

ABSTRACTS OF PAPERS PRESENTED AT THE SPRING COLLEGIATE MEETINGS

EASTERN REGION  
BRYAN COLLEGE

"Determination of the Zinc Content of Liver Tissue of Striped Bass, *Moxone Saxatilis*, of Cherokee Reservoir," Leann Deal, Carson-Newman College. Preliminary determinations of zinc content in liver tissue of striped bass, *Moxone saxatilis*, were conducted using atomic absorption spectrophotometry. These studies have been initiated in order to help correlate possible heavy metal toxicity with the recent decline of physiological health and rise in mortalities of the striped bass of Cherokee Reservoir. Frozen samples of liver tissue were dry ashed in a muffle furnace for 15 hours at approximately 425° C. The dry ash was dissolved in 3 N HCl and diluted with deionized water to 0.36 N HCl. No statistical difference was found between platinum and porcelain crucibles. Also no statistical difference was found between crucibles with lids and crucibles without lids during the dry ashing process. Determined from the wet weight of the liver tissue, the range of zinc content for mine fish tested was 24.2 — 38.1 ppm. The tenth fish tested which possessed some unusual growths in the abdominal region contained 71.0 ± 2.7 ppm in its liver. Future research in this area will include testing both liver and muscle samples from Cherokee Reservoir, using Norris Reservoir samples as controls.

"Evidence Leading to the Importance of Nitrite Determination of Human Saliva," Valerie S. Adams, Carson-Newman College. This paper presents the data from studies by various groups, that demonstrate the possible involvement of dietary factors in the incidence of gastric cancer. Postulations have been made concerning the relation of food items with high nitrate concentration and the high risk of gastric cancer.

Several alkylnitrosamides have been found to produce carcinogens in the stomach of several species of animals via oral administration. It is expected that these nitrosamines are formed by intragastric nitration from the precursor amines and nitrite from the saliva.

The factors in control of nitrite concentration and the correlation with the changes in level are illustrated by tables and charts in the paper, and proof is given that the rise in nitrite is dependent on diet and the concentration of reducible nitrate ingested.

"Graham's Law," Astor Y. Herrell and Ricky Tibbs, Knoxville College. An alternative experiment for demonstrating Graham's Law of Gaseous Diffusion in the general chemistry laboratory has been developed. The value of this procedure over those previously published lies in the fact that the investigation involves only the gas phase of reactants. Ammonia is generated from the concentrated, aqueous solution and dried over sodium hydroxide pellets. Hydrogen chloride is generated from a slurry of calcium chloride and concentrated hydrochloric acid and dried over calcium chloride. Evacuated flasks are filled with each gas and connected to a glass reaction tube. After the reactants are brought to one atmosphere of pressure they are allowed to diffuse through the tube. Relative rates of diffusion are determined from the distances traveled.

"A Study of the Effects of DMSO on the Conductivity of Some Aqueous Solutions of Analgesic Drugs," G. Blaine Bishop and Hartley Kinsey, Bryan College. Since DMSO (dimethyl sulfoxide) has been proven to relieve pain due to a variety of causes, and since DMSO diffuses very rapidly through living tissues, studies were made to determine if the compound enhanced the conductivity of selected analgesics in physiological solutions. Tests were made adding 2ml. portions of 80% DMSO to 10ml. Ringer's solutions, containing small amounts of the analgesics, and on 10ml. portions of Ca<sup>2+</sup> solutions containing the same analgesics, adding 2 drops of 80% DMSO at a time. The large quantities of DMSO significantly decreased the conductivities of the Ringer's solutions while the small portions caused no significant changes in the aspirin and acetaminophen solutions, but caused a significant increase in the conductivity of the "Bufferin" solution.

"Lethal Dosage of Rattlesnake and Copperhead Venom." Edward Howze, Milligan College. Fresh venom from the timber rattlesnake, *Crotalus horridus horridus*, and the copperhead, *Agkistrodon contortrix mokeson*, was used to determine an intramuscular LD-50. Swiss-Webster, C<sub>3</sub>H, and pet store mice were used as test animals.

"Photomicroscopy of Testicular Tissue of Rats Given Large Doses of Vitamin E," Eric Clarke, Bryan College. A study on the offspring of rats given large doses of Vitamin E was carried out through photomicroscopy of the testicular tissue of their offspring. Agreement of our own findings with those of literature was also reported, namely a report by M. M. Martin, et. al. in October of 1977 in the *American Journal of Clinical Nutrition*.

"A Preliminary Study of the Bacteriostatic Effects of Dimethyl Sulfoxide on Gram Negative Facultatively Anaerobic Rods," Eric Hedin, Sheila Barber and Becky Woodall, Bryan College. Gram Negative Facultatively Anaerobic Rods were grown on media containing various concentrations of Dimethyl Sulfoxide to determine the level of bacteriostatic activity. Results showed that at concentrations of 10% DMSO and above, inhibition was obtained on all species tested for up to 48 hours.

"A Preliminary Study of the Changing Acid Content of Developing Gooseberries," Richard Gilpin and Robert G. Ziegler, Lincoln Memorial University. This was a study of the changing acid content of the developing gooseberry. It was found that the acid content increased and then levelled off as the berries ripened.

"A Housing Alternative Utilizing Stripmine Sites," Allen, T. M., M. B. Anderson, M. O. Beaty, H. O. Chance, K. J. Coleman, R. D. Compton, J. W. Hanna, V. S. Hash, L. L. McCurdy, D. D. McLaurin, N. R. Rabin, B. Sinclair, J. M. Squitieri, J. M. Tracy, and W. C. White, The University of Tennessee at Chattanooga. The project considered a new idea for the reclamation of stripmines. It involved a summation of laws, a presentation of geological features, housing design, water needs, recycling, and waste disposal.

"A Basic Program for Constructing Random Doubly Stochastic Matrices," Terry Reynolds and Floyd Christian, Roane State Community College. A square matrix with non-negative entries is said to be doubly stochastic if the sum of the elements in each row and each column is one. If a doubly stochastic matrix has 0 and 1 as entries, exclusively, then that matrix is called a permutation matrix, and is characterized by the property that 1 appears as an entry exactly once in each row and each column.

"Amine-Catalyzed Isomerization of Diethylmaleate to Diethylfumarate II: Transition State Model and Evidence for a Competing Reaction," Roger Burress and Irving Glover, Roane State Community College. The entropy of activation for the cis-trans isomerization of diethylmaleate to diethylfumarate catalyzed by n-butyl amine is approximately -50 eu. This result is consistent with a cyclic transition state in which partial charge separation is generated.

"Amine-Catalyzed Isomerization of Diethylmaleate to Diethylfumarate I: Hydrogen Bond Studies and Steric Effects," Virden Spicer and Irving Glover, Roane State Community College.

Studies by infrared spectroscopy indicate strong hydrogen bonding between n-butyl alcohol and diethylmaleate while n-butyl amine shows little, if any, hydrogen bonding. Since n-butyl alcohol does not catalyze the cis-trans isomerization, this result is taken as evidence against a simple hydrogen bonding mechanism.

MIDDLE REGION  
UNIVERSITY OF THE SOUTH

"The Vanuxem Collection," Don Stanley, Phillip R. Kemmerly, and James X. Corgan, Austin Peay State University. Lardner Vanuxem (1792-1848), a Paris-educated mineralogist and geologist, was the first professor of geology in a North American college and did extensive geologic field work in several states, including Tennessee. Vanuxem's prized possession was a collection of over 12,000 well-curated minerals, which came from all over the world, reflecting trade and purchase as

well as personal collecting. In 1848, the Vanuxem Collection was bought by William Stewart of Clarksville, Tennessee and used by the Masonic College of Clarksville where Stewart taught geology. Part of this Vanuxem Collection still exists; which establishes it as the only known large collection of that era that is still partially intact. Stewart's use of the collection, places Tennessee as one of the leaders in Geological instruction in this country.

"Radiometric Dates in Tennessee," Michael Bradley, Austin Peay State University. This report is a compilation of radiometric age determinations from Tennessee. These radiometric dates are from the Precambrian and the Paleozoic Era. The date is taken from previously published articles and include the following radiometric methods:

- (1) Lead-Alpha; (2) Uranium-Lead; (3) Potassium-Argon; (4) Strontium-Rubidium.

The radiometric dates have been used to interpret the metamorphic history of the Appalachians as well as the overall geology of the state (Carpenter, 1970). The report does not attempt to assess the validity of the data. The results are presented in map form. The distribution of dates show a heavy concentration of Precambrian in East Tennessee. The Paleozoic dates are distributed throughout Middle and East Tennessee with one location in the western part of the state. It is intended that these maps will serve as a reference for further research into the geological history of Tennessee.

"Geological Structures of the Clarksville Quadrangle," Dan L. Ammons and Thomas M. Clark, Austin Peay State University. This project dealt with the structures of the exposed limestone beds in the Clarksville Quadrangle. Information was based solely on exposed rock outcrops which are limited to specific areas in the quadrangle. No investigations of the structure of these beds had been made previously to this one. The angle of dip in this area is somewhat small (around the 1.5°-2° range), however, after a thorough investigation of the various measurements several folds are located. Inferences can be made tying in the origins of these structures to the uplift of the Nashville Dome.

"Selected Physical/Chemical Water Quality Parameters of Acid Streams Receiving Sodium Hydroxide Treatment in the Tellico-Citico Drainages," R. M. Puckett, J. A. Arway, W. F. Porak, and E. L. Morgan, Tennessee Technological University. Following construction of a portion of the Tellico-Robbinsville Scenic Highway in the Cherokee National Forest, toxic leachates from exposed embankments where Anakeesta rock was present affected the water quality of three streams in the Tellico-Citico watersheds. The Federal Highway Administration began sodium hydroxide mitigation treatments of the streams in May 1978 and continued them until January 1979. During October and November 1978 longitudinal pH profiles of mitigated streams, Hemlock Creek, McNabb Creek, and Grassy Branch were established. The pH of the treatment sites ranged from 3.8 to 6.2 in the headwaters of affected streams. Immediately below the treatment, pH values as high as 14.0 were measured. Physical/Chemical water quality parameters measured include pH, acidity, alkalinity, hardness, conductance and selected heavy metal analysis. Preliminary analysis of the water quality data shows a marked improvement in water quality during NaOH treatments; however, water quality degraded after NaOH mitigation was terminated.

"The Effects of Acidic Precipitation on *Phaseolus vulgaris*," David Lodge, The University of the South. The acidity of precipitation in the eastern United States has increased one to two pH units in the past two decades. In order to assess possible injury to plants at a commonly encountered acidity level, bean plants (*Phaseolus vulgaris* L. 'Blue Lake') were exposed to a realistic regime of intermittent simulated rain of pH 4.0 for nine weeks. No significant reduction in harvestable bean yield was observed. There were consistent trends in the reduction of dry weights and onset of senescence which suggested physiological injury at pH 4.0. The data suggest that rainfall of pH 4.0 is near the threshold for chronic plant growth effects from acidic rains.

"Effects of Fluorescent and Ultraviolet Light on Aggregations of the Common Planarian (*P. gracilis*)," Laura Ann Mahoney, Western Kentucky University. Aggregation patterns were charted of planaria subjected to ultraviolet, fluorescent, and natural light under laboratory controlled conditions. Dose rates over 280

mJ/cm<sup>2</sup> at 254 nm decreased the aggregation size of the animals exposed to ultraviolet light. Both fluorescent and ultraviolet light wave-lengths decreased aggregation size by approximately 1/3 as compared to populations exposed to dark and natural light conditions. Individual thigmotactic response to "righting" (dorsal-ventral orientation) showed no differences to any of the light tests.

"A Simple Hortonian Analysis of the Wells Creek Structure," Richard W. Mittler, Austin Peay State University. The Strahler stream ordering system, an offshoot of the Hortonian system, is used to characterize the Wells Creek impact structure. A comparison of the bifurcation ratio, circularity ratio, and the drainage density indicates significantly different (95% level of confidence) morphometric values, inside versus outside the structure. This suggests that the three parameters may be useful in identifying suspected impact structures that are superimposed upon a given geologic terrain.

"Acute Toxicity of Aluminum to Gastropods (Goniobasis spp.) Acclimated to a Sublethal Solution of Aluminum and Manganese," L. Martino, E. Morgan, M. Bose, and J. Orr, Tennessee Technological University. Continuous flow bioassays (72 hr.) were carried out in the laboratory during the spring of 1979. A proportional dilution delivery device was used to administer an array of aluminum sulfate salts (Al<sub>2</sub>SO<sub>4</sub>•16 H<sub>2</sub>O) at 20° C in moderately hard-alkaline water. Toxicity of aluminum to individuals acclimated to A.35 mg Al/l and 4 mg Mn/l solution for 30 days were compared by log-probit LC<sub>50</sub> values to reference individuals taken directly from the same spring fed tributary not currently receiving aluminum or manganese input. 72 hr. LC<sub>50</sub> values for the acclimated and unacclimated gastropods were 14.9 mg/l and 10.5 mg/l respectively. LC<sub>50</sub> values were considered significantly different at the 95% confidence level.

"The Use of In-stream Fish Bioassays in Pollution Assessment," Wesley F. Porak, John A. Arway, and Eric L. Morgan, Tennessee Technological University. Anakeesta Leachate mitigation was undertaken by the Federal Highway Administration at highway construction sites in the Cherokee National Forest. In-stream fish bioassays using hatchery rainbow trout (*Salmo gairdneri*) were effectively used to monitor changes in the water quality of leachate receiving streams influenced by mitigation procedures. In-stream fish bioassays are an expedient and effective means of evaluating the impact on aquatic ecosystems from point source and nonpoint source pollution, as well as the impact from hazardous spills in the aquatic environment.

## WESTERN REGION UNION UNIVERSITY

"The Action of Divalent Cations on  $\beta$ -Fructofuranosidase," Paul C. Kline, Christian Brothers College.  $\beta$ -fructofuranosidase catalyzes the conversion of sucrose to fructose and glucose. The effect on the reaction velocity after the introduction of divalent cations, specifically copper, magnesium, and zinc was studied. The progress of the reaction was measured by following the change in optical rotation of the reaction mixture with a polarimeter. Preliminary research indicates a slowing down of the reaction velocity with the addition of the divalent cations.

"Pyrazole and Pyrazolato Complexes of Platinum (II)," Marolyn L. Howe, Christian Brothers College. The reaction of pyrazole with Zeise's anion yields, in addition to the normal monomer, a dimer complex involving a bridging 1, 2-dihapto pyrazolato ligand. The results of chemical and spectroscopic studies will be presented.

"The Effect of Alcohol Molecular Weight on the Phase Behavior of Certain Systems Used in Tertiary Oil Recovery," Ronnie Moody, Union University. After primary and secondary oil recovery methods have been used, there is still up to 70% of the original oil trapped underground due to capillary forces. In order to reduce the capillary forces, the oil-water interfacial tension must be reduced. Compounds known as surfactants have been very successful in reducing this tension and are being used in the process of tertiary oil recovery.

During a tertiary oil recovery process, a microemulsion slug containing hydrocarbons, surfactants, water and salt, and alcohol as a co-surfactant are pumped into the field. Phase

behavior methods may be used to study the performance of these slugs. Alcohols are considered essential to a tertiary oil recovery process for adjusting the viscosity of the slug or reducing the adsorption of surfactant on the rock. However, alcohols also affect the phase behavior of these systems. A potential mechanism behind this effect is studied in this paper.

"Plant Protein Diets for Poultry," Tony Emison and George Edwards, Lambuth College. Twenty chicks were placed on four different diets in which the proteins were of plant origin. The chicks were divided into groups of five.

The four diets were composed of ground corn, ground wheat, soy meal, fat, limestone, dicalcium phosphate and salt. In addition, Diet 1 contained alfalfa meal residue after removal of lipid. Diet 2 contained unrefined lipid from alfalfa meal. Day-old chicks were placed on diets the day they arrived. All chicks on Diet 3 died in three days. One chick was transferred from Group 2 to Group 3 at the end of three days. This chick survived with difficulty and after the third week its diet was changed to refined lipid. The lipid was refined by removing the cuticle wax. One chick from Group 1 died by accident.

The average weight of pullets at the end of seven weeks was 473g or 1.04 pounds. The pullet on Diet 3 weighed 466g. All remaining chicks on Diets 1 and 2 survived. Only one chick on Diet 4 survived after seven weeks. Average weight for the roosters surviving seven weeks was 553g or 1.25 pounds.

The evidence indicates Diets 1 and 2 are superior to Diet 4. Diet 3 using alfalfa lipid from which cuticle wax has been removed appears to be a good food additive for the chick.

"A Morphological Study of Two Populations of *Tozeuma carolinense* Kingsley (Decapoda, Hippolytidae) from Two Different Habitats in Southern Florida," Shelley R. Heard, Southwestern At Memphis. A morphological study was done on two populations of the shrimp, *Tozeuma carolinense*, from soft coral (*Pterogorgia*) and grass bed (*Thalassia*) habitats at Bahia Honda and Sunshine Key, Florida, with emphasis on structures of the third abdominal somite, and of the second, third, fourth and fifth pereopods. The two populations, though sympatric, are spatially, and perhaps reproductively, isolated by substrate preferences and camouflage requirements. The results show significant morphological differences between the two populations and seem to justify a new species status for the soft coral population.

"Vitamin A Induced Skeletal Deformities In the Mouse Embryo," Paula Freiermuth, Christian Brothers College. Retinoic (vitamin A) acid has been shown to produce a number of congenital malformations in rats and mice. The vitamin A, when administered to pregnant mice on day 12 or 13 of gestation, was found to cause fore- and hind-limb defects, along with cleft palate, stumpy tail, missing digits, and other skeletal malformations. The specific abnormality which resulted was dependent on the embryonic stage of development at the time of treatment. In this experiment, pregnant female mice were treated with a retinoic acid/cottonseed oil solution, between day 10 and day 14 of gestation. Two mice with abnormalities were obtained, but there were not enough results to form a definite conclusion.

"Some Effects of Streptomycin on Germination and Early Growth of Tomato," Lee Alston, Christian Brothers College. It has been established that the antibiotic streptomycin, when applied exogenously to plants, has inhibited chlorophyll production. Streptomycin was applied to tomato seeds as 0.85, 1.0, 2.0, and 3.0% solutions. It differentially inhibits the production of chlorophyll, and affects other growth processes. This study investigated the degree of inhibition of chlorophyll synthesis in tomato seedlings grown from the treated seeds. Germlings treated with different strengths of streptomycin solution and the control germinates were all measured for length of shoot, variation in color, germination rate, size and number of leaves, and mortality.

"Some Effects of Parathormone on Fetal Mice," William G. Parris, Christian Brother College. Parathormone (PTH) is of major importance in the maintenance of homeostasis by virtue of its regulatory role in calcium and phosphorus metabolism. PTH exerts one of its effects by increasing the movement of calcium (and phosphate) from bone into extracellular fluid by stimulating osteoclasts which break down bone structure, thus liberating calcium phosphate crystals. Therefore the introduction of excessive amounts of PTH into pregnant mice may

produce skeletal abnormalities in the fetuses. Furthermore, the incorporation of parathormone on designated gestation days (9-16th day) may produce defects in certain bone and cartilage groups that were being formed on the specified day of PTH administration.

Treatment with 0.6 cc of parathormone was given to 16 pregnant mice. A control group of 2 mice was used for comparison. The newborn mice were killed, fixed, cleared, and stained with Alizarin Red S followed by toluidine blue to stain the bone and cartilage respectively.

"Some Effects of *Streptococcus* and Other Bacteria on Rat Teeth," James F. Anderson, Christian Brothers College. High carbohydrate diets were fed to four females and a regular laboratory diet to four males to encourage cavities and fissures in the females and to compare their teeth to the males. Caries development was slow. Plaque developed faster and was observed more readily in the experiment. More plaque developed on the molars of the females than elsewhere in either sex, since gnawing animals abrade their incisors continuously. Using one male and one female as controls, no bacteria were administered to their teeth. Different strains of *Streptococcus mutans* and *S. salivarius* were given to the rest, and a comparative study of plaque formation was made. Bacteria were applied with sterile cotton swabs, and plaque was stained with a red dye, Lorvis' concentrated disclosing solution.

"An Investigation Into the Effects of Ultrasound on the Organ of Corti," Darr LaFon, Christian Brothers College. It has previously been suggested that ultrasonic radiation at diagnostic levels of frequency and power causes damage to the embryonic hair cells in the Organ of Corti. In this study prenatant mice were insolated in continuous and pulsed ultrasound environments for periods up to 30 minutes. The power output was 5 W/cm<sup>2</sup>. After birth (3 days) 2 offspring were terminated and histological techniques were used to visually scan for any damage to the Organ of Corti, especially the hair cells. Other members of the litter were allowed to live and their hearing was tested at different frequencies. The conclusion is that ultrasound equipment at its present state of the art is not harmful to the embryonic Organ of Corti and does not affect future hearing capabilities.

"The Effect of Pronase on the Serum Albumin Effect in Erythrocytes," Debra J. Walther, Christian Brothers College.

Concanavalin A, a plant lectin, and human serum albumin exhibit the same erythrocyte discocyte stabilizing effect. It is known that Con A binds the membrane at Band 3, whereas the serum albumin receptor has not been distinguished. Possibly serum albumin binds at this same receptor. The protease, pronase, is known to cleave the major Con A receptor. Washed red blood cells were treated with pronase in order to investigate the relationship of the binding of the antigens, Con A and serum albumin. Using a .3 mg/ml concentration of serum albumin, it was found that the pronase-treated cells produced a greater discocyte stabilizing effect than the control group. A delay in the actual discocyte forming effect in the pronase treated cells was also observed. These results suggest that serum albumin and Con A do not bind at the same receptor.

"Influence of Fluoride Intake on Mice," Ned Bass and Pat Barnes, Christian Brothers College. Five groups of female mice were fed a regular diet plus drinking water containing 0, 50, 100, 200, and 400 ppm fluoride, respectively. Toxic effects of fluoride were evident by retarded growth, impaired reproduction, and death in mice with intakes of 100, 200, and 400 ppm. The two highest levels resulted in 100% mortality. Growth rate and litter size were affected by the 50 and 100 ppm intake as compared to the control group. Mean weekly measurements of first generation offspring showed impaired growth rate in 50 and 100 ppm fluoride concentrations.

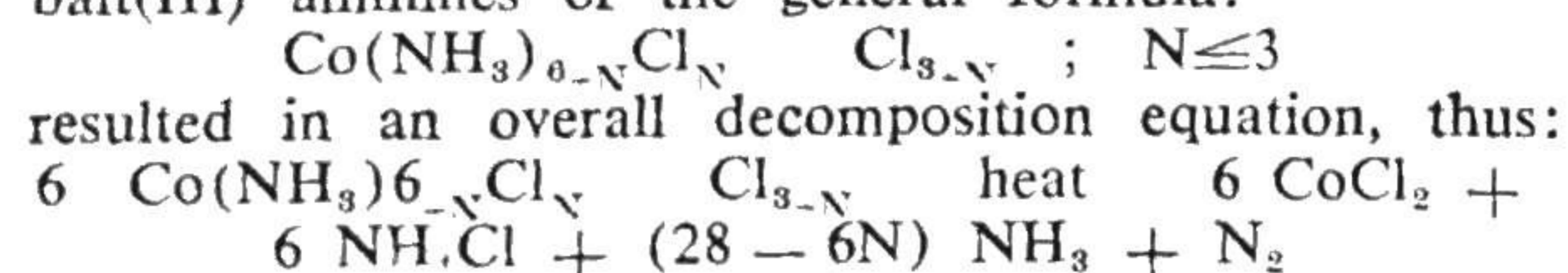
"A Genetic Study of the Geotactic Behavior of *Drosophila*," Dean Streff, Christian Brothers College. The possibility of the geotactic behaviors of *Drosophila* being hereditary was investigated by allowing the subjects to enter a glass tubular maze where they could either climb upward or downward. After the flies were separated into these two groups, each was inbred and the offspring run through the same maze. This procedure was repeated for several generations. The geotactic behaviors of the final generations were then statistically compared with that of the parentals by using the Chi-square analysis test, and were not found to deviate significantly.

"*Skeletal Teratogenic Effects of Meclizine Hydrochloride in Mice*," Rachel Patterson and Stephanie Mansfield, Christian Brothers College. This experiment was designed after earlier research testing various drugs for teratogenicity. The drug involved at this time was Meclizine Hydrochloride (MHC1), an antihistamine used against motion sickness. Previous studies have revealed limb deformities, absence of vertebral calcification, and cleft palate to be the primary actions of this drug which is one of the most potent members of the norchlorcyclizine group. In the initial phase of this experiment pregnant mice were injected with MHC1 at various stages of gestation in doses varying from 5 to 25 mg/kg. The fetuses were removed by cesarian section on day 20 of gestation and submitted to a staining procedure to reveal congenital skeletal defects.

"*The Hydrolysis of Propyl Pyruvate Esters by Bovine Carbonic Anhydrase*," Ed Hines, Christian Brothers College. Carbonic anhydrase is an enzyme found in mammalian erythrocytes. Carbonic anhydrase catalyzes the hydration of Carbon dioxide to carbonic acid. Recently, bovine carbonic anhydrase (or Bca has been found to catalyze both the hydration and the hydrolysis of two pyruvate esters; methyl and ethyl pyruvate. It was unknown if BCA could hydrolyze propyl pyruvate esters. Both isopropyl and n-propyl pyruvate esters were synthesized from pyruvic acid and the corresponding propyl alcohol. The esters were carefully measured and injected into 3 ml. of BCA solution. After incubation, the absorbance of the reaction solution was measured in a spectrophotometer at 340 nm. Preliminary investigations indicated that BCA had indeed catalyzed the hydrolysis of propyl pyruvate esters. Results also indicated that n-propyl pyruvate was hydrolyzed more effectively than isopropyl pyruvate.

"*The Effect of Cyclizine Lactate on the Fetal Development of Mice*," M. Ilgner, D. Mascari, J. Wills, P. Mott, C. Barnes, D. Racette, Christian Brothers College. Cyclizine lactate is an antihistemic drug in the class of Piperazines. It has been shown to have teratogenic effects on the development of fetal rats, rabbits, and mice. In this experiment pregnant female mice. In this experiment pregnant female mice were given 75 mg/kg on days 10-15 of gestation and the young were delivered cranial cavity to close was observed in 9 out of 11 in one litter, and failure of the abdominal cavity to close was observed in 77 out of 11 in another litter. When this dosage was given on days 15-20 of gestation there were no apparent external abnormalities in one litter. At a dosage of 50 mg/kg given on days 1-5 of gestation 1 out of 11 young were missing a lower jaw and tongue. The teratogenic effect of this drug has been shown in other similar experiments with mice, rats and rabbits but its human teratogenic potential still remains in question.

"*Determination of the Thermal Decomposition Mechanism of Trichlorotriaminocobalt(III)*," Deborah Edmonson, Union University. Thermal decomposition studies of some cobalt(III) amines have resulted in varied and conflicting data. A study performed in 1961 by Dr. June B. White on a group of cobalt(III) amines of the general formula:



From Dr. White's studies, the series of compounds adhering to this mechanism of decomposition were found to include all but the last, where N 3, or the compound trichlorotriaminocobalt(III) [ $\text{Co}(\text{NH}_3)_3\text{Cl}_3$ ]. The results obtained here were erratic, and it was concluded that either the compound studied was not trichlorotriaminocobalt(III), or that this non-electrolyte does not decompose in the same manner as the other compounds with the same general formula.

This compound was resynthesized according to a method similar to that used by Dr. White. It was found from the data collected that this compound did in fact decompose according to the general equation.

"*The Synthesis of Several Anionic Surfactants Used in Tertiary Oil Recovery Research*," Randy W. Johnson, Union University. A more efficient method of tertiary oil recovery is being investigated by experimenters. This usually involves studies of interfacial tension reduction between crude oil and water by surfactants. The synthesis of several anionic surfactants is discussed. Those discussed include sodium alkyl sulfonates and the sodium salts of alkyl benzoic acids.

"*Imprinting Among Quail*," Cindy Baker, Union University. Imprinting is a very rapid, permanent type of learning which takes place within a defined "critical period" of short duration. The purpose of the following experiment was to obtain information concerning specificity of imprinting in quail and thus gain clues as to the function which imprinting plays among quail (such as establishing species awareness or establishing preference for a specific parent which will protect and guide).

Three clutches of quail were hatched and classical imprinting techniques used to evoke a following response toward the experimenter. In two of the three clutches, most of the quail exhibited the following response for an arbitrarily specified distance of sixty feet and were thus considered to be imprinted to the experimenter. Then the following response elicited by persons other than the experimenter was measured using the same criteria. Finally, response to the experimenter was again measured and comparisons made.

Results showed differences in response figures along a continuum comparable to differences in human voice pitch and size. Thus though there is some generalization, specificity of imprinting is noticeable.

"*Synthesis and Mutagenetic Testing of Neohesperidin Dyhydrochalcone*," Kay E. Copeland, Christian Brothers College. An artificial sweetener now being considered for commercial use is neohesperidin dyhydrochalcone. According to published materials, it can be synthesized from naringin, the chief flavonoid constituent of grapefruits, or neohesperidin. Testing for Food and Drug Administration approval for commercial use include mutagenetic and carcinogenic studies. The results in this presentation are from mutagenicity testing done on *Serratia marcescens* and *Micrococcus luteus* bacteria.

"*Temperature Dependence of Silicone Solar Cell Parameters*," B. Anderson and A. J. Fisher, Department of Physics and Computer Science, Murray State University. The basic theory of silicon cells is presented, including equivalent circuits and characteristic equations. Fundamental experiments on maximum power output, peak efficiency and cell parameters are described. Values of the parameters  $I_0$ , A,  $R_s$  and  $R_{sh}$  were determined in temperature range 300°K to 400°K. It is found that  $I_0$  increases with temperature as expected and A,  $R_{sh}$  as well as  $R_s$  decrease with temperature. Experimental results and agreement with theory are presented for several cells.

"*Some Performance Data on 16 Junction Solar Panels*," A. J. Fisher and B. Anderson, Department of Physics and Computer Science, Murray State University. Power curves were determined for several 16 junction solar panels at several intensities and temperatures. A halogen-tungsten light source was used to illuminate the panels which were placed in a temperature controlled oven. Light intensities were determined by use of a photometer and a calibrated solar panel. Maximum Power output, peak efficiency and open circuit voltage were found to decrease with temperature and intensity while the short circuit current was indifferent to temperature and directly proportional to intensity. Experimental results and agreement with theory are presented for several solar panels.