

**ABSTRACTS OF PAPERS PRESENTED
AT THE SPRING 1987 COLLEGIATE MEETING**

EASTERN REGION

ROANE STATE COMMUNITY COLLEGE

[EDITOR'S NOTE: *The following abstracts are the only ones received at press time from the Eastern Region*]

Esterification Using Dicyclohexylcarbodiimide (DCC) with Tertiary Amine Catalysts, II. Tera Jenkins and Irving T. Glover, Roane State Community College. The rate of esterification of benzoic acid (BA) and p-nitrophenol (PNP) in the presence of DCC with 4-pyrrolidinopyridine as catalyst was studied by spectrophotometry at 410 nm. The results indicated that the reaction was second order overall, first order in BA and first order in DCC. Whereas the data were a better fit to a second order equation, they did not rule out a third order reaction with PNP as a first order component.

Fort Southwest Point Archeological Project, Kingston, Tennessee. Constance D. Thomas, Roane State Community College. Fort Southwest Point Archaeological Excavation, rich in both historical and prehistorical information, is examined. Four seasons, requiring meticulous detective work by Roane State Community College students in association with The University of Tennessee, have been accomplished. The step-by-step reconstruction of a past lifeway is examined in detail.

A comparison of the Effects of Gamma Radiation on Hydrated and Air Dried Sweet Corn Seeds and Hydrated and Air Dried Rye Grass Seeds. Marsha Worthington, Roane State Community College. This is a comparative study of the effects of gamma radiation on the growth of hydrated and air dried seeds during the first weeks of primary growth. Four groups of seeds were used in the study: 1) hydrated sweet corn, 2) air dried sweet corn, 3) hydrated rye grass, and 4) air dried rye grass. Each group was then further subdivided and exposed to various levels of gamma radiation using a Cobalt-60 irradiator, except for the control samples of the four groups which received no radiation above background level. All seed samples were then planted, allowed to grow for approximately 12 days, and harvested. Growth of both shoot and root of each seed was recorded for data analysis according to specific groups. Analyses of data from this study shows that the mean growth of hydrated seeds is significantly less than the mean growth of air dried seeds when exposed to

gamma radiation prior to planting. The results of the statistical analyses of this study are as follows: percent germination of hydrated sweet corn seeds is significantly lower than the percent germination of air dried sweet corn seeds; the mean total growth of hydrated sweet corn seeds exposed to 25,000 rads of gamma radiation is significantly less than the mean total growth of air dried sweet corn seeds exposed to 25,000 rads of gamma radiation; the mean total growth of air dried rye grass seeds is significantly inhibited with 25,000 rads or more of gamma radiation; the mean total growth of hydrated rye grass seeds is significantly inhibited with 2,000 rads or more of gamma radiation; the mean total growth of air dried sweet corn seeds is significantly inhibited with 50,000 rads or more of gamma radiation; and the mean total growth of hydrated sweet corn seeds is significantly inhibited with 15,000 rads or more of gamma radiation.

Esterification Using Dicyclohexylcarbodiimide (DCC) with Tertiary Amine Catalysts, I. Scotty Wyatt and Irving T. Glover, Roane State Community College. The esterification reactions of acetic acid and methanol, benzoic acid (BA) and methanol, and BA and p-nitrophenol (PNP) were studied in the presence of DCC with 4-pyrrolidinopyridine chromatography on silicagel and identified by infrared spectroscopy and comparison with authentic samples. The reaction rate (measured by polarimetry) of acetic anhydride and cholesterol with 4-PP as catalyst was much slower than the esterification of acetic acid and cholesterol in the presence of DCC with 4-PP as catalyst. This result indicates that acetic anhydride is not an intermediate in the esterification reaction.

MIDDLE REGION

TENNESSEE TECHNOLOGICAL UNIVERSITY

Δ^9 -Tetrahydrocannabinol. VIII. Procedure for the Quantification of the Metabolite in Urine. Karen Mangubat, Judith M. Bonicamp, and Rhonda Norrell, Middle Tennessee State University. 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

and scanning densitometry. We wish to report results of quantitative procedures for determining Δ^9 -THC-COOH in urine using absorbance data from densitometry of the Δ^9 -THC-COOH and Δ^8 -THC-COOH derivatives on two types of chromatography plates.

Δ^9 -Tetrahydrocannabinol. VII. Confirmation of Cannabis Use by Derivatization of the Urinary Metabolite with Two Reagents. Rhonda Norrell, Judith M. Bonicamp, and Karen Mangubat, 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 a method for detecting the unconjugated metabolite using thin-layer chromatography followed by derivatization with fast blue BB salt/diethylamine vapors. The visible spectrum and λ_{max} of the fast blue BB derivative have been determined by scanning densitometry. We wish to report use of sequential detection reagents in combination with scanning densitometry to further confirm the presence of the cannabis metabolite in urine.

Excystment in Acanthamoeba Castellani: An Ultrastructural Study. Anita Bonds, Phyllis Tucker and Gus Tomlinson, Tennessee State University. A laboratory procedure whereby cysts of *Acanthamoeba castellanii* were induced to undergo excystment and become rapidly dividing trophozoites was devised. The ultrastructural changes which occurred during excystment were investigated using phase contrast and transmission electron microscopy. *Acanthamoeba* were found to excyst via ostioles in the cyst wall when placed in a buffered saline solution with a carbon and nitrogen source. The double-walled cyst was left behind as the operculum was enzymatically removed and the trophozoite emerged via amoeboid movement. Substantial changes in the nucleus, nucleolus, mitochondria, vacuoles, cytoplasmic density and endoplasmic reticulum were documented during the excystment process. Difficulties in obtaining synchronous excystment as well as conditions and treatments which affect excystment will be presented.

Distribution and Pathogenicity of Acanthamoeba spp. Teresa Bondurant and Gus Tomlinson, Tennessee State University. The cyst-forming capability of these soil amoebae has enabled them to spread via air, soil, water, food and contaminated objects from the frigid soil of Antarctica to the tropical waters of the Pacific; from "washed" vegetables of Mexico to treated and bottled mineral water in Germany; from the filtered air of Australia to the dental treatment rinsing units of South America; from hot tubs of the USA to the cold soils of Poland; from

contact lenses in America to *Legionella* cultures of Israel and England. *Acanthamoeba* are opportunistic pathogens in mice, dogs and humans associated with meningoencephalitis, brain tumors, keratitis of the eye, meningitis, amoebic dysentery, osteomyelitis, lung infections, cerebral and cerebellar abscesses, pneumonia, Viluy encephalomyelitis, and most recently as killers of weakened AIDS patients. *Acanthamoeba* are very resistant to antibiotics, antimetabolites and typical cytostatic agents. More specifically, they are resistant to greater than 1000 $\mu\text{g/ml}$ levels of paromomycin, polymyxin, B-bacitracin-neomycin, acriflavine, 5-fluorocytosine, amphotericin B, gentamicin, and trimethoprim-sulfamethoxazole. Thus, effective control procedures are not yet available to control this opportunistic pathogen in debilitated hosts. Support for this work under NIH Grant 3 S06 RR08092-14S1 and NSF Grant RII-8704133 is gratefully acknowledged.

Excystment in Acanthamoeba Castellani: An Ultrastructural Study. Twala Hogg, Zalaria Moore and Gus Tomlinson, Tennessee State University. An experimental procedure for inducing excystment in *Acanthamoeba castellanii* was utilized to study ultrastructural changes which initiate and/or accompany the process. The investigation was made using phase contrast and transmission electron microscopy. Substantial changes in the nucleus, nucleolus, nuclear membrane, mitochondria, food and contractile vacuoles, and endoplasmic reticulum accompanied formation of the cyst wall. Such changes were followed in synchronously encysting trophozoites from initiation of excystment throughout the excystment process. Conditions which affect the rate of excystment and difficulties encountered in obtaining synchrony in the encysting culture were followed. When the process of excystment was complete, a doubled-wall cyst, approximately half the diameter of the beginning trophozoite, was the result. Most cysts are from 10 to 20 micrometers in diameter and have a tendency to clump together.

Facies Analysis of the Hartselle Formation in the Livingston Area of Tennessee. Susan L. Abston, Mary A. McCaskey, and L. Gregory Stephenson, Tennessee Technological University. The Chesterian Hartselle Formation in the Livingston area is approximately six meters thick. The upper contact with the Bangor Limestone is sharp and erosional. The lower contact with the Monteagle Limestone is also sharp and erosional. Within the Livingston area the Hartselle Formation contains five facies arranged in a shoaling upward sequence. The first and lowermost is the coarsening and thickening upward sequence of interbedded shales and current rippled sands. The second is a sequence of fine grained sandstones with swaley and some

hummocky cross-stratification. These sands were deposited by storm action below normal wave base. The third facies consists of medium grained sandstones that are trough- and planar-tabular crossbedded which were deposited in the upper shoreface above wave base. The fourth facies of the shoaling sequence is a thin-bedded planar sandstone that was deposited in the swash zone of the beach. The last facies consists of fluvial channel fills and overbank deposits. Epsilon cross-bedding is visible in the point bar deposits of this facies. Based on the analysis of the five facies in the Livingston area the Hartselle Formation represents a wave-dominated delta. Plunge directions of trough axes indicate significant longshore transport to the northeast and offshore transport to the southeast. The shoreline was oriented northeast-southwest, based on the dip direction of beach laminae. The Livingston Hartselle is a separate and distinct deltaic lobe located updip from the Buck Mountain Hartselle as reported by Parnell and Maxwell (1986).

Linguistic and Music Stimulation During a Mirror Tracing Task—A Cerebral Dominance Effect. Scott Baker, Tennessee Technological University. The cerebral hemispheres have specialized functions; generally the left side is more specialized for verbal functions, while the right is more spatially and emotionally oriented. On the mirror tracing task, because of perceptual reversal, it is assumed the right side of the brain operates on this task. It also appears that logical or left brain activity seems to interfere with the mirror tracing performance. It was hypothesized that by stimulating the left side of the brain verbally the right side of the brain will dominate causing the subject to do better on the mirror tracing device, whereas using music the right side will compete with spatial activity, and thus the subject will not do as well. Twelve males and twelve females were tested with the mirror tracing device under three conditions: reading, silence, and music. The object traced was a six sided star pencil maze. The subject was told to stay inside the two lines that form the star. As predicted there was significance among the three conditions. $F(2,24) = 10.483, p < .001$. Verbal stimulation with the mean equated time of 51.23 seconds was the best, with fewer errors and less time, while music was the worst, with a mean equated time of 123.45 seconds, and silence was in the middle, with a mean equated time of 95.30 seconds. The mean equated time was calculated by adding a one second penalty for each one sixteenth of an inch outside of the lines to the latency for one third of the star maze. No significant gender or order of treatment effects were found attesting to the stability of this phenomenon. The mirror tracing device seems to be useful in measuring cerebral hem-

ispherical functions.

Parent-Peer Influences on Pre-adolescent and Adolescent Children's Decisions. Donny Ray Ballard, Tennessee Technological University. Two hundred and twelve students from the 4th, 6th, 8th, 10th, and 12th grades, in two separate school systems in Middle Tennessee, responded to 24 scenarios involving four categories of behaviors: future goals, moral dilemmas, personal preferences, and illegal activities. Advice of parents and peers was manipulated to determine spheres of influence. Responses were analyzed for parent compliance and peer compliance, as well as appropriate vs inappropriate decisions. In the first school system, the 4th and 6th grades were located in the elementary school, while the 8th, 10th, and 12th grades were located in the high school. In the second school system the division between elementary school and high school occurred between the 8th and 10th grades. Significant differences occurred between the elementary grades and the high school grades, with the elementary grades being parent-compliant for future goals, moral dilemmas, and illegal activities, when parental advice was appropriate. In contrast, these same grades went against this advice when parental advice was inappropriate. The high school grades were equidistant between parent compliance and peer compliance, regardless of parental advice. This suggests that the different attitudes and behaviors of pre-adolescent and adolescent children occur due to changes in reference groups and not due to the onset of puberty and adolescence. Further analyses revealed that the elementary grades based their decisions on performing the appropriate behavior. That is, they chose to do the right thing, for these behavioral categories, regardless of parental or peer advice. The high school grade's decisions for these behavioral categories were not constrained by making the appropriate decisions.

The Effects of Varying Degrees of Feminist Support on the Perception of Women. Karla F. Brock, Tennessee Technological University. The purpose of this experiment was to determine how affiliation with a feminist organization and the degree of support given to that organization affect perceptions of known feminists. Seventy-two subjects (36 males, 36 females) from Tennessee Technological University were exposed to a typewritten scenario depicting either an active member of the National Organization for Women (NOW), an inactive member, or a feminist unaffiliated with NOW. Subjects were then asked to complete a semantic differential assessing attitudes about sexual activity, femininity, attractiveness, radicalism, and competence of the feminist in the scenario. Administration of a scale designed to assess the

feminist orientation of subjects followed. The active member of NOW was perceived as being significantly more radical and less feminine than the inactive member [$F(6,198) = 3.09, p < .01$]. In a separate analysis, the radicalism measure for the active member was found to be significantly higher than both other groups [$F(2,65) = 3.12, p < .05$]. Male and female subjects were found to respond differently to the scales, with male subjects providing higher ratings on the sexual activity and radicalism scales, while female subjects provided higher ratings on the femininity scale [$F(3,198) = 2.85, p < .04$]. It was concluded that certain characteristics are assumed of feminists and that these may be altered most effectively by the degree of feminist activism, rather than by the degree of affiliation with a feminist organization.

Electromagnetic Transitions in Neutron-Rich Nuclei Near $A = 40$. C.R. Bybee and R.L. Moyers (R.L. Kozub), Tennessee Technological University. The γ -ray facility at the Argonne Tandem-Linac Accelerator System (ATLAS) has been used in conjunction with two charged-particle detector telescopes to study the structure of neutron-rich nuclei in the mass-40 region. The use of bismuth germanate (BGO) shields to reduce the Compton background in the γ -ray spectra will be described. Enhancement of weak peaks in the γ -ray spectra is made possible by requiring coincidences with one or two charged particles, which are identified by EDE telescopes. A description of the detector array in its present state will be given. Research supported in part by DOE Contract DE-AS05-79ER10335.

Effect of Embarrassment on Nonresponse Bias. Franklin D. Fujita, Tennessee Technological University. The effect of embarrassment, defined as having to report a low Q.P.A. (grade point average adjusted to reflect relative weights of classes) on nonresponse bias was investigated. Questionnaires were mailed to 203 subjects about whom Q.P.A. information was known. Subjects were classified into a high Q.P.A. group and a low Q.P.A. group. Subjects were then randomly assigned to either an "asked to report" Q.P.A. group or a "not asked to report" group. Results ($\chi^2(1) = 4.44, p < .05$) indicated that, on the academic questionnaire, subjects are less likely to respond only if they both have a low Q.P.A. and are asked to report it. On the non-academic questionnaire, subjects with a low Q.P.A. are less likely to return a questionnaire whether or not they are asked to report their Q.P.A. These findings are congruent with previous research.

The Effects of Stress and Locomotor Activity on Serum Cholesterol Levels in Male Albino Rats. Bert E. Geer, Tennessee Technological University. Twenty one male

albino rats of the Holtzman strain were cold stressed and tested for pre-stress cholesterol levels. Also analyzed were activity levels, food and water consumptions, and stomach ulceration due to stress. The rats were divided into three groups: Group A—Old Group (18 months old), Group B—Old Group which also received Dexedrine (18 months old), and Group C—Young Group (6 months old). Upon analysis of variance, significance was found between the baseline cholesterol values and the post-stress cholesterol values for all groups [$F(2,15) = 5.49, p < .02$]. Due to the high degree of variability caused by group B, there was no significance found between the difference in the pre-stress and post-stress cholesterol levels between the groups themselves. However, when only group A and group C were analyzed for difference in cholesterol change it was found to be significant [$F(1,10) = 15/6, p < .004$]. This might imply that age plays an important role in Serum cholesterol levels. Significance was also found between cholesterol levels of the groups [$F(1,15) = 11.8, p < .004$]. Group A showed the largest mean increase of 16.3 MG/DL, group B had the next largest increase of 14.7 MG/DL, and group C displayed only a 5.5 MG/DL increase. A regression analysis was conducted to determine whether or not extraneous variables could be considered as predictors for serum cholesterol level changes but none were found. This seems to support the current view that serum cholesterol levels are not determined by a sole predictor but by a complex combination of several influencing factors.

Tidal Inlet Facies Within The Hartselle Formation at Cardwell Mountain, Warren County, Tennessee. C. Allison Hodges and Eric M. Solt, Tennessee Technological University. The Hartselle Formation found on Cardwell Mountain is a very fine to fine grained sandstone 6 to 10 meters thick. It contains various bedforms including; trough cross-bedding, ripples, sand waves, and planar beds. The tidal inlet facies found within the Hartselle is characterized by large sand waves, some exposed over distances of 8 to 10 meters, and a grain size that ranges from fine to medium. Measured sections indicate that the facies is elongated parallel to sand-wave transport direction, has a width of approximately one kilometer, a maximum thickness of six meters, and forms a sharp contact with the Hartselle at the margins of its shortest dimensions. Fossil debris, consisting of Archimedes bryozoa and crinoid columnals is found throughout the inlet facies. The bryozoa are in an unusually fine state of preservation suggesting little net transport prior to their deposition and subsequent rapid burial. Statistically significant paleocurrent directions of N40E and N60W were determined from the 2-D bedforms. Parnell and Maxwell (1986), and

Abston, McCaskey and Stephenson (1987), conclude that the Hartselle shoreline orientations were northeast-southwest to east-west with progradation from the northwest to southeast. By correlating this information with the data collected at Cardwell Mountain, a model of a tidal-inlet facies can be constructed. The northeast and northwest oriented sand waves suggest flood-directed transport into a tidal inlet. The model is further supported by the large size and orientation of the 2-D bedforms, the state of preservation of the fossils within the described section, and the overall geometry of the section.

Paleocurrent and Environment of Deposition of the Rockcastle Conglomerate in the Northwest Cumberland Plateau Area of Tennessee. C.B. Lawson and M.G. Marcum, Tennessee Technological University. The Rockcastle Conglomerate (Crab Orchard Group) is a lower Pennsylvanian age siliciclastic unit outcropping in the northwest Cumberland Plateau area. It ranges from 30 to 90 meters in thickness, and overlies the Fentress Formation. It is predominantly sandstone in composition, split occasionally by coal and shale. Bedforms measured in the western part of the northern plateau area are mostly trough crossbeds (3-D), the remainder being sandwaves (2-D). The plunge direction of 95 trough axes were measured, as were the dip direction of 26 sandwave slip faces. The former are orientated west to northwest and the latter to the south. The Rockcastle environment of deposition is interpreted to be a fluvial system of low sinuosity. This interpretation is based on: 1) the uniformity of trough axes directions, 2) the sand waves orientated at a high angle to the trough axes, 3) the scarcity of overbank sediments, 4) broad lateral expanse of the sandstone unit and relatively uniform texture, and 5) no evidence of bioturbation.

Electromagnetic Transitions in ^{43}K . R.L. Moyers and C.R. Bybee (R.L. Kozub), Tennessee Technological University. Data on the level scheme of ^{43}K will be presented. The nucleus was populated via the $^{36}\text{S}(^9\text{Be}, \text{pn})^{43}\text{K}$ reaction, and γ -rays were assigned to ^{43}K on the basis of coincidence with γ -rays already known to be in ^{43}K . Several previously unobserved γ -rays have tentatively been placed in the level scheme, and further analysis is proceeding. A brief discussion of other nuclei populated in this same reaction will be given, and plans for future analysis will be described. Research supported in part by DOE Contract DE-AS05-79ER10335.

Differences in Individuals' Study Techniques. Lisa M. Privette, Tennessee Technological University. This study examines the difference in amounts of irrelevant information learned by successful and less successful learners.

Sixty undergraduate students at Tennessee Technological University (TTU) participated. Thirty of the subjects were selected from the Remedial and Developmental Studies Program and the other thirty were selected from the Honors Society at TTU. An ambiguous passage by Pichert and Anderson (1977) was used as stimulus material, along with an experimenter-created word problem, which was used as a distractor. A free-recall test and an experimenter-created recognition test, which consists of only irrelevant concepts, were used for dependent measure materials. On the free-recall test, the successful learners ($M = 13.42$) recalled significantly more concepts than the less successful learners ($M = 9.21$), $F(1,44) = 12.39$, $p < .001$, $MSe = 12.59$. Significance was approached when an analysis of variance was conducted on the mean percentage of irrelevant information recalled, determined from the total number of concepts recalled by that subject, $F(144)=1.39$, $p < .24$, $MSe = 506.48$. The mean score on the recognition test for the less successful learners ($M = 5.54$) was significantly higher than the mean score for the more successful ($M = 3.71$), $F(1,46) = 19.55$, $p < .001$, $MSe = 2.06$, which supports the hypothesis, that less successful learners would recall more irrelevant information. An implication of this research then is the possible implementation of training provided to learners to better enable them to determine the relevance of information.

Factors Affecting the Social Acceptability of Remarriage. Lisa M. Privette and Michie O. Towns, Tennessee Technological University. The study investigated social attitudes toward remarriage in relation to the following: 1) various time intervals between first and second marriages (3 months, 9 months, and 15 months); 2) the cause of termination of the first marriage (divorce, death by long term illness, and death by unexpected, sudden accident); and 3) the gender of the person remarrying. These factors were used interchangeably in a marriage termination/remarriage scenario developed by the experimenters. Subjects were 216 undergraduate students at Tennessee Technological University. Each subject was given one of the 18 scenarios and asked to rate the person remarrying on a 6-point semantic differential and a 6-point Likert-type scale. The remarrying persons were rated on morality, kindness, and stability, and the remarriage was rated on successfulness, stability, and happiness. Upon analysis of the data, a significant main effect was found for time between marriages, [$F(2,198) = 4.93$, $p < .008$], and cause of termination of first marriage [$F(2,198) = 9.52$, $p < .001$]. For the ratings on the remarriage itself, significant main effects were found at the .001 level for time and cause on all questions. In all analyses, 15 month latencies before remarriage were rated significantly higher than

three month latencies; and all subjects rated the person remarrying and the remarriage itself lower when the first marriage ended by divorce than when it ended by death by long term illness or unexpected sudden accident. Significant interactions were also found between gender and time on the ratings for success, happiness, and stability of the remarriage. Males' remarriages were rated higher when the time between marriages was 9 or 15 months, as opposed to 3 months; whereas females' remarriages were not rated higher at 9 months, only at 15 months.

The Effects of Color and Illumination on Visual Depth Perception. Brenda Stanton, Tennessee Technological University. Twelve female subjects were tested in task on depth perception. The subjects were seated in a chair 6.09m from the Stoelting Depth Perception Apparatus. Subjects were given 72 trials, 36 trials each in an ambient dark and light setting. The task consisted of aligning a movable rod to a stationary rod, by using the combination pairings of Hering's Opponent Process Theory. The colors of the rods for the pairings were red, green, blue, yellow, black, and white. Order was controlled for by using a 6×6 balanced Latin Square. An analysis of variance was performed on the data. Significance was found on illumination for colors [$F(1,11) = 8.196, p < .014$]. Subjects were closer to the target for the light colored rod comparisons on green-red, yellow-blue, and white-black trials and the reversal was found on the dark colored rods for ambient dark illumination. For Hering's Theory, the subjects were closer to the target under ambient dark illumination. A second analysis was performed on red-green and blue-yellow comparisons. Significance was found for illumination on color [$F(1,11) = 6.299, p < .027$]. Blue-yellow could be distinguished longer than red-green pairings in both light and ambient dark illumination. A third analysis on black-white pairings was run. Black-white could be distinguished longer than blue-yellow or red-green. A stratification was also performed on performance based on acuity level, but no significant interactions were found for acuity level. This study supports both Hering's Opponent Process Theory and Duplicity Theory.

Effects of Diazepam Injection Upon Oral Consumption of Diazepam. Sandy Templeton, Tennessee Technological University. Sixteen female albino rats from the Holtzman strain were used to investigate the effects of sensitization to diazepam (preinjection) upon addiction. Addiction was defined as an increase in voluntary oral consumption of the agent which was measured by recording the amount of fluid consumed daily. Daily fluid measurements were initially taken for four days to establish a

baseline, for four days after placebo injections, for two days after treatment injections, and for four days after treatment injections and introduction to the oral diazepam solution. Significant differences occurred between all measurements taken of water-only consumption and measurements taken after the addition of diazepam to the solution. Significant differences also occurred between the control and treatment groups after the addition of diazepam to the solution. The results of this experiment demonstrate that rats that are sensitized will show a significant preference for oral diazepam as indicated by an otherwise unexplainable increase in fluid consumption of over fifty percent.

The Applications of Scaling Theory in a Physics Laboratory Experiment on Human Mechanics. Richard R. Ward, The University of the South, Sewanee. Scaling theory predicts performance as a function of body size. In an introductory physics laboratory experiment on human dynamics, correlations for height vs. weight and power exerted in running upstairs vs. weight were investigated. In another experiment various human physiological parameters (lung and blood pressures, metabolic rate) were measured or calculated. Data collected from students (sample sizes varied from 42 to 212) over periods from three to eight years were analyzed using a spreadsheet on an Apple Macintosh computer with the Cricket Software statistics program, Statworks. Lung pressure was found to be independent of body size as scaling theory predicted. The leg power of the stair runners did increase with body weight. According to the model, $\text{Power} = (\text{constant}) \times (\text{Weight})^n$ where $n = 2/3$ is the exponent of the scaling factor. The experiment gave $n = 0.8$. A more complex model, The Mayo Clinic standard metabolic rate tables with the Dubois Body Surface Area Nomograph, proved to be an even better predictor of leg power performance.

WESTERN REGION RHODES COLLEGE

Analysis of Five Monoclonal Antibodies for their Specificity for Male-specific H-Y Antigen. Angel K. Baker and Vikram L. Jaswaney, Christian Brothers College and Center for Reproductive Biology. Five monoclonal antibodies were analyzed using ELISAs for subtypes specific for H-Y antigen. Monoclonal antibody GW16, subtype IgG2a, was found to be specific for two H-Y antigen sources: mouse testicular supernatant and mouse Sertoli cell supernatant. Absorption of this antibody by male and female mouse spleen cells and subsequent testing of unabsorbed antibody by direct and indirect ELISAs showed that GW16 may have some usefulness as in testing for H-Y antigen.

Phylogenetic analysis of P-gene descent in avian and mammalian influenza A viruses. Richard J. Coleman and Yoshihiro Kawaoka, Christian Brothers College and St. Jude Children's Research Hospital. The polymerase genes PA and PB1 of several strains of mammalian and avian influenza A viruses were sequenced to determine phylogenetic relationships. Gene homologies were greater within the mammalian strains and avian strains than between mammalian and avian strains. In the PB1 sequences, however, high percentages of homology were found between some avian and human strains which supports previous hypotheses regarding the descent of H3N2 subtypes of the virus.

A New Method of Determining Isothermal Compressibility on an Analytical Ultracentrifuge. Kenneth Hester, Christian Brothers College. Isothermal compressibility can be determined by ultracentrifugation. The standard method, however, involves knowing the refractive index of the liquid as well as other parameters related to the particular ultracentrifuge. It can be seen from the definition of compressibility, $k=1/\rho \cdot dp/dP$, that if ρ and P could be measured and correlated that the compressibility could be easily obtained. If the sample is put into the CsCl gradient of an ultracentrifuge it will appear as a band in the gradient. The pressure and density can be calculated knowing the speed of the ultracentrifuge and the location of the sample in the gradient. If this is done at several different speeds, pressure and density data can be taken and graphed. The compressibility of the liquid can be obtained from the slope of the curve at a particular pressure. This method is both more accurate and easier than the standard method.

Structure of (4-aminopyridine) bis (1,10-phenanthroline)copper(II) hexafluorophosphate. Ann Marie Hobson, Christian Brothers College. The following single crystal X-ray diffraction data were collected for the compound (4-aminopyridine) bis (1,10-phenanthroline)copper(II) hexafluorophosphate chemical formula: $\text{CuC}_{29}\text{H}_{22}\text{N}_6\text{P}_2\text{F}_{12}$ Mr=931.9, orthorhombic, P_{bcu} $a = 32.574(7)$, $b = 16.012(3)$, $c = 13.648(3)$ Å, $\alpha = \beta = \gamma = 90.0^\circ$, $V = 7118.5(6)$ Å³, $z = 8$, $D_x = 1.508$ g cm⁻³, $\lambda(\text{MoK}\alpha) = .71073$ Å, $\mu = 7.922$ cm⁻¹, $F(0,0,0) = 3240$, $T = 293$ K, solved from 6303 unique, observed reflections. Five of the nitrogen atoms are coplanar with the copper atom. The sixth nitrogen gives rise to a square pyramidal coordination geometry about the copper atom. The plane of the 4-aminopyridine forms a dihedral angle with the primary nitrogen atom plane.

Comparison of triglyceride content of liver samples from Reye's Syndrome and control subjects. Robin J.

King, Christian Brothers College. The triglycerides of liver samples from Reye's Syndrome and control subjects were extracted in chloroform-methanol, separated by thin-layer chromatography and quantitated. Fatty acids were released by hydrolysis with pancreatic lipase. Mean values for total neutral lipid and triglyceride content were not significantly different between Reye's and control livers but this may be due to variation in recovery.

Survey of Parasites in Lepomis macrochirus from a Western Tennessee Pond. Kathy Nichols, Christian Brothers College. A sample of *Lepomis macrochirus* was taken from a pond at Lichterman Nature Center in Memphis, Tennessee during July, 1986. The location and species of parasites infecting the fish were determined. Three major species of parasites were identified: *Posthodiplostomum minimum*, *Protocephalus ambloplitis*, and *Ozwardocruzi* spp. A higher incidence of parasitism and greater parasite load were found in these fish compared to fish caught in similar locales during winter.

Structure of Aquabis (3,5-dimethylpyridine) (1,10-phenanthroline) copper(II) perchlorate. Todd Edward Stiles, Christian Brothers College. In this project we are determining the structure of Aquabis (3,5-dimethyl pyridine) (1,10-phenanthroline) copper (II) perchlorate by using data collected by single crystal x-ray diffraction. The characteristics of the crystal are: chemical formula= $\text{CuC}_{26}\text{N}_4\text{H}_{28}\text{Cl}_2\text{O}_9$, Mr = 675.0, triclinic, $P - 1$, $a = 9.391(2)$, $b = 12.457(2)$, $c = 13.448(3)$ Å, $\alpha = 74.81(2)$, $\beta = 87.95(2)$, $\gamma = 79.46(1)$, $V = 1492.5(7)$ Å³, $Z = 2$, $D_x = 1.50$ g cm⁻³, $\lambda(\text{MoK}\alpha) = 0.71073$ Å, $\mu = 9.7$ cm⁻¹, $F(0,0,0) = 1006$, $T = 293$ K, solved from 3783 unique, observed reflections. The four nitrogen atoms are coplanar and the oxygen atom of the water molecule gives rise to a square pyramidal coordination geometry about the copper atom, which is above the basal plane. The planes of the two 3,5-dimethylpyridine rings form dihedral angles with the nitrogen atom plan.

The Synthesis of Silicon and Carbon Phosphine Ligands and Their Metal Carbonyl Derivatives. Keith Butler and Dr. Larry W. Houk, Memphis State University. Bidentate phosphine ligands will withdraw electron density from transition metal carbonyl centers to stabilize the metal in its low oxidation state. Most ligands have limited electron withdrawing ability because once the electrons are accepted by the phosphorus d-orbitals no further electron dispersion occurs. The purpose of this study is to synthesize new bidentate phosphine ligands with increased electron withdrawing capacity and then to allow them to react with transition metal carbonyls. The pro-

posed ligands may provide this unusual stability by "direct" d-orbital electron transfer. This type of electron transfer may occur in compounds such as 1,2-bisdiphenylphosphino-1,2,2-tetramethyl disilane where there is a phosphorus-silicon bond. This compound may have cyclical d-orbitals when chelated to a metal: from metal to phosphorus, to silicon, to silicon, to phosphorus, and back to the metal. This may provide a highly electron withdrawing ligand through a pseudoaromatic d-orbital electron delocalization effect.

Benzene-Linked Porphyrin. Christopher Green and Richard Petersen, Memphis State University. Our research involves the synthesis of a porphyrin complex similar to the heme in hemoglobin. Different metals (including iron) are being inserted into the porphyrin. Several tests are being conducted to determine the properties of the benzene-linked porphyrin. The reactants in the synthesis of the porphyrin ring are pyrrole and carboxyaldhyde, diluted with benzaldehyde. This gives rise to oligomers. Metal ion complexes are then formed and visible and ultraviolet spectra are taken to characterize the different metal complexes formed.

Complex Formation of Phenol with Cyclic Ketones. Mei-Lee Hwang and Ying-Sing Li, Memphis State University. The hydrogen-bonded complexes formed by phenol with a series of cyclic ketones have been identified in CCl_4 by infrared spectroscopy. The equilibrium constants (K) at different temperatures have been determined from the changes in the intensity of the free OH-stretching band of the proton donor. Thermodynamic quantities, ΔH , ΔS and ΔG , have been calculated from the temperature-dependence of the K value. The relative strength of forming H-bonded of phenol with these cyclic ketones will also be compared and discussed.

Metal Complexes of Ferrocenylporphyrin. Jessie Lee and Richard Petersen, Memphis State University. Ferrocenylporphyrin was synthesized by reacting ferrocene carboxaldehyde with pyrrole in glacial acetic acid. This product was characterized by a visible spectrum which showed broad, poorly resolved peaks compared to the spectrum of teraphenylporphyrin. The low resolution may be attributed to the presence of atropisomers of the ferrocenylporphyrin which cannot be separated by column chromatography. The spectrum also suggests that electronic interaction between the porphyrin and the ferrocene π -system exists. Iron, cobalt, copper, manganese and zinc complexes of ferrocenylporphyrin were prepared by refluxing the metal acetate with the porphyrin in dimethylformamide. Visible and ESR spectroscopies were used

to characterize these metalloporphyrins. The reduced iron complex was of particular interest in its chemical interactions with molecular oxygen and carbon monoxide.

Conformational Analyses of Cyclic Ketones. San Li and Ying-Sing Li, Memphis State University. Some cyclic ketones in the gaseous phase have been studied by microwave spectroscopy. The most stable conformer for each of these ketones in the ground vibrational state will be presented and discussed. The studies of bicyclo[3.3.1]non-9-one by microwave spectroscopy and molecular mechanics calculations are being carried out and the results will be presented and compared in terms of relative conformational stabilities.

Microwave Spectrum of 4-Fluoro-1-butene. Bih-Ying Liu and Ying-Sing Li, Memphis State University. The microwave spectrum of 4-Fluoro-1-butene, $\text{CH}_2=\text{CHCH}_2\text{CH}_2\text{F}$, has been investigated in the region from 26.0 to 40.0 GHz. Most of the intense bands have been assigned as a-type rotational transitions from which rotational constants and centrifugal distortion constants in the ground state were determined to be $A = 19196.5 \pm 323.0$, $B = 2132.48 \pm 0.01$, $C = 2112.52 \pm 0.01$ MHz, $D_J = 0.70 \pm 0.03$ and $D_{JK} = 26.16 \pm 0.05$ kHz. These results suggest that the most stable conformer exists in the *skew-trans* form. Electric dipole moments were obtained from Stark effect measurements: $\mu_a = 1.62 \pm 0.01$, $\mu_b = 0.69 \pm 0.05$, $\mu_c = 0.39 \pm 0.15$, and $\mu_t = 1.80 \pm 0.05$ Debye.

The Effects of Quipazine on the Circadian Rhythms of Pineal Indoleamine Metabolism in the Rat. Paja Faudree, Rhodes College. The pineal gland, an endocrine organ, produces circadian rhythms via a complex network of indoleamine metabolism. The primary hormone it produces is melatonin, synthesized from serotonin in a two-step process. The rate-limiting step in this conversion is accomplished by N-acetyltransferase (NAT), which exhibits, in the rat pineal, an increase in activity of enormous amplitude initiated soon after the onset of darkness. Based on this fact, studies were conducted *in vivo* concerning the effects of quipazine, an agonist of serotonin receptors, on rhythms of indoleamine metabolism as reflected by NAT activity, which was measured via an established radioenzymatic assay. Results indicated that quipazine produces a dose-dependent stimulation of NAT activity. These results have important implications about the nature of the regulation of pineal circadian rhythms, suggesting that perhaps serotonin receptors within the gland are responsible for controlling the rhythmicity of melatonin synthesis.

The Role of Temperature in Aerial Predator Avoidance Behavior of the Fish Xiphophorus variatus. Chris Howard Frazier, Rhodes College. Predator avoidance behavior of the fish, *Xiphophorus variatus* at different temperatures was observed and quantified. Predator avoidance was elicited by a moving artificial aerial predator. The major behavioral responses measured were "dive distance" (DD) and "freeze time" (FT). There was no significant difference among distances of the fish from the surface during aerial predator introduction at the different temperatures ($p > .05$). However, distances of the fish from the surface during aerial predator introduction and DD were inversely related ($r = -0.68$; $df = 37$; $p < .01$). The proximal cues used by the fish in this reaction are not known, but this behavior would seem to be selectively advantageous. Both DD and FT were nonlinearly related to temperature. DD exhibited a minimum at 75F and FT exhibited a maximum at 80F. These data demonstrate that temperature may affect predator avoidance behaviors in fish.

Construction of a Variable Temperature Guoy Balance. Jon Duffey and Dr. Jimmy H. Davis, Union University. This project involved construction of a Guoy balance for measuring magnetic susceptibilities at temperatures down to 195K. Trials and tribulations of this method will be discussed.

Synthesis and Characterization of a Seven Coordinated Manganese(II) Complex. Shawn Phillips and Dr. Jimmy H. Davis, Union University. The seven coordinated compound $MnBCl_2 \cdot 6H_2O$, where B is 2,13-dimethyl-3,6,9,12,18-petaazabicyclo-[12,31]octadeca-

1(18),2,12,14,16-pentaene, was synthesized. The ESR spectrum of this compound will be compared to the ESR spectrum of another seven coordinated compound, $Mn(DAPSC)Cl_2 \cdot 3H_2O$, where DAPSC is 2,6-diacetylpyridine-bis(semicarbazone). Spectra were obtained of both diluted and undiluted samples.

The Effect of Histamine Dihydrochloride and 3-isobutyl-1-methylxanthine in the Migration of Newt Epidermal Cells. R. Preston Rogers (under the supervision of Donald J. Donaldson, Ph.D.), UT Center for the Health Sciences. The effect of histamine dihydrochloride and 3-isobutyl-1-methylxanthine (IBMX), a known phosphodiesterase inhibitor, on the migration of newt epidermal cells *in vitro* was examined. Wounded hind limbs were incubated in test and control solutions in order to obtain a dose response for each drug under investigation. Inhibition was maximum for histamine at 10^{-4} M and the least at 10^{-5} M, yet none of the inhibition by histamine was statistically significant. IBMX inhibition also peaked at 10^{-4} M and diminished at 10^{-5} M. When the two drugs were combined at various concentrations, the inhibitory ability of IBMX was hindered significantly in each case. These data suggest that histamine has no effect on the migration of the epidermal cells, but IBMX, as expected, greatly influenced migration. Because IBMX is known to block the proliferation of various cell types via the inhibition of phosphodiesterase production, its inhibition in this study is probably due to the same mechanism. It is evident that histamine does not inhibit migration, but, when present in solution with IBMX, there is nonspecific competition which lowers the inhibitory effect of IBMX.