

ABSTRACTS OF PAPERS PRESENTED AT THE SPRING COLLEGIATE MEETING

EASTERN REGION UT CHATTANOOGA

Morphology of and Major Coral Genera in Fringing Coral Patch Reefs Off Sue Point, Bonefish Bay, San Salvador, Bahamas. Carol Barber, Barry Cleveland, and Scott Morie, UT Chattanooga. The morphology of three fringing coral patch reefs off Sue Point (northern extremity of Bonefish Bay) was determined by triangulation methods. A total of ten coral counts were made on the two reefs nearest Sue Point. Coral count results show that the reef nearest Sue Point (later named Bullwinkle because it contains large amounts of the Elkhorn coral, *Acropora palmata*, contains more coral genera and larger amounts within each genera than the second reef off Sue Point (later named Two Turtles, because two Hawksbill sea turtles were observed here). Two Turtles contains large amounts of the fire coral (not a true coral), *Millepora alicornis*. The third reef off Sue Point was named A Reef Too Far, because it was far removed from triangulation stations on Sue Point and therefore it was difficult to map its morphology.

Classification of Mollusc Shells from the Northern Part of Bonefish Bay, San Salvador, Bahamas. Carol Barber, UT Chattanooga. Earlier investigators have produced species checklists of the invertebrates on San Salvador. Non-living specimens were hand collected from the lagoon floor among fringing coral patch reefs off Sue Point (marks northern end of Bonefish Bay) as well as from the strand, and windrows landward of the strand, in the northern part of Bonefish Bay located on the leeward side of San Salvador Island. Twenty-three families, twenty-nine genera and forty species were identified from northern Bonefish Bay. Of these, seven families, nine genera and nine species were added to the existing invertebrate checklists of San Salvador. It was the purpose of this study to collect, identify, and make comparisons of marine molluscs with existing checklists and include new entries where necessary. This study will also serve as a basis for further studies on the role that these marine molluscs may play in the production of calcareous sands on San Salvador.

Thin Section Petrography and Grain Size Distribution in a Quartzose Transverse Bar in the Warren Point Sandstone, Elder Mountain, Tennessee. Lisa Burke, UT Chattanooga. In order to determine the most likely origin of an ancient sedimentary rock unit, its morphology (shape), sedimentary structures (anatomy) and texture and composition (grain size and mineral content) are compared to modern counterparts. Accordingly, a quartzose sandstone unit in the Pennsylvanian Warren Point Sandstone on Elder Mountain, just northwest of Chattanooga, Tennessee, displays large scale, planar tabular crossbeds with individual thin beds exhibiting graded bedding. Additional depositional units are: scours filled with quartz pebble gravel, and trough crossbeds. More regional studies of Pennsylvanian siliciclastics in the Chattanooga area suggest deposition in meandering and braided streams. Therefore, this quartzose units is interpreted as a transverse bar (graded, planar tabular crossbeds) deposited in a braided stream in association with an in-channel sequence of trough crossbeds (megaripples) and channel scours with lag (scours with quartz pebble gravel).

Contribution of Algae to the Sediment Environment of San Salvador, Bahamas. Barbara Claiborne, UT Chattanooga. (Abstract not submitted by publication deadline.)

Statistical Survey of Oak Ridge and Roane County Students Concerning Opinions Related to Monitored Retrievable Storage (MRS). Rosa Lee Cornet and Sherrie Graham Chadwick, Roane State Community College. A sample of 200 questionnaires was collected and the data was analyzed using two sample binomial tests and 2×2 Chi Square tests. In general, it was found that: (1) significantly more females than males are opposed to the MRS facility being located in the Oak Ridge area; (2) significantly more females than males felt that the MRS would have an adverse effect on our environment; (3) significantly more females than males felt that the MRS would present a serious health hazard; (4) significantly more females than males felt that our highways would be unsafe because of transportation involved with the MRS; (5) significantly more females than males felt that the jobs created would not be worth the risk associated with MRS; (6) there was no significant difference in the number of males and females who felt that the MRS would discourage new business from locating in the Oak Ridge area; (7) there was no significant difference in the

opinions of Oak Ridge and Harriman students on any question; (8) significantly more technical students who had experience or training related to the nuclear industry were supportive of the MRS than were technical students who had no experience or training related to the nuclear industry; (9) significantly more technical students than non-technical students were in favor of the proposed MRS being located in the Oak Ridge area; (10) significantly more non-technical students than technical students felt that the MRS would have an adverse effect on our environment; (11) significantly more non-technical students than technical felt that the MRS would present a serious health hazard; (12) significantly more non-technical students than technical felt that our highways would be unsafe because of transportation involved with the MRS; (13) significantly more technical students than non-technical felt that the jobs created would be worth the risk associated with the MRS; (14) there was no significant difference in the opinions of technical students and non-technical students regarding the question of whether the location of the MRS in the Oak Ridge area would discourage other new business.

Map of Portions of the Sea Floor in Northern Part of Bonefish Bay, San Salvador, Bahamas. John Dougherty and Scott C. Kirby, UT Chattanooga. Sue Point marks the northern end of Bonefish Bay in the northwestern leeward part of San Salvador Island, Bahamas. Three traverses (four stations per traverse), located approximately in the northern half of Bonefish Bay were laid out and ranged from 600-770 feet seaward of the strand line. Bottom conditions in carbonate sands were noted and photographed. It has been determined that almost all bed forms observed here, fall within values established for ripples. This means that bottom current energy develops bedforms here that are considered to be largely in the lower part of the lower flow regime. An arcuate, north-south trending, avenue of sedimentation moves past Sue Point, and its straight to slightly sinuous ripple crests become cusped as this avenue intersects (in a perpendicular sense) a west to east moving bottom current (straight to slightly sinuous ripple crests) in the extreme northern part of Bonefish Bay.

Water Chemistry in the Northern Part of Bonefish Bay, San Salvador, Bahamas. Joseph Eaker and Thomas Thornburgh, UT Chattanooga. Bonefish Bay is a shallow lagoon (1-6 meters deep) situated on the northwestern leeward side of the island of San Salvador which is located in the eastern portion of the Bahamas and fronts on the Atlantic Ocean. Three traverses were laid out in the northern part of Bonefish Bay. Each traverse contained four stations with approximately 50 meters between stations. Three bottom water samples were taken at each station, and each sample was tested for nine parameters using portable LaMotte test kits. Parameters tested include: dissolved oxygen, dissolved carbon dioxide, salinity, alkalinity, hardness (Ca and Mg), phosphorous, nitrate and pH. These data were analyzed using a two way ANOVA for fixed point replication and the software used was QSTAT. It was discovered that there were no significant differences between and among stations in a given traverse or between and among traverses. Hardness and alkalinity data showed the water to be extremely hard and alkaline. This is related to the fact that the dissolved carbon dioxide was found to be zero ppm. The constancy of the alkalinity (127 ppm) and calcium hardness (898 ppm) is responsible for the buffer solution which aids in keeping the pH value at an average value of 8. Salinity averages 43‰, a value that borders on hypersaline, and it may be due to a high rate of evaporation in the shallow water of Bonefish Bay. Nitrate and phosphate, normally considered as minor constituents, were found to be less than one ppm.

Isopach, Structure Contour and Percent Shale Maps of Subsurface Mississippian Pennington Formation and Devonian Chattanooga Shale on Burrville and Twinbridges Quadrangles, Fentress and Morgan Counties, Tennessee. Bronnie Hartman, UT Chattanooga. Oil and gas wells have penetrated a subsurface Devonian-Mississippian sedimentary package in the northern Cumberland Plateau of Tennessee. The Devonian Chattanooga shale and the Mississippian Pennington Formation are the lowermost and uppermost stratigraphic units of this unconformity-bounded sedimentary package, and they are composed dominantly of fine-grained siliciclastic rocks. Hundreds of gamma ray logs from two adjacent

quadrangles in two adjoining counties (Fentress and Morgan) have been selected to construct isopach, net shale and structure contour maps. The net shale map of the Pennington indicates that these green, maroon and red intertidal shales were deposited in east-west trending channels. The overall thickness of the Pennington is variable, in that it ranges from 140 to 330 feet thick, and this variation is largely a function of erosion on top of this unit. Structure contour maps drawn on top of the Chattanooga and Pennington show circular to elliptical depressions and knobs as well as linear ridges and depressions. The depressions and knobs tend to abound within a narrow, NE-SW trending zone. These features on the Chattanooga appear to be related to a karst topography developed on underlying Ordovician carbonates.

Porous Zone Trends in the Mississippian Monteagle (Oolitic) Limestone in Fentress and Morgan Counties, Northeastern Tennessee. Edward Williams, UT Chattanooga. Examination of over 300 logs composed of gamma ray, bulk density and porosity graphs, most of which penetrated the Mississippian Monteagle (oolitic) limestone in the subsurface of Fentress and Morgan Counties, Tennessee (Burrville Quadrangle), enabled determination of the number of porous zones (4% or more porosity) in the Monteagle, irrespective of their stratigraphic position within this formation. Isopleths of the number of porous zones in the Monteagle reveals east-west and northeast-southwest trends. It is suggested that the Monteagle advanced northward during the Mississippian, up the low dip of an Ordovician structural feature known as the Nashville Dome. Further, oolites typically form along shelf-edges in shallow, warm, agitated marine water, and these porous zones may have formed in these oolitic deposits during successive stands of sea level, where the upper surface of these oolitic deposits was sub-aerially exposed.

MIDDLE REGION AUSTIN PEAY STATE UNIVERSITY

The Effects of Success and Failure Feedback on Arousal and Attribution of Cause. Robin D. Allison and Cindy D. Pinger, Tennessee Technological University. This study investigated the effects of success and failure feedback on arousal and attribution of cause to internal and external factors on 34 undergraduates (21 males and 13 females) from Tennessee Technological University. The subjects were hooked up to a Datagraph system, which measured BSR every 10 seconds. After a two minute baseline reading of BSR, the subjects were given false feedback of 90% (success) and 50% (failure). The subjects then rated the importance of internal and external reasons for their success or failure on a six-point scale. An analysis of variance on the attribution data showed a significant interaction between achievement and question [$F(3,84) = 11.24, p < .001$]. The failure group was more likely to agree that the test was hard (external). The success group was more likely to state that the course material was easy to understand (internal). The success group was more likely to attribute their performance to luck than the failure group. An analysis on the success group showed a main effect for attribution [$F(1,14) = 4.32, p > .05$]. Subjects credited internal factors significantly higher as a reason for their success. A significant interaction between attribution and question [$F(1,14) = 6.55, p < .02$], showed those who did well felt they succeeded because of internal reasons. Analysis of the failure data revealed a three-way interaction between Gender x Attribution x Question [$F(1,14) = 6.11, p < .04$]. The main differences appear to be that females who failed were more likely to make an internal attribution, they worked hard, than were males. Analysis of the arousal data showed a significant interaction for Feedback x Gender x Block [$F(6,132) = 2.34, p < .04$]. Females in the failure group became more aroused when feedback was given than females in the success group. The opposite effect was found for males, who became more aroused when given successful feedback.

Is Music A Distractor in the Study Setting? Donny Ray Ballard, Tennessee Technological University. The present study investigated whether music acts as a distractor in the study setting. Some studies (Chalmers (1977); Freeburn and Fleisher (1952); Henderson, Crews, and Barlow (1945)), report that music neither facilitates nor detracts from academic performance. Others found music to enhance recall but detract from comprehension (Hall (1952); Mullican and Henk (1961)). Mullican and Henk (1961) found that classical music facilitated memory while rock music detracted compared to no music. The present study tested 24 college subjects with four music conditions: rock, semi-classical, country, and no music. Subjects read four articles balanced for length, vocabulary, and comprehensibility. Orders for music and articles were balanced by two, 4 x 4 Latin Squares. Memory was examined for both recall and comprehension. Memory scores were analyzed using ANOVA with recall scores being

significantly higher than comprehension scores [$F(1,20) = 11.40, p < .005$]. However, there was a significant interaction between music type and memory technique. Comprehension was better than recall for rock music with the opposite true for semi-classical and country music. These data support the findings of Mullican and Henk (1961). Overall, semi-classical facilitated memory best while country and no-music were the least effective. Use of a semantic differential revealed that while all three types of music were well liked, rock music was rated higher for activity, potency, and complexity [$F(6,120) = 22.87, p < .002$]. Multiple correlations indicated that none of the semantic differential components were significant predictors for recall or comprehension except for potency for recall on the country music selection.

Interfacing a Microcomputer to an X-Y Recorder. Daniel L. Bucy and Harvey F. Blanck, Austin Peay State University. A Commodore microcomputer was interfaced to an X-Y recorder using two 12 bit digital to analog converters. The interface was accessed through Commodore's User Port which utilizes a 6522 interface adapter. Use of this interface adapter avoids the necessity of constructing address selection hardware. The User Port has 9 data lines. The DAC (Analog Devices AD667) was loaded 4 bits at a time with the proper DAC latch being selected by 3 other bits. The remaining two data lines were used to select the appropriate DAC and to strobe the data into the latches. Use of 12 bit DAC's provides the possibility for a recorder resolution of 4096 x 4096 ($2^{12} \times 2^{12}$) when graphing. Typical screen resolution on many small microcomputers is 40 characters x 25 lines or 320 x 200 pixels. Manipulation of data was facilitated because of Commodore's inclusion of the Boolean algebraic functions AND, OR and ANDNOT (EOR) in BASIC. The interface allows the computing capabilities of a computer to be combined with the high resolution and hard copy advantages of an X-Y recorder.

The Effect of Caffeine and Rock Music on Aggressive Behavior in Rats. Jennifer B. DeWeese, Tennessee Technological University. In the present study an attempt was made to find if the combination of caffeine and "Porn Rock" might cause an increase in adolescent rats aggressive behavior. Six female albino strain rats, 90 days old at the study's beginning, were separated into Group 1 and Group 2 and both served as their own control. Each group was given either 12mg/kg of caffeine orally or a placebo and each was presented with either rock music (AC/DC), classical music (classical guitar of Mozart's work) or no music. After baseline data was collected, Group 1 received caffeine; Group 2 the placebo. After the duration of five days, a drug cross-over design was utilized. Each group was divided into three pairs and ran in three, two minute intervals with the non-aggressive social contacts, aggressive social contacts and activity levels recorded for six minutes. An analysis of variance was performed. The study appears to indicate that rock music and caffeine together increases social contacts. Rock music, alone, is responsible for more social contacts also. Caffeine, in addition to more social contacts, also was responsible for more aggressive behavior. Even though there is a limited amount of data, the addition of a rock music selection did not cause aggressive behavior.

The Effects of Competition on Assessment of an Opponent. Russell R. Duggan II and Carl A. McCandlish, Middle Tennessee State University. An investigation was conducted in a natural setting (University Gamework) to assess the effects of competition on perception of one's opponent. Twenty-three male college students, ages 18-25, rated their opponent on an Osgood Semantic Style rating form. Ratings were obtained before and after each competitive interaction. Due to the natural attrition in a tournament format, statistical analyses were only possible for the first two rounds of the five round pool tournament. No competitive interaction lasted more than thirty minutes. Analyses of the ratings were performed using the step-wise multiple regression and T-test. The results indicated a significantly positive increase in ratings of opponents after competition for both the first round ($p < .05$) and the second round ($p < .01$). Analyses of the individual items on the rating form indicated that both the losers and the winners rated their opponents as more competitive, relaxed, graceful, strong, mature, and pure. Before beginning tournament competition, all subjects also filled out the Sports Competition Anxiety Test (SCAT). Anxiety levels were not found to be a predictor of match outcome.

The Effects of Dexedrine on Procarbazine for the Treatment of Lymphatic Tumors. Bert E. Geer, Tennessee Technological University. Twelve albino rats of the Holtzman strain underwent different levels of drug chemotherapy. All of the subjects exhibited naturally occurring lymphatic tumors. Four rats, three males and one female were placed in one of three groups which were equated according to total tumor mass. Group one, the control group, received water only. Group two received the chemotherapeutic drug Procarbazine (Matulane) and group three received

a combination of both Procarbazine and Dextro-Amphetamine Sulfate (Dexedrine). The dexedrine was added to try and overcome the depressant effects of the procarbazine. It was hypothesized that dexedrine would increase the efficiency of the procarbazine drug. Each group underwent a baseline period and two treatment periods, each of which lasted 10 days. Groups two and three were administered 5 mg/kg of procarbazine orally during the first treatment period and both dosages were then increased to 10 mg/kg during the second treatment period. Group three also received 0.4 mg/kg of dexedrine orally throughout both treatment periods. The nodal tumors were measured every other day in three perpendicular planes to produce a mean diameter. Analysis of variance conducted on the relative increase and decrease of the tumor mass displayed no overall significance. However, upon analyzing the last two measurements within each treatment period, there was a marginal significant interaction found between the treatment periods and the groups [$F(4,18) = 2.45, p < .084$]. The control group displayed a mean increase of 2.2 mm. Group three exhibited a small mean decrease of 1.9 mm and group two exhibited a mean decrease of 7.5 mm. Most of group two's decrease occurred during the second treatment period where the procarbazine dosage was 10 mg/kg. It appears that the dexedrine did not increase the efficiency of the procarbazine as hypothesized. There was an anorectic effect found by the dexedrine so one could infer that it did in fact act as a stimulant.

A Study of Methods for Isolating Prostaglandins from Cell Culture Media. Kerry Ingold and Judith M. Bonicamp, Middle Tennessee State University. Prostaglandins, the major cyclooxygenase products of arachidonic acid, are potent mediators of cellular responses to challenge by chemicals and electromagnetic radiation, and to mechanical disturbance. The relationship between cell injury and prostaglandin production is not fully understood but it appears that the rise in prostaglandin levels is related to both the nature and extent of cellular distress. Because of the obvious involvement of the cells comprising the capillary vessels, endothelial cells derived from capillaries can be cultured *in vitro* and serve as a model to assess toxic effects of test substances. Prostaglandins are present in picomolar quantities in tissue culture; therefore, only a few methods are available for their quantitation, among them mass spectrometry and radioimmuno assay. Because the efficiency of the initial extraction and recovery steps is critical to the success of subsequent analysis of prostaglandins by mass spectrometry, we have begun a study of the extraction efficiency and percent recovery of prostaglandins over a range of concentrations in tissue culture media. We will report on the methods planned for prostaglandin recovery and some of the problems encountered in this pilot study. The Department of the Army is supporting this project.

Assay of Δ^9 -Tetrahydrocannabinol-11-oic Acid in Human Urine by Scanning Densitometry. Joe Jones and Judith M. Bonicamp, Middle Tennessee State University. Conjugated Δ^9 -tetrahydrocannabinol-11-oic acid is the major urinary metabolite in humans of Δ^9 -tetrahydrocannabinol from *Cannabis sativa* (marijuana). We have reported methods for hydrolyzing conjugated Δ^9 -tetrahydrocannabinol-11-oic acid to the unconjugated form (Δ^9 -THC-COOH), for separating unconjugated and conjugated Δ^9 -tetrahydrocannabinol-11-oic acid by liquid-liquid extraction, and for detecting the unconjugated form by thin-layer chromatography followed by derivatization. We are developing a quantitative procedure for determining Δ^9 -THC-COOH by comparing the absorbance of a Δ^9 -THC-COOH derivative to a working curve established using absorbance vs. concentration data from densitometry of Δ^8 -THC-COOH derivatives. We wish to report use of this quantitative procedure to investigate the stability of Δ^9 -THC-COOH in stored urine specimens, its potential for establishing the extraction efficiency for the metabolite from urine, and the results from a study of the metabolite's tendency to bind to glassware.

Optimum Selection of Mie Function Parameters. Paul E. McCluer and Whitney E. Sanders, Tennessee Technological University. A pattern search has been used to determine optimum values for the force constants and repulsive exponent in the Mie (6, N) intermolecular potential function. Second virial coefficient data for four gases were analyzed to test the computational procedure. The results for the four of the gases tested indicated that N=12 is optimum and this is consistent with the widely used Lennard-Jones 12-6 function. Two of the gases exhibited optimum repulsive terms of N=14. The results for the four gases showing (6, 12) behavior compare favorably with results obtained by others. The program has been validated and can be used to process data for additional chemical species.

An Investigation into the Attitudes of Potential Employers Toward Handicapped Applicants. Gordon R. Miler, Tennessee Technological

University. Thirty-two college students balanced for gender were exposed to photographs and job applications, Male and Female, one of which had a debilitating physical handicap. A sixteen pair semantic differential involving factors of reliability, flexibility, honesty, and longevity in a potential managerial position was used to assess capability. Handicapped females were viewed as less self-sufficient than handicapped males, though the opposite relationship was found among non-handicapped applicants. Correlations of these factors viewed self-sufficiency as not relating to hireability of the handicapped while in all other cases it was a significant predictor. Similarly male subjects indication of reliability did not correlate with hireability for either handicapped or non-handicapped but it was a significant predictor for both groups by female subjects. Flexibility was a significant predictor of hireability of both the handicapped and non-handicapped for male subjects, but for only the handicapped evaluated by female subjects. It would appear that the gender of the personnel officer may be a critical determinant in evaluating the physically handicapped for employment.

Removal of Pentachlorophenol from Aqueous Systems by Foam Flotation. G.A. Nyssen, G.S. Lovell, A.A. Simons, J.G. Smith and B.K. Tolar, Trevecca Nazarene College, Nashville. D.J. Wilson, Vanderbilt University. Pentachlorophenol (PCP) was removed from water by foam flotation with the cationic surfactant cetyltrimethylammonium bromide (CTAB). Residual PCP concentrations of less than 0.1 ppm were obtained after five minutes of flotation. The concentration of CTAB and the length of flotation are directly related to the amount of PCP removed from solution. PCP removal was also found to be most efficient at neutral to basic pH values and with low ionic strengths. PCP can also be removed by foam flotation with sodium dodecyl sulfate (SDS). However, SDS requires longer periods of flotation and is generally less efficient. The PCP removal is explained by an ion-pair attraction and an ion-dipole attraction between PCP and the surfactant ion.

The Inhibitory Effect of Color and Group Pressure on Concept Identification. Michie Odle, Tennessee Technological University. Twelve males and twelve females were tested on concept identification in groups of two and individually. The groups contained same-sexed subjects. The subjects were all exposed to eight sets of concept sheets containing eight pairs of geometric shapes. The concept sheets were arranged into two different orders. On one-half of the concept sheets, the shapes were colored, but color did not serve as the basis for pairing. Only one of the four following themes served as an explanation for the pairing: size, shade, sequence, and height. Feedback was given for incorrect responses, and latencies before the correct answers were given served as data units. An analysis of variance was performed using a three between, two within design. Neither grouping nor gender produced significant results. While the two orders of concept sheets were balanced for color, order one had the more difficult concepts at the beginning which produced a significant effect [$F(1,16) = 5.628, p < .030$]. In general, when individuals began with more difficult sets, they identified the concepts more easily throughout the testing period. This was true for all subjects except when the males were tested individually. The main hypothesis was supported; color appears to be a strong inhibitory factor in concept formation [$F(1,16) = 78.651, p < .001$]. There was also interaction between color type and solution mode [$F(3,48) = 10.772, p < .001$]. Color seemed to have a particularly strong inhibitory effect on the sequence problems, a moderate effect on height and shape, and no effect on size.

New Meson States. Daniel C. Ralph and Dr. Steven E. Csorna. Using the Schrodinger equation with the "linear + Coulomb" Cornell potential, masses of heavy mesons were calculated. Generally good agreement was found between calculated masses and the observed masses for the J/psi (cc) and the upsilon (bb) families of mesons. Predictions were then made for the masses of the yet to be observed family of bc mesons. We calculate that the lowest mass meson in this family should be located at 6320 + 40 MeV. Other members of the family should be observable through approximately 7890 MeV.

Use of the Lennard-Jones Intermolecular Potential Function for the Calculation of Vapor Phase Thermodynamic Properties. Whitney E. Sanders and Paul E. McCluer, Tennessee Technological University. Vapor phase thermodynamic properties are calculated in terms of departure functions which give the difference between properties at pressure greater than zero and the zero pressure state at the same temperature. Exact thermodynamic expressions link the departure functions and the equation of state for the vapor. The virial equation of state with a statistical mechanical formula for the coefficients provides a theoretical basis for evaluating thermodynamic properties in terms of molecular properties.

Computer programs have been written to calculate virial coefficients from a given intermolecular potential function and thus provide for rapid calculation of vapor phase properties. Results obtained with this method compare favorably with values obtained using generalized correlations.

The Development of Abstract and Realistic Concepts in Preschool Age Children. Brenda J. Stanton, Tennessee Technological University. The present study attempts to update the study of Brian and Goodenough (1939) from the change in reference of form to color, to color after age three. The study tested to see if functional relationships were important to children before age seven or the onset of the concrete-operational stage of Piaget (1953). Twenty-four nursery school children were used and balanced for gender and age. They were between the ages of three and five. Each child was shown the twenty-four sets of three choice pictures mounted on white cards. Each set of three pictures had two pairings that were logical and one pairing that was illogical. The logical combinations were color vs. form, color vs. function, and form vs. function. Half of the objects dealt with realistic pictures of toys and half on abstracts dealing with similar shape to the realistic sets. Each child was shown all sets of pictures and asked which two went together and why. They were then asked which other two went together and why. An analysis of variance was run on the data where the first choice was given a value of two, second choice a value of one, and all the illogical responses were not analyzed. Color was the most preferred choice for all ages [$F(2,63) = 16.93, p < .001$] which was contrary to the work of Brian and Goodenough (1939). Realistic vs. abstract choices were not significant [$F(1,18) = .008, p > .14$]. The interaction on choice test was marginally significant [$F(2,36) = 6.193, p < .006$]. Color gave the highest rate on realistic choices and form and function were higher for abstract comparisons.

Caffeine and Valium: Behavioral and Neurochemical Basis for Synergism. Michael J. Thrasher, Tennessee Technological University. The behavioral effects of Valium and caffeine on aggressive and non-aggressive behaviors were investigated. The subjects were eight albino rats of the Holtzman strain approximately 70 days old and, ranging from 184 to 199 grams at the beginning of the study. The subjects were placed within group pairs and baseline data was collected for five days. Following this, the first four rats were given caffeine (8mg/kg) in a .5g/100ml Nutrasweet solution. The other group was given Valium (5mg/kg) in the Nutrasweet solution. Data was collected for five days. The next treatment involved giving both drugs to both groups for five days. Following this, a no drug post-test was conducted for five days. Testing was conducted for six minutes for each pair daily in a ten gallon aquarium in dimly lit conditions. Contact behaviors were defined as aggressive or non-aggressive according to 10 behavioral categories. Both drugs were found to selectively increase aggressive behaviors [$F(3,30) = 18.701, p < .001$]. Also both drugs appeared to slightly decrease non-aggressive behaviors. Interestingly the synergistic effect on aggression was most pronounced in the group that had Valium followed by caffeine. There appeared to be a delayed aggression effect during the post drug test in the group that had received caffeine followed by Valium. Due to the specific effects of these drugs, and their availability and abuse, these data could potentially have human social implications.

WESTERN REGION UNION UNIVERSITY

The Incidence of Pneumocystis carinii Antibody in Immunosuppressed Transplant Patients and AIDS Patients. S. Baltz, Christian Brothers College. In an investigation of immunologic defenses against *Pneumocystis carinii* (PC), an enzyme-linked immunosorbent assay was used to determine titers of PC antibody in immunosuppressed transplant patients and in patients with AIDS. Although all patients in the study were at risk and suspected of having PC pneumonia, not all were PC antigen positive as determined by a latex particle agglutination test. This study showed no significant difference in PC antibody levels between those patients who were positive for PC antigen and those who were negative. However, both groups of patients had significantly lower average PC antibody titers than did healthy controls.

Single Crystal X-ray Diffraction Analysis of Pyridine Derivatives. C.L. Beasley, D.Y. Jeter, and S.M. Condren, Christian Brothers College. The crystal structures of the compounds $\text{Cu}(\text{phen})_2(\text{AR})(\text{ClO}_4)_2$ [where AR = phenyl, pyridyl, 3-picolinyl and 4-picolinyl] have been studied using single crystal x-ray diffraction techniques. Crystallization of these compounds was performed in acetone/deionized water. A slow growth rate was desirable to produce crystals with dimensions of 0.2 to 0.5 mm. Data was collected using a CAD-4 diffractometer at ambient temperature

using Mo x-rays, and analyzed by direct methods of Fourier analysis. The preliminary results will be discussed.

Cloning of trt A and trt B Promoters from the pCD1 Plasmid of Yersinia pestis. M. Burton, Christian Brothers College. The promoters *trt A* and *trt B* on the *Yersinia pestis* plasmid pCD1 were cloned with a beta-galactosidase gene under their transcriptional control into plasmid pMC 874. The recombinant plasmids were transformed into *E. coli* strain CSH 50. Production of these recombinant plasmids served to reduce the complexity within which the promoters were operating to aid in investigation of the promoters themselves and of their relationship with their modulator, *Lcr F*. Temperature regulation was shown when *Lcr F* was present in the genome of the host strain that received one of the recombinant plasmids.

ESR Characterization of Marble from Classical Greek Quarries. M. Cheeseman and R.V. Lloyd, Memphis State University. Samples of marble from several quarries known to be open in the classical Greek world were studied by ESR spectroscopy to assist in the determination of the provenance of a statue recently purchased by the Getty Museum. The spectra of Mn^{+2} ions present as trace impurities in the marble can be used for quantitative determination of Mn and measurement of other properties that affect the ESR spectrum. Both peak heights and integrated areas were used for quantitation. The latter method was more reliable. The results suggested that the statue in question could be associated with one of the quarries, a possibility that was not apparent from previous methods of provenance determination.

Synthesis, Isolation and Analysis of a di-Manganese (II) Complex Theoretically Defined as $\text{Mn}^2(\text{L}^2)(\text{OH})^2(\text{ClO}_4)^2 \times 2\text{H}_2\text{O}$. O.L. Hamada & J.H. Davis, Union University. 2,6-Diacetylpyridine, 1,3-diamino-2-hydroxypropane, barium perchlorate and manganese perchlorate were used in a series of reactions in order to synthesize $\text{Mn}^2(\text{L}^2)(\text{OH})^2(\text{ClO}_4)^2 \times 2\text{H}_2\text{O}$. This compound was analyzed by IR spectroscopy in order to determine its approximate structure, and on a Guoy magnetic balance to find the number of unpaired electrons present in this di-manganese (II) complex.

The Antimicrobial Effects of Garlic and Onion Extracts on Streptococcus mutans. D.L. Hines, Christian Brothers College. Aqueous extracts of garlic (*Allium sativum*) and onion (*Allium cepa*) were prepared and tests for antimicrobial activity against *Streptococcus mutans*, a gram-positive bacterium believed responsible for dental caries. The extracts exhibited significant inhibition of growth of *S. mutans*. Quantitative assessments were carried out to determine the minimum inhibitory concentration of the extracts. The garlic extract had a slightly greater antimicrobial activity than the onion extract.

Transmission and Scanning Electron Microscopic Observations of Developing Dermis and Epidermis of Embryonic Gallus Domesticus Receiving Injections of a Structural Proline Analog. C. Jordan & S. Boyd, LeMoyne-Owen College. Collagen has been implicated in feather formation, and preliminary studies have shown that L-azetidine-2-carboxylic acid (LACA) causes suppression of feathers in chick embryos. Analysis of ultrastructural changes that occur in chick embryonic skin following administration of LACA was conducted to determine if these changes were due possibly to an interruption of collagenogenesis. The results suggest that LACA causes malformations in the skin of chick embryos by delaying or preventing the extrusion of the protein into the extracellular matrix. (Supported by NIH/MBRS Grant #2-S06-RR-08179-04.)

Sugar Competition in the Binding of Bacteriophage OX174. P. Katz, Christian Brothers College. Under normal circumstances, bacteriophage OX174 binds to a lipopolysaccharide (LPS) receptor site in the outer membrane of *E. coli*. Since the receptor contains a number of monosaccharides, it was hypothesized that the normal binding of OX174 to the LPS could be inhibited by the addition of simple sugars. In order to test this hypothesis, the OX174 was incubated with its host cells in the presence of glucose, fructose, sucrose, galactose, N-acetylgalactosamine or N-acetylgalactosamine; and the amount of virus not attaching to cells determined. None of the sugars tested competed with the LPS for binding by OX174.

The Incidence of Sarcocystis Among Whitetail Deer of Middle Tennessee. R.E. Kissel Jr., Christian Brothers College. Tongue tissue of whitetail deer (*Odocoileus virginianus*) was examined for the presence of *Sarcocystis*. Species identification was not attempted. Data concerning specimen age, sex, weight and collection site were examined for possible correlation. As expected, a significant percentage (52%) of the sample surveyed was infected with the parasite.

A Novel Nucleoside Phosphorylase from Eukaryotic Algae. T.D. Morris, Christian Brothers College, and J.R. Katze, The University of Tennessee, Memphis. An enzyme termed Chlorella factor has been extracted from *Chlorella pyrenoidosa* and *Chlamydomonas reinhardtii* and characterized as a purine nucleoside phosphorylase which uses 7-deazapurine (queuosine) and guanosine as substrates. Substrate specificity was determined using an LM cell bioassay which showed incorporation of the base form of queosine into tRNA after exposure of the cells to queuosine and Chlorella factor. Reactions of Chlorella factor with labeled guanosine and queosine were performed in the presence of potassium phosphate and analyzed by HPLC. Chlorella factor converted both guanosine and queosine to their base forms plus ribose-1-phosphate.

Decarboxylation of Carboxylic Acids Through Photolysis, Resulting in Loss of an α -Hydrogen Atom. W.A. Moore, Christian Brothers College. A chromatographic study of the photoreduction of carboxylic acids in carbon tetrachloride showed regiospecific loss of a hydrogen atom from the α -carbon, and formation of the corresponding hydrocarbon. Octanoic acid, for example, was reduced to heptane. While the conversion to heptane is not complete, as suggested in earlier studies of primary alkanolic acids (RCH_2COOH , R = H, Me, Et & Pr), the evidence is sufficient to suggest the reaction does occur.

Lectin-like Agglutination of Mammalian Erythrocytes by Polypeptides and Amino Acids. K. Mosher & J.H. Trull, Freed Hardemann College. Lectins are high molecular weight proteins extracted from plants, which have the ability to agglutinate specific cells by binding sugars on their surface. The bulk of lectin research has been limited to the use of plant or seed extract. This work deals with lectin-like agglutination response from molecules smaller than typical lectins. The molecular weight of lectins as presented in the literature ranges from 20,000 to 400,000. This research dealt with lower molecular weight substances such as histones, tripeptides, dipeptides and amino acids. Each of these produces an agglutination response in human erythrocytes. This indicates that the agglutination process may not require complex molecules, such as antibodies and lectins, but may be accomplished by mere ionic forces.

Arginine Vasopressin Inhibition of Adrenergic Transmitter Release in the Isolated Rat Kidney. W. Oellerich, Christian Brothers College. Isolated rat kidneys perfused with Tyrode's solution and prelabeled with norepinephrine- ^3H were used to examine the effect of arginine vasopressin (AVP), desmopressin (dDAVP), and AVP in the presence of an AVP-V₁ receptor antagonist on the release of the neurotransmitter. Infusion of AVP at 1-10 ng/mL into the kidney increased the perfusion pressure but decreased the release of ^3H and the associated rise in perfusion pressure elicited by renal nerve stimulation. dDAVP failed to alter the perfusion pressure and ^3H overflow from those of the control. AVP-V₁ abolished the effect of AVP at the adrenergic neuroeffector junction. The results suggest that AVP contributes to the regulation of vascular tone by influencing the activity of the adrenergic nervous system.

The Enzymatic Oxidation of Lactate to Pyruvate Using Lactate Dehydrogenase as a Catalyst. T.B. Priestly, Christian Brothers College. This study followed the enzymatic oxidation of lactate to pyruvate. Medically, lactate levels in the blood system are important because they are a measure of "oxygen debt". Hydrazine was used to trap the pyruvate formed. The concurrent reduction of NAD to NADH was measured with a Bausch & Lomb Spectronic 2000 at 340 nm. The absorbance due to NADH was a measure of the original lactate concentration in the plasma. An appropriate enzyme concentration was determined and a standard curve derived. The reaction was temperature dependent and difficult to quantitate. The observed lactate concentration in the plasma studied was 0.2478 mmol/L.

The Effects of Garlic Extract on Resistance to Candida Infections in Mice. J.C. Rankin, Christian Brothers College. The effect of garlic extract (allicin) on the virulence of *Candida albicans* was investigated by comparing results obtained in mice inoculated subcutaneously or intraperitoneally with the fungus. Separate groups of mice were either treated with allicin before inoculation, treated with allicin after inoculation, or inoculated with fungus previously treated with the extract. Virulence of the fungus was determined by the presence of the pathogen in the alimentary tract, blood and kidneys of mice inoculated intraperitoneally, and by the presence of lesions on and under the skin of mice inoculated subcutaneously. Mice treated with allicin after infection or with pretreated cells did show significantly lower number of cells in the tissues investigated.

Effects of Neutron Radiation on Seed Germination and Seedling Development of Lycopersicon esculenta. P. Sarna, Christian Brothers

College. Seeds of the beefsteak tomato (*Lycopersicon esculenta*) were irradiated with a mixture of thermal and fast neutrons using a neutron howitzer at Christian Brothers College as the neutron source. Four groups of 50 seeds each received 0, 6, 12 and 48 hours exposure. Effects of the radiation on germination time, percent germination and seedling development were determined. Seeds in the control group showed 92% germination, with 86, 66 and 70% germination for the 6-, 12- and 48-hour exposure groups, respectively. Effects on seedling development are currently under observation.

Restriction Mapping of an R-myc-related Sequence Isolated from a Normal Human Genomic Library. P.J. Schnebelen, Christian Brothers College. The oncogene R-myc, isolated from a human rhabdomyosarcoma cell line, has been shown to be capable of inducing complete malignant tumorigenesis in humans. Another gene which is related to R-myc has been found in normal human cells. It would be beneficial to study the tumorigenic properties of this R-myc-related gene. Restriction endonuclease analysis has shown that R-myc from rhabdomyosarcoma cells and the R-myc-related gene from normal cells have closely related restriction maps.

The Synthesis of Pharmacologically Interesting 1-Benzyl Tetrahydroisoquinoline Derivatives. S.A. Sims & R.V. Williams, Memphis State University. Tetrahydroisoquinolines of the type (1) to (4) are expected to be efficient agents in the prevention of blood platelet coagulation. In order to test this hypothesis the total synthesis of these compounds was undertaken. Reaction of B-(3,4-dimethoxyphenyl) ethylamine with either 3,4-dimethoxyphenyl acetyl chloride or 3,4,5-trimethoxyphenyl acetyl chloride gave the corresponding amide. Bischler-Mapierski cyclization of these amides produced the dihydroisoquinoline derivatives in excellent yield. These dihydroisoquinolines could be alkylated with methyl iodide in methanol to give the N-methyl derivatives, which could be reduced to the desired (3) and (4). Alternatively the dihydroisoquinolines could be directly reduced to (1) and (2).

- (1) R = R' = H
 (2) R = H, R' = OMe (3) R = Me, R' = H
 (4) R = Me, R' = OMe

Light Microscopic Observations of Skin and Feathers in Developing Chick Embryos (Gallus Domesticus) Exposed to a Structural Proline Analog. B. Tucker, K. Stamps, LeMoyné-Owen College. In chick embryos injected with L-azetidine-2-carboxylic acid (LACA), the feather germs emerge in an unorganized pattern. There is a lack of cellular organization in the ectodermal ridge and in the mesodermal condensations, including a lack of distinction between the ectodermal ridge and the basement membrane. The objective of this study was to determine if a relationship between normal collagen synthesis and normal feather morphogenesis exists by using LACA as a probe. These results suggest that LACA interferes with the normal development of feathers, but the exact mechanism by which this interference occurs is not known. However, the data have been interpreted on the basis of collagen deformations because of LACA. (Supported by NIH/MBRS Grant #2-S06-RR-08179-04.)

Pharmacologic Effects of Testosterone on Growth and Stamina in Rat Weanlings. K. Turner, Christian Brothers College. Inconsistencies in reports concerning the effects of androgens on increasing strength, stamina and body mass prompted this study. One method of administering testosterone practiced by athletes was mimicked by injecting groups of rats (30 days old) with one of three dosages: none (placebo), 1 mg/kg body weight, or 10 mg/kg. Injections were given biweekly for six weeks, suspended for six weeks, and then resumed for a second six week period. One half of the rats in each group were exercised regularly by swimming; the other half remained sedentary. The change of body weight was monitored; stamina was assayed by determining a swim-to-exhaustion time. Statistical analysis of the data shows no significant differences in weight gained or degree of stamina achieved.

Determination of the 0-13 constants for the p-CO₂CH₂ and the 2,5-dimethoxy groups. K.C. Utley and C.N. Robinson, Memphis State University. It has been shown that a set of Hammett type free energy relationships can be established based on the carbon-13 nmr shifts of the B-carbon of B,B-disubstituted styrenes, R-O-CH=CXY. The substituent constants, 0-13, are defined by the equation: $\sigma\text{-}^{\text{B}}_{13} = A (\sigma_{\text{R}} - \sigma_{\text{H}})$ in which σ_{R} and σ_{H} represent the chemical shifts of the B-carbon atoms in the substituted and unsubstituted compounds, respectively, and A is a scaling factor. 0-13 values for twelve para- and nine meta-substituents have been calculated based on the nmr data from twenty series of compounds with varying X and Y groups. Correlations of this type have sometimes been criticized for not including certain types of R groups. With this in mind we are now

attempting to evaluate the ρ -13 constant of the p -CO²CH² group. The possible use of these constants for polysubstituted styrene derivatives will be discussed.

Extrarespiratory Sites of Influenza A Virus Replication in Ferrets. K.A. Vincent, Christian Brothers College. It was believed that the acid-lability of Influenza A viruses restricted replication to the respiratory tract in mammals with acidic stomachs and harsh bile salts. Recent evidence, however, suggests that intestinal virus replication can occur in a mammalian host such as the ferret. Ferrets were infected with different strains of Influenza A isolated from mammalian and avian hosts. Three days postinfection, virus was recovered from jejunum, rectum, kidney and mesenteric lymph nodes, nasal cavity, trachea and lung. These results indicate that Influenza A virus replication is not restricted to the respiratory tract in ferrets. Whether these sites are significant in the transmission of Influenza A in mammals remains to be demonstrated.

Correlation of Age to the Clotting Factor Prothrombin. G. Waller, Christian Brothers College. (Abstract not submitted by publication deadline.)

Non-planar Hydrocarbon Radicals. R.V. Williams and D.M. Moss, Memphis State University. ESR spectroscopy of the bridgehead radicals

generated directly from cis- and trans-decalin reveals that they are distinguishable and non-planar. However, the quality of the ESR spectra was very poor. Alternative methods of generating these radicals are being investigated. The cis- and trans-9-halodecalins are being prepared stereoselectively, and the results will be presented.

*Stereoselectivity in the Quench of *o*-Sulfonyl Anions.* R.V. Williams and L.L. Hensley, Memphis State University. Calculations suggest that the electrophilic quench of *o*-sulfonyl anions should show some stereoselectivity; however, experimental evidence for this theory is not available. A series of bicyclic sulfones were synthesized, and the anions generated by treatment with butyllithium were quenched with various electrophiles. The results were encouraging and lead to the conclusion that electrophilic quench proceeds with complete retention of configuration.

Photoreduction of Poly(vinyl acetate) in Hexamethyl Phosphoramide (HMPA). J.L. Yancey and L. Wescott, Christian Brothers College. The photoreduction (254 nm) of poly(vinyl acetate) in HMPA was investigated. The polyethylene product was separated from HMPA by dialysis for C-13 nmr analysis. The extent of photoreduction was determined by titration of the liberated acetic acid with standard base.

ERRATA

In the article "Larval Development of *Hiodon tergisus* Lesueur with Comparisons to *Hiodon alosoides* (Rafinesque)" which appeared in Volume LXI, Number 3 (July issue) of the JOURNAL, captions for all five pictures were omitted, but copies of completed art are available by request from the author, Robert Wallus, TVA, Norris, Tennessee 37828.

Figure 1. *Hiodon tergisus*.

- A. Protolarva 9.8 mm TL.
- B. Early mesolarva 12.0 mm TL.

Figure 2. *Hiodon tergisus* mesolarvae.

- A. 13.5 mm TL.
- B. 16 mm TL.

Figure 3. *Hiodon tergisus*.

- A. Mesolarva 20.0 mm TL.
- B. Metalarva 30.0 mm TL.

Figure 4. Early mesolarvae *Hiodon alosoides* and *H. tergisus*. Note postanal pigmentation and dorsal fin position relative to anal fin.

- A. 11.8 mm larva *H. alosoides* (Reproduced from Battle and Sprules (1960).)
- B. 12.0 mm *H. tergisus*.

Figure 5. Late larval hiodontids. Note ventral median finfold and dorsal fin positions relative to anal fin.

- A. 33.0 mm *H. alosoides* (Reproduced from Battle and Sprules (1960).)
- B. 30.0 mm *H. tergisus*.