

ABSTRACTS OF PAPERS PRESENTED AT THE SPRING 2000 COLLEGIATE MEETINGS

EASTERN REGION

CARSON NEWMAN COLLEGE
JEFFERSON CITY, TENNESSEE

EFFECTIVENESS OF DISINFECTANTS AGAINST COMMON BACTERIA. *Heather R. Williamson, Pellissippi State Technical Community College, Knoxville, Tennessee.* Disinfectants were analyzed for their effectiveness against five types of representative household bacteria using a modified use-dilution test. Commercial disinfectants containing alcohols, halogens, quaternary ammonium compounds, and strong bases were used according to manufacturers' instructions. Both Gram negative and Gram positive, as well as spore-forming, organisms were evaluated. Chemicals were ranked based on rates of bactericidal activity. Disinfectants were evaluated based on manufacturers' instructions for length of treatment. Predictions of the effectiveness of untested disinfectants were made based on the chemical composition of their active ingredients. Bacterial susceptibility to disinfectants was compared with susceptibility to a range of antibiotics.

THE EFFICACY AND MACROSCOPIC EFFECT OF ANTI-HELMINTHICS ON THE TAPEWORM *HYMENOLEPIS DIMINUTA*. *Jodi Lloyd, Maryville College, Maryville, Tennessee.* The efficacy of the drugs Cestex (epsiprantel) and Droncit (praziquantel), developed for *Dipylidium caninum* was determined for the closely related tapeworm *Hymenolepis diminuta*. The cysticercoids of *H. diminuta* were separated into three groups: control; Cestex, in a twenty-five percent concentration; and Droncit, in a four percent concentration. The cysticercoids were examined to determine whether the length, width, or floatation had changed. These data were collected from time zero to 4 h at 1 h intervals. The *P* value for the length change in the control group was 0.90, the Cestex group was 0.31, and the Droncit group was 0.60. The *P* value for the width change in the control group was 0.93, the Cestex group was 0.56, and the Droncit group was 0.01. Thus, only Droncit had a significant effect on the cysticercoids. However, a 20% floating rate showed that Cestex also was effective. It is probable that both Droncit and Cestex would be useful in treating other tapeworms than *D. caninum* for which they were developed. The expansion of these medications to more tapeworm groups could decrease the number of infestations and subsequent deaths caused by these parasites in third world countries. Future experiments should examine the mechanisms of the drug's macroscopic effects, thus validating the use of these procedures in similar culture-based systems.

AN IN VITRO STUDY OF ESTROGEN'S REVERSAL OF OSTEOPOROSIS. *Paige Morefield, Maryville College, Maryville, Tennessee.* Osteoporosis means porous bones; it is a disease characterized by low bone mass and microarchitectural deterioration of bone tissue, leading to enhanced bone fragility and a conse-

quent increase in fracture risk. Postmenopausal women and young female athletes who exercise strenuously and excessively are at the highest risk of developing osteoporosis because of estrogen deficiencies. Estrogens cause increased osteoblastic activity. This study firstly tests the hypothesis that osteoporotic characteristics can be initiated in osteoblasts through estrogen deprivation. This study secondly tests the hypothesis that the induced osteoporotic characteristics can be reversed through estrogen therapy. The experiment consisted of sustaining a positive control group in which osteoblasts were exposed to normal levels of estrogen, a negative control group in which osteoblasts were deprived of estrogen, and an experimental group in which osteoblasts were deprived of estrogen for the first half of the experiment and exposed to normal levels of estrogen for the second half of the experiment. Calcium uptake by the bone cells from the growth medium was calculated by spectrophotometry to indicate the physical states of the bone cells during the experiment. The positive control group maintained a high level of calcium inside the cells for the duration of the experiment. The negative control group and the experimental group were inconsistent in absorbing and emitting calcium. The length of the experiment was too short to allow for osteoporotic characteristics to develop; therefore, the first hypothesis was not supported by the experiment and the second hypothesis could not be tested. However, the results suggest that estrogen aids in maintaining healthy cell function, but cannot renew function in already distressed cells.

HAPPINESS ACROSS THE AGES. *Teri Green, Maryville College, Maryville, Tennessee.* The purpose of this study was to determine how people define happiness, assess their level of happiness, and identify the factors influencing happiness. There were a total of 87 participants: 30 teenagers (13-19 years), 31 middle-age adults (35-64 years), and 26 elderly adults (65+ years). A nine-question survey was used in gathering data. Significant differences were found between teenagers and middle-age adults and teenagers and elderly adults. Teenagers ranked family as less influencing than middle-agers and the elderly. Emotions were the number one way to define happiness by all three age groups, and environment was important to making people happy, which supports the results reported by Myers (1992).

A POPULATION OF THE PRAIRIE VOLE, *MICROTUS OCHROGASTER* (RODENTIA: MURIDAE) IN THE RIDGE AND VALLEY PHYSIOGRAPHIC PROVINCE OF EASTERN TENNESSEE. *Eric Wilson*, Dianne King, John Hisey, Eurydice Kemp, Sudave Mendiratta, and Elizabeth Brezina, Lee University, Cleveland, Tennessee.* The prairie vole is among the most ecologically and economically influential vertebrates in grassy habitats within its broad geographic range. It may reach high population densities, impacting vegetation and providing a major food source for predators. This species is reportedly undergoing a major range expansion eastward from the Mississippi River

Valley into the Appalachian region. Our description of the characteristics of the first known population of prairie voles east of the Cumberland Plateau in the Ridge and Valley Physiographic Province casts new light on this expansion. Employing 200 live traps in 33 sessions over a six-month period in a mesic meadow in Cleveland, Bradley County, Tennessee, we captured 128 individual prairie voles a total of 295 times. Other species frequently captured at the site included the short-tailed shrew (*Blarina spp.*) and house mouse (*Mus musculus*).

RELATIVE FITNESS OF PRAIRIE VOLES (*MICROTUS OCHROGASTER*) IN DISTURBED HABITATS IN SOUTHEASTERN TENNESSEE. *Eurydice Kemp*, John Hisey, Dianne King, Eric Wilson, Sudave Mendiratta, and Elizabeth Brezina, Lee University, Cleveland, Tennessee.* After decades of intensive research, the role of dispersal in population growth in microtine rodents remains unclear. We measured fitness parameters of dispersing prairie voles relative to residents. Biweekly trapping sessions for the eight weeks before and sixteen weeks after one half of our trap grid was mowed allowed us to address the role of habitat disturbances and recovery in population movements, structure, and survival and reproductive condition of dispersers compared to resident voles in maintaining populations of this species.

CHANGES IN YEAST INTEGRAL MEMBRANE PROTEIN FUNCTION INDUCED BY VARIOUS LIPID ENVIRONMENTS. *Todd Aiken, Carson Newman College, Jefferson City, Tennessee.* The activity of an integral membrane protein in *Saccharomyces cerevisiae*, baker's yeast, was examined by making use of yeast natural biological process and genetic engineering. When yeast reproduce sexually they require a peptide component, a pheromone, from the opposite mating type. For this to occur, the pheromone must attach to an integral membrane protein and induce a series of changes within the cell that enables the process of sexual reproduction to take place. In this experiment, yeast mating type a was used and alpha pheromone was added to induce the signal pathway within the cell. A special strain of yeast cell was used that had been genetically engineered to produce a detectable product when the alpha pheromone attached to the protein and transported its signal inside the cell. This provided a means to test for the protein function of the yeast. This assay was run on native cells with varying concentrations of alpha pheromone and showed a linear relationship, ensuring everything was proper and functional. This assay was then used to measure the effect of different lipids on protein activity. The lipid environment of the cells was changed in one of two ways: (1) by adding liposomes to the media the yeast were grown in, causing the uptake of the lipids into the cell, or (2) by adding drugs to the media that shifted the cell into synthesizing only certain lipids to be incorporated into the membrane. Phosphatidyl inositol consistently increased the activity of the protein while phosphatidyl serine decreased protein activity. Other lipids used did not show any consistent pattern in their effect on protein activity.

A NEW PROTEIN DYE BINDING ASSAY USING BROMOCRESOL PURPLE. *Anuj Suri, Maryville College, Maryville, Tennessee.* Bovine serum albumin, chymotrypsin, and chicken egg albumin were the proteins used in this study to create a new protein-dye-binding assay for the quantitative analysis of these proteins. Bromocresol purple was the dye that was used as the

binding substance for the protein. The protein-dye complexes were tested by using a UV-Visible absorbance spectrophotometer. Bromocresol purple exhibited a maximum absorption wavelength at 440 nm. During protein interaction, a bathochromic shift occurred and shifted the maximum to 590 nm. The assay proved to be highly stable with a quick reaction time.

MIDDLE REGION

AUSTIN PEAY STATE UNIVERSITY
CLARKSVILLE, TENNESSEE

SILVER RECOVERY FROM SILVER CHLORIDE LABORATORY WASTES. *Lisa Baker* and Todd Lafrenz, Austin Peay State University, Clarksville, Tennessee.* Silver chloride is a waste product of analytical determination experiments. Therefore, each semester significant waste consisting of silver chloride mixed with other metal salts and filter media is produced by undergraduate analytical laboratories. This waste is currently a hazard and a cost to the Chemistry Department for storage and disposal. However, silver chloride can be converted into silver nitrate or solid silver by relatively inexpensive means. From the several processes found in the literature, two processes were evaluated: oxidation-reduction with copper metal, and ion exchange. These will be compared and contrasted experimentally to determine the most efficient, cost-effective method of silver recovery from silver chloride laboratory wastes.

THE EFFECT OF STEREOTYPE PRIMES ON ATTRIBUTIONS OF RESPONSIBILITY OF STEREOTYPED GROUP MEMBERS. *Natasha D. Watkins* and Elliott Hammer, Tennessee State University, Nashville, Tennessee.* The effect of priming on stereotypes has been the basis of much recent research. Researchers have studied the effect of negative priming on the automatic process of stereotyping. However, little research has been done using positive primes, or on the effects of both positive and negative primes on minority populations. This study examined the effect of priming negative stereotypic and positive counter-stereotypic depictions of African Americans on attribute of responsibility in real life media events. Eighty participants from a southern historically black university received either a stereotypic or counter-stereotypic prime as well as two newspaper articles. One article highlighted a positive or negative scenario concerning Rodney King, and the other article did the same concerning Magic Johnson. The valence and target of each article was counterbalanced. Based on the content in each article, participants answered a questionnaire regarding their feelings about the respective target. The counter-stereotypic prime elicited more sympathy. However, this was shown for Rodney King and not Magic Johnson. In reference to personal responsibility, participants judged Magic Johnson to be more responsible for his negative situation, while Rodney King was thought to be more responsible for his positive situation. Based on these findings, we suggest that stereotypes may have a different effect on African Americans when evaluating their own in-group members. Stereotypes may serve as expectations for behavior, and when another member's behavior is not congruent with this expectation, one feels let down and less sympathetic to the situation. Some results also may be interpreted in terms of the contrast effect, such that the positive prime aroused high expectations for the in-

group, which were especially disappointed by the negative Magic Johnson scenario.

USING BOVINE SERUM ALBUMIN AS A NOVEL BIOCATALYST IN ORGANIC SYNTHESIS. *Patrizia Lemma-Gray* and Xiao-Chuan Liu, Austin Peay State University, Clarksville, Tennessee.* The catalytic properties of bovine serum albumin (BSA) have been studied extensively. The protein has successfully been used to catalyze a variety of reactions. However, there are no reports of reactions catalyzed in organic media. Thus, the catalytic properties of BSA in organic media were studied by monitoring its effect on the isomerization of 1,2-benzisoxazole in acetonitrile. Time based readings were taken by using a spectrophotometer at 330 nm. Readings were taken for solutions containing different concentrations of the benzisoxazole, so that a double-reciprocal plot could be constructed. The protein catalyzed the reaction of 1,2-benzisoxazole with a catalytic efficiency of 0.918 mol/sec. Considering the low cost and high availability of the protein, and the advantages deriving from the use of organic solvents in industrial applications, the results indicate that potential BSA use in biocatalysis is worthy of further exploration.

RELATING CPG15 INDUCTION AND SEIZURE SEVERITY IN ADULT MICE. *Corey Harwell* and Fu-Ming Chen, Tennessee State University, Nashville, Tennessee.* The capacity of the central nervous system (CNS) to modify neuronal connections as a result of activity is termed plasticity. Activity in the brain induces certain candidate plasticity genes (CPGs), which may play an important role in generating plasticity of CNS neurons. Seizure paradigms in rats have been used extensively in the study of CPGs. In order to study the function of CPGs using transgenic and "knockout" mice, it would be useful to have a well-characterized protocol for CPG induction in this species. We tested the correlation between kainate-induced seizure behavior and induction level of a specific CPG, cpg15. Kainate amounts of 10–30 mg/kg were injected intraperitoneally into C57/BL6 male mice, a strain often used in the creation of transgenic or knockout animals. Induction of cpg15 was assayed *in situ* hybridization. We found a correlation between the level of seizure activity and the level of cpg15 induction, where cpg15 induction levels increased with increased seizure severity. To determine the optimal time of cpg15 induction after kainate injection, animals were sacrificed at time points of 4, 6, 8, 12, and 24 h. Our findings show that cpg15 induction is highest 4 h after treatment. This protocol can be used on genetically manipulated animals to elucidate the relation of one gene to another in the cascade of molecular genetic events that lead to neuronal plasticity. For example, a seizure paradigm would not induce cpg15 in plasticity gene knockout animals if the deleted genes preceded cpg15 in the molecular pathway.

FUEL CELL CATALYSTS. *Kristy Reece* and Todd Lafrenz, Austin Peay State University, Clarksville, Tennessee.* The cost of platinum and other noble metals as catalysts for PEM fuel cells has driven research towards design and synthesis of the most efficient usage of these metals. Complicating this is the poisoning effect of carbon monoxide, a by-product of methanol oxidation and contaminant in gaseous hydrogen. A detailed analysis of X-ray diffraction patterns and lattice parameters has been done to develop a better understanding of high surface area metal alloy catalysts. Specifically, a series of binary catalysts of different atom percents of platinum and ruthenium have been considered.

The crystal structures of platinum and ruthenium were identified, as well as the structure that various alloys create. X-ray diffraction patterns of the alloys were found to contain one crystalline, face-centered cubic (fcc) phase, characteristic of pure Pt. The lattice parameters of various compositions showed a relationship related to Vegard's law. However, since pure Ru is hexagonal closest-packed (hcp), a modified approach had to be identified to model the lattice parameter data. The development of these relationships allowed for the verification and quantification of an amorphous phase, which is likely to have a direct impact on catalyst activity.

EXAMINATION OF PLANT EXTRACTS ON CANCER CELLS. *Clifton Randell*, Crystal Barbee, D. Long, C. Caudle, and E. Lewis Myles, Tennessee State University, Nashville, Tennessee.* Many higher plants produce economically important organic compounds such as oils, resins, tannins, natural rubber, gums, waxes, dyes, flavors and fragrances, pharmaceuticals, and pesticides. However, most species of higher plants have never been described, much less surveyed for chemical or biologically active constituents, and new sources of commercially valuable materials remain to be discovered. Advances in biotechnology, particularly methods for culturing plant cells and tissues, should provide new means for the commercial processing of even rare plants and the chemicals they produce. These new technologies will extend and enhance the usefulness of plants as renewable resources of valuable chemicals. In the future, biologically active plant-derived chemicals can be expected to play an increasingly significant role in the commercial development of new products for controlling microorganisms and cancer. Many higher plants accumulate extractable organic substances in quantities sufficient to be economically useful as chemical feedstocks or raw materials for various scientific, technological, and commercial applications. Natural substances are employed, either directly or indirectly, by a large number of industries, and natural plant products (phyto-chemicals) figure prominently in several of these. Economically important plants serve as sources of industrial oils, resins, tannins, saponins, natural rubber, gums, waxes, dyes, pharmaceuticals, and many specialty products.

CADMIUM ENHANCED MITOGEN-ACTIVATED PROTEIN KINASE ACTIVITY IN VASCULAR SMOOTH MUSCLE CELLS OF HYPERTENSIVE PHENOTYPE. *Shuntae Williams*, JiDong Li, and Benny Washington, Tennessee State University, Nashville, Tennessee.* Cadmium is widely used in industry, causing exposure of workers and environmental pollution because of its persistence in the biosystem. Its very long half-life in the human organism causes its accumulation over the lifetime in liver and kidneys. Cadmium is a heavy metal, and in the body cadmium, as well as other heavy metals such as zinc and mercury, can have adverse effects. It has been reported that cadmium does not have a specific uptake mechanism in the body as, for example, iron or copper. It seems that cadmium ions are taken up through the calcium channels in the duodenum, liver, kidney, and brain. Our preliminary results indicate that cadmium affects mean arterial blood pressure and heart rate in both normotensive and hypertensive rats. We hypothesized that cadmium alters the calcium transient mechanism, thus affecting blood pressure and heart rate in rats. To investigate this hypothesis we exposed primary cultures of vascular smooth muscle cells (VSMCs) to increased concentrations of cadmium (1–8 $\mu\text{g/ml}$) to determine its effect on cell viability and Mitogen-Activated Protein Kinase

(MAPK) activity. The results indicate that cadmium reduces cell viability in a dose-dependent manner and induces MAPK activity in vascular smooth muscle cells from both normotensive and hypertensive rats.

AN ANALYSIS OF PATTERSON WOODS, AN OLD GROWTH FOREST REMNANT IN MONTGOMERY COUNTY, TENNESSEE. **Stephanie M. Gunn*** and **Edward W. Chesler**, *Austin Peay State University, Clarksville, Tennessee*. Patterson Woods is an 8.09 ha (20 acre) parcel in the Dotsonville Community, western Montgomery County, Tennessee. It is one mile north of the Cumberland River and adjacent to and south of Outlaw Branch, a tributary of Blooming Grove Creek, which flows into the River. Various hardwoods dominate the slope forest with individuals up to 102.11 cm (40.2 inch) diameter breast height (dbh). The forest has received little disturbance in the past 50 years; large trees, standing snags, dead wood on ground, random canopy distribution, and a rich herbaceous flora all indicate old growth conditions. The forest was sampled with fifteen 0.04 ha circular plots in 1999. A total of 592 stems with a dbh >2.54 cm (1 inch) were measured; 235 stems were >10.16 cm (4 inch) and 357 were between 2.54–10.15 cm (1–3.99 inches). The average dbh for stems was 29.05 cm (11.44 inches). Oaks (*Quercus*) dominated the canopy with a cumulative importance value (IV) of 138.18 (max. 300), or 46.07% of the total IV. Sugar maple (*Acer saccharum*) (21.69 % of canopy IV) dominated the subcanopy (50.86% of IV) and seedling layer (21% of IV). American beech (*Fagus grandifolia*) also was more significant in the lower strata; oaks were poorly represented as seedlings. Thus, it appears that canopy domination by oaks may change to more mesophytic species such as sugar maple and American beech as natural succession occurs.

CHARACTERIZATION OF THE TRANSCRIPTIONAL REPRESSOR REGION OF *MYC*. **Jamil B. Scott***, **Philip Ganter**, and **William Tansey**, *Tennessee State University, Nashville, Tennessee*. Structural and functional studies of *Myc* have shown that several highly conserved domains of the *Myc* protein are necessary for its transforming activity. Association of *Miz* and *Max* also play an integral role in *Myc* biological activity. Previous studies have identified a novel repressor activity within the C-terminus of *Myc*. The aim of this research was to characterize the region in *Myc* that represses transcription. Mutants that disrupt *Miz* and *Max* binding and a series of scanning deletions (JSD1, JSD2, JSD3, and JSD4), were made within the C-terminus of *Myc*. These mutants were generated using site-directed mutagenesis, transiently expressed in HeLa cells, and assayed for their transcriptional activity. Results indicate that the mutants that disrupt *Miz* and *Max* binding both retain their ability to repress transcription, as well as mutants JSD1 and JSD4. Future work would require the generation of additional mutants to delineate the sequence sufficient for transcriptional repression by *Myc*. (Supported by MARC Grant 5T34 GM07663)

HEMICHOLINIUM-3 INHIBITION OF [3H]-CHOLINE TRANSPORT IN *LIMULUS POLYPHEMUS* BRAIN. **Kistrea Marche' Martin*** and **Michael Ivy**, *Tennessee State University, Nashville, Tennessee*. Abstract not available.

CORTICAL AND SUB-CORTICAL MECHANISMS OF EPILEPTIC SEIZURES: AN IN-VITRO STUDY USING THE

BRAIN SLICE TECHNIQUE. **Bryan Fisher*** and **Hal Blumenfeld**, *Tennessee State University, Nashville, Tennessee*. Abstract not available.

EFFECT OF ACCLIMATIZATION TO SUMMER AND WINTER CONDITIONS ON METABOLIC ENZYME ACTIVITIES IN THE EASTERN RED SPOTTED NEWT (*NOTOPHTHALMUS VIRIDESCENS VIRIDESCENS*). **Emmanuel P. Bessay*** and **Nancy J. Berner**, *University of the South, Seawane, Tennessee*. Eastern red spotted newts acclimatized to winter and summer conditions were collected from Lake Cheston, in Seawane (Franklin County, Tennessee) in July 1999 and January 2000. Metabolic enzymes of liver and skeletal muscle tissues were determined to ascertain the metabolic adaptation of these animals to the significant seasonal temperature changes that occur on the mountain. The enzymes assayed included cytochrome c oxidase (CCO), lactate dehydrogenase (LDH), glutamate dehydrogenase (GDH), carnitine palmitoyl transferase (CPT), citrate synthase (CS) and β -hydroxyacyl CoA dehydrogenase (HOAD). The activities of these enzymes were determined spectrophotometrically at both winter and summer temperatures (8°C and 25°C, respectively) in all samples. We found that for both muscle and liver tissue CCO and CPT appeared to be completely temperature compensated: the activity for winter acclimatized animals at an assay temperature of 8°C was the same as the activity for summer acclimatized animals at an assay temperature of 25°C. The activity of the other enzymes (muscle: CS, HOAD, and GDH; liver: CS, GDH, and LDH) showed no compensation at all: no change in activity between seasons at the same assay temperature. These enzymes usually had significantly higher activity at 25°C than at 8°C for animals acclimatized to the same seasonal conditions for both tissues. There were a few cases where the activity of an enzyme from a winter animal was significantly higher than the activity of that enzyme from a summer animal at the same assay temperature: CCO from muscle at 8 and 25°C; CCO from liver at 8°C; and HOAD from liver at 8 and 25°C. There was very little CPT activity in muscle except in winter animals assayed at 8°C, while CPT activity was more evident in liver tissue homogenates. This may indicate a difference in major energy source between these two tissues and/or that muscle switches to fatty acid metabolism in the winter.

RELATIONSHIPS BETWEEN PRIMARY PHOTOCHEMISTRY AND PRIMARY PRODUCTION IN STREAMS WITH DIFFERING WATER QUALITIES. **Alex S. Flynt**, **Rebecca A. Houtman**, **Candace M. Loreant**, and **Jefferson G. Lebkuecher**, *Austin Peay State University, Clarksville, Tennessee*. Growth and primary photochemistry of a pollution-intolerant alga and primary production of natural photoautotrophic periphyton communities were evaluated in streams with poor and good water qualities. In the stream with poor water quality, photoautotrophic periphyton production was significantly greater. Following in situ growth of the pollution-intolerant alga *Selenastrum capricornutum*, *S. capricornutum* photosystem-II synthesis, photosystem-II photochemical efficiency, and reproduction rate were significantly decreased. The results demonstrate the importance of evaluating physiological properties of pollution-intolerant algae in addition to community primary production when examining the effects of water quality on photoautotrophs.

USING THE SCANNING ELECTRON MICROSCOPE TO IDENTIFY HEAVY METALS IN THE HAIR OF STRIPED

SKUNKS. *Luke West**, *Kenny Smith*, *Hillman Mann*, *Nancy Morris*, and *Charles Snelling*, *Volunteer State Community College, Gallatin, Tennessee*. Road-killed skunks were collected in a specific area of Sumner County, Tennessee, between January and April 1999. Hair from these skunks was obtained, cleaned, and examined for heavy metals using X-ray mapping with the Scanning Electron Microscope (SEM).

WESTERN REGION CHRISTIAN BROTHERS UNIVERSITY MEMPHIS, TENNESSEE

CHANGES IN RAT CRANIAL SUTURE MORPHOLOGY. *Carolyn Jaslow and Brock Lanier**, *Rhodes College, Memphis, Tennessee*. Cranial sutures are joints between the skull bones and their structure reflects patterns of growth and applied forces. To examine the effect of incisor eruption and occlusion on the developing suture, thirty-six rat pups were sacrificed on days one, five, seven, nine, thirteen, seventeen, and twenty-three of life. The skulls of these rats were cleared and stained. Facial sutures of the skulls were measured and the complexity, or interdigitation, of these sutures was quantitatively recorded as the ratio of the length of the suture divided by its end-to-end distance. These measurements can illustrate whether a linear development of interdigitation occurs or if the rate of interdigitation is related to incisor eruption, which begins between days eight and ten, and the start of occlusion, which begins a few days later.

DEVELOPMENT OF MICROWAVE-ASSISTED DECALCIFICATION PROTOCOL: COMPARISON WITH STANDARD TECHNIQUES. *Jarad Braddy** and *S. Frase*, *Christian Brothers University, Memphis, Tennessee, and The University of Memphis, Memphis, Tennessee*. In this investigation, a protocol for the decalcification of the rodent skull, *Mus musculus*, with ethylene diamine tetraacetic acid (EDTA) using microwave technology was developed. This newly developed protocol is described in detail and allows for adequate decalcification to occur in hours, as opposed to the many days required with routine EDTA methods. The preservation of cellular structure in specimens decalcified using this new procedure was evaluated using a control specimen decalcified using routine EDTA procedures. Hematoxylin and Eosin stained slides of both specimens were compared. The specimen decalcified using microwave technology demonstrated preservation of cellular structure equal to or better than that of the routinely decalcified sample. (Supported by Univ. Memphis, Integrated Microscopy Center)

THE ANALYSIS OF VAPORIZED HYDROGEN PEROXIDE PARAMETER USING DESIGN OF EXPERIMENTS. *Karen Hill** and *Dave Vogel*, *Christian Brothers University, Memphis, Tennessee, and Smith & Nephew Orthopedics, Memphis, Tennessee*. The purpose of this project was to determine which process parameters or interaction of parameters were most critical to sterilant concentration in a vaporized hydrogen peroxide sterilizer. The statistical tool, Design of Experiments (DOE), was used to study the interaction of the process parameters. The process parameters studied were: load temperature, load size, chamber pressure, liquid sterilant weight, and transition gas. These process parameters were randomly changed to their high and low

limits while measuring the H₂O₂ concentration. The study demonstrated that the most significant process parameter was load volume. Other factors that had an impact were sterilant weight and chamber pressure.

CLASSIFICATION AND CORRELATION OF NONPYRAMIDAL NEURONS USING MORPHOLOGY AND PHYSIOLOGY. *J. Michelle Chang*, *M. Galarreta*, and *S. Hestrin*, *Christian Brothers University, Memphis, Tennessee (JMC)*, and *The University of Tennessee, Memphis, Memphis, Tennessee (MG, SH)*. The purpose of this study was to determine if a morphological and physiological correlation could be found between pyramidal and nonpyramidal neurons (NP), specifically in NP of the cerebral cortex of fourteen to twenty-one day old rats. The classification of some nonpyramidal neurons also was attempted. By using immunocytochemistry, pyramidal neurons showed the characteristic of having a dominant apical dendrite that passed from the cell body vertically toward the pial surface of the neuron. Nonpyramidal neurons lacked this characteristic feature of the pyramidal cells. In addition, their somata exhibited different sizes and had a variety of dendritic field shapes and few to no dendritic spines. Pyramidal neuron recordings revealed spikes that exhibited accommodation, while NP showed no accommodation. Bitufted and bipolar neurons, one type of NP, exhibited regular spiking patterns and their axon passed through several layers of the neocortex. This distribution pattern may suggest that NP are important inhibitors of neurons in vertical columns of the neocortex. The multipolar neurons, another type of NP, exhibited fast spiking patterns and showed dense local innervations. These data lead to the conclusion that multipolar cells exhibit very powerful inhibition to local areas, whereas bitufted and bipolar cells inhibit neurons in cortical columns. This suggests that the morphology of neurons is an important feature of their function. (Supported by R07-3004-54)

MORPHOLOGICAL INVESTIGATION OF NEUROSPHERES. *Nicole Walker*, *Malinda Fitzgerald*, *Eric Laywell*, and *Dennis Steindler*, *Christian Brothers University, Memphis, Tennessee (NW, MF)*, and *The University of Tennessee, Memphis, Memphis, Tennessee (EL, DS)*. The subependymal zone (SEZ) is a persistently neurogenic structure that lines the periventricular region of the forebrain throughout life. The SEZ contains multipotent neural stem/progenitor cells that are capable of generating neurons, astrocytes, and oligodendrocytes. In vitro, stem/progenitor cells of the SEZ can grow as proliferative, multipotent clones called neurospheres that also are capable of giving rise to the three classes of cells found in the central nervous system. In this investigation, four mouse pup SEZs were extracted, twenty-five clones were obtained, fixed, mounted on stubs, and coated for scanning electron microscopy observation. Some cells were immunolabeled with antibodies against the cell surface and extracellular matrix proteins L1 and tenascin. The neurospheres were found to be around 90 μm in diameter, and the neurospheres assumed different shapes. There were single-cell outgrowths around the periphery. These single cells were around 3 μm in diameter. As for the antibodies, there appeared to be more L1 labeling than tenascin. Future studies such as these should lead to insights into the composition and behavior of these potentially therapeutic sources of neural cells. (Supported by NIH and NINDS)

THE ROLE OF POLYAMINES IN MIGRATION OF CUL-

TURED RETINAL PIGMENT EPITHELIAL CELLS. *Amy Fallon**, *M. E. C. Fitzgerald*, and *D. A. Johnson*, *Christian Brothers University, Memphis, Tennessee (AF, MECF)*, and *The University of Tennessee, Memphis, Memphis, Tennessee (DAJ)*. Studies from this laboratory have shown that polyamines are necessary for the cellular migration of cultured retinal pigment epithelial (RPE) cells. In this study, we investigated the necessity of polyamines for migration through inhibition of ornithine decarboxylase (ODC) and S-adenosylmethionine decarboxylase (SAMDC), two of the rate limiting enzymes of polyamine biosynthesis. Cells were grown to confluence at which point they were treated with difluoromethylornithine (DFMO), diethylglyoxal bisguanylhydrazone (DEGBG), or a combination of the two. Exogenous spermine was added to selected cultures. Treatments were conducted for two days at the end of which a migration stimulus was introduced. Cell migration was determined after the allowance of a six-hour migration period. Migration of RPE cells treated with DFMO was reduced to ~40% of control levels, and the results were reversed to ~96% with spermine addition. In cells treated with DEGBG, migration was reduced to ~35% of control levels, but the ability to migrate was restored to ~70% with the addition of spermine. Treatment of cells with both DFMO and DEGBG inhibited migration ~50%. Migration was restored with concomitant treatment with exogenous spermine. These data reveal the necessity of polyamines in cultured RPE cellular migration. The polyamine-depletion is believed to affect migration through rearrangement of the cytoskeleton. However, further studies are needed to investigate the role of polyamines in greater detail. (Supported by Fight for Sight (AF) and NEI R01 EY0 1655 (DAJ))

THE RESPONSE OF MALE MEADOW VOLES TO THE SCENT MARKS OF FEMALE CONSPECIFICS IN DIFFERENT REPRODUCTIVE STATES. *Danielle N. Lee** and *Michael H. Ferkin*, *The University of Memphis, Memphis, Tennessee*. Meadow voles, *Microtus pennsylvanicus*, like other mammals, use scent marks to convey information about their reproductive state to conspecifics. We predicted the rate of scent marking by female and male meadow voles depends on their reproductive state. We also predicted that the rate of scent marking by and the reproductive state of the donor affects the scent marking behavior of an opposite-sex individual that encounters these marks. We conducted two experiments to address the predictions. In experiment 1, we hypothesized that a postpartum estrus (PPE) female deposits more scent marks than a behavioral estrus (BE) or ovariectomized (OVX) female. In experiment 2, we hypothesized that a male deposits more over-marks on the marks of a PPE female than those of a BE or OVX female. The data from experiments 1 and 2 supported each hypothesis. PPE females appear to signal heightened attractivity to males and males are more responsive to scent marks of PPE females as compared to those of other females. Scent marking by females and subsequent male over-marking may serve to coordinate mating in meadow voles.

AGGRESSIVE INTERACTIONS AND BEHAVIORS OF THREE, MALE WESTERN LOWLAND GORILLAS (*GORILLA GORILLA GORILLA*). *Mandy McGill Tillery**, *J. A. Huggins*, and *H. W. Wofford*, *Union University, Jackson, Tennessee*. This study examined the aggressive interactions among three, male western lowland gorillas (*Gorilla gorilla gorilla*), Tumai, Koga, and Oliver from the Memphis Zoo. Because Koga had

been showing signs of aggressive behavior with Tumai, the oldest gorilla, he (Koga) was the primary subject of the observations. However, any significant aggressive interactions among the other gorillas were documented. The gorillas were observed in their outdoor exhibit in thirty-second intervals for thirty-minute intervals over several days. It was found that Koga rarely made any advances toward either Tumai or Oliver. However, Tumai and Oliver both made aggressive advances toward Koga. Although the harassing behaviors of Oliver toward Koga appeared to be a playful/learning behavior, Tumai's encounters appeared to be in response to aggression. (Facilitated by C. Brady, Memphis Zoo)

PATTERNS OF SELF-ADMINISTRATION IN RATS ACQUIRING NICOTINE ADDICTION. *Mary Cole Taylor*, *Victoria Brower*, and *Shannon Matta*, *Christian Brothers University, Memphis, Tennessee (MCT)*, and *The University of Tennessee, Memphis, Memphis, Tennessee (VB, SM)*. Previous animal models for nicotine addiction do not mimic the human pattern of nicotine exposure through smoking. This could have significant consequence for studies characterizing neuronal changes with chronic use. The purpose of this study was to develop a rat behavioral model that more closely emulated human smoking; i.e., exposure was chronic, intermittent, and motivated. Male rats were allowed to self-administer nicotine with 24 h unlimited access over a 25 day period. Nicotine was self-injected when each rat pressed a bar connected by computer to a pump that injected nicotine into the rat as a rapidly delivered bolus through an indwelling IV catheter. Daily patterns of self-administration were recorded as the number and time of injections. Results demonstrated that, during acquisition, individual patterns varied greatly from day to day, as well as between animals. As maintenance levels and addiction were achieved, these variations decreased. In addition, self-administration during the inactive (sleep) cycle increased. This model more closely resembles the actual patterns of nicotine exposure in smoking humans. (Supported by NIDA DA03977)

CONSEQUENCES OF MULTI-MALE MATING IN FEMALE VOLES. *Aimee S. Dunlap-Lehtilä* and *Jerry O. Wolff*, *The University of Memphis, Memphis, Tennessee*. We conducted an experiment with prairie voles, (*Microtus ochrogaster*), to discern between two alternative hypotheses for the advantages of multi-male mating (MMM) in female mammals. The two hypotheses are that MMM increases the chance of pregnancy and increases litter size, and that multiple copulations, rather than multiple partners, affects litter size and the probability of pregnancy. We recorded the time, number, and sequence of copulations and the male(s) involved. Preliminary results suggest that litter size and probability of pregnancy are not significantly different for females who mated with one or with multiple males.

THE FREQUENCY AND OCCURRENCE OF AGGRESSIVE BEHAVIOR IN A MALE LION-TAIL MACAQUE (*MACACA SILENUS*) POPULATION AND AN EXAMINATION OF THE EFFECTS OF KAVA KAVA (*PIPER METHYSTICUM*) ON AGGRESSION LEVELS. *April Grigg**, *J. A. Huggins*, and *H. W. Wofford*, *Union University, Jackson, Tennessee*. Four male lion-tail macaques (*Macaca silenus*) were observed for a total of ten hours over several days to determine the occurrence and frequency of aggressive behavior among them. The different types of behavior observed were described and categorized as either aggressive behavior or affiliative (friendly) behavior. Also, the

effects of a mild relaxant called Kava Kava (*Piper methysticum*) were observed. The Kava reduced the percentage of aggressive behaviors from 63.1% to 54.6%. It reduced the aggressive acts by all of the subjects except for Johan, the dominant male, and Andre, the subdominant male. Overall, the Kava Kava did have a positive effect on the observed population in regard to aggression. (Facilitated by C. Brady, Memphis Zoo)

FACTORS INFLUENCING NEST SITE SELECTION IN SLIDING TURTLE, *TRACHEMYS SCRIPTA*, IN WEST TENNESSEE POPULATION. *Yelena A. Lapova**, *Bill Gutzke*, and *Don Thomas*, *Christian Brothers University, Memphis, Tennessee (YAL)*, and *The University of Memphis, Memphis, Tennessee (BG, DT)*. Turtles do not provide parental care. Nest location affects survivorship (and gender) of the offspring. The aim of this study was to investigate microenvironmental factors influencing nest site selection in *Trachemys scripta*, the red-eared slider turtle. This study demonstrated that distance of nests from the nearest pond, soil type, amount of vegetation, and elevation influence nest site choice. Most nests were located in areas with high elevation, tall and abundant vegetation, and sandy soil. Turtles may choose high elevations in order to save incubating eggs and young from seasonal or interannual flooding. Abundant vegetation provides shade, presumably lowering nest temperature. This may result in a male-biased sex ratio. Turtles may choose to nest at sites with a certain amount of vegetation in order to balance gender ratio in the population. Tall vegetation also may protect nesting females from predators. Sandy soil likely conserves turtles excavating effort. Nest site selection patterns may have evolved to increase reproductive success of the species. Greater understanding of nest site selection will benefit the preservation of freshwater turtles. (Supported by Dept. Biology, University of Memphis)

A LONG-TERM STUDY OF VERTICAL MIGRATION IN *CHAOBORUS* (DIPTERA: INSECTA) LARVAE: PATTERNS OVER TIME AND THE ROLE OF OXYGEN CONCENTRATION. *Heidi E. Rine** and *David H. Kesler*, *Rhodes College, Memphis, Tennessee*. The aquatic insect larvae of *Chaoborus punctipennis* exhibit diel vertical migration, remaining in deeper waters during the day and ascending at night. This behavior reduces visual predation on the larvae, but incurs costs. For the past 19 years, data were collected over a 24 h period in the fall on water oxygen concentrations and depths of *Chaoborus* larvae in Poplar Tree Lake, Shelby County, Tennessee. We determined the mean depth at which larvae were found during the night and day of each sampling period. There was no consistent change in either mean nighttime or daytime depth over time ($P > 0.22$). We assumed that an oxygen concentration below 2.0 mg/l cannot be tolerated by fish. Comparison of the depths at which this critical oxygen concentration occurred with mean larval depth showed a significant correlation ($P < 0.05$), suggesting that diel vertical migration is driven by fish predation.

DIFFERENTIAL INFLUENCE OF METAL IONS IN THE HUMAN IMMUNODEFICIENCY VIRUS INTEGRASE ACTIVE SITE. *Mohsen Abu-Khudeir* and *Abby L. Parrill*, *The University of Memphis, Memphis, Tennessee*. Previous analyses have shown that the Human Immunodeficiency Virus integrase uses either manganese or magnesium ions to assemble as a stable complex on the donor substrate and to catalyze strand transfer. In contrast, calcium ions support only assembly and cobalt ions support only

catalysis. These metal ions clearly have different impacts on the function of the enzyme. These impacts may be due to minor geometric differences in the inner coordination sphere that propagate into nearby regions of the enzyme structure, thus affecting allosteric sites at which other viral proteins involved in the preintegration complex need to interact. We are concentrating on the influence of metal ions in the integrase active site. The interactions of Mg^{2+} , Mn^{2+} , Ca^{2+} , and Co^{2+} with the active site of integrase were investigated using quantum mechanical computations. Our results indicate that geometric differences induced by these ions are modest, but significant.

DIMETHYLARGININE DIAMINOHYDROLASE ACTIVITY IN MOUSE TISSUE SUPERNATANT. *James Allen**, *Dyette Harper*, and *Ellen Kang*, *Christian Brothers University, Memphis, Tennessee, Lane College, Jackson, Tennessee, and The University of Tennessee, Memphis, Memphis, Tennessee*. Asymmetric dimethylarginine (ADMA) is synthesized by dimethylation of arginine in non-histone nuclear proteins. It is usually disposed of through excretion in the urine and is broken down into L-citrulline and dimethylamine through hydrolysis by dimethylarginine diaminohydrolase (DDAH). The inhibition of DDAH would result in an accumulation of ADMA that would inhibit nitric oxide (NO) synthase. Despite regular dialysis, some patients with chronic renal failure (CRF) still have high levels of ADMA. Characterizing DDAH activity and optimizing the assay were explored as a prelude to testing inhibition of DDAH activity in patients with CRF. Liver, lung, heart, kidney and brain tissues were assayed for DDAH activity while varying the protein amount, incubation time, and substrate concentration in the reaction. The optimizing of the enzyme assays was evaluated based both on the amount of product produced and the specific activity of the enzyme. The kinetic constants K_m and V_{max} were derived using Lineweaver-Burke plots. The kidney K_m value was two-fold higher than in liver, lung, heart and brain. This indicates that there may be two forms of the enzyme DDAH, one requiring twice as much ADMA for maximum activation as compared to the other. The results of the study should allow for the further testing of the inhibition of DDAH activity in patients with CRF. (Supported by Reye's Syndrome Grant Fund)

INTERLEUKIN-17 RECEPTOR KNOCKOUT MICE EXHIBIT REDUCED RESISTANCE TO *KLEBSIELLA PNEUMONIAE* INFECTION. *F. H. Rodriguez**, *P. Ye*, *J. J. Peschon*, *J. E. Shelitto*, and *J. K. Kolls*, *Christian Brothers University, Memphis, Tennessee (FHR)*, *Louisiana State University Health Sciences Center, New Orleans, Louisiana (PY, JES, JKK)*, and *Immunex Corporation, Seattle, Washington (JJP)*. Interleukin (IL)-17 is a pleiotropic cytokine largely restricted to CD4+ T-cells. Since IL-17 can increase the release of pro-inflammatory cytokines, we hypothesized that signaling via the IL-17 receptor is required for in vivo pulmonary host defense against bacteria. To test this, we challenged IL-17R knockout mice or C57Bl/6 controls with intranasally administered *Klebsiella pneumoniae* at 3×10^3 or 10^4 cfu/mouse. IL-17R knockout mice were extraordinarily sensitive to this challenge, and exhibited a much higher mortality than control mice ($P < 0.05$). We found that the absolute neutrophil count (ANC) both in BALF and blood in IL-17R knockout mice was significantly lower at all time points compared to control mice ($P < 0.05$). Lung and spleen histology from IL-17R knockout mice showed significantly more necrosis compared to control mice. These data demonstrate that signaling through the IL-17R

is necessary for lung polymorphonuclear leukocyte recruitment and host defenses against *Klebsiella pneumoniae*. We speculate that relative IL-17 deficiency may in part explain the pulmonary host defect associated with either HIV infection or congenital immunodeficiency of CD4+ T-lymphocytes. (Supported by NHLBI HL62052-01)

TESTING METHODS FOR THE CHARACTERIZATION OF ACRYLIC TYPE COPOLYMERS. *Eric C. Epps* and Daniel A. Lowy, The University of Memphis, Memphis, Tennessee.* One main component of miniaturized reference electrodes (MREs) is the hydrogel-type copolymer matrix, in which the central reference element is imbedded. This copolymer matrix consists of acrylic acid and acrylonitrile, deionized water, and a supporting electrolyte (KCl or a quaternary ammonium salt). In order to obtain reliable and reproducible MREs a series of tests was performed on copolymer samples of various composition. Thus, swelling/dissolution over time was monitored over 62 days for samples stored in de-ionized water or in organic solvents (methanol, acetonitrile, or methylene chloride). Also, drying/evaporation of samples previously immersed in a liquid phase for 7 days was examined in air and vacuum over a time period encompassing two weeks. These tests allow for the determination of the media in which the electrodes can be employed and give an input on the wet/dry storage conditions of MREs.

ELECTROCHEMICAL TESTING OF NONPOLARIZABLE ELECTRODES BASED ON SILVER-SILVER SALT INTERNAL REFERENCE ELEMENTS. *Nicholas I. Buss* and Daniel A. Lowy, The University of Memphis, Memphis, Tennessee.* We prepared nonpolarizable electrodes based on internal reference elements of silver wire coated with a low solubility silver salt immersed in an acrylic type copolymer matrix. Next, we evaluated the stability of their electrode potential. For this, open circuit potential vs. time curves were recorded in chloride solutions in the concentration range from 0.0001 to 3.0 mol/l. Low sensitivity towards chloride ions and protons was determined as being 1.8–5.2 mV/log[Cl⁻] and 0.25 mV/pH, respectively. These electrodes can be used as miniaturized reference electrodes in potentiometric and voltammetric applications. They were employed successfully in both aqueous systems and organic supporting electrolytes (acetonitrile or methanol), without special pretreatment or conditioning being necessary. Special attention was paid to determining the rate at which the electrode can adapt to its changing environment when moved from water to an organic solvent, and back and forth.

SYNTHESIS AND CHARACTERIZATION OF SUBSTITUTED CYCLOPENTADIENYL COBALT DICARBONYL COMPLEXES THAT MAY FORM CHELATES. *Joseph Lovett* and Randy Johnston, Union University, Jackson, Tennessee.* Two different cyclopentadienyl ligands, which have substituents that may chelate to a metal center, were prepared via nucleophilic substitution reactions of a thiol acid chloride and a thiol ether with sodium cyclopentadiene. The sodium or thallium salts of these ligands were isolated and characterized by FTIR. These salts were further reacted with Co(CO)₄I in an attempt to form the corresponding cobalt dicarbonyl derivatives (i.e., (C₅H₄R)Co(CO)₂ where R = C(O)CH₂SCH₃ and C(O)CH₂CH₂SCH₃). The compounds were characterized by FTIR and ¹H-NMR and were found to be impure and air sensitive.

DETECTING PHARMACEUTICALS IN WASTEWATER. *Kahalia Harris*, Patrice Jackson, and Delphia Harris, LeMoyné-Owen College, Memphis, Tennessee.* For years the major focus of environmental analysis and remediation has been devoted to priority pollutants. An emerging concern is the possible impact of Pharmaceuticals and Personal Care Products on the Environment. The first symposium on this topic in the United States will be held at the National American Chemical Society Meeting in San Francisco, March 26–30. Two additional conferences will address this issue in upcoming months. The purpose of this project is preliminary method development for the analysis of wastewater for acetaminophen, caffeine, and ibuprofen using gas chromatography-mass spectrometry.

THE EFFECTS OF TRANSLINE HERBICIDE ON THE SOIL NUTRIENT CONTENT WHEN USED IN THE ERADICATION OF KUDZU VINE. *Deborah Sloan* and Scott Franklin, Christian Brothers University, Memphis, Tennessee, and The University of Memphis, Memphis, Tennessee.* This research is part of a kudzu vine eradication study that has been in progress for several years by the faculty of the University of Memphis. This is a qualitative study of the soil nutrient content of three areas of the Meeman Shelby Forest Biological Center: Payne's Pond, the control site, which had no kudzu vine growing on its banks; the South side of Kudzu Pond, which had kudzu vine growing on its banks that was previously treated with Transline herbicide; and the North side of Kudzu Pond, where kudzu vine grew unchecked. Transline herbicide is a product with the chemical name 3,6-dichloro-2-pyridinecarboxylic acid. Transline is a 'hormone' herbicide that promotes lethally abnormal growth in treated plants. Four soil samples, each containing seven random cores, were collected from each of the 3 test sites. These 12 samples were analyzed for the following: nitrogen, water, pH, phosphorus, potassium, calcium, magnesium, zinc, iron, manganese, and soluble salts. The results were analyzed using the SAS system using a MANOVA procedure. Pillai's Trace statistic for phosphorus levels and pH levels showed significant differences between the three sites. (Supported by Univ. Memphis)

N-BENZYLADRIAMYCINE-14-VALERATE (AD 198) CIRCUMVENTS BCL-2 BUT DOES NOT DIRECTLY INDUCE CYTOCHROME C RELEASE FROM MITOCHONDRIA. *Amanda Frazier* and Len Lothstein, Christian Brothers University, Memphis, Tennessee, and The University of Tennessee, Memphis, Memphis, Tennessee.* Apoptosis is a cellular response to cytotoxic drugs in which cytochrome *c* (cyt *c*) and apoptosis inducing factor (AIF) are released from mitochondria to effect cell death through controlled dismemberment of cell structure. Overexpression of the mitochondrial membrane protein Bcl-2 blocks the release of cyt *c* and AIF. Consequently, Bcl-2 is an impediment to drug-induced apoptosis and is a significant clinical problem in the treatment of cancer. However, apoptosis induced by the doxorubicin analog, AD 198 is unaffected by Bcl-2 through a mechanism which may either inactivate Bcl-2 or circumvent the effects of Bcl-2. The goal of this research project was to determine whether AD 198 could directly induce the release of cyt *c* from mitochondria expressing Bcl-2, and in doing so, circumvent Bcl-2 activity directly. Purified mitochondria from 32D mouse myeloid leukemia cells (C1) and 32D cells overexpressing Bcl-2 (C3) were treated with AD 198 followed by immunological detection of cyt *c* released from the mitochondria. AD 198 was unable to directly induce the release of cyt *c* in C1

cells at levels higher than solvent controls or the positive control betulinic acid, a compound previously shown to directly induce cyt *c* release from mitochondria. These results suggest: AD 198 may be circumventing Bcl-2 by releasing cyt *c* from the mitochondria indirectly or by stimulating the execution phase of apoptosis without the need for cyt *c* release. (Supported by UT Medical Group/Moreton Cancer Research Endowment and Susan G. Komen Breast Cancer Research Foundation)

UPREGULATION OF MDR1 BY MUTANT P53 REQUIRES INTERACTION WITH A CELLULAR PROTEIN. **Amisha Gandhi***, **J. Sampath**, **L. H. Shapiro**, **G. P. Zambetti**, **K. W. Scotto**, and **J. D. Schuetz**, *Christian Brothers University, Memphis, Tennessee (AG), St. Jude Children's Research Hospital, Memphis, Tennessee (JS, LHS, GPZ, JDS), and Memorial Sloan-Kettering Cancer Institute, New York, New York (KWS)*. We have recently shown that endogenous MDR1 (multi drug resistance) gene is up regulated by mutant p53-281G. To determine the mechanism, deletion analysis was performed and revealed upregulation of the MDR1 basal promoter (-107/+30) by p53-281G and other p53 mutants. Further deletions identified a specific region required for upregulation by mutant p53. This region contained an Ets binding site. Loss of the Ets-site (deletion or specific mutation) decreased basal MDR1 transcription. Specific mutation of the Ets-site in the basal MDR1 promoter abrogated transactivation by mutant p53s. However, decreased basal transcription was not responsible for impaired mutant p53 transactivation because MDR1 NFY promoter mutants retain transactivation by mutant p53 despite dramatically reduced basal activity. Previous studies suggested that mutant p53s required and interacted with cellular proteins. Because of these findings, we used in vitro studies to demonstrate p53-281G specifically interacted with the Ets-1 protein in pull-down assays. Cumulatively, these studies suggest that MDR1 activation in vivo by mutant p53s requires the cellular protein Ets-1. (Supported by NIH Grant ES/GM 5851 and American Lebanese Associated Charities)

GENETIC POLYMORPHISMS IN TUMOR NECROSIS FACTOR-ALPHA GENE AND THE DEVELOPMENT OF PREECLAMPSIA—A PRELIMINARY STUDY. **Kathrin L. Brown*** and **Jeffery Livingston**, *Christian Brothers University, Memphis, Tennessee, and The University of Tennessee, Memphis, Memphis, Tennessee*. The purpose of this study was to investigate the relationship between the severity of preeclampsia with the occurrence of the genetic polymorphism in the TNF α gene and the plasma levels of TNF α . In a prospective case controlled study, genetic polymorphisms in the TNF α gene associated with increased TNF α levels were studied in 114 women with severe preeclampsia and 94 normal pregnant controls. Maternal and umbilical cord bloods were obtained at the time of delivery and DNA extracted. Polymerase Chain Reaction (PCR) was performed and separated by gel electrophoresis. Phenotype frequencies were calculated. Plasma levels of TNF α were measured using an ELISA. The mean maternal TNF α plasma levels in preeclamptic patients were not significantly different from control patients. Moreover, there were no differences in phenotype frequencies between the TNF α mutation and the normal phenotype. We conclude that maternal and fetal TNF α polymorphisms may not be associated with severe preeclampsia. In addition, plasma levels of TNF α are not elevated in severe preeclampsia. (Supported by Dept. Obstetrics and Gynecology, UT Memphis)

PLASMA, URINARY, AND SALIVARY 8-EPI-PROSTAGLANDIN F_{2 α} LEVELS IN NORMOTENSIVE AND PREECLAMPTIC PREGNANCIES. **Sean Hunt***, **Elizabeth T. McKinney**, **Reza Shouri**, **Robert A. Ahokas**, and **Baha M. Sibai**, *Christian Brothers University, Memphis, Tennessee (SH), and The University of Tennessee, Memphis, Memphis, Tennessee (ETM, RS, RAA, BMS)*. Objective: To measure and compare plasma, urinary and salivary 8-epi-prostaglandin F_{2 α} (8 isoprostane) concentrations in women with normotensive pregnancies to respective concentrations in pregnancies complicated by preeclampsia. Study Design: Plasma, urinary and salivary 8-isoprostane levels were measured in preeclamptic ($n = 40$), normotensive ($n = 20$), and nonpregnant women ($n = 10$). One-way analysis of variance was used to determine significant differences. Results: Plasma free 8-isoprostane concentrations were increased in women with severe preeclampsia (342 ± 50 pg/ml) compared to nonpregnant (129 ± 17 pg/ml) and normotensive (150 ± 11 pg/ml) pregnant women ($P = 0.003$ and 0.0001 , respectively). Urinary excretion of 8-isoprostane was slightly, but not significantly decreased in preeclampsia (1200 ± 227 pg/ml) as compared to nonpregnant (1625 ± 364) and normotensive pregnant women (2149 ± 432 pg/ml). Salivary concentrations of 8-isoprostane were increased in normotensive pregnancies (496 ± 113 pg/ml) compared to nonpregnant women (150 ± 27 pg/ml) but were not related to preeclampsia (419 ± 96 pg/ml), $P < 0.003$. Conclusions: Free 8-isoprostane concentrations are increased in the plasma of women with severe preeclampsia. Further studies are warranted to determine whether such increases are due to an increase in phospholipase A₂ activity, or in lipid peroxidation, or to a decrease in renal excretion.

LOCALLY STRONG GROUND SHAKING SUGGESTED BY A POSSIBLE LIQUIFICATION FIELD ABOVE THE SALINE RIVER FAULT ZONE IN THE SOUTHERN MISSISSIPPI EMBAYMENT. **R. T. Cox** and **Jeremy McHugh**, *The University of Memphis, Memphis, Tennessee*. Recent field studies, geomorphic analysis, and aligned earthquakes outline a newly recognized Quaternary fault system in the Southern Mississippi Embayment. Eight earthquakes $M > 3$ (two $M > 4$) have been recorded along the Saline River fault zone. At the southeast limit of the fault zone there is a 10 km diameter field of surficial sand bodies that have many of the characteristics of seismically generated sand blows. An electrical conductivity survey of one sand body revealed a linear pattern of anomalously low conductivity running through it. Grain size analysis of another sand body showed a fining-up trend. The diameter of this possible liquefaction field suggests a M 5 to 6 event during the mid to late Holocene.

A RE-EXAMINATION OF HELIACAL RISE AND SET PHENOMENA FOR BRIGHT STARS IN THE MAYAN SKY. **Shabnam Kaderi**, *The University of Memphis, Memphis, Tennessee*. The annual appearance of a bright star on the horizon in the pre-dawn or post-sunset sky is a visual event that constitutes a manifestation of nature's calendar. As a result, such rise-set occurrences were of great importance to ancient civilizations such as the Native-Americans, and were recorded and predicted by early astronomers in order to establish important civil, religious, and agricultural dates in their year. The Maya, in particular, recorded their observations in ancient texts called codices. Mathematical calculations of these dates based on modern astronomy have been made for comparison with the Mayan codices. In the present work, planetarium software is used to simulate heliacal rising and

setting dates of stars in the Mayan sky and the results compared to earlier mathematical calculations and ancient Mayan texts.

MEASURING THE DENSITIES OF SOLAR PROMINENCES.

Lauren E. Mize*, **Thomas E. Holzer**, **Holly R. Gilbert**, and **Robert M. MacQueen**, *High Altitude Observatory, National Center for Atmospheric Research, Boulder, Colorado, and Rhodes College, Memphis, Tennessee*. Solar prominences are semi-stable structures, which appear to protrude off the edge, or limb, of the sun. They can be characterized as cool (5000–6000°K) plasma suspended in the hot (1–2 million°K) solar corona by complex magnetic field structures. Prominences may erupt, resulting in an ejection of material from the sun, but the exact causes of such eruptions are not known. To better understand the structure and activity of solar prominences, we devised a new method of determining their densities. We acquired data from a satellite-borne instrument, which creates images of the sun in extreme ultraviolet wavelengths. Using these images, we measured the intensity of radiation in the region of the prominence and accounted for radiation originating in front of the prominence as well as that originating behind it.

A STUDY OF RAY-LIKE SOLAR CORONAL MASS EJECTIONS.

Elizabeth Serex*, **Holly Gilbert**, **Tom Holzer**, and **Rob-**

ert MacQueen, *High Altitude Observatory, National Center for Atmospheric Research, Boulder, Colorado, and Rhodes College, Memphis, Tennessee*. Coronal mass ejections (CMEs) happen when the sun emits enormous amounts of its mass and energy into interplanetary space. These events, which are not well understood, can occur several times daily, reaching speeds of several hundred kilometers per second. Named for their appearance, ray-like CMEs appear to be physically simpler than other types of CMEs. Using various wavelengths of electromagnetic energy, this study aims to examine some properties of several ray-like events in order to gain insight into understanding the physics of all CMEs.

A GENERALIZATION AND ANALYSIS OF LAMBERT'S Ω -FUNCTION.

Roberto E. Martinez* and **Leigh Becker**, *Christian Brothers University, Memphis, Tennessee*. The Ω -function proposed by Johann Heinrich Lambert was modified into a general transcendental form and studied. Also, the λ^β -function, an infinitely-iterated logarithmic function, and the η^β -function, an infinitely-iterated exponential function (both of base β), were found to be fundamental to the construction of the solution sets of the modified Ω -function. Certain solution sets, however, exhibited unstable and stable equilibria, period-2 and period-4 behavior, and self-similarity upon tetration.