

## ABSTRACTS OF PAPERS PRESENTED AT THE SPRING COLLEGIATE MEETINGS

## EASTERN REGION

## BRYAN COLLEGE

*Effect of Acetone on [2-methyl-indolyl-(3)]-[2-methylindolenylidene-(3)]methane.* S. Elaine Griffin, Carson-Newman College.

Indole derivatives have shown signs of having anti-tumor activity, under certain conditions. That is, upon administration of one derivative in solution with acetone, there is some anti-tumor action that does not occur when the derivative is in solution with other organic solvents. This unexplored observation necessitates and investigation of the possibility that the actual anti-tumor agent is a product that forms between the indole derivative and acetone. Hence this paper deals with (1) the synthesis of the indole derivative and (2) isolation and purification of any products formed between the indole and acetone.

*Platinum Coordination Complexes in Cancer Chemotherapy.* David C. Ziegler, Carson-Newman College. Platinum coordination complexes form a new class of anti-tumor compounds. Some common features of the active complexes have been noted. The mode of action of the complexes is not known but it is believed to be a lesion on the DNA of the cell. The platinum complexes seem to increase the antigenicity of the tumor, perhaps by complexing with DNA which may be capping the antigens on the surface of the tumor cells.

*A Polarographic Study of Coordinating Compounds.* Lynn M. Frontone, Lincoln Memorial University. The polarograph may be used to determine the composition and the formation constants of coordination compounds. When the polarographic wave of a coordinated species is obtained, the half-wave potential is shifted relative to the value exhibited by the aquo species. By adding varying amounts of the ligand to a solution of the metal a straight-line function of the half-wave potential is obtained, whose slope is relative to the number of ligands coordinated per metal ion. The amount of shift of the half-wave potential can also be related to the formation constant of the compound after the number of ligands per ion is determined. This study was done to determine the reaction of Ni(II) and Cu(II) with acetamide and benzamide. The shifts obtained were too small to be able to determine either the amount of coordination or a formation constant. The work needs to be repeated with larger concentrations of the amide. In aqueous media the amides may be too weakly coordinating to be able to be measured by this method.

*Rings and Polymers From Benzosubstituted Hydroxycyanates.* L. Eric Spulveda and James F. Kinstle, The University of Tennessee. Hydroxycyanates are very reactive, and exist only as transient intermediates. In this study, orthobenzosubstituted hydroxycyanates were formed from the hydroxycyanolazides by the Curtius Reaction. The hydroxycyanates so formed (I through V) reacted intramolecularly to form benzosubstituted cyclic carbamates or intermolecularly to form polyurethanes. Intermediate I cyclizes to form benzoxazalinone, II and II form predominantly the benzoxazinones and ~ 10% polymer, and IV and V form polymer and almost none of the corresponding benzoxazepinones.

*Secondary Growth of Deciduous Woods on Four Slopes at Center Hill Reservoir.* Teresa J. Ragain, Tennessee Technological University. Sampling of trees larger than 4 inches dbh on four slopes of a hill at Center Hill Reservoir indicated several different communities: beech-maple, sweetgum, sweetgum-tulip poplar, and Ehrhart. The dominant species was beech (*Fagus grandifolia* tulip poplar (*Liquidambar styraciflua* L.) and *Liriodendron tulipifera* L.) as accessory species. *Students.* Kenneth M. Froemke and Joy Steel, Bryan College. Health Dept. which discovered high percentages of anemia in males and females, ages 14-17, under standard clinical procedure. Using the oxyhemoglobin method, the blood samples

were analyzed with a Spectronic 20 and percentages of transmission were determined. The values were converted to grams of hemoglobin per 100 milliliters of blood. Twenty-five subjects below the normal range. When the subjects were grouped according to life style and background, female blacks were shown to have the lowest mean hemoglobin levels of all groups tested. A similar study was performed among 50 college students whose ages ranged from 18-22. Only one subject was found to have a low hemoglobin level among this group. No statistical analysis was performed because of insufficient data. All subjects were informed of their hemoglobin levels, and those with low hemoglobin values were identified and advised of diet corrective measures. Subjects with extremely low levels were urged to consult their private physician or the health department.

*A Preliminary Study of the Effects of Chlorinated Hydrocarbons in the Drinking Water of White Mice.* Becky Ely and Eunice R. Knouse, Bryan College. A preliminary study was done on the effects of chlorinated hydrocarbons in the drinking water of developing white mice approximately 30 days old and weighing and average of 20 grams when treatment began. Dosing was begun with 9 mg/kg body weight per mouse per day of each of the 3 chlorinated hydrocarbons: carbon tetrachloride, chloroform, and tetrachloroethylene. At intervals the dosage was doubled and then again increased to a maximum of 36 mg/kg. Two treated and one control were sacrificed after approximately one month of treatment, and the remaining mice were sacrificed after another two weeks of treatment. Their organs were examined, livers and kidneys were extracted with normal hexane, and the solvent extracts were subjected to gas chromatographic analysis. Blood samples were taken and hemoglobin contents determined by the standard Oxyhemoglobin Method.

All subjects survived the dosages and no gross pathological conditions were observed overall in the experimental animals. However, the stomachs of treated animals appeared to have suffered some damage. This study was done for approximately two months and should be continued using mice and larger animals to determine the long-term effects of the presence of these chlorinated hydrocarbons in the drinking water.

*A Study of the Chemical and Microbiological Characteristics of a Wilderness and an Urban Stream.* James Anderson and Mrs. Grace Ely, Bryan College. Samples were taken from October to April from an Urban and a Wilderness stream. Chemical contents were determined by standard titrimetric and photometric methods and samples were examined for microbiological organisms. The concentration of the chemicals in the Urban stream averaged approximately twice the magnitude of those in the Wilderness stream. Many interesting and diverse diatoms, algae, bacteria, and other zooplankton were observed and photographed. These photographs were then shown to classes in the area high school and to future teachers. Mrs. Ely explained the optimum chemical and microbiological conditions for a healthy stream; students were encouraged to bring their own samples for examination and discussion.

*A Preliminary Study of the Effects of Music on Various Cognitive and Psychomotor Tasks.* Bev Shondelmyer, Carolee Rothenbach, Steve Smith, Mark Trail and Steve Bradshaw, Bryan College. The music used was "classical" in style and included four experimental conditions. The two main divisions of music were active and passive in nature, with subdivisions of vocal and non-vocal selections (active non-vocal, active-vocal, passive non-vocal, passive-vocal). A random selection of students performed each of the four tasks; two which were cognitive (reading comprehension, rote memory), and two which were psychomotor (peg board, mirror tracing unit). While performing each of the four tasks each subject listened to a specific type of music, excluding the control group. The findings of the study did not conclusively indicate a positive or negative effect of the music on the performance of the specified tasks. However,

because the music had an innocuous effect on performance, it was concluded that the subjects became habituated to the various types of music. Therefore, the music acted as a type of white noise masking audible distractions from the environment.

## MIDDLE REGION BELMONT COLLEGE

*"A Study of the Development of Young Barn Swallows (Hirundo rustica)." Margaret Ringland.* The University of the South. A study was made of *Hirundo rustica* to determine clutch size, incubation period, brood size, growth rate, and length of brooding time. A colony of nine nests, located at Tennessee Tech Aqua, was used. Clutch size ranged from three to eight eggs with most being five; incubation time was thirteen to seventeen days. Brood size was one to four fledglings and brooding time sixteen to twenty days. Growth rate reached a peak at sixteen to twenty days, dropping slightly when the birds began to fly and then rising again. The study was begun in the middle of the nesting season, so information was not complete for all nine nests.

*"Radiation Induced Mutations in Drosophila melanogaster."* Sandra Jean Mason, Belmont College. Each of seven cultures of progeny produced for six adult male-female pairs of *Drosophila melanogaster* were treated with a different intensity of radiation beginning with 200 Rads and doubling the radiation treatment per culture up to 1400 Rads. All larval progenies received the radiation treatment at the three day old stage of development. At lower dosages of radiation (i.e., 200, 400, 600, and 800 Rads) there were no apparent phenotypic mutations. However, at higher dosages (i.e., 1000, 1200, and 1400 Rads) phenotypic mutations, both somatic type and sex-linked type, were present. Also, the survival rate of the progeny receiving the higher dosages of radiation (i.e., above 1000 Rads) was impaired. Thus, this study indicates an increasing linear relationship between the higher amounts of radiation and phenotypic mutations present in experimental culture groups.

*"Stress Response in Malnourished Rats."* Tim Foote, Belmont College. There is little evidence of research in the 60's and 70's concerning the induction of an external stress factor in protein-deficient test animals. Of the research recorded in this area, most pertains to behavioral patterns from the external stress, and not physiological responses. My work considers the physiological response of eosinopenia in protein deficient rats after introduction of an external stress factor, epinephrine.

After two hourly eosinophil counts, rats fed a protein-deficient diet were stressed with epinephrine. Three subsequent hourly counts showed decreases of 8-34% in eosinophils. Rats fed a high protein diet and regular diet had a 51-67% decrease. The difference in eosinopenia indicates less of a physiological response to stress by protein deficient rats.

*"A Preliminary Polarographic Study of Drinking Water in Nashville, Tennessee."* Sharon A. Martin, Tennessee State University. Information on the metal content of water, as well as food, consumed by humans is sorely needed. Most efforts in this direction have been concentrated on lead (Pb), mercury (Hg), and cadmium (Cd), perhaps due to the toxicity involved with these elements. Other metals such as zinc (Zn), copper (Cu), iron (Fe), cobalt (Co), chromium (Cr), and manganese (Mn), even though considered essential and vital when present in the right amount and form, may also be considered hazardous when an imbalance occurs.

Studies have been made locally on the effects of mercury in the aquatic environment, and of lead in the gaseous, and to some extent the solid environments. To our knowledge, a complete study of the mineral or heavy metal content of the local drinking water has not been made. It was against this background that the study was undertaken, at the suggestion, and under the guidance of Dr. Rubye P. Torrey.

Research on the heavy metal content of our consumable aquatic environment and its effect on human health has been rather limited. The preliminary, or first stage, of this study deals with Tennessee State University campus drinking water only during the summer and winter seasons. The technique used for studying the mineral content of this water was classical dc polarography. The residues of the evaporated campus drinking water were analyzed in three supporting electrolytes: one-tenth formal potassium chloride, one formal sodium hydroxide, and were one-hundredth percent in gelatin as a maximum suppressor. The instrument used was an E. H. Sargent and Company

Polarograph, Model XVI, which has a sensitivity maximum of one-thousandth microampere per millimeter (0.001 A/mm).

The only metal positively identified in this preliminary work was manganese. The average concentration of the summer samples appears to be about 29.2 milligrams per liter, while the average value of the winter samples appears to be about 2.7 milligrams per liter. The summer samples were taken during July and August, 1974, and the winter samples taken during February and early March, 1975. The seasonal concentration of this element appears to differ by a factor of approximately 10. Hence, there does appear to be a seasonal difference in the heavy metal content of our drinking water. This work is being continued in Dr. Torrey's laboratory.

## WESTERN REGION

## THE UNIVERSITY OF TENNESSEE AT MARTIN

*"Effects of Extreme Temperature on the Testis of the Rat."* Steve Martin and Donald Bennett, Bethel College. One group of rats was subjected to a temperature of 37°C for 73 hours and another group was subjected to a temperature of 7°C for a comparable time. The rats subjected to heat had a lower sperm count. Histological sections showed damage to the seminiferous tubules. The rats subjected to the cold temperature showed less variation in sperm number and no tubule damage. Study is continuing to determine variations in sperm length.

*"The Photolysis of Phenyl-alpha-thienyl Ketone with Triphenylphosphine."* Lyle D. Wescott, Jr., Peggy Dowling and Milligan Fossett, Christian Brothers College. The light-induced reaction between phenyl-alpha-thienyl ketone and triphenylphosphine, in the absence of air, yields triphenylphosphine oxide and the ylide, triphenylphosphinephenyl-alpha-thienylmethylen. Evidence for this reaction and mechanistic interpretation were presented.

*"Mercapto Groups and Enzymatic Activity of 3a-Hydroxysteroid Dehydrogenase."* Johnnie R. Roberts and S. K. Airee, U. T. Martin. Enzymatic activity measurements were made at intervals as the reactions of 3a-hydroxysteroid dehydrogenase (Worthington, STDHMP 43MO78) with 5,5'-dithiobis (2-nitro-benzoic acid) proceed. No significant change in the activity was noticed during or at the completion of the reaction. This is in contrast to the report in literature of the inhibiting effect of another mercapto group reagent p-mercuribenzoate. During the studies it was also found that the number of mercapto groups reacting increased only slightly after denaturation with SDS.

*"Acupuncture, The Ancient Art of Healing."* Beverly Wolfe, Christian Brothers College. Acupuncture, and whether it really works, was considered. It is a Chinese system of medicine in which fine needles are used for the cure of disease. The prick of the acupuncture needle at certain precisely defined points on the skin stimulates specific nerves which transmit electrical impulses to the spinal cord and lower centers of the brain and thence to the diseased area. The art of acupuncture depends on knowing precisely which nerve(s) to stimulate in a given disease. American doctors are finding out that acupuncture is effective, at least for some things. It is being used as a treatment for drug addicts, for people who have severe neurological pain that western medicines and surgery cannot help, but it does not work, for example, for cancer, muscular dystrophy, or nerve deafness. Personal experience with acupuncture has brought better insight into the possible uses of it in western medicine.

*"Pollution Problems."* Randy McCadams, Bethel College. A stream was taken under study for possible pollution characteristics. Pollution was suspected since the McKenize Sewage Treatment Plant dumps a liquid effluent directly into the stream from its plant.

A series of tests were conducted on the stream including the Ph, temperature, dissolved oxygen, and biochemical oxygen demand.

Results showed the Ph, temperature and dissolved oxygen to be in a range of tolerability. The biochemical oxygen demand was found to be high above 5 p.p.m. which is the suitable standard for this test.

*"Reactions of Atomic Titanium with Various Esters"* Margaret A. Dowling, Lyle D. Wescott and Milligan C. Fossett, Christian Brothers College.

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