvantages of each and then, why I chose to combine these technologies by using HTML as an authoring tool to develop a CD-ROM specifically targeting a class in Field Botany. A dichotomous key for the woody plants on the BSC campus was developed during the spring and summer 1998. A portfolio of pictures of the campus flora emphasizing the vegetative features of the plants was prepared using a digital camera. This information was then used to develop an interactive identification key for the campus flora. Future classes will be involved in the collection of additional information that will add to the information content and utility of the key. Additional information will be provided on plant families, the historical distribution of the tree or shrub, economic and medicinal uses of each of the plants, etc. The CD-ROM can be used as a stand-alone for campus tree identification even if one does not have access to the WWW. However, with the embedded links in the key and access to the WWW one has the opportunity to explore related websites with a click of the mouse.
I thank the ACS-Mellon Technology Fellows Program for their support.

DEVELOPMENT OF A LABORATORY COURSE FOR AN INTRODUCTION TO PHYSICAL SCIENCE. Steven Arnold and Randy Russell, Department of Physical Sciences, Auburn University Montgomery, Montgomery, AL 36124

A set of laboratory exercises to accompany an introductory physical science course were developed. Because the course currently has no math prerequisite the required level of mathematics was kept to a minimum . The experiments were chosen to illustrate the important course topics while requiring a minimum investment in equipment. A laboratory manual was written which provides all the necessary background theory and procedures for performing the experiments. Students are required to fill in logical gaps in instructions for analysis of their data and in some cases to respond to a more challenging task or question after having observed the basic concepts. In this way the students are encouraged to think and apply the concepts without having to produce all the details of the experiment. The topics currently covered include measurement, projectile motion, simple machines, dimensions of a molecule, calorimetry, Ohm's law, reflection and refraction, and spectroscopy.

THE LABORATORY-RECITATION: HANDS-ON AND MINDS-ON ACTIVITIES FOR INTRODUCTORY MOLECULAR BIOLOGY. Helen H. Benford, Department of Biology, Tuskegee University, Tuskegee, AL 36088.

The introduction of a sophomore-level course in molecular biology offered a fresh opportunity to ask, "What should students gain from the laboratory component of courses?" Five goals have guided the development of this introductory molecular laboratory: (1) to advance interpretive reading skills, (2) to become acquainted with scientific literature, (3) to understand the nature of experimental science, (4) to build a strong foundation in laboratory fundamentals, (5) to develop teamwork skills. Few lab exercises of the traditional type have been incorporated; rather, the course has evolved into a "laboratory-recitation" in which activities from various categories are selected for each three-hour weekly lab period. Thus one lab period might incorporate calculations for solution making, analysis of published affinity chromatography data, and use of digital micropipettes. Activities fall into several major categories: wet-labs, usually derived from commercial teaching kits; dry labs based on kits, videos, computer simulations, or student reports; calculations; interpretation of graphical data; manipulation of data supplied by instructor; and biological literature. In a culminating activity, students work as teams to analyze a scientific article for presentation. The mix-and-match approach energizes the laboratory session and provides an opportunity to revisit concepts, strategies, and tools. Students appear to develop increased confidence in their analytical skills and their response to the nature of the lab is generally positive. They report that this lab course requires more work than many others, but they also report that it is a good bridge to the research laboratory.

BEHAVIORAL AND SOCIAL SCIENCES

NATIVE AMERICAN OUTREACH FOR THE THIRD GRADE. Angela Morgan and Daniel Spaulding, Anniston Museum of Natural History, 36202.

The Anniston Museum of Natural History has developed an outreach program to help students understand the relationship between North American Indians and their environment. The program was developed in response to requests from local teachers and adapted to meet Alabama State social studies curriculum requirements. Segmented into geographic regions, North American Indian cultural development, lifestyles, and traditions are discussed. Replicated tools and ceremonial objects, animal bones and skins, and maps are used to illustrate the diversity of culture in North America prior to European contact. The program is brought into every third grade class room in Calhoun County by a Museum educator and is designed to be easily replicated by other institutions or adapted to suit other grade levels and scientific disciplines.

COMPUTER STRESS AND THE BIG FIVE PERSONALITY FACTORS. Richard A. Hudiburg and Irena Pashaj, University of North Alabama, Florence, AL 35632 and Raymond Wolfe, State University of New York, Geneseo, NY 14454.

This study investigated personality correlates of computer users' stress. Specifically, computer users' stress was measured by the Computer Hassles Scale and personality factors were measured by the Big Five Inventory. The Big Five Inventory measures the major domains of personality traits: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. In addition, self-report somatic complaints and anxiety reactions were measured. A sample of 100 college student computer users' who have completed a computer course provided complete responses to the questionnaire. The sample reported a fair amount of computer experience. Correlations between the summed responses of the Computer Hassles Scale and each of the personality traits measured by the Big Five Inventory. Correlations between the summed responses of somatic complaints and anxiety reactions and the Computer Hassles Scale and Big Five Inventory. There was a significant correlations between the computer users' stress (measured by the Computer Hassles Scale) and Openness. There was a significant correlations between the Computer Hassles Scale and somatic complaints and anxiety reactions. Additional analyses revealed that Neuroticism and Extraversion had a "buffering effect" between a stressor (computer hassles score) and stress reaction (somatic complaints and anxiety reactions). The relationship between the Computer Hassles Scale and Openness was a surprising result. It was suggested that additional research was need to determine the nature of this relationship.

COLLECTIVISM VERSUS INDIVIDUALISM AS A DIMENSION OF INTERCULTURAL ADAPTATION. Irena Pashaj and Richard Hudiburg, University of North Alabama, Florence, AL 35630.

Acculturation is the adjustment process through which an individual adapts to a different culture. The degree of differences and similarities between the two cultures is one of many predictors for intercultural adaptation. An important dimension of culture that has a significant impact on the adjustment process, is collectivism versus individualism. Many studies have shown that individualism prevails in developed and western countries, while collectivism in developing eastern countries. The individualist belongs to many in-groups and his/her participation is voluntary, while the collectivist belongs to a few in-groups and his/her participation is involuntary. The individual in the collectivist culture is more considerate of the in-group members than the individual in the individualist culture. The collectivist surrenders his/her personal intentions so he/she can minimize the degree of conflict within in-group, thus contributing to the harmony of the group. Conversely the individualist promotes the conflict within the group by pursuing his/her uniqueness and ignoring the needs and wishes of the group. The differences of the collectivist and individualist cultures have a great influence on the self. Studies have shown that self-liking is high in the collectivist society and low in the individualist society whereas self-confident is high in the individualist society and low in the collectivist society. The self in return influences the coping strategies one adapts through his/her acculturation process. Finally the strategy chosen during the adjustment process will influence the degree of stress perceived by the individual during his/her intercultural adaptation.

HEALTH SCIENCES

HEALTH PROMOTING BEHAVIORS IN THE AFRICAN AMERICAN ELDERLY

Mary Swint, College of Nursing, University of South Alabama, Mobile. Alabama

There has been a profound increase in America's older population. By the year 2030, the 60 years-old and older elderly will double in population growth. Of this population, the 75 years-old and older age group will be the fastest growing. It has been predicted that 100,00 individuals will be over the age of 100 in the United States (U.S. Department of Health and Human Services,1997). During this trend of growth, the minority elderly will have a profound increase. This increase will be more rapid than the general population. With an increase in longevity the occurrence of acute and chronic health problems may escalate. Minority groups, especially African Americans are at a high risk for the most severe and devastating health problems. Since life expectancy will be prolonged, a need for health promotion in the elderly African American is critical. The purpose of this study was to Assess the incidence of health promoting behaviors in one population of African American elderly in the deep south. Self-Efficacy a central concept in the Social Cognitive Theory (Bandura,1986) was used as a framework. Outcome and self-efficacy expectations are essential to behavior changes such as: Modification of diet and performance of exercise. Outcome expectations include an individual's appraisal of the fact that a given behavior can produce a given outcome. A sample of fifty participants randomly selected, using a stratification technique by faith traditions was adopted. Two questionnaires were developed. A Demographic Data Sheet was designed to describe the sample and a Health Survey used to obtain the subject's perceived opinions on health promotion. Content and statistical analyses were employed. Findings from this study provides clinicians, basic and advanced practice nurses, allied health professionals and gerontological associations/agencies with knowledge on what the health promoting activities are in the African American elderly and how successful they are in implementing health promoting care actions. Through the use of this data, more effective health assessments, teaching and learning strategies and follow up care can be implemented.

PROBLEM-BASED LEARNING IN A CLINICAL NURSING COURSE.
Ellen B. Buckner, University of Alabama at Birmingham, B'ham, AL 35294-1210

Problem based learning is an educational approach designed to develop linkages between theory and practice. We initiated this strategy in Fall 1997 because of several tensions present in our curriculum (a) need to increase students' application of knowledge, (b) low student morale and collaboration and (c) faculty dissatisfaction with students' independence in educational processes. Seminars were designed around longitudinal case studies exemplifying a variety of physiologic and psychologic stressors in diverse cultural populations. Students independently located a wide array of resources from texts, libraries, internet and clinical agencies and compared/contrasted these in the seminars. Testing of case study applications was done as open note essay questions.

Students strongly identified effectiveness of PBL seminars in resource exploration and collaboration. Students also recognized the seminars as beneficial in cognitive application of content. Students have not viewed the seminars as beneficial in morale improvement. Modifications of this approach have been done to enhance complexity and avoid pitfalls of too-easy analysis and division of labor.

BREAST RECONSTRUCTION -- RESTORATION OF SELF FOLLOWING LOSS OF A BREAST.
Sarah R. Johnston, School of Nursing, Univ. of AL., Birmingham, AL 35294. Pat Turner, Brookwood Women's Medical Center, Birmingham, AL 35209.

Management of breast cancer has changed from radical surgery to procedures that conserve or reconstruct the breast. The goal of breast reconstruction is to create a new breast from autogenous tissue that feels and looks like the woman's own breast. The procedure may be delayed or done concurrently with mastectomy. Research delineates benefits from immediate reconstruction. The nature and extent of the surgery mandates careful selection of candidates. The ideal candidate is an otherwise physically and mentally healthy woman with a strong desire for breast reconstruction and realistic expectations. The procedure is not advised in the presence of conditions that impair circulation or impede healing or for women with certain psychosocial problems or attitudes. Preoperative management focuses on counseling and reducing risk factors. Tissue from the lower abdomen, including the rectus abdominis muscle with its main blood vessels as a pedicle, can be tunneled to the thorax where it is shaped and attached as a breast mound. The abdomen is closed with a "tummy tuck" technique. Measures to enhance blood flow are initiated preoperatively and continued through surgery and recovery. Stress and pressure on the operative sites are minimized. Postoperative care focuses on monitoring and enhancing blood flow in the neobreast. Subsequent procedures may refine the neobreast, reshape the opposite breast for better appearance and symmetry, and reconstruct the nipple/areola. Breast reconstruction is a viable option for women who wish to reconstruct their body as part of self-restoration after losing a breast. The health care team assumes multiple roles in supporting the woman during her recovery of self.

PRENATAL CARE EN ESPAÑOL IN BIRMINGHAM, ALABAMA. Gwendolyn P. Alcázar, Honors Program, Univ. of Ala. at Birmingham, Birmingham, AL 35294.

During the last several years, the Birmingham area has become home to a small, but growing, community of Hispanics, many of whom are recently-arrived, Spanish-speaking immigrants from Mexico and Central America. The health care community has had to learn to cope with this new population, especially in the area of maternal care. In 1997, there were 158 Hispanic births in Jefferson County, only 1.7% of the total births, but showing that the population does exist in this area. Adequate prenatal care is accepted as an important factor contributing to the successful outcome of pregnancy. The reasons Spanish-speaking immigrants may not receive adequate prenatal care include cultural differences, language differences, economic difficulties, fear of deportation, and ignorance of available health care. To deal with the language difference, several of the Birmingham area hospitals and the Jefferson County Department of Health (JCDH) employ Spanish-English interpreters and the Central JCDH maternity clinic also has available bilingual written materials. Spanish-speaking immigrants in Birmingham would be helped even more if information was available in the community on prenatal care options.

NASAL DELIVERY OF POLYPEPTIDES WITH THE AID OF ALKYLGLYCOSIDES

John G. Eley, McWhorter School of Pharmacy, Samford University, Birmingham, AL 35229.

To investigate a series of surfactants (Alkylglycosides) using tissue culture models, to determine the optimal agent for delivery of low molecular weight polypeptides and to determine if the paracellular pathway is used above the transepithelial route. Cell lines known to form tight junctions, HT29Cl19A and T-84, were grown as monolayers and maintained in the usual way using Transwell® plates, surface area 4.71 cm^2 Cells were shown to have formed tight junctions by transepithelial electrical resistance (TEER) measurements. Twenty-four hours prior to testing they were maintained in serum-free medium. To date, two of the alkylglycoside series have been tested, Dodecylmaltoside (DDM) and Octyl-glucoside (OG). After various concentrations of surfactants were applied to the cell monolayers at 37°C, they were washed and recovery time was noted. For the HT29Cl19A cell line steady resistance reading was obtained after 45 minutes. DDM at 0.001% caused a fall in resistance of 40% and full cell recovered within 16 hours. At 0.01% DDM resistance fell by 47% with full recovery after 18 hours. The final single DDM concentration of 0.1% caused a fall in resistance of 88% with a 97% recovery at 72 hours. OG showed no significant effect on cell resistance under a concentration of 0.2% where a decrease of 30% was observed. Concentrations of DDM and OG below 0.1% and 0.2% respectively indicate that a full recovery of cells occurs. It may be that a transepithelial effect can be dismissed in favor of a possible opening of tight junctions and a potential passage for polypeptides enhanced with an alkylglycoside vehicle. Trials are continuing with other alkylglycoside in the series. Supported by a grant from the American Association of Colleges of Pharmacy.

GUIDELINES TO ASSIST PATIENTS WITH ACUTE MYOCARDIAL INFARCTIONS IN OBTAINING APPROPRIATE MEDICAL CARE. Robert Pieroni, Dept. of Internal Med., Univ. of Ala., Tuscaloosa, AL 35487-0326

Over 13 million Americans have significant coronary heart, peripheral vascular, and cerebrovascular diseases, and their risk for later myocardial infarction and death is about 6 times higher than for the general population. Recently the National Heart Attack Alert Program has been established in order to diminish morbidity and mortality from acute MI's and other cardiac catastrophes. Guidelines have been developed to describe high-risk patients whom health care providers should target for intervention, and for appropriate preventive education concerning early symptom recognition and need for prompt follow-up. Reasons for decreased access to care and delayed treatment have also been addressed. Additionally, the guidelines which we shall present can greatly contribute to the knowledge of physicians and other health care workers in triaging patients at risk for acute MI's, and in expeditiously instituting appropriate and potentially life-saving diagnostic and therapeutic modalities.

UTILITY OF HOMOCYSTEINE MEASUREMENTS IN A FAMILY PRACTICE CENTER. Sherry Wedgeworth and Robert Pieroni, Dept. of Internal Medicine, Univ. of Ala., Tuscaloosa, AL 35487-0326

Many of the risk factors for development of atherosclerosis are well recognized, as are methods to modify some of these risks. In recent years, elevated blood homocysteine (HC), an amino acid, has been associated with premature coronary, carotid and peripheral artery disease, as well as certain thrombotic disorders. Postulated mechanisms of action include cholesterol oxidation, toxic damage to arteries and interference with clotting factors. Elevated HC levels appear as important as high cholesterol in coronary artery disease development in up to 20% of cases. It is well established that dietary supplementation with folic acid can reduce high HC levels in most subjects and can prevent cardiovascular events in patients with hereditary homocysteinemia. We shall discuss a pilot study being undertaken at the UA School of Medicine, Tusaloosa Program's Capstone Medical Center, to measure HC in high risk patients and describe methology, costs, relationship to serum cholesterol, and possible interfering drugs and disorders. The value of other vitamins in addition to folate, as well as patient vignettes, and suggestions on whom tests for elevated HC should be performed will also be addressed.

COMPARATIVE ANALYSIS OF THE MYOLOGY AND OSTEOLOGY OF THE FLORIDA MANATEE (TRICHECHUS MARINUS LATIROSTRIS) AND THE DUGONG (DUGONG DUGON). T. Joshua Meyer, Dept. of Biology, Univ. of South Ala., Mobile, AL 36688. Dr. Amy Sheldon, Graduate School of Physical Therapy, Univ. of Mobile, Mobile, AL 36607.

The Florida manatee is an endangered species found in the coastal waterways and rivers of the Southeastern United States. The study of manatees has concentrated on behavior and conservation. Relatively little study has been directed towards the anatomy of this species. Studies of myology and osteology are needed to address ontogenetic, evolutionary, and adaptive questions. Dugongs are the closest relative to the manatee, and like manatees, their ancestors secondarily returned to the marine environment. A previous study of dugong anatomy provided a comparative reference. Limbs of four manatees representing early juvenile through adult development are the subjects of this study. Limbs were chosen for analysis because locomotor structure is significantly modified during the transition to the marine setting. Radiological data was gathered by means of CT and MRI scans of the intact forelimbs. The specimens were dissected with attention focused on myology, anatomy and ontogeny. Significant differences were found between the expected growth sequences of terrestrial vertebrates and the manatee. In addition to establishing a baseline description of manatee anatomy, these data provide information helpful in understanding the transition of terrestrial vertebrates to the marine environment.

OUTCOMES OF PBL IN COMMUNITY HEALTH NURSING. Janet G. Alexander, Mary Sue Baldwin and Gretchen S. McDaniel, Ida V. Moffett School of Nursing, Samford University, Birmingham, AL. 35229.

The challenge for nursing educators is to develop innovative strategies that will prepare nurses to practice in a multi-disciplinary health care system. Given the current complexity of health care and increasing patient acuity, problem-based learning (PBL) is a natural approach to use with nursing students. Samford University recently received a one million dollar grant from the PEW Charitable Trust to develop PBL courses in five undergraduate schools. In the School of Nursing, PBL became a major component of the Community Health nursing course. This course is offered the last semester of the senior year and is required for all baccalaureate nursing students. The primary learning outcomes that this course is designed to achieve are to improve critical thinking, self-directed learning, communication, interdisciplinary collaboration skills, enhance ability to contribute to a group or team, and develop life-long learning skills. The assertion to be proven was that redesigning the course with the PBL methodology would improve these desired learning outcomes. Quantitative evaluations from the pre and post essay exams, clinical evaluations and the weekly and semester long PBL activities determined the comprehensiveness of the student's knowledge of the concepts in the course as well as the student's ability to communicate an understanding of the course. Qualitative evaluations from the individual papers, clinical journals, peer and course evaluations and outside consultant reviews further revealed that these outcomes were achieved.

THE COMPUTERIZED SOCIETY: INFLUENCE OF THE INTERNET ON AFFECTIVE DISORDERS AND INTERPERSONAL RELATIONSHIPS.

Nell Williams, Lisa Rains Russell, Robert Pieroni and Allan Bernhardt, UA School of Med. & VA Med. Center, Substance Abuse, Depts. of Health Sciences Library, and Internal Medicine, Tuscaloosa, AL 35487-0326

Although the Internet has the capacity to alter greatly our lives, as did the telephone and television, there has been increasing debate on whether its use, in general, is beneficial or detrimental to our mental well being and our social involvements. A variety of studies suggest that use of the Internet can enhance feelings of depression, isolation, frustration and anxiety; lead to addictive and compulsive behavior; and have decidedly negative impact upon interpersonal relationships. Other studies emphasize potential effects of the Internet on cognitive behavior and socialization. Indeed, its use has been recommended in an attempt to ameliorate symptoms of psychopathology in select patient groups. We shall review some of the conflicting evidence concerning the risk/reward ratios of Internet utilization in different population groups, and offer suggestions on who may best benefit from specific Internet usages.

SYNDROME X: CHARACTERISTICS AND CASE STUDIES OF PATIENTS WITH INSULIN RESISTANCE SYNDROME.

Robert Pieroni, Dept. of Internal Medicine, Univ. of Ala., Tuscaloosa, AL 35487-0326

Insulin Resistance Syndrome (IRS) often referred to as "Syndrome X" is characterized by decreased responsiveness to endogenous and exogenous insulin, and is associated with a variety of cardiovascular risk factors, e.g., glucose intolerance, type 2 diabetes, hyperinsulinemia, hypertension, central obesity, and dyslipidemia. Although IRS is common, affecting half of hypertensives, it is usually unrecognized until later in life when severe metabolic complications develop. The disorder may even occur in young children leading to untoward sequellae. I shall discuss several patients presenting with IRS and emphasize assessment, potential complications, recommended life-style changes, and medications for prevention and treatment of this potentially deadly disease.

MASSIVE SUBSTERNAL THYROID GLAND: CASE PRESENTATION AND THERAPEUTIC CONSIDERATIONS. C. Edward Shackelford and Robert Pieroni, Dept. of Internal Med., Univ. of Ala., Tuscaloosa, AL 35487-0326

Thyroid goiter remains a world-wide problem affecting an estimated 5% or more patients. A goiter is considered substernal if 50% or more lies below the suprasternal notch. Studies of various populations have found the occurrence of substernal goiter ranging from 3% - 17%. We present a 75 yo female with a history of DM, peripheral vascular disease, hyperlipidemia, and a past MI. During a routine visit this patient indicated a constant, mild right supraclavicular pain. A past C-Spine for unrelated reasons had provided evidence of thyroid calcification and a calcified area of undetermined significance in the cervical spine film. With these considerations, a CT of the head, neck, and thorax was performed. The CT scan revealed a massive, multi-nodular goiter, anterior to the great vessels, extending from the lower most aspect of the oropharynx, just above the epiglottis (approximately the C3 level) down to the top of the aortic arch (approximately at the sternomanubrial junction). Upon a subsequent follow-up visit the patient reported recent onset of difficulty swallowing. Symptoms of substernal goiter include airway compression, dyspnea, stridor, wheeze, dysphagia, cerebral edema, and the Superior Vena Cava Syndrome. Therapeutic options are limited. Substernal goiters traditionally show poor response to non-surgical management with agents such as levothyroxine. Surgical treatment is the preferred option for most patients, even those who remain asymptomatic, if there is no prohibitive health risks.

ABUSE OF NURSING HOME PATIENTS: PROBLEM RECOGNITION AND METHODS FOR PREVENTION. Robert Pieroni, Dept. of Internal Medicine, Univ. of Ala., Tuscaloosa, AL 35487-0326

Of the 1.5 million Americans residing in nursing homes, unfortunately many are subjected to abuse and neglect. As the Coalition to Protect America's Elders has stated, "while many nursing homes provide professional care, too many facilities are more concerned about profits than people." Abuse may take several forms; e.g., physically injuring or manipulating elders, verbally threatening and degrading residents, as well as emotional manipulation and even sexual abuse. The effects of such practices on the welfare of our vulnerable elderly are incalculable and devastating. I shall discuss specific examples of such abusive behaviors with special emphasis on physical injuries; e.g., development of pressure sores, inappropriate restraints, dehydration, malnutrition, falls and fractures. Additionally, methods to minimize and obviate elder abuse will be underscored.

GUIDELINES TO ASSIST PATIENTS WITH ACUTE MYOCARDIAL INFARCTIONS IN OBTAINING APPROPRIATE MEDICAL CARE. Robert Pieroni, Dept. of Internal Med., Univ. of Ala., Tuscaloosa, AL 35487-0326

Over 13 million Americans have significant coronary heart, peripheral vascular, and cerebrovascular diseases, and their risk for later myocardial infarction and death is about 6 times higher than for the general population. Recently the National Heart Attack Alert Program has been established in order to diminish morbidity and mortality from acute MI's and other cardiac catastrophes. Guidelines have been developed to describe high-risk patients whom health care providers should target for intervention, and for appropriate preventive education concerning early symptom recognition and need for prompt follow-up. Reasons for decreased access to care and delayed treatment have also been addressed. Additionally, the guidelines which we shall present can greatly contribute to the knowledge of physicians and other health care workers in triaging patients at risk for acute MI's, and in expeditiously instituting appropriate and potentially life-saving diagnostic and therapeutic modalities.

ENGINEERING AND COMPUTER SCIENCES

DUALING CUBES. Lara A. Francis. Computer and Information Sciences Dept. University of Alabama at Birmingham, Birmingham, AL 35294-1170. U.S.A. *francis@cis.uab.edu*

Volume rendering is the direct rendering of data represented as 3D scalar fields. Such data may come from several sources especially from the computed tomography (CT), Magnetic Resonance Imaging (MRI) and ultra-sound. Typical input data to volume rendering consists of 3D grid of points with density values at each point computed through one of the above imaging techniques. Several approaches to volume rendering have been developed. One of these approaches is the marching cubes algorithm. In this algorithm, scalar values are assumed to be given at each point of a lattice in 3-space. A particular level surface can be approximated by determining all intersections of the level surface with edges of a lattice. We look for pairs of adjacent lattice points whose scalar values surround the desired value. The location of an intersection of the level surface with the edge is then estimated by linear interpolation so that each cube in the lattice has some number of edges marked with intersections. The arrangement of the intersection points on the edges can be classified into 256 cases which in turn can be reduced to 15. Using these cases a choice is made of how to fill in the surface whithin each cube. In this paper we present a new and improved algorithm, *dualing cubes* based on the marching cubes algorithm. Dualing cubes consists of two steps: root finding,and forming facets and dualing cubes. Again the input is a lattice of scalar values. We define an edge to be the line segment connecting two points; one with scalar value less than the level surface value and another with scalar value greater than the level surface value. In step one roots or points of intersection of the lattice with the desired value are found using linear interpolation in the one-dimensional case and then this step is generalized for the two and three dimensional cases. In step two facets are formed by connecting the roots of two adjacent squares intersecting in an edge in the 2-space case. In the 3-space case the roots of adjacent four cubes intersecting in an edge are connected forming either quadrilateral or triangular facets.

ANALYSIS OF AN INTERPOLATING SURFACE GENERATED BY BUTTERFLY SUBDIVISION SCHEME. Lakshminarayanan Venkatasubramanian, Dept. of Computer & Information Sciences, UAB, AL- 35294

The subdivision scheme involves triangulation of control points and recursive transformation of each triangle of the control polyhedron into four new triangles interpolating the old control points. The edges of the old triangulation contribute new vertex points. New points are inserted by an eight-point rule called the "butterfly scheme" developed by Dyn, Gregory and Levin. A tension parameter controls different segments in different directions. This paper explores a visualization scheme to study the surface properties by analyzing the tangents. The effect of the tension parameter on the surface characteristics is also analyzed.

UNPREDICTABLE BEHAVIOR IN A PREDICTIVE LEARNING AUTOMATON. Steve Donaldson, Department of Computer Science, University of Alabama at Birmingham, 35294

An inability to predict actions and outcomes is frequently considered the bane of environments as diverse as computer programming, economic evaluations, and interpersonal relations. Paradoxically, however, it is also what gives human behavior its richness and variety. One mechanism for modeling human behavior involves the use of a predictive learning paradigm based on artificial neural networks and suggested in various forms by Rosenblatt (1964), Kanerva (1988), and Elman (1990), among others. This particular approach lends itself to a variety of configurations and manipulation alternatives which can be utilized to realize predictable as well as unpredictable aspects of human-like activity. This research describes the development and use of an artificial neural network simulator to investigate behavior based on the predictive learning paradigm, and comments on a variety of ways in which that behavior might be realized. This research has been supported in part by a grant from the Alabama Academy of Science.

USING MICROSOFT WORD 97 TO CREATE AND HANDLE CLASS WEB PAGES ON A CD ROM T. Morris Jones, Sarah Brown and Paulette Alexander, College of Business, University of North Alabama.

Online course offerings are growing at a rapid rate at colleges and universities across the country. Instructors are using the Internet to provide their students access to various course materials such as an online syllabus, lecture outlines, PowerPoint slides, and example tests. More and more, students are coming to expect this type of multimedia material to be available via the World Wide Web. The big drawback comes when the student goes on-line to gain access to the course materials, and then has to wait on the data transfer from the Web server to their PC screen. To help minimize this problem, the instructor can save time for the students by copying the class web site in machine-readable form to a compact disk. With a CD Recorder, a replica of the class web site can be made for each student on a single CD. By taking this extra step, the instructor can make all the course materials readily available to each student in the class in a format that has a much faster data transfer rate than is available through the Internet itself. The paper is a multimedia presentation consisting of an illustration of a CD that emulates a course web site, with an explanation of the making of the CD.

WEB-BASED DISTRIBUTED GROUPWARE ARCHITECHTURE AND ITS APPLICATION. Tao Tao and Robert M. Hyatt, University of Alabama at Birmingham, Department of Computer and Information Science 1300 University Boulevard, Birmingham AL 35294-1170.

Technologies, which support collaboration and distribution, are in greater demand today than ever before, however, the traditional LAN-based simple and proprietary GroupWare is meeting tremendous challenge. Since GroupWare supports the efforts of teams and other paradigms, which require people to work together, even though they may not actually be together, in either time or space, GroupWare needs attributes like autonomy, mobility, collaboration and intelligence. First of all, this paper study the distinguishing features and work styles of the future GroupWare, Secondly, we introduce agent technology and present an agent-oriented architectural model to achieve this goal. Based on this model, we discuss our design pattern of Web-based Agent-Oriented GroupWare. Finally, we show some possible web-based agent-oriented GroupWare applications.

KEYWORD: Web-based, GroupWare, agent, software architecture, design pattern

MODIFIED VERTEX RULES FOR SUBDIVISION SURFACES. Madhanraj Selvaraj, Dept. of Computer and Information Sciences, University of Alabama at Birmingham, AL 35294.
Dr. John K. Johnstone, Dept. of Computer and Information Sciences, University of Alabama at Birmingham, AL 35294.

Subdivision surfaces are gaining the attention of graphics researchers recently, especially in high-end computer graphics production. Motivated by Chaikin's "corner-cutting" procedure, Catmull developed a subdivision algorithm (face, edge and vertex rules) for polyhedra of arbitrary topology yielding smooth surfaces. This subdivision generalizes rules for the subdivision of uniform bicubic B-spline surfaces. Similarly, Loop developed subdivision rules for triangular meshes which generalize quartic B-spline surfaces. Both these surfaces are C^2 continuous except at "extraordinary" points. In this paper, we modify the vertex rules developed in the above-mentioned subdivision algorithms and explore the behaviour of the surface at the extraordinary points. We will visualize the smooth shaded surface, depending upon normal computation using standard tangent rules.

ANTHROPOLOGY

THE RESULTS OF PRELIMINARY ARCHAEOLOGICAL INVESTIGATIONS AT A CONJECTURED GREENSTONE PROCUREMENT SITE (1CY53) IN THE TALLADEGA NATIONAL FOREST, CLEBURNE COUNTY, ALABAMA. Loren Bredeson, Panamerican Consultants, Inc., Tuscaloosa, AL 35404.

In February 1999, a reconnaissance survey of 1CY53 was conducted in order to further explore the postulation that this site was a greenstone procurement locality. The data collected at 1CY53 indicates that chipped-stone lithic reduction activities occurred in a limited amount at this site. The intention of this paper is to demonstrate that 1CY53 is a small lithic scatter; however, the lithic materials exposed in the vicinity were not exploited as a major greenstone source by aboriginal populations.

IRON AND SMELTING BYPRODUCTS PRODUCED FOR USE AS AN ARCHAEOLOGICAL REFERENCE SET. Kelly D. Gregg, Dept. of Physical and Earth Sciences, Harry Holstein and Curtis Hill, Archaeological Resource Lab, Steven Loucks, Dept. of Art and Suzanne Marshall, Dept. of History, Jacksonville State University, AL 36265.

Iron and steel have been produced in northeastern Alabama since 1818. After several decades of very slow development, the Civil War stimulated the construction of blast furnaces and forges at locations throughout this region. These early enterprises were fueled with charcoal, using techniques generally similar to those employed since the beginnings of the Iron Age. Recently at Jacksonville State University we have undertaken the excavation, analysis and stabilization of the Janney Iron Furnace, constructed in 1863. Additionally, we have for some years been collecting information on the numerous small furnaces and forges once found in this area. In order to better understand the archaeological evidence, we have constructed a small charcoal-fired furnace to create, under controlled conditions, iron and smelting byproducts from local raw materials. The resulting "artifacts" are now part of a reference set housed in the Archaeological Resource Lab at J.S.U. In addition to creating iron, we have also attempted to make high carbon steel using a thousand year old crucible technique.

MATERIAL CULTURE REMAINS FROM BIRMINGHAM-SOUTHERN COLLEGE STUDENT RESIDENTIAL AREAS. Sean R. Hair, Buu Duong, and Jeannette Runquist, Birmingham-Southern College, Birmingham, Al. 35254.

This paper presents data obtained from a study conducted fall of 1998 by Archaeology students at Birmingham-Southern College. Residential areas of the College were identified by gender and class composition. Garbage was collected twice weekly from each area over an eight-week period. The sample totaled 110 bags representing a sample of the waste of 986 residents. Recovered items were sorted into predetermined categories and the data were analyzed using SPSS. The analysis showed that per category, first year males and students in coed upper-class apartment settings produced more waste per person than any other groups. Dormitories predominately composed of upper-class students tended to have less waste than those housing first year students. The most sodas were collected from the first year men's dormitory and the least from the upper-class female dormitory. The largest quantity of diet soda was found in the first year female dormitory and the least found in the coed upper-class apartments. First year female students showed other health conscious trends such as the most nutritional products, most hygiene products, and the most milk remains. First year males discarded the least amount of health and hygiene products. These trends, and others, provide information about the lifestyle of residents at Birmingham-Southern College.

LOWER CENTRAL AMERICAN INDIGENOUS (CABECAR) CULTURAL ADAPTATIONS. James Sewastynowicz, Dept. of Anthropology, Jacksonville State Univ., Jacksonville, AL 36265.

For well over a century, Cabecar-speaking communities of the Talamanca region of southern Costa Rica have been subjected to intensive efforts by missionaries and the Costa Rican government to assimilate into the majority culture. Based on ethnographic research conducted in the Cabecar indigenous reserve of Ujarras in June 1997, this paper explores the history and results of those efforts. Special emphasis is placed on examination of: (1) interethnic relations among Cabecars, whites, and other indigenous groups; (2) continued sources of Cabecar-white conflict; (3) the nature of ethnic boundary maintenance; and (4) recent efforts to revive traditional Cabecar culture.

CURRENT INVESTIGATIONS AT J. STROM THURMOND LAKE, GEORGIA. Jennifer E. Grover, Panamerican Consultants, Inc., Tuscaloosa, Alabama 35404.

Over the past six years, Panamerican Consultants (PCI) has been performing intensive Phase 1 archaeological surveys of the J. Strom Thurmond Lake region in South Carolina and Georgia for the U.S. Army Corps of Engineers, Savannah District. J. Strom Thurmond Lake is the largest U.S. Army Corps of Engineers project east of the Mississippi. The dam is located 22 miles northwest of Augusta and it holds back a lake that stretches 40 miles up the Savannah River to the Richard B. Russell Damn and Lake. The entire project covers 137,000 acres of water and land. To date, just over 39,000 acres have been surveyed by PCI. Field methodology for all surveys has been a one hundred percent coverage as opposed to covering high probability landforms. This has resulted in a greater site density for the region. Analysis of landform locations for sites has demonstrated that sites are equally distributed on ridge tops, ridge noses and side slopes. Most recently, we completed a survey of 7,245 acres in Columbia and McDuffie Counties, Georgia. Results from this survey were comparable with past surveys in respect to site density; however, this survey differed in the number of historic cemeteries recorded. Current research is focusing on an examination of land and soil types, distance to known historic structures and other factors in attempts to answer why the density of historic cemeteries was so high in this region.

GEOMORPHOLOGICAL METHODS IN ARCHAEOLOGICAL ANALYSIS AT 1Ee491 IN ELMORE COUNTY, ALABAMA. Kendall A. Rich and L. Michael Venegas, Panamerican Consultants, Inc., Tuscaloosa, Alabama 35404

Site 1EE491 is a multicomponent prehistoric and historic site on a terrace of the Alabama River in Elmore County, Alabama. The geomorphology of the terrace will be examined to gain an understanding of the processes affecting the archaeological site before, during, and after cultural occupation. Geomorphological methods will include grain-size analysis, oxidizable carbon ratio (OCR) and radiocarbon dating, flood frequency analysis, calculation of soil loss, saturated through-flow modeling (STFM), and soil formation analysis. In conjunction with OCR and C14 dating, grain-size analysis of soil samples taken from several locations will help describe the various depositional environments and sedimentary processes which formed the site. Thus, grain-size analysis will help explain reasons for habitation of some specific localities on the terrace. Also, background research will be used both to explain recent impacts to the soil and to assist in determining the frequency of flooding. Consequently, this background research may be useful in examining settlement patterns (e.g., duration of specific occupations) at 1EE491. Furthermore, calculation of soil loss, saturated through-flow modeling (STFM), and soil formation analysis will give an understanding of how natural processes can influence the position and mechanical breakdown of artifacts after cultural deposition.

GROUND-PENETRATING RADAR AND CORE SAMPLING AT THE MOUNDVILLE SITE (1Tu500). Matthew D. Gage, University of Alabama Museums, Office of Archaeological Services, Moundville Archaeological Park, Moundville, AL 35474

During the fall and winter of 1997, the University of Alabama Museums, Office of Archaeological Services conducted a ground-penetrating radar (GPR) survey and core sampling of Mound R at the Moundville Site (1Tu500). The project was intended to gather data related to the internal structure of the mound using the least destructive means available. As a consequence of the field investigations the entire summit of the mound was imaged and twelve coring location were sampled. The information provided by this survey has shed new light on construction sequences--information which previously was only available through intensive excavation. As a consequence of the success of the Mound R Project, a second phase of investigation has begun at the site and involves five additional mounds (A, E, L, Q, and Y). The Project goals continue to be a relatively non-invasive investigation of the internal matrix of the earthen structures utilizing GPR imagery and core sampling techniques.

STUDENT PERCEPTIONS OF THEIR TRASH COMPOSITION AND RECYCLING. Joshua B. White and Jeannette Runquist, Birmingham-Southern College, Birmingham, Al 35254.

This project presents data retrieved from surveys collected fall of 1998 by Archaeology students at Birmingham-Southern College. The survey assessed student perceptions of the composition of their trash and views on recycling in an effort to determine differences between their perceptions of trash compostion and the actual trash recovered in the material culture study. The survey was gender, dormitory, and class specific and addressed issues regarding preference of consumable and nonconsumable goods. The return percentage of surveys was 33.1%. The survey shows that 66% of students believe they recycle on a regular basis while 10% claim they never recycle. The group claiming to recycle least was first year males at 38.9%, and trash deposits from freshman male residential areas contained large quantities of recyclable materials (aluminum cans, white paper, and plastic containers). Senior males claimed to recycle the most at 72.3%. These trends and others provide information concerning discrepancies between perceptions of their trash and actual material culture collected as well as insight into the lifestyle of the average college student.

REVITALIZATION OF BROAD STREET, GADSDEN, ALABAMA: AN ARCHAEOLOGICAL MONITORING PROJECT. Curtis E. Hill, Adam Cleveland and Noah T. Cleveland, Department of Physical and Earth Sciences, Jacksonville State University, Jacksonville, AL. 36265.

The Jacksonville State University Archaeological Laboratory has conducted intensive archaeological monitoring of the Broad Street Revitalization Project during the months of December 1998 and January, February and March of 1999. This project involved the systematic excavation of one of Gadsden's oldest and most historic streets. Archaeologists worked side by side with construction crews, bulldoziers and backhoes. Any archaeologist who has performed such a task knows that it makes for an exciting project not to mention a nerve racking one. As a result of this project archaeologists were granted a rare view, layer by layer of historic Gadsden Alabama. A substantial amount of artifacts and subsurface features were recovered covering a temporal span from the 1840's to present day. The archaeological data obtained during this project benefits the historian, archaeologist and average citizen in better understanding Gadsden's rich and varied past.

MINUTES
ALABAMA ACADEMY OF SCIENCE
SPRING EXECUTIVE COMMITTEE MEETING
Athens State University
Athens, AL

Wednesday, March 24, 1999

A. **Dr. Moore U. Asouzu, President of the AAS**, called the Spring Meeting of the AAS Executive Committee to order at 6:35 p.m. The minutes of the October 3, 1998, Fall Executive Committee Meeting were discussed. A motion was made by Dr. Barker with appropriate second, and the minutes were approved by the Executive Committee with change.

B. **Officer Reports**

1. Board of Trustees—Dr. Sam Barker. Six members were present: Dr. Sam Barker, Dr. Joe Thomas, Dr. Mike Moeller, Dr. Ken Marion, Dr. Prakash Sharma and Dr. Walter Wilborn.

2. President—Dr. Moore Asouzu submitted the following written report.

   The following is a brief summary of the activities that I have been involved in since the Fall meeting of October 2, 1998, in fulfilling the duties of the office of President:

   a. Coordinated details of the annual meeting with Dr. Jandebeur, Chair, Local Arrangement Committee, and Dr. Leven Hazelgrove, Executive Director of the Alabama Academy of Science.

   b. Worked with Elected Officers, Committee Chairs, and Section Chairs as needed.

   c. Worked with Dr. B.J. Bateman, State Counselor to the Junior Academy, in finalizing selection of the keynote speaker.

   d. Sent congratulatory letter and invitation to Dr. Samuel Barker, the recipient of the 1999 Wright A. Gardner Award.

   e. Made a congratulatory and invitation phone call to Drs. Gale Christopher and C. A. Sundermann, the recipients of the

1999 Carmichael Award.

f. Worked with Dr. Holland, AAS Secretary, in welcoming more than 50 new members to the Academy.

g. Updated and sent to each officer of the Academy
   1) List of AAS Elected Officers
   2) List of AAS Committees and Members

3. President-Elect—Larry Boots provided the following written report.

During the past year, the President-Elect has conferred with other members and officers of the Alabama Academy of Science as needed. Currently, chairman of the various committees are being appointed or reappointed, as the case may be. Subsequently, the committees will be reconstituted as needed.

4. Second Vice President—Richard Hudiburg submitted the following written report.

I have had several discussions with the Chair of the Committee on Research, Anne Cusic of UAB, concerning the duties of that committee and website usage for the various competitions.
I have had several discussions with the Secretary of AAS about the development of the membership database. I would like to reiterate a goal for the Academy to increase electronic connectivity via e-mail and web pages on the Internet.

5. Secretary—Priscilla Holland presented the following written report.

Membership by Section		Lifetime Members	New Members
Section 1	175	37	4/98 to 3/99
Section 2	64		81
Section 3	28		
Section 4	27		
Section 5	59		
Section 6	27	Members Paid – Current Year	
Section 7	25	482*	
Section 8	32		
Section 9	62		
Section 10	33	*Includes honoarary, benefactors, and	
Section 11	8	lifetime members.	
Section 77	28		
Section 88	2		
Undeclared	16		
TOTAL	586		

6. Treasurer—Larry Krannich submitted the following written report.

The Treasurer's Report consists of copies of the following:
Information for Calendar Year 1998:
All Account Balances as of 12/31/98;
Activities Relative to 1998 Budget for the period 1/1/98 through 12/31/98;
Treasurer's Summary Report By Quarter for the period 1/1/98 through 12/31/98;
Treasurer's Summary Report By Account for the period 1/1/98 through 12/31/98.
Information for Calendar Year 1999:
All Account Balances as of 3/15/99;
Treasurer's Summary Report By Quarter as of 3/15/99 for the period 1/1/99 through 3/15/99;
Activities Relative to 1999 Budget for the period 1/1/99 through 3/15/99.

All account balances as of 12/31/98 were $70,212.26. Although the Academy budgeted a deficit of $14,565, the year ended with income exceeding expenditures by $7,160.80. This is primarily a result of not receiving any invoices for the printing of the Journal during calendar year 1998. Dues income for 1998 was slightly higher ($460) than in 1997, and meeting revenue was higher than anticipated. Income to the Gorgas category was not budgeted in 1998, but this was also entirely expended in the Gorgas competition. Although support for the Journal appears higher than budgeted, this is somewhat misleading, because $2,700 in support for 1999 was received and deposited in 1998. Thus, actual 1998 Journal support was down by $400. On the expense side, expenses for the annual meeting were less than budgeted, grant expenditures were less, office expenditures were up, and, as mentioned, there were no expenditures for Journal printing. The "Over Expenditures" that appear for Science Olympiad and Science Fair were paid from income received for both activities.

For the first quarter of 1999, our dues income is at the level expected. The income to the Gorgas category consists of $1,500 to the Academy for 1999 Scholarship expenses and $1,616 for the Gorgas competition fee that we receive from the Alabama Power Foundation. The remaining $1,000 was a reimbursement from Birmingham Southern for the Gorgas Scholarship recipient who

transferred to the University of North Alabama. These funds were subsequently transferred to UNA. We also received a $1,000 gift from Vulcan Materials. Thus, we appear to be keeping within the budget for 1999 and do not anticipate any budgetary problems.

7. Journal Editor—James Bradley submitted the following written report for the period January through December 1998.

During this period 12 articles were submitted for review and 10 were published in the *Journal of the Alabama Academy of Science* (JAAS). Three of the normally four issues of the *JAAS* were published in 1999. October's issue was not published due to lack of articles submitted for review. I propose that a combined issue – October 1998/January 1999 – be published as soon as 5 or more publishable articles are available.

The Academy should be prepared to lose the circa $4,500 annual subsidy of the *JAAS* by the Auburn University Library as well as the Library's donation of labor and postage for the mailings sometime during 1999. I will need to ask the Academy to pay for secretarial help for the mailings if/when the Library no longer donates this service.

Far more articles need to be submitted to the *JAAS*. I suggest that beginning with the 1999 Annual Meeting, it be the Academy's policy that every symposium speaker be asked to submit a manuscript for publication in the *JAAS*, that the deadline for this submission be the date of the symposium, and that the July issue become the Symposium Issue of the journal.

Many presenters this year apparently failed to receive instructions for abstract submission. I recommend that in the future this form be mailed to every member of the Academy along with the call for titles and general meeting information. I also recommend that the deadline for abstract submission be moved from March 1 to March 15.

8. Counselor to AJAS—B. J. Bateman gave an oral report, stating that the AJAS is expecting an estimated 60 students and teachers to participate this year.

9. Science Fair Coordinator—Mary Thomaskutty – No Report

10. Science Olympiad Coordinator—Jane Nall presented the following written report.

The Alabama Science Olympiad currently consists of five Division C (grades 9-12) Regional Science Olympiad tournaments, four Division B (grades 6-9), and one Division A (grades 1-6). To date the estimated number of registered teams for 1999 include 68 Division C, 72 Division B, and 40 Division A. Following is a list of host institutions, regional coordinators, and Science Olympiad dates for 1999.

Regional Science Olympiads

University of Alabama - 27 February 1999 (Divisions C and B)
Bill Price (205) 348-5510; e-mail: bprice@coe.eng.ua.edu

Auburn University – 6 March 1999
http://members.aol.com/Scarey8355/alSO.html (Divisions C and B)
Steve Stuckwisch, Department of Mathematics, Parker Hall, Rm 228, Auburn University, AL 36849-5310 (334) 844-6575; e-mail: stuckse@mail.auburn.edu; web site: Auburn University Science Olympiad

Jacksonville State University – 6 March 1999 (Division C)
James Rayburn, Biology Department, Jacksonville State University, 700 Pelham Rd., N., Jacksonville, AL 36265-1602 (256) 782-5803; fax: (256) 782-5587; e-mail: jrayburn@succ.jsu.edu

UMS-Wright Prep. Sch. 27 February 1999 (Division B)
Terry Lathan (334) 343-6399; e-mail: GOPJunkie@aol.com

Univ. of AL in Huntsville – 20 March 1999 (Divisions C and B)
Vanessa Colebaugh, UAH, Earth System Science Lab, Huntsville, AL 35899; (256) 922-5747; fax: (256) 922-5723; e-mail: vanessa@atmos.uah.edu

University of Mobile – 20 February 1999 (Division C)
Jane Nall; e-mail: finsjdn@acan.net

State Science Olympiads

Division C State Science Olympiad
Troy State University – 24 April 1999
Gene Omasta (334) 670-3578

Division B State Science Olympiad
Alabama School of Mathematics and Science – 17 April 1999
Kay Kouadio, 1255 Dauphin St., Mobile, AL 36605 (334) 441-2100;
e-mail: kkoua@olympus.asms.state.k12.al.us
Thomas Fink, 1255 Dauphin St., Mobile, Al 36605 (334) 441-2100;
e-mail: tomjfink@aol.com

The Division C State Tournament will be held at Troy State University on 24 April 1999; Division B at the Alabama School of Math and Science on 17 April 1999; and Division A at Auburn University on 1 May 1999.

State winners for Division C and B may advance to the National Science Olympiad, 13-15 May 1999, hosted by the University of Chicago in conjunction with the Field Museum/Planetarium/Aquarium.

We have experienced a substantial increase in Science Olympiad participation, which may qualify us to send two Division B teams to the national competition.

Anyone interested in learning more about the Science Olympiad program can access the Science Olympiad web page at: http://www.macomb.k12mi.us/science/sciloym1.htm.

The Science Olympiad is a volunteer effort and everyone who gives their time and expertise to make this program a success deserves the support and thanks of the Academy.

11. Counselor to AAAS—Katharine Mayne—No Report

12. Section Officers

I. BIOLOGICAL SCIENCES—Roland Dute submitted the following written report.

The Biology Section of the Alabama Academy of Science has 48 presentations scheduled involving 38 papers and 10

posters. The paper presentations will be held in three sessions to accommodate the Friday morning symposium. Our Friday afternoon session will begin at 2:00 to allow interested faculty and students time to discuss the poster presentations with their authors.

A new vice chair will be chosen at Thursday's business meeting.

II. CHEMISTRY—Tracy P. Hamilton—No Report

III. EARTH SCIENCE—Daniel O'Donnell gave an oral report. He reported that this year all Earth Science presentations are posters. Presentations were made to Geology Departments at universities throughout the state to increase membership, as well as to private industry.

IV. GEOGRAPHY, FORESTRY, CONSERVATION & PLANNING—Chukudi Izeogu submitted the following written report for 1998-99.

a. Membership: Last year (1998) twenty persons were registered in Section IV of the Alabama Academy of Science (AAS). Currently, the membership list has grown to twenty-six. This represents a 30% increase over the 1998 number. As in the past, the membership includes students.

b. Papers: the number of papers for presentation during the spring 1999 meeting stands at twelve in addition to one poster presentation. Thus, the number of papers for this year is at the same level as last year's. As in the past years, the topics reflect the wide range of interests and disciplines in Section IV. Moreover, students have continued to show interest in presenting papers.

c. General: Since last year, regular contact has been maintained with the Executive Director and the Secretary of the Academy. We hope to continue to work hard to gain more visibility on university campuses, to recruit more members, and increase the number of paper presentations in our section.

V. PHYSICS & MATHEMATICS—John T. Tarvin submitted the following written report.

The Physics participation at the AAS Spring Meeting is slim due to the scheduling of the AAS meeting – it coincides with the 100th Anniversary Meeting of the American Physical Society, held in Atlanta. Consequently, a large percentage of our members are in Atlanta instead of in Athens. This time conflict happens every year – as far as my experience is concerned; I recommend that the scheduling committee investigate the possibility of moving the AAS Spring Meeting forward – or backward – one week to avoid this perennial conflict.

Dr. Menon has requested that I retain the section chair through next year (2000), after which he will assume the chairmanship. I am agreeable to this plan – since the 2000 meeting is being held at Samford University – and will formalize this plan during our sectional Business Meeting on Thursday, March 25, 1999.

There has been a dramatic increase in participation of the Samford Department of Mathematics, Engineering and Computer Science. I hope to see this trend continue, and to have an increased participation of the physics community as well, for the 2000 meeting.

VI. INDUSTRY AND ECONOMICS—T. Morris Jones—No Report

VII. SCIENCE EDUCATION—Helen Benford submitted the following written report.

A letter describing the diversity of membership and interests in the Science Education section was sent to members of Section VII, AAS officers, section chairs and vice-chairs in December. It carried an appeal to promote participation in Section VII. We received ten titles for the Science Education paper session at the Annual Meeting. This is a larger number of presentations than we have had in recent years. To all of you who encouraged submission of papers, Section VII extends its thanks. Please continue to support by attending some of the presentations.

An inquiry was sent to Section VII members in December in an effort to develop a database that would include members' specific areas of interest within Science Education. Response has been poor. A follow-up attempt will use a check-off type of questionnaire. It would be helpful if the AAS membership lists included e-mail addresses.

Section VII has a membership of 24 as of the March 1, 1999 listing received. We continue to support a multi-section membership policy whereby AAS members could list more than one section (perhaps primary and secondary affiliations). This would allow members to identify their interests both in a science discipline and in the teaching of science. It would give Section VII a larger mailing list through which to solicit papers, draw audiences, and communicate goals. Strengthening Section VII would contribute to the overall strength of the Alabama Academy of Science.

Section VII encourages a science education theme for the Academy-Wide Symposium at the 2000 meeting at Samford University.

VIII. BEHAVIORAL AND SOCIAL SCIENCES—Jerald Burns—No Report

IX. HEALTH SCIENCES—Barbara Wilder—No Report

X. ENGINEERING AND COMPUTER SCIENCE—Alan Sprague—No Report

XI. ANTHROPOLOGY—Curtis E. Hill—No Report

13. Executive Officer—Leven Hazelgrove submitted the following written report.

Since the Fall Executive Meeting, October 3, 1998, at SRI we have been working on the following projects during the last five months:

a. Set up and prepared the Gorgas Scholarship Program for Science Talent Search in cooperation with the Westinghouse (Now Intel) Scholarship Science Service, Inc., D.C. for the Athens State University, March 26, 1999, meeting with the

leadership of Dr. Ellen Buckner, Co-chair and Dr. Thomas S. Jandebeur, Local Chair.

b. Prepared for bulk mail 700 "Call for Paper Titles" for Athens State University meeting for March 24-27, 1999, edited by Dr. William J. Barrett.

c. Sent development letters to 3 industrial companies and foundations with positive reply from one, Vulcan Chemical of Vulcan Materials.

d. Sent handwritten notes and brochures to 25 outstanding Scientists and Engineers, Mathematicians and potential members whose "write-up" appeared in local publications.

e. Site visit with Dr. Tom Jandebeur, Professor and Head, Biology Administration and his local committee for the AAS dates: March 24-27, 1999, at Athens, AL with Drs. Buckner, Asouzu, Bush, and Bateman.

f. Prepared 12 abstract forms for the Athens State University meeting, March 24-27, 1999 for eleven section chairs and 650 printed programs.

g. Your director studied flora, fauna and pollution in the USA, February 10-13, 1999, with the Alabama Fisheries Association, Gulf State Park, with Drs. Marion and Angus.

h. Set up the 76th Annual Meeting with the able direction of Dr. Tom Jandebeur, Professor of Biology, Athens State University, Athens, AL, March 24-27, 1999.

i. Prepared with Dr. Larry Davenport (205) 870-2574, fax (205) 870-2479, the 77th Annual Meeting to be at Samford University, March 29 – April 2000.

j. Trying to get the AL Legislature to grant AAS exemption from sales tax! Anyone know anyone?

C. Committee Reports

1. Local Arrangements—Tom Jandebeur presented an oral report. He reported that 79 individuals have pre-registered for the Annual meeting.

2. Finance—Sam Barker submitted the following written report.

Last fall, nearly at the end of three-quarters of the 1998 budgetary year, the Executive committee apparently faced an operating deficit of over $5,000. Our anticipated income of $4,500 from the 1998 annual meeting had not been received, and added to that, dues receipts had lagged considerably. In true dramatic fashion, our Treasurer announced that he had received the meeting income check just the previous day. To add to this good news, although we didn't know it until the fourth quarter actually was completed, dues receipts for that period were excellent.

These, and other items detailed in the first paragraph of the Treasurer's Report for 1998 have resulted in a paper surplus of income expenditures, not of a few hundred dollars, but of $7,161. That is all fine, but it did cost to print the Journal; $14,000 was in the budget, based on the previous years' costs. The books are closed on the 1998 year, so the surplus stands. If the missing costs come in during the 1999 Budget Year, the deficit may rise to haunt us.

As usual, with our Spring Meeting coming in March, less than one quarter into this budgetary year, it is very difficult for me realistically to assess the Academy's chances of going through another year in the black. As 1999 progresses, some items of income may appear to be more favorable than we anticipated when drawing up the budget late in 1998. Unless expenditures rise extraordinarily, perhaps we should propose a budget for the much-maligned year 2000 in balance at the $30,000 level. With reserves of about $70,000, it would be more confidence inspiring to face this new Millennium without a proposed deficit.

3. Membership—Adriel Johnson—No Report

4. Research—Anne M. Cusic provided the following written report.

The Chairperson of the Committee on Research received only 20 requests for application materials related to the Student Research Award Competitions, Student Research Grants, and Student Travel Awards. The low number of requests was most likely due to many students going directly to the web page for application materials. Several students contacted me for the web address after receiving the Academy Newsletter which contained an error in the address. I

recommend that use of the website for next year. (http://www2.una.edu/psychology/hudiburg.htm.)

Seventeen students applied for the Travel Grants. Sixteen were awarded with one student withdrawing her application. Nineteen students submitted completed applications for entering the Student Research Awards Competition. One student withdrew from the competition; thus 18 students are competing for the awards in 5 Sections of the Academy. All of the students are entered in the paper competitions. There were 7 applications for Student Research Grants.

The Vice-Chairpersons will need to provide the names of the competition winners for the Student Research Awards to me before the annual meeting banquet scheduled for Friday, March 26.

Two items concerning the Research Committee need to be addressed by the Committee. These points might be worthy of discussion by the Executive Committee. The first deals with a request made by a Section Chair to the Research Committee this year. The inquiry was: If no student enters the poster competition of a section, can the section give two paper awards? Currently the rules state a $50 award for the best paper and $50 for the best poster. Since there is no provision in the rules of the Research Committee to do otherwise, the two committee members who have been on the committee the longest decided that, at least this year, only one paper award could be presented for each section. Does the Executive Committee feel that a provision should be made to modify the current award rules?

The second point concerns students applying for awards or grants who are not, at the time of application, members of the Academy. This year I accepted the applications but informed the students that the eligibility requirements state that to receive the monetary awards the applicant must be a member of the Academy. I plan to discuss with the Research Committee the possibility of adding a requirement that the student must be a member of the Academy by the deadline for receiving applications for the research awards and grants. Input from the Executive committee would be beneficial.

5. Long Range Planning—Ken Marion submitted the following written report.

The committee considered a number of items generated from an informal discussion at a dinner for the Executive Committee hosted by Birmingham Southern College previous to the Fall AAS Executive committee meeting. The Long-Range Planning Committee's recommendations or suggestions center around budgetary issues.

a. Raising of Annual Dues and/or Registration Fees: It may well be time for a modest increase in annual membership dues. It has been several years since the last increase. Most other societies have higher annual dues and an AAS membership does include a journal. It was felt that a modest increase would not deter current members from renewal. Further, it was felt that meeting registration fees for senior Academy members should always be kept high enough to ensure that the Academy can receive at least a small amount of monies as income from the annual meeting. A significant profit from the annual meeting should not be the aim; instead, the aim would be to mandate that there would be no monetary loss.

b. Journal Issues: The Committee recommends that an Ad Hoc Committee (perhaps composed of Journal Editor, Associate Editors, and Editorial Board) be formed to 1) monitor The Journal expenses and make recommendations to address expense issues, if warranted and 2) investigate the possibility of placing The Journal (at least partially) on the Internet. It may reduce costs, but problems of indexing, getting on databases, and access may outweigh the benefits. It has probably come time to consider exploring this issue.

c. 2-Year Presidency: This issue was discussed. There is no recommendation at this time. One benefit would be having the experience gained in a first-year present again. This may have distinct benefits for carrying through initiated programs. Perhaps ideas should be explored which would make better use of either the past president or president-elect.

d. Change of Meeting: The idea of shortening the meeting to Friday afternoon and just having a luncheon meeting was a thought that was considered.

6. Auditing-Sr. Academy—Denny Bearce—No Report

7. Auditing-Jr. Academy—Danice Costes provided the following written report.

This is a report of the Alabama Junior Academy of Science Auditing Committee for the July 1997-July 1998 financial year. We have examined the books provided by the Alabama Junior Academy of Science Treasurer, Dr. B.J. Bateman. We are satisfied ourselves that the receipts and expenditures, as presented to us, are correct and that all expenditures are legitimate expenses.

The net worth as of June 30, 1998, is $18,567.03.

a. Editorial Board and Associate Journal Editors—Douglas Watson/Larry Wit/Bill Osterhoff. The following written report was provided.
I am pleased to announce that the following institutions have supported the Journal of the Alabama Academy of Science as benefactors:

Samford University
University of South Alabama
Auburn University at Montgomery
Tuskegee University
University of Alabama
University of North Alabama
Jacksonville State University
Birmingham Southern
University of Alabama/Birmingham
The University of Montevallo
University of West Alabama
Troy State University

9. Place and Date of Meeting—Tom Bilbo submitted the following report.

Plans for future meetings:

Annual Meeting	Location	Local Arrangements Chairperson
2000 March 29—April 1	Samford University Birmingham, AL 35229	Dr. Larry Davenport

2001	Auburn University Auburn , AL 36849	
2002	University of West Alabama -Station 7 Livingston, AL 35470	
2003	Jacksonville State University 700 Pelham Road North Jacksonville, AL 36265	Dr. Frank Romano

10. Newsletter—Lynn Stover/Tom Jandebeur—The following oral report was given.

There is a need for articles for the spring newsletter. Mail information to Lynn Stover.

11. Public Relations—Myra Smith—No Report

12. Archives—Troy Best provided the following written report.

Several items have been submitted for deposition in the archives, but we still need to obtain photographs (especially of members of the Executive Committee), committee reports, minutes of the AAS Executive Committee meetings, etc.

If you have items that you believe may be worthy of inclusion in the AAES Archives, please send them to me or to Dr. Dwayne Cox, the archivist in charge of AAS materials at the Auburn University Ralph B. Draughon Library.

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

13. Science and Public Policy—John Frandsen provided the following written report.

Members of the Committee: S. Brande (UAB), J. Frandsen—Chair (AU), Dail Mullins (UAB), R. Rowsey (AU), and S. Sign (ASU).

Status of Distribution of NAS Booklets *Teaching About Evolution and The Nature of Science*. About 120 of these booklets were distributed to Alabama biology teachers at the NSTA Regional Convention, in Birmingham last November. We hope to complete mailing of these booklets to the more than 700 remaining teachers

within the next few weeks. The committee expresses its sincere thanks to Dr. Eugenie Scott, of NSCE, Dr. Robert S. Davis, Alabama State Department of Education, and Ms. Cissy Bennett, State Coordinator assistance in this project.for the National Association of Biology Teachers, for their vital

Chair Needed for Academy's Environmental Panel—This panel was established to monitor environmental issues in the state and bring those possibly meriting the Academy's concern to the attention of the Chair of the Science & Public Policy Committee. Though it has been in existence for several years, the panel has not accomplished its mission because of the lack of a Chair willing and able to devote sufficient time to the panel's business. A qualified environmental scientist is urgently needed for this position.

The need for an active environmental panel will increase over the next few years. A story in the *New York Times* recently reported that the Administration intends to work with the Congress to transfer much of the responsibility for environmental quality back to the states.

The Academy and Science and Public Policy in Alabama
Inasmuch as several members of this committee, including the Chair, have expressed a desire to be replaced, it is perhaps an appropriate time for reflection.

The area with which this committee is charged is vast. It obviously includes science education in the public schools, environmental and industrial policies, and all of the other matters where governmental policies affect science—and where scientific knowledge and expert opinion should affect these policies. How can a committee of six deal with all of this effectively? In the past, we've done what we have by limiting our concerns primarily to education. One way to increase our involvement beyond this would be to have a larger committee, or to have a number of subcommittees, each charged with responsibility for a discrete area. Hard as it's been to get people to serve on the little committee we have, how can we recruit sufficient qualified volunteers to expand our membership or create subcommittees?

The world has changed much since the Academy was founded. As its environment changes, its mission and operations must be

continually reviewed and modified. The scientific community as such increasingly needs an influential voice in the halls of state government. The only collective voice of that community in this state is the Academy. Those who make public policy must not depend for expert background on experts paid by special interests.

The Alabama Academy of Science is a unique deposit of scientific information and expertise. State government would benefit greatly by drawing from that deposit. As of this time, the only governmental agency to have sought out the Academy is the Department of Education.

If we wish the Academy to have greater influence in shaping public policy in the state, here are two changes that might be considered:

a. Moving the Academy office to Montgomery, because it is the seat of state government. In association with this, the Executive Director would become a part-time lobbyist, a familiar face in the statehouse during legislative sessions, an acquaintance of every legislator important in shaping public policies relevant to science.

b. Providing the Science and Public Policy Committee with sufficient funds to reimburse the costs of its members for participation in committee affairs. These funds should pay for attendance of members at pertinent hearings of the legislature and state boards, as well as a limited number of workshops, conferences, etc., relevant to the committee's interests. In this last year alone, there have been several important conferences and workshops on environmental issues that should have been attended by committee members, but the costs precluded their attendance.

14. Gardner Award—Ellen McLaughlin provided the following written report.

a. Requests for nominees for the Gardner Award were made through the Alabama Academy of Science Newsletter.

b. In addition, letters of request for nominations were sent to 70 or 80 members representing most schools, colleges and universities in Alabama.

b. Wright A. Gardner Award Committee selected the following

nominee for this award from three excellent choices:

Samuel B. Barker, Ph.D.—Distinguished Professor Emeritus, University of Alabama at Birmingham, Professor in Departments of Pharmacology, Physiology and Biophysics, first Dean of the Graduate School and ardent supporter of the Alabama Academy of Science.

d. The other very fine nominees will be held over for consideration next year.

15. Carmichael Award—William J. Boardman submitted the following written report.

The committee selected the outstanding paper published in Volume 69 (1998) of the *Journal of the Alabama Academy of Science* to receive the Emmett B. Carmichael Award. Since the fall issue (October, 1998, No. 4) was not available at balloting time, papers in that issue will be judged with those in Volume 70 (1999) for the award next year.

The announcement of the recipient(s) of the award and the title of the paper will be made at the presentation at the banquet of the 1999 meeting.

16. Resolutions—Gerald Regan submitted the following written report of resolutions to be presented at the Annual Banquet.

Be it resolved by the executive committee that the following script be employed at the appropriate time:

Each year the Academy recognizes individuals who have served it in an exceptional manner.

a. First and foremost we recognize Jerry F. Bartlett, president of Athens State University for graciously hosting the 76th annual meeting of the Alabama Academy of Science.

b. The Academy would also like to recognize Thomas S. Jandebeur, chairperson of the local arrangements committee for the many weeks of planning and hard work that enabled us to have this very successful annual meeting.

c. Lastly the Academy thanks Moore U. Asouzu for his able leadership of the Academy as its president during the past year.

The Academy would like to take a moment to recognize the following members of the Academy whom it has lost through death over the past year:

Herman Davis Alexander	William Ray Laseter, Sr.
Charles Edwin Butterworth, Jr.	Larry Ludwick
Charles E. Feazel	Charles S. Sherer
Edward J. Griffith	Wynelle Doggett Thompson
George Vernon Irons, Sr.	Bertie Mae Warren

The Academy notes, finally, the loss through death of the Honorable George C. Wallace, who although he was not a member of the Academy, fostered the growth of science in the state.

17. Nominating Committee—Richard Hudiburg presented the following written report.

The nominating committee has commitments/interest from the following individuals for election to the indicated offices:

President	Larry Boots (2000)
President-Elect	Richard Hudiburg (2000)
Second Vice-President	Roland Dute (2000)
Treasurer	Larry Krannich (1999-2002)
Editor of AAS Journal	James Bradley (1999-2002)
Trustees	B. J. Bateman (1999-2002) Wayne Finley (1999-2002) Ken Marion (1999-2002) Walter Wilborn (1999-2002) Prakash Sharma (1999-2002)

18. Mason Scholarship—Michael Moeller submitted the following

written report.

We had six completed applications for the William H. Mason Fellowship this year. After considering all the application material, the committee has selected Ruth Borden for the $1000 fellowship and she has been notified of this award. Ms. Borden received a B.S. with a math major from Birmingham-Southern College and a M.S. degree with a major in mathematics from the University of Alabama at Birmingham. She is returning to the University of Alabama at Birmingham for the fifth year program in education leading to a teaching certificate in mathematics, from the University of West Alabama for the $1000 fellowship.

The committee chairperson is very appreciative of the work of Dr. Malcolm Braid and Dr. Sandy Caudle in reading and rating the applications.

19. Gorgas Scholarship Program—Ellen Buckner presented the following written report.

We are pleased to report that there were 25 Alabama entrants in the Intel National Science Talent Search, almost 50% more than 1998. There were also four national Semifinalists from Alabama, all of whom are among the Gorgas finalists. Twelve finalists were selected based on course work and reviews of their scientific papers. All twelve are competing in the final judging on Friday. You are invited to view the exhibits Friday afternoon as listed in the Gorgas Program.

We are also pleased to report that 14 Alabama Colleges and Universities responded to our letter asking for commitment regarding additional scholarships offered to Gorgas finalists or winners. Several were first time offers. There continues to be strong support statewide for the Gorgas competition among institutions of higher education. The teachers and students are to be commended for their outstanding work.

D. **Old Business** – None

E. **New Business**

Dr. Larry Witt offered a suggestion that the membership join with a university consortium to promote undergraduate research, using the Academy's Annual Meeting as a place for students to present their research findings. The membership took the suggestion for future consideration.

F. **Adjournment**

The meeting adjourned at 10 p.m.

Respectfully submitted,

Priscilla Holland, Secretary
Alabama Academy of Science

Journal of the Alabama Academy of Science, Vol. 70, No. 1-2, January/April, 1999.

REPORT ON THE GORGAS SCHOLARSHIP COMPETITION, 1999

Today the Gorgas Scholarship Foundation, Inc. announced the ranking of the finalists in the 1999 Alabama Science Talent Search. The Search was held at the meeting of the Alabama Academy of Science at Athens State University in Athens, Alabama.

The winner of the first-place tuition grant of $3000 was

(S) Mr. Stephen Alexander Rottgers, 120 Woodward Road, Trussville, AL 35173. Jefferson County International Baccalaureate School, Birmingham, AL 35210. Teacher - Dr. Trudy Anderson.

First alternate and winner of a $2,000 tuition grant was

(S) Ms. Jayun Kim, P.O. Box 851835, Tuscaloosa, AL 35486-0016. Central Tuscaloosa High School, Tuscaloosa, AL 35401. Teacher - Ms. Suzanne Alexander.

Second alternate and winner of a $1,500 tuition grant was

Mr. Satya Shreenivas, 3237 Wisteria Drive, Birmingham, AL 35216. Vestavia Hills High School, Vestavia Hills, AL 35216. Teacher - Ms. Beth Walston.

Third alternate and winner of a $1,000 tuition grant was

Ms. Laura Alan Grostick, 128 38th Avenue NE, Birmingham, AL 35215. Jefferson County International Baccalaureate School, Birmingham, AL 35210. Teacher - Dr. Trudy Anderson.

Fourth alternate and winner of a $500 tuition grant was

(S) Ms. Elizabeth Anne Dillard, 109 Stoney Creek Drive, Florence, AL 35633. Bradshaw High School, Florence, AL 35630. Teacher - Ms. Cynthia Tillery.

Fifth alternate was

Mr. Bradley Taylor Boyer, 3508 Brent Drive, Birmingham, AL 35243. Jefferson County International Baccalaureate School, Birmingham, AL 35210. Teacher - Dr. Trudy Anderson.

Sixth alternate was

Mr. Adam Lee Summerlin, 5216 Tyler Oaks Drive, Mt. Olive, AL 35117. Jefferson County International Baccalaureate School, Birmingham, AL 35210. Teacher - Dr. Trudy Anderson.

Seventh alternate was

Mr. Jimmy Quang Huynh, 429 Cedar Trace, Birmingham, AL 35244. The Altamont School, Birmingham, AL 35222. Teacher - Ms. Sophia Clifford.

Eighth alternate was

Mr. Todd Robson Foisy, 1076 Cloud Court, Birmingham, AL 35235. Jefferson County International Baccalaureate School, Birmingham, AL 35210. Teacher - Dr. Trudy Anderson.

Ninth alternate was

Ms. Jennifer Kaye Pritchett, 520 Springdale Road, Mt. Olive, AL 35117. Jefferson County International Baccalaureate School, Birmingham, AL 35210.

unable to exhibit:

(S) Mr. Zachary Scott Frentz, 301 Leach Court, Birmingham, AL 35213. The Altamont School, Birmingham, AL 35222. Teach - Ms. Sophia Clifford.

Mr. David Samuel Kallman, 155 Scenic Drive, Birmingham, AL 35071. Jefferson County International Baccalaureate School, Birmingham, AL 35210. Teacher - Dr. Trudy Anderson.

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INTERNATIONAL SCIENCE AND ENGINEERING FAIR AWARDS for 1999

Jeb Orr — Alabama School of Math and Science-Mobile Regional Fair

American Chemical Society	1st Place Award of $500
U.S. Airforce	1st Place Award of $3,000, Medallion and Certificate of Recognition

Holli Hitt — Tuscaloosa County H.S.-West Alabama Regional Fair (UWA)

American Geological Institute	Honorable Mention
Association of Women Geoscientist Award	$150 Cash Award

Bryce Roberts — Altamont High School-UAB Fair

American Mathematical Society	Honorable Mention, a certificate
Eastman Kodak	Honorable Mention Award of $100
National Taiwan Science Education Center	3rd Place Award of $100

Leah Brown — Covenant Christian Academy-North Alabama Fair

American Statistical Association — Honorable Mention

One-year subscription of "STATS" and "Chance" data analysis Computer software and books selected by ASA. Student's school also will receive computer software, books, and one-year school membership in the ASA.

Christopher Stower — Bradshaw High School, North Alabama Fair

Category Award - Environmental Science — 3rd Place Award of $1,000

John Mays — Altamont High School- UAB Fair

Category Award-Gerontology — 4th Place Award of $500

Taylor Griswold — Trinity Presbyterian School Troy State University

National Aeronautics and Space Administration — An all expense paid trip to U.S. Space Camp in Huntsville, AL and Certificate

Category Award-Engineering — 2nd Place Award of $1,500

Notes

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INSTRUCTIONS TO AUTHORS

Editorial Policy: Publication of the *Journal of the Alabama Academy of Science* is restricted to members. Membership application forms can be obtained from Dr. A. Priscilla Holland, Office of Research, UNA Box 5121, University of North Alabama, Florence, AL 35632-0001. Subject matter should address original research in one of the discipline sections of the Academy: Biological Sciences; Chemistry; Geology: Forestry, Geography, Conservation, and Planning; Physics and Mathematics; Industry and Economics, Science Education; Social Sciences; Health Sciences; Engineering and Computer Science; and Anthropology. Timely review articles of exceptional quality and general readership interest will also be considered. Invited articles dealing with Science Activities in Alabama are occasionally published. Book reviews of Alabama authors are also solicited. Submission of an article for publication in the implies that it has not been published previously and that it not currently being considered for publication elsewhere. Each manuscript will receive at least two simultaneous peer reviews.

Submission: Submit an original and two copies to the editor. Papers which are unreasonably long and verbose, such as uncut theses, will be returned. The title page should contain the author's name, affiliation, and address, including zip code. The editor may request that manuscripts be submitted on a diskette upon their revision or acceptance.

Manuscripts: Consult recent issues of the *Journal* for format. Double-space manuscripts throughout, allowing 1-inch margins. Number all pages. An abstract not exceeding 200 words will be published if the author so desires. Use heading and subdivisions where necessary for clarity. Common headings are: **Introduction** (including literature review), **Procedures** (or **Materials and Methods**), **Results, Discussion,** and **Literature Cited.** Other formats may be more appropriate for certain subject matter areas. Headings should be in all caps and centered on the typed page; sub-headings should be italicized (underlined) and placed at the margin. Avoid excessive use of footnotes. No not use the number 1 for footnotes; begin with 2. Skip additional footnote numbers if one or more authors must have their present address footnoted.

Illustrations: Submit original inked drawings (graphs and diagrams) or clear black and white glossy photographs. Width must not exceed 15 cm and height must not exceed 20 cm. Illustrations not conforming to these dimensions will be returned to the author. Use lettering that will still be legible after a 30% reduction. Designate all illustrations as figures, number consecutively, and cite all figures in the text. Type figure captions on a separate sheet of paper. Send two extra sets of illustrations; xeroxed photographs are satisfactory for review purposes.

Tables: Place each table on a separate sheet. Place a table title directly above each table. Number tables consecutively. Use symbols or letters, not numerals, for table footnotes. Cite all tables in the text.

Literature Cited: Only references cited in the text should be listed under **Literature Cited.** Do not group references according to source (books, periodicals, newspapers, etc.). List in alphabetical order of senior author names. Cite references in the text parenthetically by author-date.