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ABSTRACTS OF PAPERS PRESENTED AT THE SPRING COLLEGIATE MEETINGS

Interspecific Odors as Cues for Runway Behavior. Walter P. Crutchfield, Janet Shaver, and Tom Sullivan, King College. Seven male, albino rats and seven male gerbils served as subjects in a cross-species test of the odor hypothesis. In both phases of a two-phase experiment, rats followed gerbils on all trials in a straight runway. During the first phase the relationship between the goal event (reward or nonreward) received by the gerbils and that received by the rats was perfect (i.e., odor maximizing conditions). During the second phase a 50% contingency was introduced (i.e., odor minimizing conditions). The results indicated that the rats learned to respond appropriately (fast to reward, slow to non-reward) during the first phase. Responding during the second phase was non-differential. These results are seen as supporting the odor hypothesis.

A Progress Report on Cosmic Ray Research at Carson-Newman College. Harold D. Sparling and Richard A. Rosenberger, Carson-Newman College. The project reported on last year by Gary Harris and Samuel Kiser has been continuing at Carson-Newman College. We shall report on some difficulties encountered over the summer. The spark chambers have been started and further work has been done on the Geiger tubes and the Marks generator. Some of the electronic circuitry has been tested. The project is supported by the Academic Year Extension Grant from the National Science Foundation awarded to Prof. Charles E. Magnuson.

Photoelectric Period and Light Curve Determination for an Eclipsing Binary Variable Star. Robert C. Tate, King College. The eclipsing binary BV 346 (HD 202 000) was observed photoelectrically on seventeen nights between June 21 and July 17 1969 at the Kitt Peak National Observatory. Four minima were observed which, when combined with existing minima produce the elements: Min.=HJD244 0400.914 ± 0.005 + $1^d.252387$ ± 0.000005. Both blue and visual light curves were obtained from which a solution may possibly be derived.

A Photoelectric Study of Suspected Magnetic Variable Stars. John A. Cruise, King College. This paper relates the findings of a period determination study of suspected magnetic variable stars. The research was conducted at Kitt Peak National Observatory, Tucson, Arizona during the summer of 1969. Approximately seven stars will be reported on.

A Preliminary Survey of the Parasites of Anadonta on a Shoal in Powell River. Kenneth D. Siegel, Lincoln Memorial University. To our knowledge this is the first time that a survey of this nature has been done at this location. The faunal area for the study is, according to Pennock, 1953, the Cumberland region. Anadonta apparently have migrated into this region from the vast Mississippi region, because they are not reported to be characteristic of the Cumberland region. The genus Anadonta seems to be predominant in the Powell River basin. Numerous species of parasites representating several families have been reported in bivalves by several authors: e.g. Dawes 1968; Cheng 1967; Baer 1952. In this preliminary study only one genus of endoparasite was found, which could indicate that the mussels of Powell River are not heavily parasited. Further evidence for this was noted in that none of the mussels that were dissected showed the symptoms of heavy parasitemia as described by Cheng 1952.

Lactam Synthesis via Aminolysis of Diketoesters. William C. Hutton, Maryville College. This paper concerns the synthesis of lactams by condensation of diamines with diketoesters. The synthesis of barbiturates by the condensation of urea and various malonic esters is well known. Parabanic acid is also known and is synthesized from the reaction of urea and diethyloxalate.

To this date, most of the research has concerned the reactions of ethylenediamine with the diketoesters. Ethylenediamine has been reacted with diethyloxalate, using concentrated hydrochloric acid as a catalyst to yield a polymer of the configuration $(—NHCH_2CH_2NHOCCO—)_n$; the desired product being

Eliminating the acid catalyst produced similar results. Ethylenediamine was reacted with diethyl malonate in the presence of an acid catalyst to yield a similar polymer $(—NHCH_2CH_2NHOCCH_2CHO—)_n$; the desired product being

Absence of the acid catalyst yielded an amide-ester of the configuration $NH_2CH_2CH_2NHOCCH_2COCH_2CH_3$. Diethyl maleate reacted with ethylene diamine in the same manner, with the desired product being

The amide-ester product is currently being reacted with sodium methoxide in order to produce an intermolecular reaction to yield the desired lactam. Work is also being done with ortho-phenylenediamine's reaction with diethyloxalate to yield a fused ring lactam of the configuration

The paper will also discuss the proposed mechanisms of the reactions and further work intended in this area.

Copper Complexes of N,N-Dimethylacetoacetamide. Gerald Ramsey, Lincoln Memorial University. To prepare the copper complex, copper (II) perchlorate (5 millimoles) dissolved in 10 milliliters of methanol was reacted with N,N-dimethylacetoacetamide(DMAA, 10 millimoles). The addition of ethyl ether causes the precipitation of a blue compound with a melting point of 220°C. The copper composition was determined by titration with EDTA using pyrocatechol violet as the indicator. The perchlorate was determined by a conductometric tit ation with tetraphenylarsonium chloride. The carbon, nitrogen, and hydrogen composition was determined by Dr. F. B. Strauss Microanalytical Laboratory, Oxford, England. The comound's infrared spectrum was obtained using a Nujol mull and a potassium bromide pellet. The visible spectrum was obtained in a nitromethane solution. The conductance of the nitromethane solution of the complex was determined and indicated a 2:1 ionic structure. From the analytical data the formula for the copper complex has been postulated to be $[Cu(DMAA)_2(H_2O)_2]\ (C1O_4)_2$.

Fear Conditioning and the Avoidance Response as a Function of the Estrus Cycle in the Long-Evans Hooded Rat. W. Lanson Ikard and William C. Bennett, *University of the South.* In an initial fear conditioning pilot study, a comparison of the avoidance response speeds of 4 male and 4 female Long-Evans hooded rats suggested that the significantly higher speeds in females may be a function of the estrus cycle, a finding consistent with current literature sources. A second larger experiment, N=50, using the same procedure and strain of rats as in Experiment 1, compared female rats both in and out of estrus with each other and with a group of males over 45 extinction trials. The results were not in support of either the first study or the commonly held notion that female rats make poor experimental subjects because of estrus cycle confounding a given dependent measure.

Stream Pollution Survey of Buchanan Creek. Lucy Rosson, Mary Alice Martin, Gayle Fox, Martin College. Samples were taken from two stations, above and below the Mid-State Rendering Plant, on Buchanan Creek in Giles County to determine if the water was being polluted by the plant. The creek was examined by using biological oxygen demand, test for coliforms, chemical analysis by Delta Scientific Model 50 Test Meter, and survey of flora-fauna. Aerobacter aerogenes were found above the plant and Aerobacter aerogenes and *Escherichia coli* were found below the plant with little difference in the flora-fauna and chemical analysis.

Preparation of 4-substituted-1-acetyl-bicyclo-(2,2,2,)-octane. Frank Cook, The University of the South. This research is directed toward the study of substituent effects in ultraviolet spectroscopy in which the substituent and the chromophore interact only by inductive or field effects. From the known compound the prepara-

tion of the compounds needed for the study was undertaken. These compounds are of the form

where y = C-Cl, C-NH_2, Br, OH, CN, C-O-Et, CH_3.

The synthesis of some of the compounds will be the main topic of discussion.

A Survey of Hypoderma Lineatum (Common Cattle Grub) From Selected Herds of Cattle in Giles County. Bubba Parker and Glenn Edwards, Martin College. A survey was taken from 344 head of cattle in Giles County to determine the extent of infection of *Hypoderma Lineatum* (common grub). 111 head were infested at a rate of 4.43 grub per cow. 222 head were grub free.

An Attempt to Graft the American Chestnut, Castanea dentata, onto a Chinese Chestnut, Castanea mollissina, Root Stock Using the Nurse Seed Graft. Claudia DiBona, Wanda Crutcher, Nina Lowe, Fred McMillen, Al Haynes, Terry Holland, Tommy Price, Steve Adams, and Myron Rose, Martin College. The nurse seed graft offers a great deal of potential as an economical and simple technique of grafting chestnuts. A total of one-hundred eighty experimental grafts using Chinese chestnut seeds with American chestnut scions and eighteen control grafts using Chinese chestnut seed and scions were made with 5% of the experimental living and growing and 44.4% of the controls living and growing.

The Effects of Small Concentrations of DDT on the Respiratory Rate of Crayfish. George Freeman and William Hall, Middle Tennessee State University. The effects of DDT upon the respiration rate of crayfish were investigated using the Warburg Apparatus and B.C.D. flasks for measuring the rate of oxygen consumption. Various concentrations of DDT were used, but it was found that a concentration as low as .5 ppm would rapidly affect the ability of a crayfish to carry on normal respiration. The respiratory rate was determined as the qO_2, which is a measure of the volume of oxygen used per unit weight per unit of time—or in this work, micro 1/g/hr. The qO_2 of crayfish exposed to DDT decreased to only 32% of the qO_2 of the control group within four hours.

Survey of Herbert White's Minnow Farm. Robin D. McClary and Jack H. Norris, Martin College. A stream survey of the source of two ponds of a local minnow

farm was conducted. The tests completed in the survey included chemical analysis of the water, biological oxygen demand, tests for coliforms, and a survey of the flora and fauna.

Pollution Survey on a Pulaski Drainage Ditch. Thomas Merritt, Bruce Taub. Carter Garner, Henry Hamilton, and Bobby Davis, Martin College. A pollution survey was conducted on a residential drainage ditch just west of Pulaski's city limits. The examination consisted of a survey of the flora-fauna, test for coliforms, chemical analysis by Delta Scientific Model 50 Test Meter, and biological oxygen demand (B.O.D.). The stream was under observation from February 10 to April 30, 1970.

Paradoxical Effect of Chlorpromazine on the Resistance to Extinction of an Approach—Avoidance Conflict in Rats. William M. Goodwin and Catherine G. Jarvis, The University of the South. Six male Holtzman albino rats were trained to bar press on a VR schedule of 4 : 1 with a range of 1 to 8. After three half-hour sessions, a 0.96 ma shock was given with every reinforcement for three half hour sessions. A two day lapse in experimental sessions was followed by extinction sessions in which barpressing resulted in food reinforcement on VR 4 : 1. During extinction trials, half the rats were injected with 2.5 mg/kg chlorpromazine; half with a placebo injection of distilled water. The placebo group recovered pre-shock barpressing rates before the chlorpromazine group.

Some Properties and Identities of Fibonacci Numbers. Brother Robert Effler, Christian Brothers College. The paper begins with the recursive definition of the Fibonacci numbers. From this point of departure, certain identities and summations of Fibonacci numbers are proven, mainly through induction. Then, by the methods of finite differences, the Binet formula for the n th Fibronacci number is derived. This formula is used to prove a few identities. Next, consideration is given to a sequence of generalized Fibonacci-type numbers, based on the original recursive definition. The formula for finding the n th term of such a sequence, and the direct relation between the generalized and the classical Fibonacci sequences are developed. The Lucas numbers are brought in as a special case of the generalized Fibonacci-type numbers. A few identities for the Fibonacci and Lucas numbers are shown to be implied by analogous identities for the generalized case. Some identities involving both Fibonacci and Lucas numbers are developed. Finally, some miscellaneous properties, like divisibility criteria, are developed for Fibonacci numbers.

The Effects of Thalidomide on the Young of Gravid Rabbits. Joseph B. Dixon, Christian Brothers College. The laboratory-synthesized thalidomide was injected intra-venously in dosages of 50 mg/kg of body weight into a female rabbit four days after copulation. The treatment was continued for twelve days after which no more injections were given. Thirty days later the test rabbit delivered eleven *still born* young. Two of the eleven might have been dead longer than the others because of apparent necrosis. Variations in total body length were from 6.9 to 9.0 cm, three of the young being less than 8.2 cm. Body weight varied from 18.63 to 56.64 g, and maximum abdominal girth measurements varied from 3.8 to 9.2 cm. The first young delivered showed shortening of the fourth and fifth digit of the left front paw. Also, there was arrested development of the right eye in the second born. Other comparative measurements were taken against a control litter.

Chromosome Damage from Radiation. Jeanette Wilson, Lambuth College. Chromosomes, the structures in the nucleus of the cell on which the genes are located, can be broken by the passage through them of ionizing radiations. In chromosome-type aberrations, both chromatids of a chromosome are broken at identical loci. The chromatid type aberration affects a single chromatid after replication. Subchromatid aberrations change only parts of individual chromosomes. Polycentrics, rings, and interstitial and terminal deletions are common aberrations of the chromosome pattern. Bridges between chromatids may also be formed resulting in poor exchange of genetic material at cell division. Each type of aberration shops a particular relation to the dose of radiation. Even though structural changes can be produced by irradiation of cells at any stage of their mitotic cycle, certain phases in the life of the cell appear to be more susceptible to chromosome damage. Restitution or rejoining may take place between severed ends of chromosomes or chromatids in the presence of ATP.

The Recall of Neutral and Hostile Words by Schizophrenics and Normals. Brian Collins, Lambuth College. The purpose of this experiment was to determine the effect of various degrees of hostility on the recall of words. Four lists of words were constructed. One list contained no hostile words and was used as the control list. The other lists each contained six hostile words and four neutral words. The hostile words used had been rated previously to determine the intensity of hostility represented by each word. By selecting hostile words with different intensity ratings, the three lists were varied in average intensity level. The lists were presented to both schizophrenic and normal subjects by tape recorder. Immediately after the two successive presentations of the word lists, the subjects were asked to recall as many of the words from the list as possible. The results indicated that schizophrenics had fewer correct recalls of all words than normals. Both normals and schizophrenics responded differentally to the hostile and neutral words.

Snakes of Carroll County, Tennessee. Charles P. Stevens and John F. Hedden, Jr., Bethel College. Twenty-three species of snakes were observed in Carroll County between 1 April and 26 September of 1969. This is only five less than the number of species reported by Conant for western Tennessee. The following species were best represented as to numbers ( ) of individuals found: *Coluber c. constrictor* (13), *Agkistrodon piscivorus leucostoma* (11), *Diadophis punctatus stictogenys* (6), and *Opheodrys a. aestivus* (5). Most snakes (20) were seen in the vicinity of Vale Pond and Maple Creek Lake. Most specimens (8) were observed at an ambient temperature of 30° C, and 20 snakes were collected on cloudy days compared to 8 on clear days. More males than females were collected.

A Study of Schiff Base Analogs of Three Esters of p-Aminobenzoic Acid. T. Marty Carr, Christian Brothers College. Some esters of para-aminobenzoic acid (as Benzocaine) are known to have analgesic effects. The addition of 2,4,-dichlorobenzaldehyde to the methyl, ethyl and propyl esters of p-aminobenzoic acid produced the corresponding Schiff bases. Attempts to test these compounds for possible analgesic effects were thwarted because they were soluble only in high concentrations of ethyl alcohol. The alcohol produced drunkenesss in the test animals, thus masking any analgesic effect the compounds may have had.

Metalations of 1,3-Dihydrobenzo(c)thiophene and Its Sulfone. H. E. Buehler, Memphis State University. It was found in the literature that hydrogens on carbon atoms adjacent to sulfone or sulfide linkages are generally slightly acidic in nature. Therefore, it would seem feasible that metalations using n-butyl lithium should occur, depending on the acidity of the hydrogen on the carbon atom. Metalations were run using n-butyl lithium on the sulfide as well as the sulfone. No metalations were obtained with the sulfone, probably due to steric hindrances caused by the d orbitals of sulfur. In this case the sulfide metalation did occur and several varieties of compounds were reacted with the metalated products to yield other materials.

Tubular Structure of the Frog Pancreas. Ginger Proctor, Siena College. An extensive duct system permeates the pancreas of the frog. The duct system proper consists of the larger ducts ,branches of the main duct, and the main duct itself. The lumen of the larger ducts is formed by columnar epithelium, and low cuboidal epithelium forms the lumen of the smaller ducts. There is a thick covering of cilia along the luminal border of the largest ducts. It is by means of the duct system that the pancreas communicates with the digestive tract. By means of the duct system, digestive enzymes such as trypsin, chymotrypsin, lipase and others are able to enter the digestive system to aid in the digestion of blood.

Microscopic Anatomy of the Mammalian and the Amphibian Urinary Bladder. Susan Locker, Siena College. The purpose of this study was a comparison of the urinary bladder using a microscopic analysis. Similarities were noted in the presence of transitional epithelium, lamina propia, three layers of muscle, and the adventitia. Yet, while possessing such elements in common both the frog and the mouse bladder exhibited characteristics not found in written description used as a basis for this study. In the frog bladder the presence of single mucous-secreting cells was a factor unique to the frog bladder. In the mouse bladder, two elements of an interesting nature were noted. First, cytoplasmic branches were seen radiating from the dome-shaped cells of the epithelium appear to connect with the deeper lying connective tissue. Secondly, the presence of a sensor immediately underneath the connective tissue was noted.

In the previous issue, J. Tenn. Acad. Sci. 45 (3): 65, footnote [2] should have read:

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