

ABSTRACTS OF PAPERS PRESENTED AT THE SPRING 1989 COLLEGIATE MEETING

EASTERN REGION MARYVILLE COLLEGE

The Relationship of Self-Esteem to Body-image in College Age Females. Laura E. Brock, Maryville College. The objective of this study was to assess the relationship between self-esteem and body-image in college age females. Subjects were 30 female college students whose skeletal structure was estimated and whose height and weight were measured. Each subject's ideal weight was calculated according to a mathematical formula composed by the National Fitness Foundation. Each subject was given the Body-image Silhouette Scale Test, as well as the Gordon Personal Profile Test which was used to assess self-esteem. A point biserial correlation revealed almost no relationship between actual body-weight and self-esteem while a Pearson's r correlation showed a weak, negative correlation between body-image and self-esteem.

Flow Cytometric Deoxyribonucleic Acid Analysis as a Marker of Breast Neoplasia in Humans. James A. Chiverton. This study involved the processing of five human breast tumors which by biological and cytological evaluation were symptomatic for neoplasia. Samples of these tumors were taken and processed with mechanical cell membrane disruptors. The nuclear RNA was then cleared so that it did not bind the DNA fluorescent dye (Propidium Iodide) with which the samples were next treated. The resulting suspension was analyzed by a Varian T-60 Flow Cytometer. The DNA content of the cells, measured in fluorescent units, was arranged in a histogram which facilitated isolation of the various stages of the cell cycle. All sample findings confirmed the earlier lab reports as they were all found to contain aneuploid DNA populations. Statistical analysis included proliferation rate (P.R.), DNA index (DI), aneuploid DNA content (ADC); and the Coefficient of Variance (CV), gave an idea of the quality of our work results. Forty percent of the samples had coefficients of variance which were indicative of high resolution flow cytometry. In addition to these experiments, a literary search suggested that the value of flow cytometry as a diagnostic tool for human solid tumors is at present limited because of its novelty; however, such findings provide optimism and enthusiasm for clinicians and investigators as they inspire

better and more definitive techniques.

Improving the Detection of Deception by Attending to Vocal Cues. Mary Coleman. A videotape containing true and false messages from three male and three female speakers was shown to 31 female college age subjects. The subjects were split into four groups and given different instructions. Three groups were told to pay attention to different vocal cues (voice pitch, speed of speech and non-fluencies), and the fourth group was used as a control and not told to pay attention to anything. The purpose of this procedure was to determine if one vocal cue would be more helpful than another. There was no significant difference among groups. It was found that subjects identified female speakers who were telling the truth more accurately than female speakers who were lying. There was no difference in the subject's accuracy when judging truth or lying when the speakers were male.

Comparative Study of Effects of Heavy Metals in Soils, After Application of Sewage Sludge and Cement Kiln Dust-Amended Sludge. Sabine Hutchison, Maryville College. Municipal sewage sludge has the potential to be used as an agricultural fertilizer. The process of sewage sludge applications to agricultural lands may result in numerous advantages and disadvantages. Heavy metals in the sludge may accumulate in the soil; this accumulation may reach toxic levels. The addition of Cement Kiln Dust (CKD) as a lime stabilizer to the sludge may alleviate the harmful effects of such metals. Equivalent concentrations of sludge and CKD-amended sludge were applied to two soil types, based on percent solids of the sludge. A Diethylenetriaminepentaacetic acid (DTPA) extracting solution was used to determine the percent extractable metals from the soil. Atomic absorption is used to determine the concentration of Cu, Cd, Pb and Zn in the soil. The percent extractable metals was found to be significantly lower in the soils which were treated with CKD.

Statistical Analysis of Gross Motor Skills and Fine Motor Skills of Pre-school Children. Jane Kittrell, Roane State Community College. 1. Students entering this program were found to be significantly delayed in fine motor skills by about 8 months. 2. Students entering this program were found to be significantly delayed in gross motor skills by

about 9 months. 3. There is no significant difference between males and females in gross motor skills or fine motor skills. 4. There is a significant difference between the amount of delay in gross motor skills between those identified before 30 months of age and those identified after 30 months of age. Those identified at the earlier age were significantly more delayed. 5. There is no significant difference between those who were identified before 30 months of age and those who were identified after 30 months of age in fine motor skills. 6. There is no significant difference between percent of delay at initial testing and the percent of delay after one year in the program in either gross or fine motor skills.

Personal Reflections on Human Malaria. Lloyd D. Le Pagè, Lee College. In the race to find a vaccine for malaria, scientists have often overlooked major problems faced in fighting malaria. This paper attempts to review some of these problems as well as give the viewpoint of the Third World from the opinion of the author who was raised in Africa. Major problems overlooked are finances, overpopulation, lack of research, lack of cooperation, lack of skilled personnel, poor field conditions, resistance of *Anopholes* mosquitoes and *Plasmodium* spp. In conclusion the author gives his personal contact with malaria.

Electromorphs of Glucose-6-Phosphate Dehydrogenase and Isocitrate Dehydrogenase from Vitrinizonites latissimus (Lewis). Gregory A. Snyder, Lincoln Memorial University. Polyacrylamide gel electrophoresis of whole body tissue extracts from nine individuals of the land snail *Vitrinizonites latissimus* (Lewis), glassy grapeskin, was performed. The specimens were collected at Coweeta Hydrologic Laboratory, Otto, N.C. Two enzymes, glucose-6-phosphate dehydrogenase and isocitrate dehydrogenase were investigated. From this sample, glucose-6-phosphate dehydrogenase was found to be represented by two electromorphs. Isocitrate dehydrogenase was found to be represented by one.

Synthesis of Phospholidine Sulfates for Hammett Correlation Studies. Angela Turner, Maryville College. A series of phospholidine sulfates was synthesized from various anilines and (2R,4R,5S)-(+)-2-Chloro-3,4-dimethyl-5-phenyl-1,3,2-oxazophospholidine 2-sulfide in tetrahydrofuran for Hammett correlation studies. The anilines used were: Aniline; *para*-Anisidine; *N,N*-Dimethylphenylene diamine; and *para*-Nitroaniline. The starting materials for each synthesis were purified by distillation. Each synthesis took approximately 24 hours to complete, 12 for the production of the nucleophile, and 12 for the production of the phospholidine sulfate. Each synthesis had a percent yield of forty-five percent or greater. The final compounds

were characterized by infrared spectroscopy.

MIDDLE REGION TENNESSEE STATE UNIVERSITY

Aqueous Preparation of Clotrimazole as an Amoebistatic Agent for Acanthamoeba Castellanii (T87). Jannet Ajala and Gus Tomlinson, Tennessee State University. *Acanthamoeba castellanii* (T87) were grown in a sterile proteose peptone-glucose medium at 30°C until log phase cells reached 6×10^5 /ml. Trophozoites were inoculated into fresh growth medium at 10^4 cells/ml after which sterile clotrimazole in aqueous solution ranging in dosage from 50 ng to 150 µg/ml was added aseptically. Cell counts were made via Coulter ZM cell counter on alternate days for 7 days. Cell viability was determined via methylene blue staining of trophozoites. Controls received sterile isotonic saline. Cultures receiving 500 ng/ml or less of clotrimazole grew at essentially the same rate and final cell density as the controls, while cultures receiving 1 µg/ml or higher did not grow beyond the initial inoculum. Methylene blue staining of the latter cultures indicated that 1 µg/ml or higher treatment with aqueous clotrimazole was amoebicidal as well as amoebistatic. These studies showed that it is unnecessary to employ high concentrations of clotrimazole suspensions in ethanol or water for effective amoebistatic use due to the relatively insoluble characteristics of clotrimazole in the solvents. Its slight solubility in water (0.5 mg/ml) is more than adequate to allow even injectable solutions which would be efficacious due to the level of sensitivity that *Acanthamoeba castellanii* shows for clotrimazole. Support for this work under NIH Grant 3 S06 RR08092 and NSF Grant RII-8704133 is gratefully acknowledged.

Earthquake Hazard in the North Middle Tennessee Area. James A. Biddle and D.M.S. Bhatia, Austin Peay State University. This paper considers the impact of a strong earthquake (Richter surface wave magnitude 8.3 or higher) originating along the New Madrid Fault on the North Middle Tennessee area, and particularly on Montgomery County. An earthquake of magnitude 8.3 along the fault is likely to produce moderate to severe damage in the Montgomery County area; however, the possibility of such a quake is quite remote (less than 1.0% by the year 2000 A.D. and less than 4.0% by 2035; Nava, 1985). The information gained in this study is being provided to area residents in a condensed and logical form on which they can base their evaluations and decisions regarding earthquake hazards.

The Effects of Metronidazole and Sulfanilamide on Growth Rate of Acanthamoeba castellanii (T87). Kim Clifford and Gus Tomlinson, Tennessee State University. *Acanthamoeba castellanii* (T87) were grown in a sterile

proteose peptone-glucose medium at 30°C to a cell density of 6×10^5 /ml. Log phase cells were inoculated into fresh growth medium at 10^4 cell/ml after which sterile metronidazole or sulfanilamide ranging in dosage from 1 to 500 µg/ml was added aseptically. Cell counts were made using a Coulter Zm cell counter on alternate days for a total of 7 days. Cell viability was determined via methylene blue staining of trophozoites. Controls received sterile isotonic saline. For metronidazole cultures, the growth rate and final cell concentration exceeded that of the controls. No inhibition of growth occurred even in cultures receiving 500 µg/ml of metronidazole. Tests to determine if metronidazole might be breaking down in the growth medium to provide carbon and nitrogen sources to enhance growth were carried out. No such effects of culture medium on metronidazole could be demonstrated for tests run up to 10 days. For sulfanilamide cultures, the growth rate and final cell concentration were only slightly less than for the controls, even at drug dosages as high as 500 µg/ml. Again, no cultural effects on sulfanilamide could be demonstrated for up to 10 days. Therefore, neither metronidazole nor sulfanilamide proved efficacious as amoebistatic or amoebicidal agents against *Acanthamoeba castellanii* (T87). Support for this work under NIH Grant 3 S0 6 RR080892 and NSF Grant RII-8704133 is gratefully acknowledged.

Screening for Calmodulin-binding Proteins in Leishmania tropica. Angela Howard and A. Adibi, Tennessee State University. This study looked at the distribution of calmodulin-binding proteins in the promastigotes of *L. tropica*. Promastigotes of the organism were grown at room temperature in M-199 medium supplemented with 10% fetal bovine serum and penicillin-streptomycin. Cells were harvested at log phase, washed twice in cold PBS and counted in a hemocytometer. Cell pellet was resuspended in 0.25M sucrose solution and lysed in Dounce type tissue homogenizer. Lysate was used to prepare lysosomal/mitochondrial fractions by differential centrifugation. Membrane fraction was prepared by step gradient using 1.11M, 1.52M and 1.75M sucrose. Cell lysate for membrane fraction was layered on the discontinuous gradient and centrifuged at 42,000g. Calmodulin was iodinated by the lactoperoxidase method using ^{125}I . Reaction mixture was passed through sephadex G-10. Fractions were collected and aliquots of these fractions were counted in a gamma counter. The peak count was used in gel overlay technique for location of calmodulin-binding proteins. Gel overlay was done by resolving whole cell lysate, lysosomal/mitochondrial fraction and membrane fraction in SDS-PAGE. The gel was fixed, washed and reacted with approximately $4-5 \times 10^6$ cpm of iodinated calmodulin in the presence of calcium chloride.

The gel was washed again, stained in coomassie blue, destained, dried and exposed to x-ray film. Results obtained from the autoradiogram showed that promastigotes of *Leishmania tropica* have four visible bands representing calmodulin-binding proteins. Two of these bands were located in the lysosomal/mitochondrial fraction; one band was visible in the lane loaded with the membrane fraction.

Growth Rate Analysis of Soybean Suspension Cultures in Sodium Chloride and PEG. Tonya Howard, John Jenkins, E.L. Myles and P.S. Kahlon. Soybean is a very important agricultural crop, and probably the most important legume crop in the United States. It is rich in both oil and protein which broadens its uses to both agriculture and industry. Increasing soil salinity and prolonged drought conditions can threaten this crop. Our studies involved the use of *in vitro* techniques to identify more tolerant soybean strains. To screen for water stress, 15 and 20% Polyethylene Glycol (PEG), with a molecular wt. of 8000, was added to Murashige and Skoog (1962) media supplemented with 2 mg per liter 2,4-Dichlorophenoxy acetic acid. To screen for salt stress, 0.2, 0.4 and 0.6% Sodium Chloride (NaCl) was used in Murashige and Skoog's media. The growth rate of cultivar Hill was measured weekly. The results show that cells grown under water stress grew 60% less than the control group and cells grown under salt stress grew 55% less than the control group. Other experiments of this nature will be performed to evaluate other cultivars of soybean for their tolerance to water and salt stresses.

Dose Response of Acanthamoeba Trophozoites and Cysts to Ketoconazole. Simon Idiare and Gus Tomlinson, Tennessee State University. *Acanthamoeba castellanii* (T87) were grown in sterile proteose peptone-glucose medium at 30°C until log phase cells reached 6×10^5 /ml. Trophozoites were inoculated into fresh growth medium at 10^4 cells/ml after which sterile ketoconazole in aqueous solution ranging in dosage from 1 to 500 µg/ml was added aseptically. Cell counts were made via Coulter ZM cell counter on alternate days for 7 days. Cell viability was determined via methylene blue staining of trophozoites and cysts. Controls received sterile isotonic saline. Cultures of trophozoites receiving 5 µg/ml or less of ketoconazole showed substantial growth, while cultures receiving 8 µg/ml or more showed no cell proliferation above inoculation levels. Cultures of cysts receiving 4 µg/ml or less of ketoconazole showed a lag phase of 3 days (same as the controls) and then excysted and grew. Cultures of cysts receiving 7 µg/ml or more of ketoconazole did not excyst and did not show cell growth above the level of inoculation. It was concluded from these results that a ketoconazole dose between 5-8 µg/ml is the minimum effective treatment to prevent excystment

and/or cell proliferation of *Acanthamoeba*. Thus, ketoxonazole is an effective amoebistatic agent for *Acanthamoeba* in dosages that are well tolerated by humans who suffer from keratitis or meningoencephalitis associated with this organism. Support for this work under NIH Grant 3 S0 6 RR080892 and NSF Grant RII-8704133 is gratefully acknowledged.

An Attempt to Establish a Resident Flock of Mallard Ducks, Anas platyrhynchos, in Northern Middle Tennessee. Edward H. Martin, Jr., Belmont College. Five hundred and sixteen day-old mallard ducks were purchased and brooded for seven weeks until release into the wild in an attempt to establish a mallard population that will breed and remain in middle Tennessee throughout the year. Goals are to produce a "wild" population, that will eventually be self-sustaining, in numbers large enough to enhance hunting on the state-controlled Cheatham Lake Waterfowl Management Area. Major concerns include care of the flock until release, reduction of predation, optimum age for release, tracking hunter harvest, and ways to improve nesting success. Patterns of movement and interaction with migratory birds are observed throughout.

The Effects of Fluconazole on Leishmania tropica. Clarissa Nelson and A. Adibi, Tennessee State University. The effects of fluconazole on the growth and gene expression of *Leishmania tropica* promastigotes was studied. The organism was grown at room temperature in M-199 medium supplemented with 10% fetal calf serum and penicillin-streptomycin. Fresh medium containing different concentrations of fluconazole were inoculated with cells at log phase to a concentration of 10^5 cell ml^{-1} . Growth was monitored every day for 5 days by counting aliquots of the cultures in a hemocytometer. Aliquots were also centrifuged, washed and used in SDS-PAGE. Fluconazole at concentrations of 5, 10, 20 and 30 $\mu g ml^{-1}$ was effective in decreasing the number of *L. tropica* promastigotes in culture. This effect was directly proportional to the concentration of fluconazole. There was no effect on gene expression as shown by the protein profiles. Fluconazole in culture medium led to change in morphology of the promastigotes from the normal elongated cells to round cells. This was more pronounced at 30 $\mu g ml^{-1}$ of fluconazole. Cells that were washed and resuspended in culture medium regained their normal morphology.

Lake Trout Studies at Kagati Lake, Togiak National Wildlife Refuge, Alaska. David Y. Parker, Jr., David Lipscomb University. A study of lake trout at Kagati Lake, Togiak National Wildlife Refuge, Alaska was begun in 1988. This paper contains preliminary findings from a population study that will encompass two or three

years. Prior to this study, no Southwest Alaskan lake trout population of significant size had been studied. Gill nets and hand-held rods were used to capture the fish, with the rods proving much more effective. At the conclusion of the first study season, 169 lake trout had been captured, marked, and released. The average fork length for all of the sampled fish was 48.5 centimeters and the average weight was 1598 grams. Several of the fish captured showed signs of parasitism and disease. The inability to capture young fish indicated that they must remain secluded until they mature and become able to fend for themselves.

The Floating Vascular Plants of Old Farm Ponds in Land Between the Lakes, Kentucky and Tennessee. Lance Richardson and Edward W. Chester, Austin Peay State University. The floating vascular plants of old farm ponds in Land Between the Lakes (LBL) was documented during the summers of 1987-88. LBL, a 170,000 acre tract, has been in public ownership and managed by the Tennessee Valley Authority as a conservation-education-recreation area since the middle 1960s. Before then, it was mostly used for farming and old, mostly small, farm ponds are frequent. Ponds for study, randomly selected from topographic maps, included 33 in Stewart Co. (TN), 24 in Lyon Co. (KY), and 48 in Trigg Co. (KY). Of the 105 ponds visited, 26 were without water and 36 of those with water did not harbor floating vascular plants. Frequency and coverage for species in the 43 ponds with floating plants gave an importance value for assessing dominance. Fifteen species were found to comprise the floating vascular flora. Pondweed (*Potamogeton diversifolius*) was most frequent (21 ponds). Other true-floating species appearing in two or more ponds included water-shield (*Brasenia schreberi*), nelumbo (*Nelumbo lutea*), and watermeal (*Wolffia papulifera*). Such species as spikerush (*Eleocharis acicularis*) and water-primrose (*Ludwigia palustris*), which are rooted plants normally found as emergents, were often detached, floating, and hence contributed to this flora.

The Effects of 5,7-DHT on Nerve Cells and Fibers in the Abdominal Ganglia of Limulus. Chelsea Smartt, Tennessee State University. 5,7-Dihydroxytryptamine (5,7-DHT) is a neurotoxic analog of serotonin and has been used to study the effects of this neurotransmitter in animal systems. In this study *Limulus* abdominal ganglia were treated, *in vitro*, with 4 mg/ml of 5,7-DHT for 24 hours. The tissues were sectioned, stained and viewed at the light and electron microscope levels. Light microscopy observations revealed no notable changes in ganglionic cells which we would conclusively attribute to the treatment, although preliminary results showed some lack of structure in cells. Electron microscopic observations revealed some processes in the neuropil which showed differences and loss of structure. Use of

Spurr low viscosity medium permitted loss of some fine structure thus making evaluation of the drug treatment difficult. These preliminary results point to a need for further study in order to more fully evaluate the effects of 5,7-DHT on the morphology and fine structure of neurons on *Limulus* abdominal ganglia.

Objective Assessment of Commercial Hen Egg Shell Strength: Effect of Size and Correlation with Internal and External Variables. T.E. Swanson, K. Vo, S.L. Godwin, N.N. Ekhaton and R.J. Coppings, Tennessee State University. Egg shell damage represents an economic loss to the poultry industry. This study was undertaken to validate a procedure for quantifying the shell strength of hen eggs. Twelve each of medium, large, extra-large, and jumbo eggs were collected on the day of the experiment from hens (H&N) in their first (young) or second (old) production cycles. Two replications were performed. Shell strength (SS) was determined using a Model 4201 Instron Universal Testing Machine equipped with a 4 sq. inch compression anvil and 10° spherical recess plate (50 kg compression load cell; 20 mm/min bar speed). Peak force (kg) was recorded. Following analysis of variance, replicate data were pooled. Specific gravity (SG) tended to decline as egg size increased. SG of eggs from old hens was less than those from young hens. Medium eggs from young hens exhibited a lower SS value (3.400) than larger eggs. Neither mean shell thickness (STH) or SS of eggs from old hens varied with egg size. Yolk index (YI) tended to increase with egg size in young hens, while YI were greater in medium and large eggs from old hens, as were Haugh unit means. Percent albumin increased with egg size while percent yolk and shell declined. SS values were positively correlated with SG, shell weight (SWT), and STH. SG was negatively correlated with egg size variables. Regression analysis yielded the prediction equation $SS = 37.82 SG + 13 SWT - 38.41$. It was concluded that SS of commercial eggs can be quantified using the Instron. Moreover, SS values did not vary consistently with age of hen or size of egg but were closely related to SG and egg SWT.

WESTERN REGION

CHRISTIAN BROTHERS COLLEGE

Human Recombinant Interleukin-1 Beta Increases Stromelysin in Bovine Chondrocytes. Timothy S. Baker, Christian Brothers College. It has been postulated that chondrocytes may play a role in the degradation of their own matrix during the early stages of collagen-induced arthritis. We have demonstrated that bovine chondrocytes, upon exposure to interleukin-1 beta, increase stromelysin production approximately 81% at 10 U/ml, using laser densitometric quantitation. Our probe was an antibody made against a synthetic peptide

produced from a 22 amino acid sequence of the carboxy terminal of rat transin. Upon probing, two immunodominant bands appear at 59 Kda and 53 Kda which show caseinolytic activity in substrate gels. Following APMA activation, this doublet appears to shift its molecular weight to 48 Kda and 50 Kda which possess caseinolytic activity, and is the apparent activated form of bovine stromelysin. Antibody specificity was shown by removing the latent form from supernatants with casein bound sepharose, and correlating disappearance or re-appearance of the doublets on westerns and substrate gels. Normal phenotypic expression of the chondrocytes was shown by type II collagen production.

A Systematic Survey of the Sarraceniaceae. Kenneth M. Cameron, Rhodes College. Representatives of all species within the three known genera of the carnivorous pitcher-plant family Sarraceniaceae, *Sarracenia*, *Heliamphora*, and *Darlingtonia*, were systematically examined and compared both inter and intragenerically. Characters used in these comparisons included geographical distribution, ecological habitat, karyotype patterns, hybrid crosses, leaf, pollen, flower, wood, and seed morphology, and flavonoid, digestive enzyme, and petal extract analysis. The family was further analyzed for phylogenetic relationships with the use of several computer programs, including Dollo, Sokal, and PAUP. The family was found to be composed of at least fifteen species, eleven varieties or subspecies and nine forms. The genus *Heliamphora* was found to be quite distantly related to the other two genera of the family, and a new tribe, Heliamphoreae, within the existing family was proposed to recognize the disparity.

Selected Plant Extracts Inhibit Growth of Food-borne Pathogenic Bacteria. King-Thom Chung, William R. Thomasson and Christine D. Wu-Yuan. The report that selected plant extracts could inhibit the growth of cariogenic *Streptococcus mutans* and various periodontopathic oral bacteria such as *Bacteroides gingivalis*, *B. intermedius*, and *Actinomyces viscosus*, prompts us to examine whether similar types of plant extracts will inhibit the growth of common food pathogens. Among the six kinds of plant extracts tested, we found by using the well assay technique that three of them inhibited the growth of *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Escherichia coli*, *Shigella flexneri*, *Streptococcus faecalis*, *Salmonella paratyphi*, *Salmonella enteritidis*, *Enterobacter aerogenes*, *Pseudomonas fluorescens*, *Proteus vulgaris*, *Alcaligenes faecalis*, and three strains of *Listeria monocytogenes*. Two of these three extracts suppressed the growth of *Listeria monocytogenes* Scott A in cabbage juice. It was found that this inhibition could be prevented by the addition of protein. The potential of using plant extracts for

controlling the growth of food pathogens seems feasible.

Effects of Ascorbic Acid on the Firing Rate of Single Units in the Nucleus Accumbens. Chris Gafford and Anthony Moretta, Christian Brothers College. Male Sprague-Dawley rats were anesthetized and fixed into a stereotaxis. Ascorbic acid was then administered interperitoneally (1000mg/kg). Firing rates of single units in the nucleus accumbens were measured using glass/epoxylite electrodes. In about one half of the experiments, ascorbic acid caused the firing rate of single units to increase while a decrease in firing rate was noticed in other trials. Thus, it is suggested that ascorbic acid has the same effect on the nucleus accumbens as does neostriatum.

Isomorphism of Neural Network Dynamics. Max Garzon and Ming Zhang, Memphis State University. The dynamics of an n -cell neural network N with real weight matrix $A=[a_{ij}]$ and activation vector b can be represented by a dynamics graph with 2^n nodes in either parallel or sequential iteration. Neural networks with different weights and thresholds may give rise to exactly the same dynamics graph. These networks are called *strongly isomorphic*. The purpose of this paper is to give necessary and sufficient conditions for strong isomorphism of neural networks. Definition. Let \leq_1 be a fixed index ordering for the weight sums $a_{ij_1} + a_{ij_2} + \dots + a_{ij_k}$ ($1 \leq j_1 < j_2 < \dots < j_k \leq n, k=0,1,\dots,n$) of each cell i . The relation matrix of the neural network N is the $n \times 2^n$ Boolean matrix $[e_{ij}]$ given by $e_{ij}=0$ if the j^{th} weight sum of cell i is less than b_i ; 1 otherwise. Theorem. Neural network dynamics in parallel iteration are strongly isomorphic if and only if they have identical relation matrices. The condition is sufficient for sequential iteration. This result makes possible to obtain canonical forms for finite neural networks and, in particular, faster computer simulations via implementation of their canonical forms.

Wild Rodents as Reservoirs of Pneumocystis carinii. Rick Hammond, Stan Eisen, Linda Pifer, Christian Brothers College. In past years, cortisonized laboratory rats served as a *Pneumocystis carinii* reservoir which yielded multitudes of the organism for research. Within the last five years, these rats have failed to provide sufficient amounts of *P. carinii* because of their purity of virus and bacteria. In a search for a new host to serve as a reservoir for this organism, wild rodents of the Memphis area were trapped and tested. This hypothesis was initiated by a study in which Morjon et al. (1986) were positive for *P. carinii*. In a survey of wild rodents in the Memphis area, it was found that of the 78 animals tested, four (5.1%) were positive for the *P. carinii* organism. Of these rodents, three were males and one was female. The percent infection is slightly higher than that attributed to the fewer number of animals tested. Using a scale that varied from

zero to five, all of the positive rodents had a degree of infection rating of 1, which indicated that the infection level was almost insignificant. Therefore, it is apparent that wild rodents in the Memphis area do not present *P. carinii* in a significant enough amount to be considered as an alternative source for the organism in research.

Plasticity in the Somatosensory Cortical Barrels in Reeler Mutant Mice. Bud Jackson, Christian Brothers College. It has been well documented that during early postnatal development in both reeler normal and reeler mutant mice lectin to surface binding delineates prospective normal and abnormal barrels, respectively, as they will appear in the adult somatosensory cortex (Steindler, Cooper, 1988). In this study, the somatosensory cortical barrel field was studied in reeler normal and reeler mutant mice on Nissl and fiber stained sections. "This experiment was performed in much the same manner as done by O'Brien, Steindler, and Cooper (1987)." In addition, I chose to use these established techniques to determine whether or not plasticity (i.e., ability for an organ or organism to regain function by either regeneration of self or regain function by compensation of peripheral elements) occurs in the somatosensory cortical barrel field of the reeler mutant mouse as in that of the reeler normal mouse. Finally, after examination of flattened tangential sections of both normal and mutant brains, I have concluded that plasticity is indiscernable in the reeler mutant somatosensory cortical barrel field.

The Effect of Oleic Acid on 3-Hydroxy-3-Methylglutaryl Coenzyme A Reductase in Rat Hepatocytes. Bradley Jones, Christian Brothers College. The effect of oleic acid on the activity of 3-hydroxy-3-methylglutaryl Coenzyme A reductase has previously been studied in the perfused liver of rats; however, it is impossible to keep the perfused liver long enough to study the mechanism whereby HMG-CoA reductase activity is increased. Therefore, it is advantageous to study the effect of oleic acid in rat hepatocytes since they can be kept for an indefinite amount of time and since the effect can be studied in a particular cell (the parenchymal cell) instead of all the cells present in the intact liver. Hepatocytes were determined to be capable of showing similar results as in the perfused liver since oleic acid stimulation increased HMG-CoA reductase activity over a period of time in comparison to those hepatocytes without oleic acid stimulation.

The Enthalpy of CO Dissociation from Molybdenum Hexacarbonyl Using Photoacoustic Calorimetry. James M. Morse, Jr. and Theodore J. Burkey, Memphis State University. The enthalpy of carbonyl dissociation from molybdenum hexacarbonyl in alkane solvent can be determined using an experimental technique called

photoacoustic calorimetry (PAC). A value of 31.2 kilocalories per mole was found for the enthalpy of carbonyl dissociation from molybdenum hexacarbonyl in heptane. This disagrees with the literature value of 40 kilocalories per mole for the molybdenum carbonyl bond strength. We believe that this 8.8 kilocalories is accounted for by an agostic bond between heptane and the molybdenum pentacarbonyl.

The Copper, Lead, and Organic Content of Selected Shallow Sediments of Reelfoot Lake, Tennessee. Douglas Phillips and W.A. Sliger, University of Tennessee at Martin. This study was to determine the vertical distribution of copper and lead in the shallow sediments of Reelfoot Lake and to determine the organic content of these sediments. Cores from four selected shallow water sites were analyzed. The copper and lead concentrations were low and ranged from 0.003 to 0.045 mg/g. The data supported a random distribution with no discernable vertical stratification. The organic content of the sediment ranged from 2 to 120 mg at the four sites. The sites with unconsolidated sediments showed the highest organic carbon content. The sediment at the sites with a high sand and clay content showed a lower amount of organic carbon.

The Regulation of 3-Hydroxy-3-Methylglutaryl Coenzyme A Reductase in the Presence of Mevinolin. Tamela P. Powell, Christian Brothers College. C100 is a baby hamster kidney cell line adapted to grow in high levels of the 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase inhibitor mevinolin. In the presence of the drug mevinolin, C100 cells overexpress HMG-CoA reductase mRNA levels, providing a convenient method of studying HMG-CoA reductase, the key regulatory enzyme of cholesterol biosynthesis. In such studies, C100 cells are routinely grown in the presence of 5 μ M mevinolin for five days. In order to determine if treatment of C100 cells with 5 μ M mevinolin is sufficient to maximally express HMG-CoA reductase mRNA levels, two sets of C100 cell aliquots were treated with dosages of mevinolin ranging from 5 μ M to 125 μ M. In addition, to determine if treatment of C100 cells with mevinolin for five days is necessary for maximal expression of HMG-CoA reductase mRNA levels, RNA was harvested from one set of C100 cells 24 hours following addition of mevinolin and from the other set after 48 hours. Northern blot analysis of RNA harvested from the two sets of C100 cells indicated that HMG-CoA reductase mRNA levels were maximally expressed after treatment with 5 μ M mevinolin for 24 hours.

Smoking: How Heritable is the Habit? Marsha L. Raus, Christian Brothers College. The goal of this project was to estimate the heritability of the smoking habit in humans. A group of families was sampled and analyzed. Smoking

was found to be heritable to a small degree. The heritability index was found to be 0.145. This is a low heritability and it indicates a limited amount of genetic influence in smoking.

Hepatic SGOT and SGPT Blood Levels Following Increasing Dosages of Radiation to a Liver Volume Greater Than Two-Thirds. Bert Russell, Christian Brothers College. Studies of 102 patients between the ages of .4 and 16.9 years were conducted at St. Jude Children's Research Hospital to determine the serum glutamate-oxaloacetate transaminase (SGOT) and serum glutamate-pyruvate transaminase (SGPT) levels following radiation therapy (RT). Patients were on one of four protocols where subsequent liver irradiation incurred for treatment of cancer. Radiation dosages were grouped into three categories: 300-550, 550-800 NSD groups. However, the 800+ NSD group never showed a marked increase to a peak, but remained relatively stable throughout the 6 months post RT.

Density-dependent Injury in Larval Salamanders. Raymond D. Semlitsch and Steven B. Reichling, Memphis State University. The effects of initial larval density, food level, and pond drying regime on intraspecific aggression of larval *Ambystoma talpoideum* were studied in an artificial pond experiment. Aggression was measured by the frequency of injury of feet, limbs, and tail. Initial larval density had a significant effect on the frequency of foot, limb, and tail loss. More larvae reared at medium and high densities sustained injuries than larvae reared at low densities. Food level had no effect on the measures of injury. Pond drying regime had no effect on foot or limb loss, but more larvae reared in constant water level ponds had tail loss than in drying ponds. The frequency of limb and tail loss was negatively correlated to density-dependent survival which was the result of intraspecific predation. These results indicate that substantive levels of body injury can occur at high natural larval densities and may result in a subsequent reduction of growth and survival.

Restriction Mapping of the rRNA Gene Repeat of Loxosceles Reclusa. Kelly Sullivan, Christian Brothers College. A recombinant phage (E14) that contained a portion of the DNA of the brown recluse spider (*Loxosceles reclusa*) was digested completely with the following restriction enzymes: Bam HI, Bgl 2, Hind 3, Pvu 2, Sal 1, Sma 1. These digestions, along with a standard digestion of lambda phage cut with Hind 3, were analyzed using electrophoresis and the approximate fragment weights were determined. Then partial digestions were done with the same enzymes. These partial digestions were hybridized to ³²p-labeled oligonucleotide-left and -right. These samples were

analyzed using electrophoresis and an autoradiogram was obtained. From the autoradiogram, and using the data from the complete digestions, the relative placement of each cleavage was determined and maps of cleavage sites for each enzyme were drawn. These maps were combined to make a single map showing the relative emplacement of all the cleavage sites within the DNA segment. The map for E14 was compared to the map of the phage B32. The two were found to overlap and contain a complete repeat of the rRNA gene.

Arachidonic Acid Metabolism in the Isolated Rabbit Heart During Conditions of Hypoxia. Samantha Anne Tysz, Christian Brothers College. The purpose of this study was to determine whether a state of anoxia affects the metabolism of arachidonic acid. The experiments were performed on isolated rabbit hearts perfused with Krebs-Hensleit buffer. A state of hypoxia was obtained by bubbling the perfusate with 95% N₂/ 5% CO₂, and confirmed by blood-gas analysis and lactate and pyruvate assays. Following a bolus dose of arachidonic acid under both normoxic and hypoxic conditions, mechanics and prostaglandin outputs for both the hearts were measured. Analysis of the heart rate, perfusion pressure, and developed tension revealed that hypoxia was sufficient to compromise mechanics, yet prostaglandin outputs of PGE₂ and 6-Keto PGF₁-alpha were unaffected by hypoxia. The results of this study revealed that there was no significant difference in the metabolism of arachidonic acid under hypoxic conditions, but further investigation is

required to meet the initial objective of obtaining a state of anoxia and the effect that this would have on the metabolism of arachidonic acid.

Eclipse Kinetics of a Temperature Sensitive Mutant in the F Capsid Protein of Phage OX174. Fernando A. Zepeda and Antonino Incardona, Christian Brothers College. The extracellular structure of bacteriophage OX174 consists of an icosahedral capsid with short spikes at each of its vertices. The capsid itself consists of F proteins, while the spikes are composed of G and H proteins. Temperature sensitive mutants (*ts*) are viral mutant strains that contain a conditional lethal mutation in the viral genes that code for structural proteins. These mutants fail to enter the eclipse (DNA ejection) phase of the viral replication cycle at temperatures above 42°C. In order to demonstrate this, we examined the eclipse reaction of the mutant tsHc153. This mutant strain contains an amino acid change in the capsid protein (F) gene. The *in vivo* eclipse rates of tsHc153 were determined over a wide temperature range and the results were compared to the known eclipse rate of the wild type and the cold sensitive mutants (mutants which fail to enter the eclipse phase at temperatures below 25°C.). The results suggested that there are two components involved, a fast component and a slow component. This led to the conclusion that there are two independent events involved as tsHc153 mutants infect the host *Escherichia coli*.