

ABSTRACTS OF PAPERS PRESENTED AT THE SPRING 2003 COLLEGIATE MEETINGS

EASTERN REGION

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
KNOXVILLE, TENNESSEE

EFFECTS OF PH ON TADPOLE DEVELOPMENT. *Jennifer LeBar, Maryville College, Maryville, Tennessee.* Many amphibian populations have been experiencing significant decreases in their numbers across the United States. There are a number of factors that could be influencing the growth and development of these populations. Acid rain has become a major ecological concern in attempting to sustain and enhance growth and development of many terrestrial communities of plants and animals. The goal of this study was to determine if and how pH influences the development of wood frogs (*Rana sylvatica*). One hundred and forty-four young tadpoles were collected from the Great Smoky Mountain National Park and placed in water of different pHs in the laboratory. Growth and development was monitored and later analyzed to determine if any significant differences could be attributed to differences in pH. The purpose of this study was to help explain decreases in local amphibian populations.

THE EFFECTS OF MALATHION ON GROWTH AND DEVELOPMENT OF *XENOPUS LAEVIS*. *Catherine Webb, Maryville College, Maryville, Tennessee.* Amphibian declines have been occurring for decades, and much of this decline is attributed to environmental contaminants. One such chemical is malathion, an organophosphate insecticide that is widely used for the control of mosquitoes and other insects. Developing amphibians are often found in areas where malathion is used, and are thus often exposed to the chemical during metamorphosis. Two-week-old *Xenopus laevis* tadpoles were divided into four groups: control (water), 1.0 ng/L malathion, 1.0 µg/L malathion, and 1.0 mg/L malathion. During their 36-day exposure to malathion, the highest concentration displayed bent tails, unusual swimming behavior, and a higher mortality rate than the other three groups ($P < 0.0001$). The smaller tadpoles tended to die first, so by the end of the experiment, in the high concentration, only the large tadpoles were alive. Because of this phenomenon, tadpoles in the control group were significantly larger than the low and medium concentrations ($P = 0.002$ for weight and $P = 0.036$ for length), but they were not different from the high concentration. However, control tadpoles were significantly more developed ($P = 0.004$) than all three other groups. Malathion (1.0 mg/L) caused bent tails, abnormal swimming behavior, and a high mortality rate in developing tadpoles.

WATER QUALITY ANALYSIS OF THE REGIONAL PARK AREA OF ATHENS, TENNESSEE. *Mandy Dalton and Holly Cabrera, Tennessee Wesleyan College, Athens, Tennessee.* This presentation includes a discussion of the importance of water quality and various water quality tests that were performed during this project by the Tennessee Wesleyan College fall 2002

ecology class. Three collecting sites were chosen in the Regional Park area of Athens, Tennessee and the following tests were completed: pH, turbidity, air temperature, water temperature, total solids, dissolved oxygen, biochemical oxygen demand, phosphates, nitrates, and fecal coliforms. The data obtained from each of these tests gave an overall view of water quality for each site. Furthermore, conclusions were drawn from these test results concerning causes of water impurity and future implications.

ANALYSIS OF THE CHANGE IN LAND USE OF A WETLAND AREA FROM 1939-1980. *Thomas Becktold and C. Daniel Chase, The University of Tennessee, Chattanooga, Chattanooga, Tennessee.* Aerial photographs obtained from the Tennessee Valley Authority were scanned, georeferenced, and then manually analyzed with ArcGIS software to create overlays for each year's land use. The change in area usage from 1939 to 1980 is analyzed based on the areas calculated from each available photograph. The area evaluated is the present day area surrounding the intersection of I-75 and I-24 in Chattanooga, Tennessee, south to Exit 1 of I-75 in East Ridge, Tennessee. While today this is a highly congested commercial and residential area, in 1939 it was a mix of agricultural and sparsely populated residential areas. The South Chickamauga Creek meanders through this area and is well known for its spring flooding historically. The wetlands surrounding the creek have been highly impacted by the build-up of the surrounding area.

AN OBSERVATION OF EFFECTS OF ELECTROMAGNETIC FIELDS ON COGNITION IN LAB MICE. *Marguita Porter, Maryville College, Maryville, Tennessee.* This paper focuses on the effects of a magnetic field that is three times the strength of the earth's magnetic field on cognition in mice. Mice were placed in an electromagnetic field that was created by two amplitudes of currents for specific amounts of time. Prior to exposure to the magnetic field, mice were given two preliminary runs of the radially armed maze. The median time for completion of the maze for the mice in the preliminary runs was 83.29 seconds. The control group experienced no magnetic field exposure. Group two experienced fifteen minutes of exposure. Group three experienced thirty minutes of exposure, and group four experienced thirty minutes of exposure, with a thirty-minute rest period. After exposure, mice were timed to judge their ability to run the maze. Results show that with each of the three exposures to the field, the time for completion of the maze, as well as confusion and mistakes increased. However, in the control group, as well as group four, which received a rest period, times decreased with each trial. We conclude that cognition is negatively affected by a three-fold increases in magnetic strength. However, when a rest period was provided, cognition returned to normal.

DNA EXTRACTION FROM FORMALDEHYDE PRESERVED ZEBRA MUSSELS. *Will Lehman, Maryville College, Maryville, Tennessee.* The zebra mussel is an invasive species from Europe

that has quickly spread throughout the fresh water systems in Eastern North America. In order to easily track founding groups and thus learn more about the zebra mussel, DNA analysis is required. Typically, DNA extraction is done from fresh mussels, frozen mussels, or mussels preserved in ethanol. This experiment determined if DNA could be extracted from mussels preserved in formaldehyde. The results showed that a limited amount of DNA could be extracted. The DNA that was extracted from the mussels preserved in formaldehyde was compared to the yields and quality of that which was extracted by others using fresh, frozen, or alcohol preserved mussels.

REMOTE OPERATION OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY HAYSTACK RADIO TELESCOPE. *Erik Gern, Sandra Davidson, and David Fields, Roane State Community College, Harriman, Tennessee.* The 37 m Haystack radio telescope located at the Massachusetts Institute of Technology facility in Cambridge, Massachusetts, has been used by students at Roane State Community College (RSCC) to obtain plots and characterize emissions from selected distant sources of radio energy. These sources are caused by a wide variety of interstellar phenomena, across a range of frequencies from 22–44 Ghz. These observations may be grouped in the following areas: Cygnus X; mapping of w75N and G31 star-forming regions; mapping of R-CAS, a red giant; and imaging the passage of Saturn across Messier object M1 (the Crab nebula). This work is of interest because it demonstrates the ability to remotely control and gather data using the Haystack radio telescope, it shows the ability of RSCC students to contribute to a radio-source mapping project, and it demonstrates the ability to track and observe a planet across a large radio source.

STUDY OF RHIZOBIAL DIVERSITY FROM FOUR DIFFERENT SITES IN VENEZUELA USING DNA EXTRACTED FROM NODULES. *Josh Tummel, Maryville College, Maryville, Tennessee.* We have been studying the nodulation of various legume crops at different sites in Venezuela. Our findings indicate that some crops can be nodulated at specific sites in the absence of applied inoculum. The present study was conducted to determine whether rhizobia that nodulate native legumes are responsible for the nodulation seen at these sites. Four field sites were sampled that differed primarily in their soil pH (pH = 4.6–5.2). *Vigna unguiculata* and *Cajanus cajan* were planted at each site and were found to be nodulated in the absence of applied inoculum. Nodules were collected from these two plants species and a number of native legume species growing wild in the area. The wild species included members of the following genera: *Cassia*, *Desmodium*, *Mimosa*, *Zornia*, and *Indigofera*. DNA was extracted directly from the isolated nodules and analyzed for purity using a UV spectrophotometer and agarose electrophoresis. Preliminary PCR results show that the DNA came from a variety of rhizobia.

THE EFFECTS OF ROCK SALT ON SEED GERMINATION AND SEEDLING GROWTH. *Heather Amann, Tennessee Wesleyan College, Athens, Tennessee.* Since the last century rock salt has become a highly popular ice and snow dissolvent. Because of the availability and low price of salt, most major and minor roads are sprinkled or sprayed with rock salt with little attention paid to the effects of this salt on the soil and vegetation. In this experiment, the effects of rock salt on *Phaseolus limensis* (lima bean) were tested. Ten *P. limensis* were planted and rock salt was

sprinkled on top of the soil before watering the plants. The results were that almost half of the plants had a mold associated with them, and the other seeds slowly germinated, thus proving salt's harmful effects on plants not adapted to saline environments.

DETERMINING THE MOST ACCURATE AND BEST-DESIGNED FECAL COLIFORM TEST FOR USE BY MIDDLE AND HIGH SCHOOLS. *Jennifer Bradley, Carson Newman College, Jefferson City, Tennessee.* The Izaak Walton Clean Water Center in Knoxville, Tennessee is working with area middle and high school science teachers to teach them ways to introduce their students to watershed monitoring. Current tests that teachers are conducting with their students are water pH, hardness, and dissolved oxygen. Teachers may soon perform fecal coliform tests with their students. A variety of fecal coliform testing kits is available for determining if there has been fecal contamination of a water source. The purpose of this study was to find an inexpensive, easy to use, and accurate fecal coliform testing kit. Two inexpensive fecal coliform testing kits, Coliscan Easygel and Bacterial Pollution of Water, were compared against a Membrane Filtration method, m-ColiBlue24. Coliscan Easygel was found to be the better test: results were easy to interpret, and they were consistent with Membrane Filtration results. The Bacterial Pollution of Water test was difficult to prepare and yielded incomplete and poor results.

EXPLORING NOVEL PROTEIN INTERACTIONS INVOLVING APOPTOSIS REPRESSOR PROTEIN IN A YEAST TWO-HYBRID SYSTEM. *William R. Thompson, Michael T. Crow, and Alan T. Chesley, Lee University, Cleveland, Tennessee and The Johns Hopkins University School of Medicine, Boston, Massachusetts.* The Apoptosis Repressor protein (ARC) with a caspase recruitment domain (CARD) has been shown to inhibit both apoptosis and necrosis through interactions with initiator caspases, by preserving mitochondrial membrane potential, and blocking cytochrome C release. We have identified several protein-protein interactions involving ARC that are mediated through the CARD domain. By using a Yeast Two-Hybrid System, we show that the CARD domain of ARC has a strong dimeric interaction. Furthermore, the L31F mutant of ARC has a decreased level of dimerization compared to the ARC-CARD/ARC-CARD interaction. In contrast, the G70R mutant of ARC gave the strongest dimeric interaction of all the ARC interactions tested. Compared to wild-type ARC-CARD/ARC-CARD, the L31F mutant shows a five-fold decrease in dimerization while the G70R mutant shows a seven-fold increase in the dimerization interaction.

ALTERATION OF STE2P ACTIVITY IN YEAST MUTANTS DEFICIENT IN SPHINGOMYELIN AND ERGOSTEROL. *Anthony Jones, Brad Rogers, Justin Woolsey, and Stephen E. Wright, Carson Newman College, Jefferson City, Tennessee.* There are two functional mating types of the yeast *Saccharomyces cerevisiae*, MAT α and MAT α . The MAT α cells release the α -pheromone in pre-copulatory situations, whereas the MAT α cell type releases the α -pheromone. The membrane protein in MAT α cells that is responsible for the binding of the α -pheromone is the G-protein coupled receptor (GPCR) known as Ste2p. Binding of the α -pheromone by Ste2p induces arrest of cell growth and initiates a signal transduction cascade in preparation for conjugation of the two cell types. Not much is known about the regulation of the Ste2p receptor, but past evidence has shown that membrane lipids may be involved in its function. Various

yeast strains were genetically transformed by homologous recombination to remove the genetic sequence for key enzymes in the biosynthetic pathways of sphingomyelin and ergosterol. These genes were *SUR2* and *ERG6*, respectively. The mutants typically grew slower than the wild-type strains in complete media. Interestingly, the *SUR2* mutants, which were deficient in sphingolipids, were less sensitive to drugs that inhibit ergosterol synthesis. Growth inhibition assays involving α -pheromone indicated an altered sensitivity of the receptor. Our data suggests that sphingomyelin and/or ergosterol may play a role in Ste2p activity. We are also looking at other measurements of receptor activity to determine the underlying mechanisms of these effects.

EFFECTS OF SALICYLIC ACID ON ROOT GROWTH AND NODULATION IN THE MODEL LEGUME, *LOTUS JAPONICUS*.

Crystal B. McAlvin, Maria J. Soto, José Olivares, and Gary Stacey, The University of Tennessee, Knoxville, Tennessee.

The infection of legume roots by rhizobia occurs without the apparent induction of a plant defense response. Salicylic acid (SA) is well established as a signal molecule involved in plant defense. Previous research showed that addition of exogenous SA to plant roots could inhibit nodulation, suggesting a possible role of this signal in nodulation. We initially attempted to address this hypothesis by adding exogenous SA to roots of the model legume, *Lotus japonicus* (Handberg and Stougaard, 1992; Jiang and Gresshoff, 1997). However, we found that SA levels sufficient to affect nodulation, also strongly inhibited growth of the symbiont, *Mesorhizobium loti*. Since endogenous SA is likely the mediator of any physiologically relevant effect on nodulation, we sought to modulate these levels by expression of salicylate hydroxylase, encoded by the bacterial *nahG* gene, in transgenic *Lotus japonicus* plants. Several independent transgenic lines, expressing *nahG*, were analyzed for their nodulation and root growth phenotype after inoculation with *Mesorhizobium loti*. Expression of the transgene correlated with a significant increase in mean nodule number per plant when compared to wild-type controls. Examination of infection thread formation indicated that the *nahG* plants did not have enhanced infection, but rather an increase in the length of the root infection zone. Interestingly, the *nahG* plants also showed a significant increase in root growth that correlated to the nodulation phenotype. Analysis of plant extracts indicated that SA levels in the *nahG* transgenic plants were significantly reduced, compared to wild-type controls. These data suggest that SA may play a role in suppression of nodulation. However, the concomitant effects on root growth complicate interpretation of these results. The *nahG* transgenic plants should be a valuable resource for further investigating the mechanism of SA action in legumes.

MIDDLE REGION

TENNESSEE STATE UNIVERSITY
NASHVILLE, TENNESSEE

THE EFFECTS OF THERMAL SHOCK ON THE EMBRYOLOGICAL DEVELOPMENT OF *DROSOPHILA MELANOGASTER*. **Brandi Marie Brantner and Willodean Burton, Austin Peay State University, Clarksville, Tennessee.** In order to recognize the importance of the effects of abiotic factors on the development of organisms, heat shock was applied to populations

of *Drosophila melanogaster*. Individuals were exposed to thermal shock at two important embryological stages of development at varying durations of time to test the ability of the heat shock protein Hsp70 found before the thirteenth stage of development. The emerged individuals were examined for mutations and the total individuals of each generation were recorded. Data were organized into frequency tables and graphs that established a difference in the number of mutations and individuals emerged from the two embryological stages. The results demonstrate a dramatic decrease in the clutch size of individuals exposed to elevated temperatures and an increase in the number of mutations as embryological stages increase. Thus, the experiment provides evidence of a radical ecological change in the clutch size of heterothermic individuals.

INHIBITION OF THE IMMUNE FUNCTION OF HUMAN NATURAL KILLER CELLS FOLLOWING IN VITRO EXPOSURE TO THE AGRICULTURAL FUNGICIDE ZIRAM.

Sharnise Wilson and Margaret Whalen, Tennessee State University, Nashville, Tennessee.

Ziram is used as an agricultural fungicide and as a vulcanization accelerator in latex rubber production. Human exposure to ziram could occur from residues that may be on treated crops or by contact with latex rubber products. Natural killer (NK) lymphocytes are central in immune defense against virus infection and tumor formation. This study investigated the effects of a range of ziram concentrations on the tumor-lysing function of human lymphocytes. Purified NK cells and a preparation that contained both T and NK lymphocytes (T/NK cells) were studied. Lymphocytes were exposed to varying ziram concentrations from 1 hour to 6 days. Exposing pure NK cells to 5, 2.5, 1 and 0.5 μ M ziram for 24 h caused 100, 97, 38, and 32% decreases in tumor lysis (51 Chromium release assay), respectively. NK cells exposed to ziram for 6 d showed decreased lytic function at all ziram concentrations tested. When T/NK cells were exposed to ziram for 24 h only two concentrations caused decreases in lytic function (5 μ M, 93%; 2.5 μ M, 37%) and no ziram concentration used in a 6 d exposure decreased lytic function. These results indicate that T cells alter the effect of ziram on NK-cytotoxic function and that ziram was inhibitory to purified NK cells at levels as low as 125 nM.

SYNTHESIS OF C(7) MODIFIED FLAVIN MODELS; POSSIBLE IMPLICATIONS FOR THE MECHANISM OF FORMATION OF C(6) COVALENTLY ATTACHED FLAVIN COFACTORS.

Sydika Banks and Samuel Brown, Tennessee State University, Nashville, Tennessee.

For many years, covalent attachment between flavins and their apoproteins has been studied. Interest in the covalent attachment of flavins stems from the fact that few flavins are covalently linked to their apoprotein. From studies of triethylamine hydrogenase, Scrutton et al. (Biochemistry, 1997, 36:7162) postulated that the covalent attachment between the flavin and flavoenzyme-apoprotein occurs via nucleophilic aromatic substitution at the C(6) position. Scrutton's conjecture was based on earlier research by Bulluck et al. (J. Org. Chem., 1965, 30:2056) who demonstrated that covalent attachment at the C(8a) position occurs via formation of the flavin iminoquinone methide, which then may be attacked by a nucleophilic substrate. Scrutton and others have hypothesized that the formation of the flavin iminoquinone methide adduct may also activate the C(6) position toward nucleophilic attack. Recently, C(6) covalently attached flavoenzymes have been isolated that shed doubt on the possibility of C(6) nucleophilic aromatic sub-

stitution (J. Biochem., 1995, 117:575). The flavins isolated were a mixture of 6-(3?-myristic acid)-FMN and 6-(4?-myristic acid)-FMN for which there would be no obvious nucleophilic route. To understand the mechanism of C(6) covalent attachment of flavin and apoprotein, the synthesis of a several C(7) modified flavin models that could model radical attachment at the C(6) position was attempted. The modified flavin indicates that C(6) aromatic substitution is a radical process rather than a nucleophilic process. Two separate routes to achieve the synthesis of four model flavins have been developed. The progress toward the four synthetic goals will be discussed.

THE EFFECT OF PLANT EXTRACTS ON SECONDARY MESSENGERS OF CANCER CELLS. *Crystal Davis, Todd Gary, and E. Lewis Myles, Tennessee State University, Nashville, Tennessee.*

Abstract not available

ACUTE EXPOSURE OF IRON AND NICKEL IONS ON LIPID PEROXIDATION IN METHYL LINOLEATE. *Omari Bande and William Boadi, Tennessee State University, Nashville, Tennessee.* The purpose of this experiment was to investigate how acute exposure to and low doses of Fe²⁺ as ferrous chloride and Ni²⁺ as nickel chloride can affect lipid peroxidation in the essential fatty acid methyl linoleate. Controls, samples, and blanks were prepared in duplicates. The control contained Tris-HCl buffer containing 0.2% SDS and 0.05 M KCl, pH 7.4, methyl linoleate acid, and hydrogen peroxide. The samples contained all of the control ingredients in addition to 10, 20, 40, or 60 μ M of metal ion. All the samples were incubated at 37°C for 6 h. Samples were analyzed for lipid peroxides using the thiobarbituric acid assay. Lipid peroxides were calculated and expressed as thiobarbituric reactive substances (TBARS) using the molar extinction coefficient of 1.56 M⁻¹cm⁻¹ for thiobarbituric acid. The Fe²⁺ trials indicate a dose dependent increase in peroxide levels (14.7, 53.0, 92.6, 100.4 and 143.1 mM). The Ni²⁺ trials also indicated a dose dependent effect, although there was a decrease with the 60- μ M concentration (3.5, 76.5, 228.0, 234.5 and 193 mM). The results indicate that acute exposure to low doses of Fe²⁺ and Ni²⁺ ions resulted in a dose dependent increase of lipid peroxides. Further studies using HPLC will analyze the various peroxidation products formed.

THE INHIBITION OF DEPENDENT DENSITY OF ANCHORAGE CANCER CELLS, BT 549, DUE TO THE PROAPOPTOTIC PROTEIN, C/EBP AND ITS ACCOMPLICE, THE PLANT EXTRACT *HYPERICUM ANTHOS*. *Alicia Cleveland, Todd Gary, and E. Lewis Myles, Tennessee State University, Nashville, Tennessee.*

Abstract not available

ATTITUDES TOWARD COMMITMENT FROM AN AFRICAN AMERICAN MALE PERSPECTIVE. *Jessica L. Watson and Mario Norman, Tennessee State University, Nashville, Tennessee.* Commitment is the tendency to maintain a relationship and feel psychologically attached to it. The Investment Model, which is derived from the Social Exchange Theory, is a theory explaining people's commitment to a relationship. However, research surrounding the Investment Model and other theories has not been directed toward African Americans. This was an explorative study seeking differences in an African American male population on the Investment Model. Questions developed

from the Investment Model were asked of five African American male undergraduate students at a historically black university. Responses from this group interview were recorded, transcribed, and compared to results from other studies in support of the Investment Model. African American males displayed similar attitudes toward commitment as participants studied in previous research surrounding the Investment Model. When rewards exceed costs and great investments have been put into a relationship, commitment is greater. Availability of alternatives did not appear to have as much of an influence on degree of commitment as expected.

MULTIMEDIA PROGRAMMING AND CARBOHYDRATE BIOCHEMISTRY. *La Tasha D. Taylor and Prem S. Kahlon, Tennessee State University, Nashville, Tennessee.*

Abstract not available

A TEST OF THE ULTIMATE ATTRIBUTION ERROR. *Ursula L. Bailey and Peter Millet, Tennessee State University, Nashville, Tennessee.* The purpose of the current study was to examine the ultimate attribution error, which is defined as a systematic patterning of intergroup misattributions shaped in part by prejudice. This definition suggests that there may be a tendency to attribute behavior to dispositional characteristics when a member of an outgroup is perceived to engage in negative behaviors. Conversely, there also may be a tendency to attribute to external or situational factors when a member of an outgroup is engaged in positive behaviors. The importance of this study was to test this theory using adults from different ethnic groups and vignettes with characters from different ethnic groups. We compared the responses of the two ethnic groups while controlling for certain independent variables including: level of acculturation, level of self-esteem, economic status, education, history of positive and negative experiences with persons from each of the four identified ethnic groups in the vignettes, and racial composition of childhood neighborhood. We examined participant's reactions and perceptions to vignettes describing members of differing ethnic groups as well as members of their own groups.

THE EFFECT OF 4,4'-BIPYRIDIN-1-IUM BROMIDE MONOHYDRATE ON LIPID PEROXIDATION IN HUMAN MONONUCLEAR PROGENITOR CELLS (U937 CELLS). *Tionanata K. Newell, Justin Anderson, Brooke Henderson, William Y. Boadi, and Peter A. Iyere, Tennessee State University, Nashville, Tennessee.* Paraquat (1,1'-dimethyl-4,4'-bipyridinium dichloride) is one of the most widely used herbicides and is known for its severe toxicity to mammals, including humans. One explanation for the mechanism of paraquat toxicity is the concept of membrane damage caused by lipid peroxidation mediated by superoxide anions. We have synthesized and reported a new paraquat analog, 4,4'-bipyridin-1-ium bromide monohydrate. Because the toxicity of this compound has not been studied, we used human Mononuclear Progenitor Cells (U937) to test the hypothesis that 4,4'-bipyridin-1-ium bromide monohydrate can induce lipid peroxidation in cell membranes. Untreated and control cells were cultured side by side with the U937 cells treated with various concentrations (0-60 μ M) of 4,4'-bipyridin-1-ium bromide monohydrate. Untreated cells did not contain any reagents, and Control cells contained all reagents, except the test compound. Following the incubation for 24 h at 37°C, the cells were pelleted by low speed centrifugation and lysed by repetitive freeze/thawing in distilled water (500 μ L). The supernatant (15,000 \times g, 10

min) lipid peroxidation levels were measured with a CALBIO-CHEM Lipid Peroxidation Assay Kit (Cat. No. 437634). Briefly, 650 μL of diluted R1 (chromogenic reagent) were added to clean Eppendorf tubes. 200 μL of the cell sample were added and vortexed for 3–4 seconds. For the assay using MDA only, 150 μL of 12 N HCl, was added. The samples were then incubated for two h at 45°C. Samples were then read in a plate reader at 580 nm. Lipid peroxide levels were expressed as levels of malondialdehyde and calculated, using a molar extinction coefficient of 0.1176 $\text{M}^{-1}\text{cm}^{-1}$. The results indicated that lipid peroxides increased in a dose-dependent manner for the doses tested. Thus, the above compound can cause peroxidation in cells, which could affect human health. Further studies will correlate lipid peroxides to glutathione levels in U937 cells.

COLORS OF THE WIND. A NEW LIGHT AND COLOR LABORATORY FOR PHYSICAL SCIENCE STUDENTS. *Latonya Irons and Judith Iriarte-Gross, Middle Tennessee State University, Murfreesboro, Tennessee.* We are currently designing and developing a technology based laboratory curriculum for the general studies physical science course. This course provides a basic overview of chemistry, physics, astronomy, and geology for non-science majors. Light and how it interacts with matter is a topic that interests students. To further encourage their interest in physical science, a new laboratory activity that focuses on light, color and matter was developed. The developmental process, testing, and results, along with student comments will be presented.

A CHEMICAL COMPARISON BY GC-MS OF ROMANCE FOR MEN AND ROMANCE FOR WOMEN. *Ludine McWhinney, Lincoln Rogers, Kimberly Hammers, Christie Clayton, Matthew Hardison, Abigale Higgs, Benjamin Holmes, and K. Clinger, Lipscomb University, Nashville, Tennessee.* In order to compare the fragrances Romance for Men® and Romance for Women® by Ralph Lauren, samples of the two colognes were injected into a GC-MS instrument and the peaks in the total ion chromatograms were identified by their electron ionization mass spectra using the NIST database. The components of the two fragrances seemed virtually identical, but the concentrations varied between the version for men and the version for women. In Romance for Men®, the concentration of citrus-like components (limonene and linalool esters) was more abundant. In Romance for Women®, there was comparatively less limonene and related molecules and more jasmonate related molecules.

A COMPARISON OF THE COMPOSITION OF A PERFUME AND ITS LESS EXPENSIVE IMITATION. *Emily Rath, Leslie Myers, Jon Baese, Tyler Buckley, Jason Booton, Randi Johnson, Kathryn Bussey, Brent Jackson, and K. Clinger, Lipscomb University, Nashville, Tennessee.* A comparison of the composition of the perfume Happy® by Clinique and its cheaper imitation fragrance Wanna Play? by Parfums de Coeur was produced using a GC-MS. These perfumes have a fresh scent composed of floral and citrus elements. The total ion chromatograms resulted in the detection of a few more components in Happy® than were found in Wanna Play?. The other components of both perfumes seemed identical. Slight differences in concentrations were noticed. Some components of these perfumes are limonene, linalool and linalyl esters, linal, jasmonate, citronellal, and diethyl phthalate. The components present in Happy® that are not found in Wanna Play? have not yet been identified, but are currently being studied and will be identified in the near future.

P-31 NMR STUDY OF POLYPHOSPHATE HYDROLYSIS. *Trine Jensen, Amanda Deering, Kenneth Robertson, and Ron Robertson, Austin Peay State University, Clarksville, Tennessee.* Abstract not available

PHENOTYPIC MODIFIER SCREENING FOR REGULATORS OF P150-GLUED DYNACTIN AND DYNEIN FUNCTION IN DROSOPHILA. *Tiffany R. Oliver, Tonja D. Dandy, A. Monique Johnson, Anne Ilvarsonn, and John T. Robinson, Tennessee State University, Nashville, Tennessee.* Abstract not available

HYALURONAN OLIGOSACCHARIDES AND INTERLEUKIN-12 RELEASE FROM PERIPHERAL LEUKOCYTES. *Kenita Jobe, Sabah Ghazi, Margaret Whalen, and Koen Vercruyse, Tennessee State University, Nashville, Tennessee.* Abstract not available

WESTERN REGION

LEMOYNE OWEN COLLEGE
MEMPHIS, TENNESSEE

EVIDENCE OF LESIONS IN FRUIT FLY BRAINS AS A FUNCTION OF ETHANOL EXPOSURE. *N. Addison and S. Eisen, Christian Brothers University, Memphis, Tennessee.* Researchers frequently study the fruit fly *Drosophila melanogaster* as a model system for mammalian development. This study was conducted to determine whether there were dose-dependent effects of ethanol on the brains (cerebral ganglia) of *Drosophila*, similar to those observed in babies born with Fetal Alcohol Syndrome. This investigation carefully examined different prepared slides of the adult brain sections of *D. melanogaster* to develop a clear picture of how parts of the brain are affected and determined the degree of damage done to the brain in the presence of different alcohol dosages. As a result, there were neurological effects done to the brains of the flies due to ethanol exposure. The larger the dose, the more cloudy and disturbing the lesions appeared. The severity in the amount of lesions was directly related to the amount of ethanol exposure. An increase in exposure caused an increase in lesions.

CLINICAL AND IMAGING PARAMETERS THAT PREDICT THE DEVELOPMENT AND DURATION OF TYPHLITIS IN PEDIATRIC ONCOLOGY PATIENTS. *C. S. Adelman, M. B. McCarville, M. Lee, D. Alsamarre, J. T. Sandlund, Christian Brothers University, Memphis, Tennessee (CSA) and St. Jude Children's Research Hospital, Memphis, Tennessee (MBM, ML, DA, JTS).* The purpose of this study was to determine the imaging and clinical features that predict a prolonged course of typhlitis/colitis in pediatric patients receiving anticancer therapy. We reviewed medical records, ultrasonography (US), and computed tomography (CT) of 103 pediatric oncology patients diagnosed with typhlitis/colitis. Bowel wall thickness ≥ 0.30 cm was considered abnormal. We recorded demographics, primary diagnosis, chemotherapy, neutrophil count, duration of typhlitis symptoms, and clinical management. Multivariate analysis showed features with independent prognostic significance were US bowel wall thickness ($P = 0.003$), prolonged neutropenia ($P = 0.006$), older age ($P = 0.017$), and receipt of cytarabine ($P =$

0.026) or etoposide ($P = 0.0002$). In conclusion, US bowel wall thickness, older age, and prolonged neutropenia were the most important prognostic factors for typhlitis/colitis duration and can be used to tailor clinical management. Among the multiple chemotherapeutic agents the patients received, cytarabine and etoposide, both of which can cause mucositis, appear to have the most significant impact on the duration of this complication.

CALCIUM STIMULATION OF CARBON MONOXIDE RELEASE BY CEREBRAL MICROVESSELS. *R. W. Appling and C. W. Leffler, Christian Brothers University, Memphis, Tennessee and University of Tennessee, Memphis, Memphis, Tennessee.* Carbon monoxide (CO) is an important endogenous vasodilator in cerebral circulation of newborn piglets. The present study addresses the hypothesis that endogenous CO production via the breakdown of heme by heme oxygenase may be stimulated by increased intracellular calcium. Experiments used deeply anesthetized piglets from which fresh microvessels were collected. Ionomycin, a calcium ionophore, of increasing concentration was introduced to open calcium channels. This was done to stimulate the release of CO by utilizing extracellular calcium from a Krebs buffer containing Ca^{++} (approximately 0.072 g/L). Microvessels were treated with increasing amounts of ionomycin from zero to 2×10^{-7} M ionomycin. A 5 μL equilibrated ^{13}C O internal standard was added to each sample for quantification of the CO peak. Analysis by GC/MS following a $\frac{1}{2}$ h incubation at 37°C showed that there was a dose-dependent response to ionomycin with the most CO production being caused by the highest concentration of ionomycin. In fact, the 2×10^{-7} M ionomycin production of CO was 50 ± 4 pmol/100 μg protein whereas the control CO production was only 7 ± 1 pmol/100 μg protein. These data suggest endogenous CO production is stimulated in a dose-dependent fashion by intracellular calcium.

CONTROL OF GLIAL PROLIFERATION IN THE INJURED RAT RETINA USING ANTIBODIES TO CD81 AND NCAM. *A. M. Asbury and E. E. Geisert Jr., Christian Brothers University, Memphis, Tennessee, and University of Tennessee, Memphis, Memphis, Tennessee.* Injury to mammalian retina often results in glial scarring and potential loss of sight. We found that antibodies to CD81 and NCAM alter this scarring, decreasing proliferation of retinal glial cells in vitro (Geisert et al., 2002). To test the ability of antibodies in altering proliferation of retinal glial, we quantified proliferating cells in the retina following scrape injury and antibody treatment. The first phase defined the peak of proliferation following injury by labeling dividing cells 1, 3, 5 and 7 days after injury. The effects of the antibodies were tested one day following injury during peak cell division. Introduction of the antibody to CD81 reduced proliferation by 43%, and the antibody to NCAM reduced proliferation by 72%. The depression of mitotic activity was significant at the $P = 0.0001$ level (Student's *t*-test) showing statistical significance in reducing proliferation of retinal glial. Further studies could lead to clinical roles for the antibodies.

PKC- ζ MEDIATES NOREPINEPHRINE-INDUCED PHOSPHOLIPASE D ACTIVATION AND CELL PROLIFERATION IN VASCULAR SMOOTH MUSCLE CELLS. *Jean-Hugues Parmentier, Edin Basic, and Kafait U. Malik, University of Tennessee, Memphis, Memphis, Tennessee (J-HP, KUM) and Christian Brothers University, Memphis, Tennessee (EB).* Norepinephrine (NE) stimulates phospholipase D (PLD) activity and cell

proliferation in vascular smooth muscle cells (VSMCs). The objective of this study was to determine the contribution of PKC- ζ to NE-induced PLD activation and cell proliferation in VSMCs. PLD activity was measured by the formulation of [^3H]phosphatidylethanol in VSMCs labeled with [^3H]oleic acid and exposed to ethanol. A high basal PLD activity was detected, and NE increased PLD activity over basal by 70%. This increase was abolished by the broad-range PKC inhibitor Ro 31-8220 (1 $\mu\text{mol/L}$, 30 min), and the myristoylated PKC- ζ pseudosubstrate peptide inhibitor (25 $\mu\text{mol/L}$, 1 h). Transfection of VSMCs with PKC- ζ antisense, but not sense, oligonucleotides, which reduced PKC- ζ protein level and basal PLD activity, caused a 92% decrease in NE-induced PLD activation. NE-induced increase in PLD activity was also reduced by 61% in cells transfected with kinase-deficient FLAG-T410A-PKC- ζ plasmid but not in those transfected with wild-type PKC- ζ . NE increased immunoprecipitable PKC- ζ activity and phosphorylation, reaching a maximum at 2 and 5 min, respectively. NE-induced increase in PKC- ζ activity was inhibited by Ro 31-8220 and by the pseudosubstrate inhibitor. Treatment of VSMCs for 48 h with PKC- ζ antisense, but not sense, oligonucleotides also inhibited basal and NE-stimulated cell proliferation by 54% and 57%, respectively, as measured by [^3H]thymidine incorporation. The inhibitor of PLD activity *n*-butanol, but not its inactive analog *tert*-butanol, also reduced the basal and blocked NE-induced cell proliferation. These data suggest that PKC- ζ mediates PLD activation and cell proliferation elicited by NE in rabbit VSMCs.

RETROSPECTIVE ANALYSIS: FINDING A COMMON LINK IN CASES OF INTRAUTERINE FETAL DEMISE. *S. J. Bourg and M. Schneider, Christian Brothers University, Memphis, Tennessee, and University of Tennessee, Memphis, Memphis, Tennessee.* A retrospective descriptive analysis of a viable sample of 142 cases from a population of 577 cases of intrauterine fetal demise (IUFD) over the period of 1990–2002 was conducted at the Regional Medical Center at Memphis. A range of factors including demographics, maternal data, maternal conditions, maternal infections, substance abuse, maternal testing, delivery data, and fetal autopsy findings were examined to find broad correlations between these data and incidence of fetal demise. The data showed that abruption was the leading cause of IUFD and that the fetus was more likely to be male. In terms of other historical causes of IUFD and abruption, there was no statistical significance. Moreover, the majority of women received inadequate prenatal care. Fetal autopsy was infrequent, but 59.7% of autopsies reported fetal anomalies. From this data narrower studies could be defined for future research.

ANALYSIS OF THE KINETICS OF P53 FIBER FORMATION. *Prentice Bowman and Richard Kriwacki, St. Jude Children's Research Hospital, Memphis, Tennessee.* The mutant protein p53tetR337H is known to cause adrenocortical carcinoma (ACC) in children. Previous experiments have shown that this mutant along with the wild-type version forms fibers at pH 4 when incubated at high temperatures. By studying the kinetics of this fiber formation, it may be possible to gain more information as to how ACC is caused. It may also be possible to learn about other diseases caused by fibers, such as Alzheimers and Type II diabetes. Fiber formation kinetics were studied by measuring the fluorescence of the protein when added to the fluorescent compound, Thioflavin T, which allowed for the determination of the relative amount of fibers present.

PRESENCE OF CALBINDIN POSITIVE NEURONS IN THE REGION OF SUPERIOR SALIVATORY NUCLEUS AND POTENTIAL ROLE IN REGULATION OF CHOROICAL BLOOD FLOW IN RODENTS. *L. Brown, M. T. Wiggins, M. E. C. Fitzgerald, C. A. B. Toledo, and A. Reiner, Christian Brothers University, Memphis, Tennessee (LB, MECF), LeMoyné-Owen College, Memphis, Tennessee (MTW), University of Tennessee, Memphis, Memphis, Tennessee (MECF, AR), and Laboratorio de Neurociencias, Universidade Cidade de São Paulo, Brazil (CABT).* Studies utilizing transneuronal retrograde labeling techniques in rodents have identified a subpopulation of neurons within the Superior Salivatory Nucleus (SSN) that project to the pterygopalatine ganglion (PPG) (Cuthbertson et al., 2001). These neurons provide parasympathetic innervation to the choroid and regulate blood flow (Fitzgerald et al., 2002). The neurotransmitter enzymes that identify this subpopulation of neurons within the SSN are nitric oxide synthase (NOS) and choline acetyltransferase (ChAT) (Cuthbertson et al., 2001). With the use of double-labeling immunofluorescence techniques, present studies sought to determine if these NOS + or ChAT + neurons also contained the calcium binding protein, calbindin. Analysis of immunolabeling was carried out using confocal and fluorescent microscopy. NOS immunolabel was observed in a subpopulation of ChAT positive SSN neurons as had been previously described. The calbindin positive cells overlapped the NOS+ and ChAT+ region of the SSN. A few calbindin positive neurons were found in the region of those SSN neurons that were also positive for ChAT. These studies suggest that a calbindin population of cells is intermingled among SSN neurons. However, calbindin does not appear co-localize with NOS, and therefore, does not appear to be involved with choroidal blood flow.

CR (VI) REMOVAL WITH *LEMNA MINOR* AND POSSIBLE USAGE IN LARGE-SCALE WASTEWATER TREATMENT. *Alex Brueggeman, University of Memphis, Memphis, Tennessee.* Hexavalent Chromium is a highly mobile carcinogen. Research indicates that *Lemna* sp. removes Cr (VI) from water, but does it leach Cr (VI) after composting? *Lemna minor* was placed into buckets containing a Hoagland nutrient solution as well as an aqueous Chromium trioxide (CrO₃). The addition of CrO₃ was to introduce hexavalent Chromium to the water; this resulted in concentrations ranging between 0.3–0.4 ppm. The reason that Cr (IV) was administered in this form was that dissolved oxygen would turn into O₂ gas and go out of solution if in excessively high concentrations. Furthermore, oxygen would not affect the growth of duckweed to any major degree (negatively or positively). After the duckweed was in the solution for 2 weeks and most of the hexavalent Chromium had been removed from the water, the duckweed was then weighed to ascertain an approximate “die off” rate; this was usually a 40% to 60% die off rate. Next, the duckweed was composted for 4 weeks in 1 kilogram of compost and flushed with 5L of water. The compost water that contained duckweed with Chromium was found to contain negligible amounts of Chromium with the exception of sample number N1.

INVOLVEMENT OF MITOCHONDRIAL PERMEABILITY TRANSITION PORE COMPLEX IN AD 198-INDUCED APOPTOSIS. *C. Cash, L. Lothstein, and M. Savaranskaya, Christian Brothers University, Memphis, Tennessee (CC) and University of Tennessee, Memphis, Memphis, Tennessee (LL, MS).* A novel family of cytoplasm-targeted anthracyclines typified by AD

198 induces apoptosis by modulation of PKC- δ activity causing mitochondrial membrane depolarization. The mitochondrial permeability transition pore complex (PTPC) is a regulatory crossroad in apoptosis since its formation can be induced by proapoptotic compounds or inhibited by antiapoptotic factors, such as Bcl-2. Earlier studies showed the ability of AD 198 to induce mitochondrial depolarization despite the presence of Bcl-2, possibly implicating a novel mechanism for induction of apoptosis. We report that AD 198 induces mitochondrial depolarization and subsequent apoptosis by a pathway not involving the PTPC. In proliferating 32D.3 myeloid cells incubated with 5 mM AD 198 for 1 h, mitochondrial depolarization was observed by fluorescence microscopy. Pretreatment of 32D.3 cells with Cyclosporin A, an inhibitor of PTPC formation, did not block mitochondrial depolarization. These results suggest a novel mechanism of induction of mitochondrial-dependent apoptosis by AD 198 not involving the PTPC.

IDENTIFICATION OF ANTERIOR COMMISSURE PHENOTYPE IN ENU MUTAGENIZED MICE. *K. Cozart, A. Elberger, and N. Brauer, Christian Brothers University, Memphis, Tennessee (KC) and The University of Tennessee, Memphis, Memphis, Tennessee (AE, NB).* A possible genetic difference in the size and shape of the anterior commissure (AC) was investigated in three families of mutated mice. In the first family, three mice were shown to have significant alterations in their anterior commissure. One had a significant difference in the AC perimeter and two had a significant difference in the overall AC width as measured from anterior to posterior. The second family had four mice with significant differences, one in the AC length, one in the area of the anterior portion of the AC, and two in the AC width as measured from anterior to posterior. The third family only possessed one significantly altered mouse, which was reflected in the length of the anterior commissure. These differences are so large that they cannot be considered to fall within the normal range of variability, and therefore must be genetically based abnormalities. These families of mutated mice have genetic mutations that are localized to specific regions on individual chromosomes; these regions include many genes, some identified but others as yet unidentified. Extensive research will be needed to actually pinpoint the particular gene(s) that have been mutated and are responsible for the changes observed in the AC.

LIP SMACKING AND SOCIAL BEHAVIOR IN A CAPTIVE GROUP OF SULAWESI MACAQUES. *A. L. Deslattes and M. Carr, Christian Brothers University, Memphis, Tennessee and Memphis Zoo and Aquarium, Memphis, Tennessee.* A group of Sulawesi macaques (*M. nigra*), consisting of 1 adult male, 1 adult female and 2 sub-adult males, was studied for nine consecutive weeks in a captive habitat at the Memphis Zoo. Data in 17 behavioral categories were collected using two methods: time-interval, focal scans and all-occurrence social data. The study was designed to look at the social behaviors of the animals, with special attention paid to lip smacking, aggressive behaviors between the males, and also to behavioral changes in the two youngest males as they matured. The data were analyzed by summary statistics. Results indicated that lip smacking was most often associated with affiliative behaviors in the group. Analysis also showed that the adult male and the oldest sub-adult male displayed aggressive behaviors more often than the female and younger sub-adult male. The majority of the aggression displayed by the older males was not directed at other group members, but

instead toward objects or non-macaques. Future studies involving the macaques could continue to look at the younger males' behaviors as they develop, and also at relationship changes among the animals upon addition of another macaque into the group.

A GENETICS STUDY COMPARING BODY COLOR IN BOLL WEEVILS FROM TEXAS AND TENNESSEE. *J. D. Drake, C. J. Biggers, and M. L. Beck, The University of Memphis, Memphis, Tennessee.* Color polymorphism in boll weevils has been previously reported. Color in the boll weevil is inherited as two autosomal co-dominant alleles. The frequencies of the two alleles are examined in this study in four groups of adult weevils: (1) feral weevils from Tennessee, (2) feral weevils from Texas, (3) the laboratory stock from Mississippi, and (4) the laboratory stock from Texas. A comparison will be made of the frequencies of the feral stocks, the laboratory stocks, and the laboratory with the feral stocks. Since we found that adult body color is not stable until at least 10 days of age, we will maintain the adult weevils for 10 days before scoring them. The Mississippi and Texas laboratory weevils will be held for 30 days so the larvae can mature and their color will be fixed. The frequencies of the alleles have been shown to be different in past experiments. Body color from feral adult weevils from some Western Tennessee counties have been shown to be in Hardy-Weinberg (HW) Equilibrium, while others from neighboring counties have not been in HW Equilibrium. Reasons for these differences may include influences of insecticides or possibly natural selection pressures favoring a specific body color. In connection with the study of the body color morphology of these boll weevils, certain enzymes will also be examined using electrophoresis.

IMMUNOHISTOCHEMISTRY TO STAIN INSULIN, GLUCAGON, SOMATOSTATIN, AND PANCREATIC POLYPEPTIDE RELEASE IN PANCREATIC ISLET CELLS TO DETERMINE CHANGES IN HORMONE LEVELS OVER TIME IN CULTURE. *K. Fields, D. Fraga, Y. Abdel-Rahman, Christian Brothers University, Memphis, Tennessee (KF) and University of Tennessee, Memphis, Memphis, Tennessee (DF, YA-R).* Islet transplantation is as a potential therapy for the treatment of insulin dependent diabetes mellitus. Tissue viability remains a critical aspect of islet assessment and successful transplantation. Current protocols call for immediate transplantation of tissue following islet isolation. Prolonged culture of islets in serum free media is a method to assess viability prior to transplantation. Tissue culture may alter islet secretion. Additives to tissue culture media provide an environment where islets can remain functional for up to six months. Using these culture techniques, the islets remained stable or demonstrated increased levels of insulin secretion. We hypothesize the islet secretion for the hormones insulin, glucagon, somatostatin, and pancreatic polypeptide would increase over time in culture. Islets were isolated and purified from a human pancreas and placed in culture. On day 1 and weeks 1, 2, 3, 4 and 11 following isolation, formalin fixed aliquots were immunohistochemically stained for insulin, glucagon, somatostatin, and pancreatic polypeptide content. We found there was sustained hormone presence in the islets while in culture, with an overall increase of secretion over time.

CHARACTERIZATION OF THE HYDROPHOBIC PATCH DOMAIN IN THE G1 CYCLIN, CLN3, OF *SACCHAROMYCES CEREVISIAE*. *Alison Groeger and Mary Miller, Rhodes College, Memphis Tennessee.* In *Saccharomyces cerevisiae*, G1 cy-

clins are responsible for initiating the cell cycle in a process that ultimately leads to cell division. Cyclins function by binding to and activating a cyclin dependent kinase, in this case Cdk1. In addition to expression, localization and substrate interaction of the cyclin-Cdk1 complex influences activity. Many cyclins have a hydrophobic patch domain (hpd) in the beginning of the cyclin box. It has been demonstrated that the hydrophobic patch promotes the recruiting of substrates to cyclin-Cdk complexes in the cases of Cyclin A in humans and Clb5 in *S. cerevisiae* (Schulman, 1998; Cross, 2000). In *S. cerevisiae* the three G1 cyclins are called Cln1, Cln2, and Cln3. To investigate whether or not the function of Cln3 is dependent upon the hpd, we mutated three residues in the Cln3 hpd and tested the mutant protein, *cln3-hpm*, for function. Tests reveal cases in which the *cln3-hpm* is less efficient at rescuing the cell cycle than wild-type Cln3. This investigation supports the notion that the hydrophobic patch domain of Cln3 plays a significant role in the cyclin's activity during the G1 phase of the cell cycle in *S. cerevisiae*.

PREGNANT WOMEN WITH SICKLE CELL DISEASE AND THE OUTCOME OF THEIR PREGNANCY. *N. Kelishadi, M. Schneider, and T. Ivester, Christian Brothers University, Memphis, Tennessee (NK) and Regional Medical Center, Memphis, Tennessee (MS, TI).* To determine the maternal and fetal outcomes in pregnant women with hemoglobinopathies, a retrospective review was conducted of pregnant women with hemoglobinopathies who delivered at the Regional Medical Center between 1992–2001. Of the 51 patients, 82.4% had sickle cell (SC) disease; the remainder had either β -thalassemia or SC disease. 35.3% of patients had PTD and 17.6% had an intrauterine fetal demise (IUFD). 28.6% of patients with a live birth required a transfusion versus 44.4% with an IUFD. Of patients with an IUFD, 33.3% experienced preeclampsia compared to 9.5% of those with a live birth. Four of five patients with a hematocrit of < 22% had chest syndrome. Conclusion: Patients with a IUFD were nearly two times more likely to require transfusion and nearly four times more likely to have preeclampsia than patients with a live birth. Sickle chest syndrome was correlated to a hematocrit level of less than 22%.

EVALUATION OF 8-ISOPROSTANE CONCENTRATIONS AND THE EFFECTS OF VITAMIN C AND E SUPPLEMENTATION ON 8-ISOPROSTANE LEVELS IN WOMEN AT HIGH RISK FOR DEVELOPING PREECLAMPSIA. *D. King and R. Ahokas, Christian Brothers University, Memphis, Tennessee and The University of Tennessee, Memphis, Memphis, Tennessee.* The objective of our study was to determine 8-Isoprostane concentrations and to evaluate the efficacy of vitamin C and E supplementation as altering markers of oxidative stress in women at high risk for developing preeclampsia. Consenting patients ($n = 109$) who met study characteristics were randomized at 14–20 weeks' gestation to receive 1000 mg of vitamin C and 400 IU of vitamin E ($n = 54$) or placebo ($n = 55$) daily. Plasma samples for 8-Isoprostane were obtained at enrollment, 28 weeks gestation, and at delivery. After C-18 solid phase extraction, isoprostane was enzyme immunoassayed using a kit from Cayman Chemical Company. The data were analyzed using student's t -test. 8-Isoprostane levels were similar at enrollment, 28 weeks, and delivery in both groups. The concentrations of isoprostane were similar in women who developed preeclampsia. In this study antioxidant supplementation with vitamins C and E

did not alter markers of oxidative stress in women at high risk for developing preeclampsia.

AGGRESSIVE BEHAVIOR IN AN ALL-MALE WESTERN LOWLAND GORILLA GROUP AT THE MEMPHIS ZOO AND AQUARIUM. *T. Kueter, M. Carr, J. Ouellette, and C. Kuhar, Christian Brothers University Memphis, Tennessee (TK), Memphis Zoo and Aquarium, Memphis, Tennessee (MC, JO), and Zoo Atlanta, Atlanta, Georgia (CK).* Almost two years ago, the Memphis Zoo and Aquarium began participation in an all-male gorilla group study designed by the Atlanta Zoo. Currently, the Memphis Zoo houses three male gorillas in their teenage years, which is when aggression is usually the highest. The zoo was interested in clarifying the aggressive interactions between these animals and tracking a possible shift in dominance as the two younger gorillas matured. By comparing two summers worth of data, it was possible to examine the changes in behavior among the group. The amount of aggressive behavior directed towards the oldest gorilla by the youngest has tripled. The amount directed by the second oldest towards the oldest has decreased by 9%. The oldest gorilla has decreased his aggressive behavior towards either gorilla by a factor of five. Currently the zoo is separating one gorilla from the other two in an attempt to reduce aggression.

CONDITION INDICES OF THE ASIAN CLAM (*CORBICULA FLUMINEA*) IN THE WOLF RIVER. *Forrest McCullough and D. H. Kesler, Rhodes College, Memphis, Tennessee.* Condition indices of Asian Clams (*Corbicula fluminea*) may provide new methods to assess habitat quality for imperiled native bivalves. We identified different qualities of bivalve habitat within the upper Wolf River by measuring *Corbicula* condition indices. We collected *C. fluminea* individuals at nine locations between Michigan City, Mississippi and LaGrange, Tennessee (distance ca. 8 km) on September 7, 2002. We used tissue percent water, tissue dry mass/shell mass, tissue dry mass/internal shell volume, ash-free-dry-mass/shell mass and ash-free-dry-mass/internal shell volume as indicators of condition. A significant location effect ($P < 0.05$) was found using a one-way ANOVA for all condition indices. While condition indices did not change consistently from Michigan City to LaGrange, a Tukey's post hoc test revealed that one location (#5) contained *C. fluminea* individuals with significantly higher condition indices than at all other locations. Oxygen, temperature, and conductivity did not differ among sites. We plotted the nine locations on a 1950 USGS topographic map with GIS software. Location 5 did not appear on the main channel of this map, suggesting changes in habitat conditions over time. Use of *C. fluminea* condition indices allowed us to recognize location 5 as the most suitable habitat for Asian Clams and by inference other filter-feeding bivalves.

CELLULAR MECHANISM OF THE ACTION OF ANGIOTENSIN II ON COLLAGEN PRODUCTION IN VASCULAR SMOOTH MUSCLE CELLS. *K. U. Malik, M. Aqueel, and N. R. Newsom, University of Tennessee, Memphis, Memphis, Tennessee (KUM, MA) and Christian Brothers University, Memphis, Tennessee (NRN).* Angiotensin II (ANG II), a vasoactive hormone, promotes vascular smooth muscle cell (VSMC) growth and collagen synthesis. It also activates cytosolic phospholipase A2 (cPLA2) that releases arachidonic acid (AA) from tissue phospholipids. Moreover, ANG II activates a mitogen activated protein kinase ERK1/2. The purpose of this study was to deter-

mine if ANG II stimulates collagen production via generation of AA and/or its metabolites and by activating ERK1/2 in rabbit VSMC. ANG II (100 nM) increased collagen synthesis, measured by ELISA assay, which was blocked by inhibitors of calcium binding protein calmodulin (W-7) and cPLA2 (pyrrolidine-1) and ERK1/2 kinase (U0126). Exogenous AA increased collagen production, which was blocked by an inhibitor of AA metabolism ETYA. AA metabolites, 12(S)-, 15(S)- and 20-hydroxycosatetraenoic acids (HETEs), increased collagen production. These data suggest that ANG II promotes collagen production by activating ERK1/2 via HETEs generated by stimulation of cPLA2 by calmodulin in VSMC.

COMPARISON OF LYSOPHOSPHATIDIC-INDUCED CELL MIGRATION USING IMPEDANCE CELL SENSING AND TRADITIONAL MIGRATION ASSAYS. *F. Pascual, G. Tigy, A. Aryal, M. J. Viar, Christian Brothers University, Memphis, Tennessee (FP) and University of Tennessee, Memphis, Memphis, Tennessee (GT, AA, MJV).* Extensive damage to the intestinal epithelium can occur during disease, and the rapid repair of injured epithelium is important in the restoration of barrier function and maintaining homeostasis. Lysophosphatidic acid (LPA) is a bioactive lipid mediator that promotes wound healing in vivo. LPA's wound healing effect was investigated using rat intestinal epithelial cells (IEC-6). The wound-healing assay was carried out with the Electric Cell Substrate Impedance Sensing (ECIS) instrument. Different combinations of voltage and wounding time were applied to the monolayers. LPA treated monolayers showed acceleration of closure, and increasing the LPA dose resulted in a corresponding increase in closure. Additionally, the cell-signaling pathway initiated by LPA in IEC-6 wound healing was investigated. Using the traditional cell migration assay, Pertussis toxin (PTX) eliminated LPA-induced acceleration of cell migration. Wortmannin, a specific inhibitor of phosphatidylinositol-3-kinase (P13K), did not attenuate the rate of migration. However, LY294002, another P13K inhibitor inhibited basal migration, but had no effect on LPA-induced migration. PD98059, an inhibitor of MEK, caused IEC-6 cell death.

CREATION OF A KINASE-DEFECTIVE MPERK PROTEIN BY POINT MUTATION. *Heidi Rademacher, Linda Hendershot, and Yanjun Ma, Rhodes College, Memphis, Tennessee (HR) and St. Jude Children's Research Hospital, Memphis, Tennessee (LH, YM).* Abnormal physiological conditions cause proteins to misfold in the endoplasmic reticulum (ER). This induces ER stress and activates a signal transduction pathway called the unfolded protein response (UPR). This pathway can be activated by the addition of pharmacological agents to cells in culture and also occurs in solid tumors that are not adequately vascularized. One part of the pathway shuts down new protein synthesis, limiting the amount of unfolded proteins within the cell, and is controlled by an ER-localized transmembrane kinase called PERK. During ER stress, BiP is released from the luminal domain of PERK, which causes it to dimerize and activate its cytosolic kinase domain. In the absence of ER stress, overexpression of PERK can lead to dimerization and activation of PERK. Activated PERK is involved in the phosphorylation of eIF-2 α , which blocks translational initiation and therefore inhibits protein synthesis. We created a PERK with an inactive kinase domain by introducing a point mutation that changes an essential lysine (AAG) to methionine (ATG). The mutant PERK will be unable to phosphorylate eIF-2 α when cells are treated with ER

stress-inducing agents, allowing us investigation of the pathway downstream of PERK by specifically inactivating this part of the unfolded protein response.

EFFECTS OF DEHYDROEPIANDROSTERONE ON THE REPRODUCTION OF MICE (*MUS MUSCULUS*). *Ingrid K. Renberg and Wayne Wofford, Union University, Jackson, Tennessee.* Dehydroepiandrosterone (DHEA) is a hormone that has recently experienced popularity for its ability to increase physiological and psychological well-being. In this study, the effects of DHEA on the reproduction of mice (*Mus musculus*) were examined. It was found that mice ingesting DHEA had a higher metabolism, resulting in lower amounts of body fat, and were less likely to reproduce. If they did reproduce, it was less likely for their offspring to survive. The control mice reproduced normally, producing altogether eight litters. Only two litters were born from the mice ingesting DHEA, and of the two one entire litter died shortly after birth. As soon as the mice were taken off of DHEA, they resumed a normal rate of reproduction and their offspring were healthy and reached maturity.

THE EFFECT OF POLLUTION ON THE GROWTH RATE OF SOUTHERN RED OAK, *QUERCUS FALCATE*. *Chris Rickman and Wayne Wofford, Union University, Jackson, Tennessee.* Pollution creates problems in a wide variety of settings, and one area in which pollution is thought to have a negative effect is in the growth rate of trees. In this experiment, the effect of pollution on the growth rate of southern red oaks was examined. Six core samples were taken from three different sites. The three sites had different levels of pollution exposure ranging from an industrial setting to a rural environment. The width of the tree rings was measured with a digital caliper. A significant difference in the relative rates of increase in the width of each ring was noted among the three sites. An analysis of covariance further supported the initial hypothesis that there was a significant difference between the pollution effects on the different collection sites ($P < 0.001$) with the slowest rate of growth in the area with the highest pollution.

IDENTIFICATION OF DOWNSTREAM TARGET GENES OF CBFA1: CONSTRUCTION AND SCREENING OF A MOUSE CDNA LIBRARY. *K. Ries, J. S. Gaikwad, A. Cavender, and R. D'Souza, Christian Brothers University (KR) and University of Texas, Houston, Texas (JSG, AC, RD).* Recent molecular and genetic studies in mice and humans have demonstrated that the *Cbfa1/Runx2*, a novel transcription factor and mammalian homologue of the *Drosophila runt* transcription factor, is an important regulator of osteoblast differentiation and function. Specifically the aim of this study is to identify the tooth-specific downstream targets of *Cbfa1/Runx2* that potentially regulate late morphogenesis and cell differentiation. The study will use the *Cbfa1/Runx2* mutant tooth organ as a model and use a sensitive PCR based method-Suppression Subtraction Hybridization (SSH) to achieve this goal.

LOCALIZATION OF SK3 CHANNELS IN A RAT'S SUPRA-OPTIC NUCLEUS. *A. Rubrum and W. Armstrong, Christian Brothers University, Memphis, Tennessee and University of Tennessee, Memphis, Memphis, Tennessee.* The supraoptic nucleus contains magnocellular neurosecretory cells (MNCs), glial cells, and small Ca^{++} dependent K^{+} channels known as SK3 channels. The present experiments were done to determine whether the

SK3 channels were found inside the MNCs or inside astrocytic processes surrounding them. Slices of fixed rat brains were stained with a SK3 primary antibody and viewed with a light and/or electron microscope. Double staining of primary antibodies of SK3 and glial fibrillary acidic protein (GFAP), vasopressin- or oxytocin-neurophysin was viewed with a confocal microscope. Results from electron and confocal microscopy indicate that the SK3 channels are located outside the neurons. However, the confocal images of SK3 and GFAP indicate a strong overlap. Therefore, it can be assumed that the SK3 channels are found inside the glial cells. These channels may thus adjust glial cell membrane potential, which is critical to the ability of these cells to buffer K^{+} .

CLASS SCHEDULING IN PROLOG. *Allen Smith, Union University, Jackson Tennessee.* Prolog is a logic-based computer programming language developed in the 1970s. The language excels at facilitating the navigation of search spaces, and became widely used in the field of artificial intelligence. Logic programming involves feeding the computer a list of facts and the rules relating them to one another. Unlike procedural languages, solutions are determined by specifying goals rather than specific intermediate steps to reach them. I used Prolog to study the problem of detecting scheduling conflicts arising when the times of required classes overlap. Prolog's searching function simplifies the tedious task of guaranteeing the existence of a schedule that enables a student to take all his required courses.

POLYAMINE AND GLUTAMATE RECEPTOR LOCALIZATION IN THE RETINAL PIGMENT EPITHELIUM. *S. Stinnett and D. Johnson, Christian Brothers University, Memphis, Tennessee and University of Tennessee, Memphis, Memphis, Tennessee.* Polyamines have been implicated as having a role in a number of retinal pigment epithelium (RPE) functions, including cell attachment, cell migration, and apoptosis. Polyamines are known to regulate glutamate receptors in neurons. Therefore we questioned whether polyamine-dependent effects in RPE cells might also be mediated via glutamate receptor regulation. To test this hypothesis, antibodies against the polyamine, spermine, and two glutamate receptor subunits, NMDA NR2B and AMPA GluR2/3, were used to determine if RPE cells express these receptor subunits and if polyamines co-localize with these glutamate receptors. Human RPE cells from an 80-year-old donor and an immortalized human RPE cell line (ARPE 19) were analyzed. Inconclusive staining was observed with the 80-year-old samples. In the ARPE 19 cells, immunoreactivity suggested that RPE cells express both subunit types of the glutamate receptors, in different cellular areas, and that polyamine-filled vesicles are positioned closely to AMPA receptors in the membrane.

HYPERBOLIC GEOMETRY: 19TH CENTURY DEVELOPMENTS. *Nikki Vassar, Union University, Jackson, Tennessee.* Hyperbolic geometry is a geometry where Euclid's 5th Postulate is negated. In this geometry, there are at least two lines parallel to a given line through a given point. The historical development of this geometry dates back to the time of Euclid when men were trying to prove his 5th Postulate which is an impossible task; thus, a new geometry was formed. An overview of this historical development within the 19th century and the basics of hyperbolic geometry will be presented.

DETERMINATION OF THE GENE THAT CAUSES THE MEANDER TAIL PHENOTYPE. *E. Weirich, D. Goldowitz, and Y. Tong, Christian Brothers University, Memphis, Tennessee (EW) and The University of Tennessee, Memphis, Memphis, Tennessee (DG, YT)*. The meander tail phenotype is caused by a true, recessive mutation of a gene on a 12 cM region of chromosome 4 in the mouse genome that results in abnormal cerebellar foliation and a mild ataxic gait. This research was conducted to try and identify candidate genes that could be responsible for the mutation. Using information collected from microarray and chromo-

somal mapping data, target genes were cloned and candidate genes were determined using in situ hybridization on Black 6 cerebellar tissue. From data collected in this experiment, it appears there are many candidates, but only one candidate gene was selected as responsible for the meander tail phenotype. However further testing is needed to determine whether this gene is a valid candidate. Furthermore, other genes from this region of the mouse genome must be cloned and tested by in situ hybridization before the true identity of the gene responsible for the meander tail mutation is ascertained.