The ASB BULLETIN

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ASSOCIATION AFFAIRS

Nominations for ASB Officers

The Nominating Committee, composed of George C. Kent, Jr., Chairman, Wanda S. Hunter, and E. Ruffin Jones has made the following slate of nominations, to be acted upon by the members at the Tallahassee meeting: President-elect—J. Gordon Carlson, University of Tennessee and Horton H. Hobbs, University of Virginia; Vice President—Victor A. Greulach, University of North Carolina and Thelma Howell, Wesleyan College; Secretary — Harold Humm, Duke University and Ralph Yerger, Florida State University; Executive Committee—William Burbank, Emory University, William Mengebier, Madison College, E. Lowe Pierce, University of Florida, Elsie Quarterman, Vanderbilt University, and George Wharton, University of Maryland. Two members of the Executive Committee are to be elected.

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Proposed Amendment to the By-Laws

At its interim meeting in Atlanta in November the Executive Committee of the ASB authorized D. C. Scott to prepare an amendment to Article I of the By-Laws of the Association Constitution with the goal of simplifying the election of new members to ASB. The amended Article I as proposed by Dr. Scott is as follows:

Article I. Membership

Section 1. Membership shall be granted any person recommended and approved as being eligible by two active members in good standing.

Section 2. Such recommendations shall be submitted to the treasurer of the Association and the new member shall achieve active status in the Association with all the rights and privileges pertaining thereto when his dues for the current year have been received by the treasurer of the Association.

The following analysis of the proposed amendment has been prepared by Dr. Scott:

The purpose of this amendment to the by-laws of the Constitution of the Association of Southeastern Biologists (ASB BULLETIN 2(2):-32) is to simplify the election of new members. As things now stand, a prospective member must be recommended to the Executive Committee by two members in good standing. The Executive Committee in turn nominates the prospective member to the Society as a whole and a vote is taken at its annual meeting. In practice both the Executive Committee and the membership at large have accepted proposed members without question on the basis of the original recommendations. Thus, the two latter steps in the election of members have only been formalities which encumbered the meetings of the bodies involved. These steps are eliminated by the proposed amendment to the by-laws.

It should be noted that in the proposed amendment the treasurer, rather than the secretary, is charged with receiving new members. This change is suggested for two reasons. (1) The treasurer must, in effect, keep the master list of members in good standing. He is in the best position to know whether or not a recommender is actually a member in good standing in the Society. (2) This change removes a part of the burden of correspondence now borne by the secretary and distributes it to the office of the treasurer.

Two important points should be considered by the membership of the Society in voting on this amendment. (1) Is it wise for us to remove from the Executive Committee and the membership at large the power to reject prospective members, even though this power has never been exercised? (2) Do we wish to include new members of the year in the competition for the Meritorious Research Award? By action of the Executive Committee (July 14, 1956) persons could not enter this competition until they had been formally elected to membership. Elimination of a formal annual membership election would throw the competition open to newly acquired members. All members of the Society are urged to consider the various aspects of this proposal and be prepared to decide upon it at the Tallahassee meetings.

Abstracts of Papers Presented at The Nineteenth Annual Meeting of the Association of Southeastern Biologists

All but two of the 82 papers presented at the Nineteenth Annual Meeting of the Association of Southeastern Biologists and cooperating societies at Tallahassee, Florida are abstracted here. Reprints of abstracts marked with an asterisk are available from the authors.

A Virgin Forest Remnant in Berkely County, S. C.

WADE T. BATSON, WILLIAM E. HOY, WILLIAM R. KELLEY and JAMES T. PENNEY, *University of South Carolina*

A tract of virgin forest exists in Berkely County. This report deals with our areas of original vegetation, the discovery of this tract, the results of a floristic analysis including the species present as well as their abundance and role in the community, timber production figures on a recently harvested portion, and comments on the future of the still-existing forest.

The Effect of Sodium Iodoacetate Under Anoxia on Chromosome Aberration Frequency

A. V. BEATTY and JEANNE W. BEATTY, *Emory University*

The energy for chromosome rejoining following radiation-induced chromosome breaks in an oxygen-free atmosphere appears to come from an anaerobic respiratory system. To find more specifically the source of this energy anaerobic inhibitors are being used. In order to interrupt the glycolytic system before any energy is given up, the system was inhibited at the step where 1,3-diphosphoglyceraldehyde is changed to 1,3-diphosphoglyceric acid by the action of triosephosphate dehydrogenase. This enzyme is inhibited by sodium iodoacetate. *Tradescantia* inflorescences were treated in a M/1000 solution for 1, 5, 10 and 24 hours and irradiated with a total dose of 400 r. One hour had no effect while 5, 10 and 24 hours gave a 100-fold increase in aberrations over the controls.

The Anatomy of the Blister Gall Caused by *Asteromyia carbonifera* on *Solidago* Leaves

EDWIN G. BECK, *University of Georgia*

The larva of the midge *Asteromyia carbonifera* and an unidentified fungus are involved in the formation of a blister gall on *Solidago* leaves. The gall first appears as a dark spot on the surface of the leaf. As it matures it becomes white and thickens to form a blister with a dark margin. Histological examination reveals that the blister is composed of a fungus which attacks the mesophyll tissues of the leaf. The larva feeds upon the fungus which grows about it. The hyphae which grow along the outer regions of the mesophyll secrete a black, friable material which is responsible for the blackening of the leaf tissues in the early stages of the development of the blister and also the black margin about the edge of the blister. The fungus has been grown in pure culture on several different media but has never been identified.

A Biotic Factor Influencing the Gastropod *Urosalpinx cinerea* in Its Choice of Prey*

JOHN W. BLAKE, *University of North Carolina*

The relative attractiveness of two pelecypods as prey of *Urosalpinx* was stuied to determine whether metabolic rate of prey influenced selection by a predator. *Urosalpinx* were exposed to two currents, one from each of two aquaria in which various prey and experimental substances were placed. Comparisons within and between the prey species (*Crassostrea virginica* and *Modiolus demissus*) demonstrated a direct correlation between metabolic rate (measured as oxygen uptake) and number of *Urosalpinx* attracted. Four factors affecting metabolic rate were studied: species, age, growth rate, and feeding. Younger and more rapidly growing individuals attracted more *Urosalpinx*, *Crassostrea* being more attractive than similar *Modiolus*. Starvation of prey resulted in a decreased attractiveness. In every case the more attractive animals had a proportionately higher metabolic rate. *Urosalpinx* responded in equal numbers to groups of prey of different individual, but equal group metabolic rates. Thus this work supports the hypothesis that it is a metabolic product which mediates the predator's choice of a particular individual within a group of prey. Selection is independent of concentration of dissolved oxygen or carbon dioxide. Further work is planned toward the characterization of the attractant substance.

A Preliminary Study of Chromosome Numbers and Karyotypes in *Sprekelia formosissima* Herbert*

S. BOSE, *Blandy Experimental Farm, University of Virginia*

Several workers (Sato, Snoad, Mookerjea) have reported chromosome numbers, approximate in the first two cases, of from 116 to 121 for *Sprekelia formosissima* Herbert. We have studied chromosomes in many bulbs of *Sprekelia* from several locations.

Plants collected near Cuernavaca, Mexico usually have 60 somatic chomosomes. Cells having 58, 59, 61 and 62 chromosomes were also observed in this type. A majority of the bulbs secured from different places have higher chromosome numbers however. Somatic metaphases with well spread chromosomes have been observed with approximately 114, 115-18, 117, 118, 118-122, 119, 121, 127, 136, 141, 144-148, 149, 150, 153-156, 160, 162, 164, 169, 172 and 175 chromosomes. Of these, exact counts were possible in cells with 117, 118(3 cells), 119, 127, 149, 150(2), 172 and 175(2) chromosomes. The peak frequencies in number were between 118-122, 148-154 and 164-175. Four different types of chromosomes occur in karyotypes of 2n=60 taxa, and of taxa with higher numbers: (1) long, median-submedian centromere; (2) short submedian; (3) subterminal; and (4) subterminal, satellited on shorter arm. Two other accessions recorded as *Sprekelia* had 2n numbers of 22 and 33 respectively. These have not flowered; both leaves and karotypes suggest these to be *Amaryllis* taxa.

Some Amebas of Warm Mineral Springs, near Venice, Florida

EUGENE C. BOVEE, *University of Florida*

Warm Mineral Springs, 12 miles southeast of Venice, Florida, pours its waters to the surface from an estimated depth of 18,000 feet at a rate of some 6,000 gallons per minute. Hence, any fauna associated with it have most likely entered overland, or from the air. Its waters have about half the sodium content of sea water, and about half the magnesium content, but nearly two-thirds the sulfate content of sea water. Hence some rather special osmotic conditions are imposed on microscopic forms which enter it, yet some protozoans have become adapted to its mineralized, fast-flowing waters, amongst them several amebas. These resemble known species, and are assignable to described genera. Two forms may be identical to *Flabellula mira* Schaeffer, and *Flabellula* (Rugipes) *vivax* (Schaeffer). The others are a *Trichamoeba* sp., somewhat similar to *Trichamoeba sphaeraraum* Schaeffer; and a *Vexillifera* sp. resembling *Vexillifera telmathalassa* Bovee. There is also a *Hylaodiscus* sp. In general, these amebas are, or closely resemble, marine species.

Correlation of Sexual Cycles and Breeding Behavior of the Gray Squirrel, *Scirurus carolinensis*, Gemlin

ALFRED BRAUER and ALBERT DUSING, *University of Kentucky*

By means of trapping and retrapping wild Gray Squirrels the biannual cycles of male and female squirrels were determined. For the adult male the testicular positions of abdomen, inguinum, and scrotum, are found to be valid criteria when related to the histological pictures of cryptorchism and recovery. In the female the vaginal smear is the best method of determining stages of the cycle. When cycles so determined are compared with observations of mating chases and other breeding behavior, curves showing correlation can be constructed. Sixty five adult males and 53 females were trapped a total of 285 times.

X Radiation of Stages in the Life-Cycle of the Rat Tapeworm, *Hymenolepis diminuta*

WILLIAM E. BRILLHART, *Emory University*

Three stages in the life-cycle of *Hymenolepis diminuta* were each exposed to 5, 10, 15, 20, and 30 thousand roentgens of X radiation. The first phase of the investigation has attempted to determine the minimum lethal dose of X radiation for each stage. Cysticercoids were not recovered from 30 beetles which were fed irradiated eggs exposed to doses of 15,000r and above. Four cysticercoids, two each from two of 30 challenged hosts, were recovered from eggs exposed to 10,000r; these larvae were abnormal in appearance. No tapeworms were recovered from 5 rats that had been fed 30 cysticercoids irradiated with 15,000r. Sixty cysticercoids given 10,000r failed to establish normal infection in 10 rats; only about one half as many worms were recovered from challenged rats. At the present time adult tapeworms are being exposed to various doses of X radiation and transplanted surgically into recipient rats to establish the M.L.D. for this stage of the life history.

Mutant Analysis of Amino Acid-Keto Acid Relationships in *Neurospora crassa**

H. E. BROCKMAN and A. GIB DEBUSK, *Florida State University*

DeBusk and Wagner (1953) reported that the growth of a tyrosine-requiring mutant of *Neurospora crassa* could be inhibited competitively by any one of a wide range of naturally occurring amino acids. This mutant grows equally well on the keto analogue of tyrosine, p-OH-phenylpyruvic acid. Furthermore, the amino acid inhibitions can be relieved noncompetitively by p-OH-phenylpyruvic acid. Recent work has shown that a phenylalanine requiring mutant responds in a similar way. It is inhibited by various amino acids and the inhibitions can be noncompetitively relieved by the keto analogue of phenyalanine, phenylpyruvate. If either of the above mentioned mutants is given the keto acid as its required growth factor, it can be inhibited by a second keto acid. This inhibition is relieved by the amino analogue of the required keto acid. The inhibition is modified by temperatures, pH, and purines and pyrimidines. The inhibition can be affected only in the early stages of growth. Results of respiration studies, growth assays, and enzyme studies are given.

Dispersal of the Gelatinous Coat Material of *Mellita quinquiesperforata* Eggs by Homologous Sperm and Sperm Extracts

JOHN W. BROOKBANK, *University of Florida*

Homologous sperm and frozen-thawed sperm extracts of *M. quinquiesperforata* have been found to disperse the gelatinous coat material (fertilizin) of the eggs of this species. The dispersing factor most probably acts by depolymerization of the fertilizin gel to sol, and was not found to impair the sperm aggultinating properties of fertilizin in solution. The factor was shown to be acid labile (pH 4 for four minutes) and heat labile (70°C. for two

minutes), and therefore distinct from sperm antifertilizin. Antifertilizin is stable for at least 10 minutes at 70° C, and is not destroyed by acid treatment. Extracts which contained the dispersing factor were also able to dissolve precipitation membranes formed by antifertilizin on the surface of the gelatinous coat.

This investigation was supported in part by a research grant from the National Institutes of Health of the Public Health Service.

A Taxonomic Study of the Genus *Aletris* L. (Liliaceae)*

EDWARD T. BROWNE, JR., *Alabama Polytechnic Institute*

Chromosome numbers of n=13 are reported here for the first time for *Aletris farinosa* L., *A. aurea* Walt., and *A. obovata* Nash. The only previously reported number in the genus was 2n=52 for *A. foliata*, an eastern Asiatic species, and there is some question as to the retention of this species in the genus. For all these species there is a basic chromosome number of x=13. Since *Aletris* has been placed in the Liliaceae, Amaryllidaceae, and Haemodoraceae by various authorities, a search of the cytological literature of these families was undertaken. Examples of plant species with the basic number x=13 were located, but in these cases, e.g. species of *Narcissus*, *Fritillaria*, and *Lachenalia*, this number was derived from some other basic number which was found in the majority of the other investigated species in these genera. Of the cytologically investigated species in the previously mentioned families, only in the Liliaceae tribe Narthecieae of the Hutchinson system were there chromosomes which were like those of *Aletris* in basic number and size. On the basis of this cytological information, it is recommended that *Aletris* be placed near the genera *Narthecium* and *Metanarthecium* in future systematic treatments of the family Liliaceae.

A Method for Determining the Effects of Varied Environmental Conditions on Cell Growth in *Phleum* Roots

ROBERT T. BRUMFIELD, *Longwood College and Oak Ridge National Laboratory*

Cell development can be studied directly from photographs taken at successive time intervals of growing roots of *Phleum pratense*. The length of each cell and its distance from the root apex are continually increasing with time. If the logarithm of cell lengths (ordinate) at successive time intervals by plotted against their distances from the apex (abscissa), a family of curves is obtained which have essentially the same slope at the same distance from the apex. If the photographs are taken over a period of 2 to 4 hours (depending on the rate of growth) the curves will overlap along the abscissi. This is so since cells near the tip will be displaced to a position formerly occupied by cells basal to them. The curves can be "stacked" into a composite curve by shifting the ordinate which is logarithmic. The resulting composite curve represents the increase in length that any cell along the root axis is expected to undergo under uniform conditions. This curve thus affords a "base line" whereby the relative effect of any environmental change on individual cells can be determined. The use of the method is illustrated by an experiment with applied IAA.

Additional Information on the Mechanical-Chemical Nature of Drilling by the Gastropods *Urosalpinx* and *Eupleura**

MELBOURNE R. CARRIKER, *University of North Carolina*

A comparative study of the functional morphology and ecological significance of drilling mechanisms in muricid gastropods is in progress. It was found earlier that in drilling through shell of prey, *Urosalpinx cinerea* alternates short periods (a few minutes) of radular rasping with longer ones of "softening" by a glandular accessory proboscis in the foot. Current studies confirm this for *Urosalpinx*, and disclose for the first time the presence in *Eupleura caudata* of a drilling mechanism structurally and functionally similar to that of *Urosalpinx*. Regeneration was complete in five out of seven snails of both species whose proboscides were amputated. Drilling was resumed in 14 to 39 days. The accessory proboscis was excised from 12 other drills. Three completely regenerated this gland and resumed drilling in 21 to 61 days. The remainder lived 21 to 61 days, then died. Excised accessory proboscides, especially those from actively drilling snails, when placed on smooth shell in moist chambers for 24 hours, effected definite, though faint, erosion of shell, not observed in controls. Resumption of drilling in proboscisectomized and accessory-proboscisectomized oyster drills appeared to parallel regeneration, and occurred only when radula and accessory proboscis functioned alternately. Neither organ penetrated shell alone. These data support a mechanical-chemical hypothesis of penetration.

These studies are being supported by a U. S. Fish and Wildlife Service grant.

The Effects of X-radiation on the Early Cleavage Stages of the Snail, *Ilyanassa obsoleta*

JAMES N. CATHER, *Emory University*

The duration and character of the meiotic and mitotic stages were determined through the third cleavage and correlated with the external morphology of the cells. Doses of radiation ranging from 1000 to 10,000r at 1000r per minute were used. A dose of 4000r produced the maximum cleavage delay with minimum lethality prior to the formation of blastulae. This dose was delivered at known mitotic stages prior to the second cleavage, and the cleavage delay of the first three cleavages was studied. A sharp rise in radiation effect occurred when the eggs were treated near mid-interphase. Treatment from mid-prophase to the next cleavage had little effect on that cleavage, but the cleavage delay of the later cleavages increased as the time of irradiation approached the cleavage. Treatment during mid-telophase, shortly after the first cleavage, produced the greatest delay of the second cleavage. The delay of prophase accounted for a major part of the cleavage delay.

The Plumose-bristled Species of *Rhynchospora* (Cyperaceae)

R. B. CHANNELL, *Vanderbilt University*

This report represents the results of a recent re-evaluation of the nomenclature, taxonomy and distribution of the species comprising Series Plumosae of the genus *Rhynchospora*. It contains a number of changes and corrections for the group necessitated by the revisional study.

The Natural Vegetation of English Mountain, Tennessee

JOE A. CHAPMAN, *Carson Newman College*

The vegetation of English Mountain, an uplift of the Chilhowee series of eastern Tennessee, is described as it is related to geology, topography and soil types. Steep slopes with rocky outcrops are characteristic. The few basic soil types are derived from shale and conglomerate rock. Many variations of site exposure occur. The description and analysis of the thirteen major forest types are drawn from data secured by use of the plotless sampling method of Grosenbaugh. Density, frequency, size class and basal area data are given for all types. The pattern of vegetation is most closely related to site exposure, while altitudinal, soil and geological differences are of secondary importance.

Flagellation and the "Pseudoflagellum" in the Swarmcells of the Myxomycete, *Didymium nigripes**

ARTHUR L. COHEN, *Oglethorpe University*

Living, flagellate swarmcells (gametes) of the Myxomycetes show a single anterior flagellum under ordinary illumination. In stained preparations, two flagella are often seen. Contemporary workers are of the opinion that this biflagellate condition is typical and that the second flagellum is often curved back, closely appressed to the body of the swarmcell, and hence ordinarily invisible. The author's observations of the living swarmcells of *Didymium nigripes* under phase contrast illumination disclosed the presence of the known flagellum and also a short process which could be seen to grow from the cell at the region of insertion of the known flagellum, but which then migrated over the surface of the body to the rear and became indistinguishable from the trailing, fine, posterior pseudopodia typical of swarmcells. Electron photomicrographs of shadowed swarmcells showed the extended flagellum, the fine pseudopodial process here called a "pseudoflagellum," and a second true flagellum recurved and closely appressed to the cell.

Fluorescence Microscopy of Living *Tetrahymena pyriformis**

MARION T. COLEMAN and CHARLES RAY, JR., *Emory University*

Intra-vital staining of nuclei and cytoplasmic inclusions in *Tetrahymena pyriformis* using basic fluorochromes has been observed by fluorescence microscopy. The light source was a GE AH-4 mercury lamp. The filter system consisted of a Corning glass filter #5113 (3.85 mm thickness) between the light source and the specimen, and a Wratten G filter in the ocular. Aqueous solutions of several diaminoacridine compounds were found to be satisfactory, non-toxic, vital fluorochromes. Proflavine hydrochloride, acriflavine hydrochloride, acridine yellow and acridine orange produced yellow-green fluorescence in both micronucleus and macronucleus of *Tetrahymena*. When general cytoplasmic fluorescence was observed, the low intensity of this fluorescence did not interfere with nuclear differentiation. Acridine orange was unique; this dye simultaneously produced orange-red fluorescence of some cytoplasmic inclusions and yellow-green fluorescence of nuclei. Fluorescence persisted throughout conjugation and has been observed as long as twenty-four hours following application of the dye. The diaminoacridines are useful as vital stains because low concentrations (1:50,000 to 1:100,000) give bright fluorescence; visual contrast is excellent; and nuclear structures are easily stained by this method.

This study was supported in part by a grant from the National Science Foundation.

Studies on the Ecological Life History of *Portulaca smallii**

DAVID J. COTTER, *Emory University*

Portulaca smallii P. Wilson is a small succulent plant, endemic to the granite outcrops of the Piedmont section of southeastern United States. Field studies have dealt with its habitat, phenology, distribution, and morphological variability. Life history stages have been studied in the field and laboratory. Responses of the plant to many phases of the environment including biota, light, temperature, moisture, pH, and soil have been determined through controlled laboratory experiments. *P smallii* is able to survive innundation or severe desiccation. The amount of available water is the major factor controlling growth. *P. smallii* is photoperiodic and also exhibits marked responses to light intensity, such as phototropism, nystic movements, and photocleistogamy. The principle reasons for its endemism are its inability to withstand competition and its physiological adaptations to the severe environment of the outcrops.

Observations on *Chlorosarcina* (Gerneck) Vischer

TEMD R. DEASON and WALTER R. HERNDON, *University of Alabama*

Among numerous chlorophycean isolates from the soil of the Alabama (Greene County) Black belt, was one alga of the genus *Chlorosarcina*. This genus, originally described by Gerneck in 1907, was emended by Vischer to include those Chlorosphaeracean algae with cup-like plastids and lacking pyrenoids although he called it a *genus imperfecte notum*. This organism has been maintained in cultivation in a variety of media including Bold's inorganic salt medium and has been studied in many phases of its life history over a period of several months. Cells of this plant are characterized by the ability to divide vegetatively, a cup-like plastid without pyrenoids, and the production of zoospores of the *Protosiphon* type. Recent studies of related genera indicate that zoospore type should probably

be included among the generic attributes of *Chlorosarcina*. It is hoped that a detailed description of this organism, which is apparently new to science, as well as its availability in culture, will provide a basis for a clearer understanding of this genus, which has been rarely studied.

Gravel Bars and Flood Control*

ROBERT A. DIETZ, *Troy State College*

Some rivers evolve their own flood control systems. One such river in Missouri has been studied in detail. The Meramec River is characterized by gravel deposits along the banks, known locally as gravel bars. These bars are ideal for the study of succession leading to a stable river bed and channeled flood waters. Alternate deposition ridges and scour canals, initiated by willows, tend to mitigate the effects of slight and moderate flooding. Through percolation, runoff is decreased. The effect of the system upon severe floods is proportionately less. The downstream landowner, however, is more or less at the mercy of the watershed management practices of his upstream neighbors, and whatever he can do to moderate floods is to his advantage. The natural principles herein studied lend support to certain downstream management practices.

Analysis of Egg Color Variation in *Cyclops vernalis**

ERNEST J. DUPRAW, JR., *University of Florida*

In populations of the fresh-water copepod, *Cyclops vernalis*, different females may be observed carrying egg sacs of widely different colors, including blues, blacks, purples, browns, grays and greens. The frequencies of the different egg colors occurring in one, fairly dense population of *C. vernalis* have been recorded periodically for over a year, and slight correlations with algal concentration noted. The light-absorption curves of variously-colored eggs have also been determined, using a microspectrophotometer. From an analysis of these curves, it has been inferred that apparent egg color depends on the relationship between only two carotenoid materials, one an unmodified red-orange carotenoid, possibly astaxanthin, the other a typical, blue carotenoid-protein. By maintaining female *Cyclops* in isolation cultures during successive egg layings, it has been shown that egg color is not related to the individual female, but that any female may lay successive egg sacs of widely different colors. More precise culture experiments, in which two groups of females were maintained on entirely separate diets, have shown that differences in feeding are accompanied by profound differences in the colors of eggs produced. Various speculative physiological and optical mechanisms have been proposed.

Multi-periods of Branch Elongation In Pines

WILLIS A. EGGLER, *Newcomb College, Tulane University*

Multi-periods of stem elongation during a season (sometimes called multi-nodal growth) have been recognized for main stems of pine trees, but the fact that branches may elongate multi-periodically is less well known. Multi-period elongation of branches of longleaf pine in Louisiana and Mississippi has been reported earlier. Similar growth habits of branches of shortleaf, loblolly, and slash pine have been observed in Louisiana. Investigations are in progress to determine possible relationships between periods of branch elongation and main stem elongation, diameter increase, temperature, and soil moisture.

Cytotaxonomical Studies on a *Zephyranthes* Complex*

W. S. FLORY, JR., *Blandy Experimental Farm, University of Virginia*

Zephyranthes insularum (2n=28), *Z. nervosa* (2n=24?), *Z. puertoricensis* (2n=25) and *Z. tubispatha* (?) (2n=25), from the West Indies or South America, are taxa which have been variously confused. Traub (1958, in press) discusses the nomenclature of these in some detail. *Zephyranthes commersoniana* is another member of this complex; material of this was not available for the present work. Detailed karyotype analyses were made of the several taxa, and complement comparisons presented in some detail. Group relationships, distinctions, and possible origins are considered on the basis of cytological and morphological data and observations.

Influence of Carbonic Anhydrase Inhibitors on Shell Growth of a Freshwater Snail, *Physa heterostropha*

JOHN A. FREEMAN, *Winthrop College*

Carbonic anhydrase, an enzyme which on theoretical grounds is expected to influence mollusc shell growth, has been reported in the mantle tissue of most but not all molluscs examined for its presence and two drugs inhibiting the enzyme have been reported to decrease calcium deposit in the oyster. *Physa heterostropha* have been grown in solutions of various concentrations of five carbonic anhydrase inhibitors, sulfanilamide, benzenesulfonylamide, p-toluenesulfonamide, Diamox, and 2-benzothiazole-sulfonamide, and the growth rates of the individual snails have been determined. The last-named drug is lethal at concentrations above 0.5 mg per liter, an effect not reversed by PABA. The other drugs decreased the growth rates by a third to a half in experiments in which the snails were fed for maximum growth. The drugs did not influence growth rates in experiments in which growth was maintained at a low level by dietary restrictions. The results are consistent with the theory that carbonic anhydrase is necessary for rapid but not for slow growth of the snail shell.

Relation of the Nucleolus to Mitotic Activity as Revealed by Ultraviolet Microbeam Irradiation*

MARY ESTHER GAULDEN and ROBERT P. PERRY, *Oak Ridge National Laboratory*

Circumstantial evidence obtained in several organisms has suggested that the nucleolus controls to some unknown extent the division of a cell. This idea has been tested in living grasshopper neuroblasts by irradiating the nucleolus with a high-intensity

ultraviolet microbeam less than 3 μ in diameter at the focal point. The nucleolus is 3 μ in diameter. Cells in telophase, interphase, and prophase were irradiated; in some, the microbeam was focused on a nucleolus and in others on a non-nucleolar portion of the nucleus. These cells and unirradiated ones were observed until they divided or for at least 24 hours. Irradiation of one nucleolus for 3 seconds is sufficient to stop mitosis of cells irradiated in stages from late telophase to the middle of middle prophase. During the latter half of middle prophase, the nucleolus becomes less sensitive to ultraviolet radiation and by late prophase is completely insensitive to it, as determined by the ability of the cell to divide. Microspot irradiation of a non-nucleolar region of the nucleus causes mitotic delay but does not usually prevent cell division. These observations are consistent with the hypothesis that the nucleolus has an intimate functional relation to the mitotic process.

Distribution of Estuarine Ascomycetes and Deuteromycetes

HARVEY S. GOLD and T. W. JOHNSON, JR.,
Duke University

Estuarine Ascomycetes and Deuteromycetes were studied to determine if distributional patterns for these organisms exist and if these patterns are affected by temperature and salinity. Both lignicolous and caulogenous forms were investigated. Four basic fungal distributional types were observed: fresh water, mesohaline, stenohaline, and those that occur in all salinities, the euryhaline fungi. Salinity, as affected by temperature, influenced fungal distribution, and temperature was a limiting factor. Laboratory salinity tolerance experiments combined with field data show that mesohaline fungi possess a high degree of physiological adaptability to function vegetatively and reproductively in the fluctuating salinity and temperature of their aquatic environment.

Effect of Gibberellic Acid on Cell Division and Cell Elongation in *Phaseolus vulgaris**

VICTOR A. GREULACH and JOHN G. HAESLOOP,
University of North Carolina

Four weeks after treatment the third internodes of bean (*Phaseolus vulgaris* L.) plants supplied with 0.346 mg of gibberellic acid each and of the control plants were fixed for sectioning and anatomical measurements. The third internode was selected for study because it both initiated and completed its growth during the experiment. Though the treated plants grew 1.96 times as tall as the controls and had third internodes averaging 2.28 times as long the mean longitudinal, radial, and tangential diameters of cells from both the pith and cortex were almost identical with those of the controls, the slight differences being highly insignificant statistically. Gibberellic acid had no effect on the mean thickness of the tissues outside the pith, but the pith of the treated plants averaged only 0.86 the diameter of the controls, a highly significant difference resulting in significantly thinner stems of the treated plants. The volume of the pith of the treated plants was, however, 1.68 times that of the controls and the volume of the entire third internodes of the treated plants averaged 1.70 times that of the controls. In this experiment the growth promotion by gibberellic acid was obviously due entirely to increased cell division. The data also suggest that in the pith gibberellic acid influenced the plane as well as the rate of cell division. These results, along with other recent reports of stimulation of cell division by gibberellic acid, suggest that the generally-accepted belief that gibberellic acid promotes growth largely through an effect on cell enlargement requires re-evaluation.

Biospeciation in the Lichen *Cetraria ciliaris*

MASON E. HALE, *Smithsonian Institution*

The common conifer lichen *Cetraria ciliaris* Ach. in North America consists of three chemical populations. One with olivetoric acid (C+ red) is centered in the central and southern Appalachian Mountains and in the Piedmont. The second with alectoronic acid (KC+ red, C–) is centered in the Great Lakes area eastward to New Brunswick and southward into the Shenandoah and Cumberland Mountains. Where these two strains converge in the central Appalachians, the plants with olivetoric acid occur predominantly in pine woods on soils derived from sandstones, whereas those with alectoronic acid occur more frequently on trees in the shale barrens of the Shenandoah Mountains. A third strain with protolichesteric acid occurs exclusively in the far western states, but ranges eastward as a rarer strain with alectoronic acid plants. Since these strains are geographically distinct elements of a single species, it is proposed that they be ranked as subspecies, as commonly defined by biosystematists.

A Contribution to the History of Mendelism*

ROLAND M. HARPER, *University of Alabama*

In the 1860's Gregor Mendel, experimenting with peas in his garden, discovered that second-generation hybrids reproduced the characters of their ancestors in a pretty definite ratio. He published his findings in an obscure journal in 1866, but that seems to have attracted little attention, and was soon forgotten, the world simply not being ready for it. In 1900 Mendel's work was re-discovered almost simultaneously by three or four European geneticists, and then its fundamental importance was immediately recognized, for the time was ripe for it. Numerous magazine articles and books were soon written about it, and it was found to apply to the animal kingdom also, and incorporated into many biological text-books.

Recent delvings in old magazines by the writer have shown that some French scientists had essentially the same idea as Mendel a few years before he did, but did not push it quite so far. It is possible that he knew of their work and was inspired by it. It also appears that Mendel's work was known to a few American botanists around 1882, but it was rather out of their field (taxonomy), and they were not particularly impressed by it.

Cytological Demonstration of Cleavage Anaphase Bridges in *Drosophila melanogaster*

CLAUDE W. HINTON, *University of Georgia*

The behavior of an unstable ring-X chromosome called w^{vc} of *Drosophila melanogaster* has been explained by anaphase bridge formation during cleavage mitoses followed by breakage of the bridge to cause dominant lethality or by loss of the bridge to produce either gynandromorphs or XO males. An attempt to confirm this model consisted of cytological examination of Feulgen whole mount preparations of third through eighth cleavage eggs derived from rod-X females crossed either to w^{vc} males or to males carrying the stable X^{c2} ring chromosome. The frequency of late anaphase and telophase figures with bridges was 1.94 percent (N = 2516) and 0.28 percent (N = 1084) for the two groups, respectively; these frequencies are not corrected for the fact that approximately one-half of the embryos carry the Y chromosome rather than a ring-X. Studies of other mitotic abnormalities found in this material are in progress.

This work was supported by U. S. Public Health Service Research Grant C-3000.

A New Marine Aporocotylid Cercaria from *Donax variabilis* Say*

RHODES B. HOLLIMAN, *Florida State University*

This constitutes a preliminary report on a new cercaria of a blood fluke of fishes (Family Aporocotylidae) from the marine pelecypod *Donax variabilis* Say. The cercaria is typical for the family in being apharyngeal and brevifurcate, with a dorsal fin fold on the body. The body measures 112 microns long and the tail stem 236 microns long. The flame cells, located in the posterior third of the body, are arranged in the pattern of 2(2). This cercaria is peculiar in that it has an asymmetrical tail. One tail furca is approximately 10 microns long and the other is about 33 microns long. Another interesting feature is a longitudinal row of spines on each lateral surface of the cercarial body. These spines are arranged in 22-24 groups of 3 or 4, with the anterior attached ends of each group converging. The cephalic region of the body is surrounded by parallel bands of minute spines. There are seven penetration glands and ducts.

Notes on the Helminths of Mammals in the Mountain Lake Region. IV. The Life Cycle of *Hydatigera lyncis* Skinker*

HARRY L. HOLLOWAY, *Roanoke College*

Strobilocerci of *Hydatigera lyncis* recovered from *Neotoma magister* were fed to young *Felis domestica*. One cat, autopsied 61 days after feeding, yielded a mature specimen 34 cm long with a maximum width of 4mm. Another cat died 88 hours after being fed five strobilocerci and five tapeworms were recovered. Two additional cats began to pass proglottids 71-77 days after receiving strobilocerci. Seventeen terminal proglottids and two detached proglottids, recovered from the colon of the first cat were retained in 0.75% physiological saline at room temperature for 36 hours and fed to young white laboratory rats (Holtzman Strain). The rats were sacrificed 32-61 days after experimental feeding and all were negative for hepatic strobilocerci. Proglottids recovered from the latter two cats 1-24 hours after passage were placed on moist filter paper and incubated for 24-120 hours at 37.5 degrees centigrade. Six rats were fed two proglottids each. As the dye used to mark the animals was not permanent it was not always possible to correlate the number of strobilocerci recovered with the incubation period. The largest number of strobilocerci (5) were recovered from the rat fed proglottids incubated for 120 hours, three were recovered from each of two rats, and one was recovered from each of three rats. A control rat was not infected. In the experimental life cycle of *Hydatigera lyncis*, *Felis domestica* serves as the definitive host and *Mus norvegicus albinus* as the intermediate host.

Galactose Utilization in Yeast and Other Fungi*

G. LEON HOWELL, *University of Alabama*

Galactose utilization by *Saccharomyces cerevisiae* isolates from "Fleischmann's Active Dry Yeast for Baking" and by other fungi has been studied utilizing galactose and glucose containing carbon-14. The yeast and other fungi were placed under aerobic conditions in solutions containing various mixtures of radioactive and non-radioactive sugars. A gas train was set up to collect the carbon dioxide produced. Comparisons of specific activities of carbon dioxide produced by metabolizing fungi with the specific activities of carbon dioxide produced from oxidizing the sugar mixtures employed permitted the study of galactose utilization in the presence of glucose and other sugars which may be metabolized at the same time.

Hybridization and Allotriploidy in *Triturus viridescens*

NORMAN HUGHES, *Emory University*

The relative importance of the nucleus and the cytoplasm in development may be studied by altering the normal nuclear-cytoplasmic relationship through hybridization, through polyploidy, or by combining hybridization with polyploidy. Reciprocal diploid and triploid hybrids between *Triturus viridescens viridescens* and *T. v. louisianensis* were produced through heterospermic insemination followed by a heat shock (10 minutes at 36°C). The early development was essentially unchanged, but differences were manifested in the pigment pattern and in the time of appearance of the hind limb bud. Triploids have larger and fewer cells than do diploids. The pigment patterns of reciprocal diploid hybrids are not significantly different, but are more nearly like that of *T. v. louisianensis* than that of the other parent. Allotriploids with two *T. v. louisianensis* genomes are essentially the same as diploid hybrids, but allotriploids with two sets of *T. v. viridescens* chromosomes are about intermediate between diploid hybrids and the *T. v. viridescens* parent. The hind limb bud appears earlier in *T. v. viridescens* than in *T. v. louisianensis*, and the times of appearance in the hybrid classes is between the two extremes, with some indication of a maternal effect.

The Oviducal Environment and Normal Blockage of Meiosis in Oocytes of the Newt, *Triturus viridescens**...

A. A. HUMPHRIES, JR., *Emory University*

The oocyte of *Triturus viridescens* is normally in metaphase of the first meiotic division when released from the ovary, and the first polar body is usually extruded as the egg passes through the anterior one-third of the oviduct. Meiosis then quickly progresses to metaphase II and is blocked at that stage until the egg is activated at fertilization. Earlier (Humphries, 1955) it was shown that a significant percentage of eggs retained for forty-eight or seventy-two hours in the coelom or the extreme anterior (non-jelly-secreting) parts of the oviducts progressed past the block at metaphase II. In the light of these results, it was desirable to determine whether the same effect would be observed in eggs retained for similar periods in the jelly-secreting portions of the oviducts. Thus far, over 200 such eggs, all with at least one jelly coat, have been examined. None of these has shown advance past the normal block. Some aspect of the oviducal environment, therefore, probably associated with the secretion of jelly or with the jelly itself, seems to be responsible for the normal blockage of meiosis at metaphase of the second division.

Schooling Behavior in the Marine Snail, *Nassarius obsoletus**

CHARLES E. JENNER, *University of North Carolina*

In Barnstable Harbor, Massachusetts, it has been found that populations of the mud snail, *Nassarius obsoletus*, show annually a seasonal change in distribution pattern—from a dispersed distribution, in which the snails are present over extensive areas of the flat, to an aggregated distribution, with snails occurring in massive aggregations. This change occurs abruptly and is related to the reproductive state of the population, coming at the close of the reproductive period. Once the aggregations are formed the snails display a striking schooling behavior, snails in any one part of the aggregation often moving in mass in the same direction. If the position of a snail in such a group is experimentally changed, it will immediately reorient to its former position. Physical contact is not required in this reorientation. Thus, a unique opportunity is afforded for the experimental analysis of schooling behavior.

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Histological Observations on the Male Reproductive System of the Crayfish*

TOM L. JOHNSON, *University of Virginia*

In the subfamily Cambarinae a cyclic dimorphism is demonstrated by the male crayfish and these two forms have been designated as Form I and Form II, the former known to be capable of transmitting sperm to the annulus ventralis of the female. It is questionable that the male, Form II, is capable of accomplishing this transfer. A histological study of the male reproductive tract of these two forms was initiated to determine whether or not there exist cyclic alterations which might be correlated with the external anatomical differences which distinguish the two forms. Three distinct regions are recognized: the proximal sperm duct; the muscular "ejaculatory duct"; and the distal cuticularized "shaper" located within the penis papilla on the coxopodite of the fifth walking leg. These three regions are described in some detail as they exist in the male, Form I, and data are presented which substantiate the belief that the male, Form II, is incapable of transferring sperm to the annulus ventralis of the female.

A Fungus Parasite in Ova of the Barnacle *Chthamalus fragilis denticulata*

T. W. JOHNSON, JR., *Duke University*

Lagenidium chthamalophilum is described as an invader of the ova of a barnacle species. The fungus is characterized by the formation of a vesicle which appears before sporangial protoplasm migration, and by highly vacuolate, stout vegetative hyphae. Thirty-four percent of all lamellae examined were invaded. The fungus can invade and destroy the ova at any time between late gastrulation and emergence of the nauplii. Cross-inoculation experiments in an attempt to transfer the fungus to ova of the associated barnacle, *Balanus amphitrite*, were unsuccessful.

A New Moss for North America

Z. IWATSUKI and A. J. SHARP, *University of Tennessee*

Molendoa sendtneriana has been found in Tennessee and North Carolina. It is probably already represented in U. S. herbaria under the names *Trichostomum cylindricum* and *Gymnostomum aeruginosum* with which it might be confused.

Microsporidiosis in Shrimp

E. E. JONES, *Georgia State College*, and *Duke University Marine Laboratory*

Shrimp fishermen of the East and Gulf Coasts have for the past ten years been finding in their catches shrimp which are blue-black in color. The abdominal musculature of these animals is white in appearance and lacks the firmness of healthy muscle. These shrimp are called "cotton shrimp," "blue shrimp," "black shrimp" and "he shrimp." *Nosema pulvis* Perez 1905 and *Thelohania hunterae*, n. sp. Jones 1957 are the etiological agents. *Nosema pulvis* is a histozoic parasite of striated muscle, cardiac muscle, ovary and digestive gland. *Thelohania hunterae* is primarily coelozoic, however, invasions of the ovary and nerve cord have been encountered. Infected animals show marked physical debility and are unable to compete successfully with healthy animals.

The Seasonal Effect of Ecological Factors on *Drosophila* Populations

J. F. JONES and J. M. CARPENTER, *University of Kentucky*

A study of seasonal fluctuations among *Drosophila* species was started in June 1946 with the assumption that various ecological factors could be correlated to explain such fluctuations. The procedure consisted of bi-weekly collections from an isolated field station located along the Kentucky River near Lexington. Weekly frequencies were kept for each

species caught and recorded along with precipitation and temperature data. The above procedure was followed throughout the summers of '56 and '57 with a total collection of more than 50,000 flies. Analysis of this data has shown that a definite correlation exists between the fluctuations of certain species and the ratio between rainfall and temperature. Food is being studied as another ecological factor.

Plasmodium floridense in Georgia Lizards

HELEN B. JORDAN, *Georgia State College, Atlanta*

Plasmodium floridense (Thompson and Huff, 1944) was studied in two Georgia lizards, *Sceloporus undulatus* and *Anolis carolinensis* and discussed with respect to occurrence and host regulation of development. The incidence is about 10 per cent in *Anolis;* 4 per cent in *Sceloporus*. Requiring from two to four months for the infection to run its course in *Sceloporus*, it is characterized by an acute rise, a definite peak of parasitemia, and a rapid decline. The same parasite developing in *Anolis* does not show any of these, but continues as an irregularly developing low-grade infection which may persist for as long as two years. The peak of parasitemia often reaches 15,000 per 10,000 red cells in *Sceloporus*, while in *Anolis* the highest peak observed was 1,750 and it is usually much less. The average number of merozoites per segmenter in *Sceloporus* is 10.60 with an obvious inhibition of reproduction in the late stages of the infection; in *Anolis* it is only 9.28. These variations in development of *P. floridense* are thought to be due to differences in natural and acquired immunity of the hosts and are discussed from that point of view.

The Adaptive Significance of Variation in Response to Daylength in *Ipomoea**

ROBERT J. KNIGHT, JR., *Blandy Experimental Farm, University of Virginia*

Four species of *Ipomoea* and one artificially produced amphiploid, assembled from a number of locations at differing latitudes in the Northern Hemisphere, were grown in northern Virginia, at 39° north latitude, under conditions of natural daylength. In the short days of winter or of early spring or the shortening days of midsummer, those from the northernmost sources began blooming before those originating farther south. There was a trend of declining sensitivity to shortening days, demonstrated by a tendency to remain longer in vegetative growth, as parent stocks originated at lower latitudes. Hybrids between "long-day" and "short-day" taxa in two species appeared to demonstrate the genetic dominance of "short-day" to "long-day" bloom response. Small F_2 populations appeared to show segregation for flowering behavior when grown in an artificial light period of 14 hours. In *Ipomoea*, populations which have invaded relatively high latitudes, or have been cultivated at northerly latitudes, initiate bloom under longer daylengths than populations of the same species derived from locations nearer the equator. Genetic dominance of the "short-day" plant, along with subsequent appearance and selection (either natural or artificial) of "long-day" genotypes, are considered to be factors of evolutionary significance in adapting the species to occupy higher latitudes.

Yeasts Isolated from the Crops of Seasonally Fluctuating *Drosophila* Populations

J. K. KOMATSU and J. M. CARPENTER, *University of Kentucky*

A number of different types of yeasts were isolated from the crops of *D. affinis*, *D. melanogaster*, and *D. immigrans* populations during bi-weekly collections from the early spring through the late fall of 1957. Approximately 18 wild yeast species have been identified by morphological and physiological tests according to the procedure of Lodder and Kreger—Van Rij. Two of the three *Drosophila* species studied exhibited characteristic population curves during the collecting period. *D. affinis* dropped from a figure comprising approximately 62% of the population in April to a figure of 1% in November. *D. melanogaster* increased from a frequency of 3% in April to a frequency of 45% in November. *D. immigrans* showed a fairly constant population picture during the same period. Present studies indicate that some pattern of correlation exists between the yeast species isolated during the various seasons and the frequency of the three *Drosophila* species found during these seasons.

A New Species of *Cruzia* (Nematoda: Cruziidae) from *Didelphis virginiana*

DWAYNE N. KRUSE, *Florida State University*

This nematode was found in great numbers in the large intestine of *Didelphis virginiana* collected in the vicinity of Tallahassee, Florida. In general appearance and in some of its anatomical details it is similar to *Cruzia tentaculata* Travassos (1922) from South American opossums and to *Cruzia americana* Canavan (1929) found in North American opossums. The present specimens differ, however, from the other species of the genus *Cruzia* in number of teeth; shape, number and position of anal papillae; and other anatomical details. The differences appear sufficient to separate this nematode from the other species in the genus, and the author plans to propose it as a new species. The description will be based on about 50 worms; some were cleared in a lactophenol, picric acid, methyl green mixture and mounted in Hoyer's medium, others were stained with Semichon's aceto-carmine and mounted in damar.

Biochemical Investigations of the Developing Slime Mold, *Dictyostelium discoideum* Raper*

JEROME O. KRIVANEK, *Newcomb College, Tulane University*

Histochemical, spectrophotometric, and chromatographic methods were employed to investigate four stages in the life cycle of the slime mold, *Dictyostelium discoideum* Raper. The histochemical study utilized thirteen techniques to investigate as many biochemical intermediates and enzymes. Of the thirteen biochemical entities, two—peroxidase and acid phosphatase—were not demonstrable in any stage of the life cycle. The eleven remaining enzymes and intermediates—lipase, RNA, DNA, 5-nucleotidase, protein, acid polysaccharides, mucopolysaccharides, tyrosinase, cytochrome oxidase, amine oxidase, non-specific dehydrogenases—were

demonstrated in all or nearly all of the stages investigated. The pre-stalk area, which gives rise to the stalk cells as well as to the sorophore sheath, exhibited generally the highest degree of biochemical activity. An area of intense lipase, 5-nucleotidase, amine oxidase, and non-specific dehydrogenase activity was noted in the lower-most portion of the rising sorogen of the culmination stage. DNA content was also studied spectrophotometrically. By ascending paper chromatography the amino acid constitution of the slime mold was determined. In addition to peptides, alanine, threonine, glycine, serine, and glutamic acid were present in unhydrolysed tissue. These five plus the leucines, phenylalanine, methionine, proline, tyrosine, aspartic acid, asparagine, histidine, and cystine occurred in hydrolysed tissue. The chromatographic picture was similar in all stages.

Taxonomic Studies on the Gastrotricha of Louisiana*

ROBIN C. KRIVANEK and JEROME O. KRIVANEK, *Newcomb College, Tulane University*

During 1957, studies were begun on the Gastrotricha of Louisiana with concentration on an exceptionally rich locality, the fresh-water roadside ditches near Boutte, St. Charles Parish. This paper presents our conclusions on the genera *Stylochaeta* and *Neogossea*, with some preliminary remarks on the genus *Kijanebalola*. A new species of *Stylochaeta, S. curviseta,* is described. It is closely similar to the one other American species of the genus but bears a long, curved bristle on each of the short caudal appendages. The genus *Neogossea* is recorded for the first time in this country with two representatives. *N. sexiseta*, a new species, has six caudal spines on each side. *N. fasciculata* (Daday) is redescribed. The genus *Kijanebalola*, heretofore recorded only from East Africa, is represented by two forms in this area. These are the first observations on living specimens of this genus. Also presented is an excellent method for viewing gastrotrichs under oil immersion.

Morphology and Biology of a Species of *Proterospongia*

JAMES B. LACKEY, *University of Florida*

A bloom of *Proterospongia* consisted mainly of small colonies, usually less than 25 zooids each. They were studied alive and their method of feeding, colony, and zooid structure were noted. This is a redescription of an organism whose status has been questioned.

The Occurrence and Characterization of Ascorbic Acid Oxidase in Certain Bacteria*

DWIGHT W. LAMBE and LORETTA C. ELLIAS, *Florida State University*

This paper describes a procedure, based on the Warburg-Barcroft manometric technique, for the detection of ascorbic acid oxidase in cell suspensions and in cellular extracts of bacteria. Ascorbic acid oxidase was demonstrated in cell suspensions of *Escherichia coli* and *Aerobacter aerogenes* and in cellular extracts of *Escherichia coli, Aerobacter aerogenes, Streptococcus fecalis,* and *Proteus morgani.* A pH of 6.4 was established as the optimum for assay of cellular suspensions. Storage of the enzyme at −70° C. for 34 days resulted in only an 18% loss in activity. A study of the factors influencing enzyme production showed that a slight increase in production resulted when cultures were incubated at 35° C as compared to incubation at 30° C and that a 108% increase in enzyme occurred when ascorbic acid was added to the culture medium. The enzyme did not show a dialysable co-factor after eight and one-half hours dialysis at 4° C. After centrifugation of the enzyme at 140,000 x g for one hour at 4° C, 31% of the activity remained absorbed on the particulate material.

Photosynthetic Studies of Three Granite Outcrop Endemics: *Amphianthus pucillus* Torr., *Isoetes melanospora* Englem, and *Diamorpha cymosa* (Nutt.) Britton

WM. T. LAMMERS, *Emory University*

The unusual flora of the Atlanta area granite outcrops has attracted attention since this area was settled. The rate of CO_2 uptake by the subject plants was determined in a modified Heinicke-Hoffman apparatus. As was predicted, the plants all have (1) a high rate of respiration (2) a high photosynthetic compensation point, and (3) a more or less even increase in the rate of CO_2 fixation up to the maximum light intensity used. Probably *Amphianthus* and *Isoetes* reach their maximum rate of photosynthesis at or just above 10,000 foot candles. *Diamorpha* appears to have a higher maximum probably about 12,000 foot candles. Both *Amphianthus* and *Isoetes* are usually submerged in water. It may be assumed that the water surrounding these plants absorbs some of the light and reduces the actual intensity of light reaching the plants. This may be indicated by the lower saturation point (10,000 fc) of these two compared with the terrestial *Diamorpha*. *Diamorpha*, growing in full sunlight, seems to have adapted itself to the higher light intensity it receives. The above results seem to indicate that a photosynthetic adaptation is at least part of the means of successful survival of these endemic plants of the granite outcrops.

Meningeal Tumors of the Newt, *Triturus viridescens,* as Correlated with Trematode Infection of the Brain and Brain Case*

EDWARD W. LAUTENSCHLAGER, *University of Virginia*

Observations made of brains of newts infected with the metacercaria, *Diplostomulum* sp., have shown macroscopic masses on the dorsal and dorsolateral aspect of the brain, generally in the region of the cerebral hemispheres. Microscopic examination discloses these tissue masses to be meningeal tumors, comparable to human mengioma. While over 200 animals have been examined, the tumor has been found in only those animals which are infected by the parasite. Although an apparent correlation exists between parasitism and tumor formation in the newt, as yet there is no correlation between the presence of the tumor and degree of infestation. Sufficient information is not yet available to correlate the age of infection and tumor occurence, nor to suggest the causative mechanism of tumor formation.

A Monograph of the Genus *Rosa* in North America: *R. blanda*

WALTER H. LEWIS, *University of Virginia* and *Stephen F. Austin State College*

Although a conspicuous species in the flora of the northeast, *Rosa blanda* Ait. has never been thoroughly investigated. The variability of the complex from interspecific hybridizations and intraspecific variations (including heritable and environmental factors) is emphasized by the fifty odd taxa found in the literature and applying to various biotypes. Using the disciplines of gross and micro morphology, phytogeography, cytology, ecology, and taxonomy, an analysis of the species and its hybrid populations has been possible giving a nomenclatural conclusion to the investigation.

Synopsis of Louisiana Polypores

BERNARD LOWY, *Louisiana State University* and ARTHUR A. WELDON, *Tulane University*

A summary is presented of all the species of polypores that have been reported from Louisiana since the publication of Langlois' *Catalogue Provisoire* in 1887. There are keys to the species studied by the authors, an annotated list of collections and photographs of the more interesting specimens.

Phenylthiourea and Iodine Binding in the Tadpole*

W. GARDNER LYNN and JAMES NORMAN DENT, *Oak Ridge National Laboratory and The Catholic University of America and University of Virginia*

It was shown (Dent and Hunt, '52) that radioiodine becomes localized not only in the thyroid of the tadpole but also in the thymus, the horny teeth and in pigmented regions. It was shown by others that deriviations of thiourea inhibit melanin formation. To study the effects of phenylthiourea on iodine binding in regions of iodine localization autoradiograms were prepared from sectioned tadpoles of *Hyla versicolor* after various periods of treatment with phenylthiourea and injection with radioiodine. It was demonstrated that phenylthiourea completely inhibits binding of iodine in the thymus and in melanophores and partially inhibits binding in the horny teeth. Evidence was found to show that iodine becomes associated with regions where melanogenesis is taking place but not with melanin that is already formed.

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Interspecific Gene Exchange Between Two Southeastern Tree Frogs

JOHN S. MECHAM, *Alabama Polytechnic Institute*

Morphological evidence is presented for introgressive hybridization between populations of *Hyla gratiosa* and *Hyla cinerea* in the vicinity of Auburn, Alabama. Some six characters which distinguish the two forms are used in the analysis, permitting tentative recognition of F_1 hybrids and offspring produced by backcrossing to both parent species. The data demonstrates exchange or hereditary material between the two forms, particularly from *cinerea* to *gratiosa*. Evidence from laboratory crosses, although incomplete, indicates a high level of fertility in interspecific crosses and in hybrid offspring. Factors leading to breakdown of the species barriers and the significance of interspecific gene exchange are discussed.

Pachytene Morphology and the Evolution of Non-Homology in Chromosomes*

MARGARET Y. MENZEL, *Florida State University and U.S.D.A.*

Data from the literature and from a study of pachytene morphology of heteromorphic pairs of sex chromosomes in the blood fluke *Schistosomatium douthitti* and the hemp plant *Cannabis sativa* will be presented in connection with the following hypothesis: In addition to point mutations and structural rearrangements, chromosomes are capable of a third class of change which affects the cycle of chromosome contraction and DNA deposition. This cycle is to some extent autonomously controlled within given chromosome segments, each segment thus being capable of a degree of independent evolution in this respect. Changes in chromatic cycle are often undetectable at pachytene and may not interfere with perfect synapsis, even though they may be very striking at other stages. In this respect pachytene is a conservative stage. A difference in cycle between two synapsed partners, however, does interfere with chiasma formation in its vicinity. Chiasma formation is therefore a better criterion of similarity or homology between partially differentiated chromosomes than the ability to synapse. Alteration of the chromatin cycle between segments still capable of synapsis seems to occur in a rather wide range of plant and animal material, and is probably a basic and widespread evolutionary mechanism in chromosomes.

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Zoosporangia of *Sorosphaera veronicae**

CHARLES E. MILLER, *University of North Carolina*

Zoosporangia of *Sorosphaera veronicae* are described for the first time. The zoosporangia develop from plasmodia and are located in subepidermal and epidermal tissues, root hairs excepted, of the roots only; the cystosori are found only in the shoot system. Experimental and control host plants, *Veronica persica*, were grown from seeds in pots of sterilized soil and sand with nutrient solution in the algal culture room at temperatures and light intensities and durations which simulated natural environmental conditions. When solutions of zoospores were poured in pots of host plants as cultured above, zoosporangia in the root systems and cystosori in the shoot systems were produced. When finely ground host plant cystosoral galls which had been dried for 6-12 months were sprinkled in pots of host plants cultured as described above, zoosporangia were found in roots. Control plants showed no evidence of zoosporangia or cystosori. Zoospres are biflagellate and heterocont; the anterior flagellum is shorter than the posterior one. Zoospores stained using the Löffler technique show that both laterally attached flagella end in a whip-lash. The whip-lash on the posterior flagellum is longer than the whip-lash on the anterior one. Cruciform nuclear division occurs in zoosporangial plasmodia.

Studies on the Genus *Homalometron* Stafford, 1904 (Trematoda; Lepocreadiidae) with a Redescription of *H. armatum* (MacCallum, 1895)

GROVER C. MILLER, *North Carolina State College*

During recent studies on parasites of Louisiana fresh-water fishes, a large series of trematodes belonging to the genus *Homalometron* were collected. These flukes were collected from the following hosts: *Aplodinotus grunniens*, the fresh-water drum; *Lepomis humilis*, the pumpkin-seed sunfish and *Lepomis microlophus*, the red-ear sunfish. A survey of the literature revealed that the original description for *H. armatum* is very brief and this condition has led to some confusion regarding other members of the genus. Also certain discrepancies regarding other species in the genus had added to this confusion. The study of abundant material in the writer's collection has shown that *H. armatum* is a highly variable form and that *Homalometron pearsei* (Hunter and Bangham, 1932) should be considered a synonym of *H. armatum*. The other species of the genus are discussed and the available knowledge on life-histories is summarized. The taxonomic position of the genus *Homalometron* is also discussed.

Studies of Oyster Mortality in Alligator Harbor, Florida*

F. E. NICHY and R. W. MENZEL, *Florida State University*

Alligator Harbor, on the northwest coast of Florida, has a normal salinity range between 28 and 36 parts per thousand. Dense oyster reefs occur in the Harbor, but all are intertidal. Mortality is high on the tops of the reefs, which are from 25 to 45 cm above mean low water. Live oysters are scattered on the lower edges of the reefs, which are from 5 to 10 cm above mean low water. The majority of the live oysters occur in the zone of the sides of the reefs, 15 to 30 cm above mean low water. Observations showed that oysters on the tops of the reefs are subjected to extreme temperatures at low water, with resulting mortality. Oysters planted about 15 cm below mean low water had a very high mortality, due mainly to the action of predators, especially whelks, *Busycon contrarium* Conrad, and stone crabs, *Menippe mercenaria* Say.

Radiation Ecology Research Program at the Lockheed Reactor Site*

ROBERT B. PLATT, *Emory University*

A radiation ecology research program has been established jointly between Emory University and Lockheed Aircraft Corporation at the site of an atomic reactor under construction by Lockheed through an Air Force Contract. The reactor is in the center of a wooded 10,000 acre reservation, located in the Appalachian foothills of North Georgia near Dawsonville, some 50 miles from Atlanta. Since the reactor is to be only partially shielded, a field of 2,000 to 3,000 feet radius will be developed, having both neutron and gamma radiation. Thus not only the direct effects but also the indirect effects resulting from the transfer and accumulation of radioactivity can be investigated. Long term studies now underway are basically concerned with radiation as an ecological factor. Special aspects of these studies are food chains, including those in which man and his domestic animals represent end links, genetical and cytogenetical effects, and physiological effects, especially on tolerances of individual organisms to both physical and biotic factors, and the ultimate effects of these on populations and communities. Base lines for experimental procedures are being established prior to operation of the reactor.

A Progress Report on Studies of Mixed Hardwood Stands in the Southeastern Coastal Plain

ELSIE QUARTERMAN, *Vanderbilt University* and CATHERINE KEEVER, *Millersville State College, Pennsylvania*

In studiyng hardwood stands on mesic habitats in the Southeastern Coastal Plain (essentially the region described by Braun as the Southeastern Evergreen Forest Region), floristic lists were made of 63 stands in the states of South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. A comparison of these lists indicates that the composition of the stands is very similar throughout the area.

Micronuclear Abnormalities Associated with Non-Lethal High Temperatures during Fission of *Tetrahymena pyriformis**

CHARLES RAY, JR., *Emory University*

The strains of *Tetrachymena pyriformis* being studied by us normally contain a single macronucleus. Cytokinesis of an individual at fission is immediately preceded by mitosis of the micronucleus. The micronucleus becomes oriented antero-posteriorly. The anaphase figure stretches nearly the length of the animal; thus transverse cytokinesis separates the sister nuclei so that the two daughter animals each have a single micronucleus. This behavior is observed through a temperature range of 15°C to 27°C. However, cultures of these strains at sublethal temperatures of 34°C to 36°C contain individuals with different numbers of micronuclei—some with as many as 10, most with 3 or 4. This condition appears as soon as 48 hours after transfer from 23°C to 34°C. Microscopic examination within 24 hours after such transfer reveals micronuclei oriented other than antero-posteriorly and also some anaphase figures not stretched the length of the animal. In such cases one of the two daughter animals receives all the micronuclei and the other receives none. However, few amicronucleate animals are recovered subsequently, indicating that the amicronucleates are at a disadvantage—either in survival or rate of fission.

This work was supported by a research grant from the National Science Foundation.

Comparison of Tissue Metabolic Rates of a Shrew and Some Other Small Animals*

JAMES R. REDMOND and JAMES N. LAYNE,
University of Florida

Respiration rates of tissues of the shrew (*Cryptotis parva*), mole (*Scalopus aquaticus*), harvest mouse (*Reithrodontomys humulis*), white mouse, white rat, and domestic rabbit were compared on a weight specific basis. Metabolic rates of liver, kidney, lung, and diaphragm of white mouse, rat, and rabbit showed the same general correlation with body size as does the metabolism of the intact animal. Of the shrew tissues, only kidney respired at a rate expected on a weight basis, liver, lung, and diaphragm exhibiting lower than expected rates. These data suggest that the characteristically high metabolism of the intact shrew is due to factors other than high intrinsic cellular metabolic rates. The relatively low respiratory rates observed for three of the tissues investigated may represent either a primitive condition or a secondary adaptation to reduce energy expenditure during sleep or periods of inactivity. Kidney rates of the harvest mouse, which approximates *Cryptotis* in weight, corresponded with those of the shrew, while liver showed a depression similar to that of the shrew though less pronounced. These relationships may be typical of very small mammals. Oxygen consumption of tissues from a single mole fell markedly below expected rates. This suggests the possibility that relatively low tissue metabolism may be a general insectivore condition.

Polyploidy in the Aloineae*

HERBERT PARKES RILEY, *University of Kentucky*

The basic haploid chromosome number in the Aloineae is 7 and polyploidy is uncommon except in the Coarctatae Section of *Haworthia*. The problem is of interest in view of Darlington's theory that there is little chromosome variation in long-lived plants. Except for one South African study all plants previously studied had been growing for many years in botanical gardens on other continents and no observations on wild populations had been made. The writer studied two wild populations in South Africa, other plants collected there, and some plants raised from seeds received from there. All were diploids except the hexaploid *Aloe ciliaris*. They include 40 plants of *Aloe Davyana* collected at de Wildt, Transvaal, 119 plants of 32 other species of *Aloe*, 16 plants of ten species of *Haworthia*, 50 plants resembling *Gasteria Zeyheri* from the Bushman's River Poort near Grahamstown, Cape Province, eight plants of *Gasteria Beckeri* from that region, 44 plants of 21 other *Gasteria* species and 48 unidentified *Gasterias*. Chromosome counts were obtained from twelve *Aloe*, three *Haworthia* and ten *Gasteria* species never previously studied.

Cytological Studies of the Vernal Species of *Helenium*

HOWARD F. L. ROCK, *University of Tennessee*

Cytological data concerning the spring-flowering species of *Helenium* (Compositae) are presented. The data includes the number and behaviour of the chromosomes as observed during microsporogenesis. Correlations between chromosome number, morphological-taxonomic disposition, geographical distribution and generic affinities are also presented.

Dicyemid Mesozoans from the Northern Gulf Coast of Florida and the Florida Keys*

ROBERT B. SHORT and RAYMOND T. DAMIAN,
Florida State University

Seventeen octopuses (12 *Octopus vulgaris*, 5 *O. joubini*) from the northern Gulf Coast of Florida have been examined for dicyemid mesozoans. All specimens of *O. vulgaris* and three of the *O. joubini* were infected. The *O. vulgaris* harbored *Dicyema aegira* McConnaughey and Kritzler, 1952, previously reported only from the northeast coast of Florida. Three of the *O. joubini* were infected with a different, and as yet undescribed, species of *Dicyema*. This species will be discussed in detail. Two of sixteen specimens of *Octopus briareus* from the Florida Keys were infected with an undetermined species of *Dicyema*, now under study. Nine individuals of the neritic squid, *Lolliguncula brevis*, from the northern Gulf Coast of Florida were negative for mesozoans.

This work was supported by The National Science Foundation.

Nitrogen Excretion in the Aquatic Snail *Ceratodes cornuarietis* (L.)

WILLIAM C. SLOAN, *University of Florida*

Rates of excretion of 1) ammonia, 2) urea 3) uric acid and 4) total soluble non-protein nitrogen have been investigated using 1) micro-diffusion, 2) enzymatic and micro-diffusion, 3) enzymatic and spectrophotometric and 4) micro-Kjeldahl techniques. Adult snails excrete on the order of 10 to 20 gammas ammonia-nitrogen per hour per gram dry tissue. This appears to be approximately 100% of the total soluble non-protein nitrogen excreted. In addition, small amounts of uric acid have been detected in fecal material.

Trichopelma sp., a Trichostome Ciliate with Adoral Membranelles

JESSE C. THOMPSON, JR., *Hollins College*

Trichopelmidae, a family of ciliates in the order Trichostomatida, has been noted for its lack of adoral membranelles. In recent studies with phase microscopy and silver impregnation of the infraciliature, *Trichopelma* sp. has been found to possess two or possibly three adoral membranelles.

The Effects of Temporary Anticancer Agents on Certain Transplantable Tumors and Their Drug-Resistant Sublines Implanted in the Same Host*

J. RICHARD THOMSON and BONNIE M. JONES,
Southern Research Institute

Antimetabolites such as 6-mercaptopurine, A-methopterin, 8-azaguanine, and antibiotics such as 6-diazo-5-oxo-norleucine (*DON*) and azaserine have repeatedly been shown to be temporarily effeutive in inhibiting the growth of neoplasms both in experimental animals and in man. The problem of

drug-resistance in cancer cells, similar to drug-resistance in bacteria, presents an ever present stumbling block to the successful chemotherapy of neoplastic growths. No small effort has been expended in recent years in attempts to reveal the mechanism of resistance formation and of means to circumvent metabolic processes characterizing resistant cells.

We have employed a unique method of studying the effects of various antimetabolites on populations of resistant cells in an effort to demonstrate differences between cancer and normal cells and simultaneously test certain rationally-selected agents for activity against their resistant forms. By implanting both the resistant and parent lines of certain tumors on opposite flanks of the host, we are able to demonstrate differential effects of these agents on the two tumor types. We thereby can select in a more rational manner combinations of agents most likely to show potentiation or synergism against experimental neoplasms. Experimental data will be presented to demonstrate this technique followed by a discussion of how the results might be interpreted.

Significance of Virulence and Viability as Related to Quantitative Immunogenic Properties of Several Antituberculosis Vaccines

H. M. VANDIVIERE and MARGARET R. VANDIVIERE,
North Carolina State Sanatorium System

Standardization for potency and viability in suspensions of *Mycobacteria* has long been an enigma of import, both requiring prolonged periods and measurable in retrospect only. Cord-formation titration, omental index (potency) and formazan curve interpolation (viability) are described as standardization methods. Several vaccines have been so standardized and their immunogenic capacities quantitatively investigated. "Degree of protection" has challenge of "protected subjects" as the final critique. Thus, 3000 guinea pigs were randomly vaccinated with standardized inocula of one of the vaccines. Experimental groups were so characterized that statistical significance could evolve. Tuberculin testing of experimental and control allocates with volume of allergic response ($v = 1/6 \text{ pi } h (h^2+3r^2)$) and duration of allergy calculations were periodic. Ultimately quantitative challenge was accomplished. Evaluation of disease was based on Feldman's index and comprehensive pathological evaluations from coded gross and microscopic preperations. Short-term vaccination reveals negligible differences in protection, whereas groups challenged at 12 to 30 months present significant differences between strains. The weakest BCG afforded little protection, whereas R_1Rv afforded protection significantly higher than the best BCG. Prevaccination cord-formation titer and omental index with post-vaccination volume and duration of allergy and degree of protection stand in comport for each strain. The weakest vaccine gives the least response, the most potent evokes greatest response and the intermeiates between, each having its own specific level. Beginning human studies (2500) are presented on high-incidence groups.

Stereum and Its Segregates in Jamaica*

ARTHUR L. WELDEN, *Tulane University*

Applying technics of hyphal analysis developed over the past several years to the *Stereum*—complex in Jamaica, we find some realignment of species is necessary to show more clearly the lines of relationship. These fungi, instead of being grouped together into *Stereum*, can better be distributed amongst the following genera: *Stereum*, eleven species, one species being reduced to synonymy, *Cymatoderma* (*Cladoderris*), one species, *Podoscypha*, one species, and *Laxitextum*, two species, one being transferred from *Stereum*. *S. magnisporum* Burt is moved to *Cytidia*, an unrelated genus. Four additional species collected by the author have not been hitherto reported from Jamaica. These include two species of *Stereum*, one of *Cymatoderma*, and one of *Podoscypha*. These newly-reported species bring the total number of species of *Stereum* and its segregates in Jamaica to 21. The study of this complex is still in progress and some additional realinement and new methods may come to light before its completion.

A Chromatographic Investigation of Three Strains of *Tetrahymena pyriformis**

CAROLYN WELLS, *Emory University*

The technique of paper chromatography has been employed to investigate possible biochemical differences among three strains of *Tetrahymena pyriformis*. The strains under examinations are members of variety 6, mating types I, II, and III. Amino acid patterns were obtained for each strain after hydrolysis of the organisms for 48 hours at 110°C in 5N HCl. In addition, samples of each strain were submitted to chromatographic analysis without prior hydrolysis, and the resulting free amino acid patterns were established. A comparison of the bound and free amino acid patterns obtained from each strain will be presented.

Diploid Males and Triploid Females in *Habrobracon* and *Mormoniella**

P. W. WHITING, *The University of Pennsylvania*

In *Habrobracon* sex is determined by a series of multiple alleles, the heterozygotes being female, the azygotes and homozygotes male. The last are diploid males and are regularly produced from fertilized eggs in "two-allele crosses" after inbreeding. They are very low in viability and are near-sterile. Their sperm are diploid, their few daughters triploid. In *Mormoniella* male diploidy results only from mutation, increasing chomosome number. Diploid males develop from unfertilized eggs laid by triploid females. They are highly viable and very fertile. Their sperm are diploid, their numerous daughters triploid. Triploid females in both genera lay numerous eggs, but very few of these hatch. Of those hatching many fail to mature. Nevertheless, in *Mormoniella* it is possible to obtain many hundreds, even thousands, of F_2 males from a single diploid male because of his numerous daughters. Unfertilized eggs of triploid females with triple alleles, *A a a'*, produce six kinds of males,—three haploid, *A*, *a*, *a'*, and three diploid, *Aa*, *Aa'*, *aa'*. Nothing is known of sex determination in *Mormoniella* except that it is different from that in *Habrobracon*.

Intra-clonal Mating in Strains of Variety 6, *Tetrahymena pyriformis**

CAROLYN WELLS, *Emory University*

The mating system of *Tetrahymena pyriformis* is composed of nine non-interbreeding varieties to date. Each variety contains two or more mating types. Members of any two mating types within a variety will pair when mixed under appropriate conditions; nuclear reorganization subsequently occurs in each pair member. Strains of mating types I, II, and III, variety 6, have been maintained in this laboratory since September 1955. Within the past year, intra-clonal mating (selfing) has been observed repeatedly in all three strains of this variety. Prior to the summer of 1957, pairing within a clone had never been observed in this laboratory in any of these three strains. Isolations of single organisms from each strain gave rise to sub-clones which exhibit intra-clonal mating in every observed instance. The viability of exconjugant clones from intra-clonal pairs is being investigated.

A Cytochemical Study of Macronuclear Bodies of *Tetrahymena pyriformis**

MARGARET M. WELLS and CHARLES RAY, JR., *Emory University*

During conjugation, the macronucleus of *Tetrahymena pyriformis* exhibits clusters of centrally located bodies; the macronucleus of vegetative individuals is surrounded by similar bodies. Using stains, extraction techniques, and phase microscopy on living animals, whole mounts and ultra-thin sections, a cytochemical study was made of these macronuclear bodies. An aqueous mixture of methyl green-pyronin gave satisfactory staining results. In animals undergoing conjugation, bodies which stain red with pyronin are visible within a clear area in the control region of a methyl green stained macronucleus. In vegetative animals, bodies of similar size and staining affinity are seen only at the periphery of the macronucleus. These bodies are darkly stained with Estable-Sotelo's technique for nucleolonema. Changes during conjugation and mitosis were studied using the phase microscope on living animals. The changes in staining affinity were studied following ribonuclease, trichloroacetic and perchloric acid treatments in an attempt to determine the chemical nature of these bodies.

This study was supported in part by a grant from The National Science Foundation.

Chemical Nature of the Photoreceptor Pigment Inducing Fruiting of Plasmodia of *Physarum polycephalum*

FREDERICK T. WOLF, *Vanderbilt University*

Plasmodia of *Physarum polysephalum*, grown either under alternate light and darkness, or in constant darkness, contain two yellow fluorescent pigments, which disappear upon fruiting. The two pigments are separable by paper chromatography or column chromatography. Absorption spectra of these compounds in the ultra-violet, visible, and infra-red regions, and the fluorescence spectra of these compounds have been studied. Both pigments have been identified as pteridines. The spectral properties of one pigment, and the shifts in its spectrum with pH are such as to offer an explanation of the effectiveness of low pH and blue light in bringing about the morphogenetic response of fruiting.

The Time Intervals between Successive Generations in the Celanoid Copepod, *Acartia tonsa*

ROBERT A. WOODMANSEE, *Mississippi Southern College*

A method is described for estimating the time intervals between successive generations of copepods which have been collected in a time series of plankton samples. The basis for the method is the existence of a sexual difference in longevity, which permits one to establish the times at which broods of copepods become adults. The application of the method to *Acartia tonsa* collected from Biscayne Bay, Florida, has indicated that this species produces about eleven generations per year and that the time interval between successive generations varies from four to seven weeks and varies inversely with temperature in accordance with van't Hoff's Law. The four-week intervals between successive generations occur during the summer months when the water temperatures are 30°C or over, and the seven-week interval occurs in mid-winter when the water temperatures average 21.6°C.

The Experimental Development and Significance of Pyrimethamine Resistance in Human Malaria*

MARTIN D. YOUNG and ROBERT W. BURGESS, *Laboratory of Tropical Diseases, USPHS, Columbia, S. C.*

After the chance observation that maralia parasites responded less well to a second dose of pyrimethamine than to the first, a series of experiments was planned to elucidate this phenomenon. It was found that the three most prevalent species of human malaria reacted similarly in this respect. The first contact with the drug gave prompt schizontocidal and sporontocidal effects. The clinical symptoms disappeared and the infection could not be transmitted by the mosquito vectors. The cycle of *Plasmodium vivax* and *P. falciparum* in the mosquito was interrupted at the first growth stage on the gut wall, normally occurring a day or two following ingestion of the malarious blood.

Upon relapsing, the parasites were resistant to the second and subsequent doses of the drug. The parasitemias were virtually unaffected. The clinical symptoms in the patient were poorly or not modified. Mosquitoes biting the patient were able to transmit the infection normally. The subsequent infection was also as resistant as the infection in the donor host. Increasing the drug dosage as much as four times did not overcome the resistance. Preserving the parasites at –78° C did not alter the resistant character. Further research on the resistance phenomena with this combination of parasites and drug should yield valuable information applicable not only to this parasite but perhaps to many other infectious organisms where resistance has appeared.

Program of the 19th Annual Meeting Association of Southeastern Biologists

Florida State University, Tallahassee, Fla., April 17-19, 1958

A Joint Meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the District Convention of the Beta Beta Beta Biological Society and the Southeastern Division of the American Society of Ichthyologists and Herpetologists

SESSION SCHEDULE

Thursday, April 17

1:00-5:00 p.m. Meeting of the Executive Committee, Room 103 Conradi Building
6:30-8:30 p.m. Registration, Room 232 Conradi
8:15 p.m. General Session, Lecture Hall, The University Library

Friday, April 18

8:00-12:00 a.m. Registration, Room 232 Conradi
8:00-9:00 a.m. Southern Appalachian Botanical Club Breakfast. Each person will obtain his own breakfast in the cafeteria line at the Student Center and take his tray to the Trophy Room.
8:00 a.m. Commercial Exhibits, 239 and 242 Conradi Building
9:00 a.m. Contributed Papers
General Session, 228 Conradi Building
Plant Taxonomy, 115 Conradi Building
Plant Physiology, 107 Conradi Building
Invertebrate Zoology, 222 Conradi Building
Ichthyology and Herpetology, 319 Conradi
11:00-12:00 a.m. Business Meeting, Association of Southeastern Biologists, Lecture Hall, The University Library
12:00 Lunch, the Suwannee Room
1:00 p.m. Business Meeting, Southeastern Section, Botanical Society of America, Lecture Hall, The University Library
1:45 p.m. Contributed Papers
Protozoology, 107 Conradi Building
Animal Physiology, 319 Conradi Building
Parasitology and Bacteriology, 222 Conradi
Ecology, 228 Conradi Building
Cryptogamic Botany, 115 Conradi Building
6:30 p.m. Dinner, Beta Beta Beta Society, South Seminole Dining Room
8:15 p.m. General Session, Lecture Hall, The University Library. Smoker, Second Floor, Conradi Building, following the General Session

Saturday, April 19

8:00 a.m. Field Trips:
1. Chipola Experimental Forest, 2. St. Marks Wild Life Refuge, 3. Alligator Harbor Marine Laboratory
8:30-12:00 a.m. Student papers, Beta Beta Beta Society, Lecture Hall, The University Library
9:00-10:00 a.m. Genetics Session, 228 Conradi
10:15-12:00 a.m. Genetics Symposium, 228 Conradi
12:00-1:00 p.m. Business meeting, Beta Beta Beta Society, Lecture Hall, The University Library

GENERAL SESSIONS

THURSDAY, APRIL 17th, 8:15 p.m.
Lecture Hall, The University Library
Presiding: Dr. H. K. Wallace

Chemical Control of Sexual Maturation in Hydra, W. F. LOOMIS, Loomis Laboratory, Greenwich, Connecticut.

FRIDAY, APRIL 18th, 9:00 a.m.
Room 228 Conradi
Presiding: Ruth M. Jones, Winthrop College

9:00 The Oviducal Environment and Normal Blockage of Meiosis in Oocytes of the Newt, *Triturus viridescens*. A. A. HUMPHRIES, JR., Emory University
9:13 Polyploidy in the Aloineae. HERBERT PARKS RILEY, University of Kentucky
9:26 A Preliminary Study of Chromosome Numbers and Karyotypes in *Sprekelia formosissima* Herbert. S. BOSE, Blandy Experimental Farm, University of Virginia
9:39 Cytological Studies of the Vernal Species of *Helenium*. HOWARD F. L. ROCK, University of Tennessee
9:52 Pachytene Morphology and the Evolution of Non-Homology in Chromosomes. MARGARET Y. MENZEL, Florida State University
10:06 Histological Observations on the Male Reproductive Systems of the Crayfish. THOMAS L. JOHNSON, University of Virginia
10:19 Hybridization and Allotriploidy in *Triturus viridescens*. NORMAN HUGHES, Emory University
10:32 Interspecific Gene Exchange between Two Southeastern Tree Frogs. JOHN S. MEACHAM, Alabama Polytechnic Institute
10:45 A Contribhtion to the History of Mendelism. R. M. HARPER, University of Alabama

PLANT TAXONOMY SESSION

FRIDAY, APRIL 18th, 9:00 a.m.
Room 115 Conradi
Presiding: R. K. Godfrey, Florida State University

9:00 Multi-periods of Branch Elongation in Pines. WILLIS A. EGGLER, Newcomb College of Tulane University
9:13 The Plumose-bristled Species of *Rhynchospora* (Cyperaceae). ROBERT B. CHANNEL,Vanderbilt University
9:26 A Monograph of the Genus *Rosa* in North

America: *R. blanda.* WALTER H. LEWIS, Blandy Experimental Farm and Stephen F. Austin State College

9:39 Cytotaxonomical Studies on a *Zephyranthes* Complex. W. S. FLORY, JR., Blandy Experimental Farm

9:52 A Cytotaxonomic Study of the Genus *Aletris* L. (Liliaceae). EDWARD T. BROWNE, JR., Alabama Polytechnic Institute

10:06 Biospeciation in the Lichen *Cetraria ciliaris.* MASON E. HALE, Smithsonian Institution

10:19 A New Moss for North America. Z. IWATSUKI and A. J. SHARP, University of Tennessee.

PLANT PHYSIOLOGY SESSION

FRIDAY, APRIL 18th, 9:00 a.m.
Room 107 Conradi

Presiding: Victor A. Greulach, University of North Carolina

9:00 The Adaptive Significance of Variation in Response to Day Length in *Ipomoea.* ROBERT J. KNIGHT, JR., Blandy Experimental Farm, University of Virginia

9:13 Chemical Nature of the Photoreceptor Pigment Inducing Fruiting of Plasmodia of *Physarum polycephalum.* FREDERICK T. WOLF, Vanderbilt University

9:26 Effect of Gibberellic Acid on Cell Division and Cell Elongation in *Phaseolus vulgaris.* VICTOR A. GREULACH and JOHN G. HAESLOOP, University of North Carolina

9:39 A Method for Determining the Effects of Varied Environmental Conditions on Cell Growth in *Phleum* Roots. ROBERT T. BRUMFIELD, Longwood College and Oak Ridge National Laboratories

9:52 Galactose Utilization in Yeast and Other Fungi, G. LEON HOWELL, University of Alabama

10:06 Biochemical Investigations of the Developing Slime Mold, *Dictyostelium discoideum* Raper. JEROME O. KRIVANEK, Newcomb College of Tulane University

INVERTEBRATE ZOOLOGY SESSION

FRIDAY, APRIL 18th, 9:00 a.m.
Room 222 Conradi

Presiding: Ralph W. Yerger, Florida State University

9:00 Studies of Oyster Mortality in Alligator Harbor, Florida. F. E. NICHY and R. W. MENZEL, Florida State University Oceanographic Institute

9:13 A Biotic Factor Influencing the Gastropod *Urosalpinx cinerea* in its Choice of Prey. JOHN W. BLAKE, University of North Carolina

9:26 Additional Information on the Mechanical-Chemical Nature of Drilling by the Gastropods *Urosalpinx* and *Eupleura.* MELBOURNE R. CARRIKER, University of North Carolina

9:39 Schooling Behavior in the Marine Snail, *Nassarius obsoletus.* CHARLES E. JENNER, University of North Carolina

9:52 Analysis of Egg Color Variation in *Cyclops vernalis.* ERNEST J. DUPAW, JR., Columbia University and the University of Florida

10:06 The Time Intervals between Successive Generations in the Calanoid Copepod, *Acartia tonsa.* ROBERT A. WOODMANSEE, Mississippi Southern College

10:19 Microsporidiosis in Shrimp, a Preliminary Report. E. E. JONES, Georgia State College

10:32 Taxonomic Studies on the Gastrotricha of Louisiana. ROBIN C. KRIVANEK and JEROME O. KRIVANEK, Newcomb College of Tulane University

PROTOZOOLOGY SESSION

FRIDAY, APRIL 18th, 1:45 p.m.
Room 107 Conradi

Presiding: I. C. Kitchin, University of Mississippi

1:45 A Chromatographic Investigation of Three Strains of *Tetrahymena pyriformis.* CAROLYN WELLS, Emory University

1:58 A Cytochemical Study of Macronuclear Bodies of *Tetrahymena pyriformis.* MARGARET M. WELLS and CHARLES RAY, JR., Emory University

2:11 Fluorescence Microscopy of Living *Tetrahymena pyriformis.* MARION T. COLEMAN and CHARLES RAY, JR., Emory University

2:24 Micronuclear Abnormalities Associated with Non-lethal High Temperatures during Fission of *Tetrahymena pyriformis.* CHARLES RAY, JR., Emory University

2:37 Intra-clonal Mating in Strains of Variety 6, *Tetrahymena pyriformis.* CAROLYN WELLS, Emory University

2:50 Some Amebas of Warm Mineral Springs, near Venice, Florida. EUGENE C. BOVEE, University of Florida

3:03 *Trichopelma* sp., a Trichostome Ciliate with Adoral Membranelles. JESSE C. THOMPSON, JR., Hollins College

3:16 Morphology and Biology of a Species of *Proterosponiga.* JAMES B. LACKEY, University of Florida

ANIMAL PHYSIOLOGY SESSION

FRIDAY, APRIL 18th, 1:45 p.m.
Room 319 Conradi

Presiding: J. Gordon Carlson, University of Tennessee

1:45 Dispersal of the Gelatinous Coat Material of *Mellita quinquiesperforata* Eggs by Homologus Sperm and Sperm Extracts. JOHN W. BROOKBANK, University of Florida

1:58 Influence of Carbonic Anhydrase Inhibitors on Shell Growth of a Freshwater Snail, *Physa heterostropha.* JOHN A. FREEMAN, Winthrop College

2:11 The Effects of Temporary Anticancer Agents on Certain Transplantable Tumors and Their Drug-Resistant Sublines Implanted in the Same Host. J. RICHARD THOMSON and BONNIE M. JONES, Kettering-Meyer Laboratory, Southern Research Institute

2:24 Nitrogen Excretion in the Aquatic Operculate Snail *Ceratodes cornuarietis*. WILLIAM C. SLOAN, University of Florida

2:50 A Comparison of Tissue Metabolic Rates of a Shrew and Some Other Small Mammals. JAMES R. REDMOND and JAMES N. LAYNE, University of Florida

3:03 The Effects of X-radiation on the Early Cleavage Stages of the Snail *Ilyanassa obsoleta*. JAMES N. CATHER, Emory University

3:16 Phenylthiourea and Iodine Binding in the Tadpole. W. GARDNER and JAMES NORMAN DENT, Oak Ridge National Laboratory, Catholic University of America and University of Virginia

3:29 Correlation of Sexual Cycles and Breeding Behavior of the Gray Squirrel, *Sciurus carolinensis*, Gemlin. ALFRED BRAUER and ALBERT DUSING, University of Kentucky.

PARASITOLOGY AND BACTERIOLOGY SESSION

FRIDAY, APRIL 18th, 1:45 p.m.
Room 222 Conradi

Presiding: Robert B. Short, Florida State University

1:45 Studies on the Genus *Homalometron* Stafford, 1904 (Trematoda; Leprocreadiidae) with a Redescription of *H. armatum* (MacCallum, 1895). GROVER C. MILLER, North Carolina State College

1:58 *Plasmodium floridense* in Georgia Lizards. HELEN B. JORDAN, Georgia State College

2:11 Meningeal Tumors of the Newt, Triturus viridescens, as Correlated with Trematode Infection of the Brain and Brain Case. EDWARD W. LAUTENSCHLAGER, University of Virginia

2:24 Notes on the Helminths of Mammals in the Mountain Lake Region. IV. The Life Cycle of *Hydatigera lyncis* Skinker. HARRY L. HOLLOWAY, Roanoke College

2:37 A New Marine Aporocotylid Cercaria from *Donax variabilis* Say. RHODES B. HOLLIMAN, Florida State University

2:50 Dicvemid Mesozoans from the Northern Gulf Coast of Florida and the Florida Keys. ROBERT B. SHORT and RAYMOND T. DAMIAN, Florida State University

3:03 A New Species of *Cruzia* (Nematoda: Cruziidae) from *Didelphis virginiana*. DWAYNE NATHANIEL KRUSE, Florida State University

3:16 Association of Encephalitis Virus with *Nippostrongylus muris* in Mice. GEOFFREY M. JEFFREY, Laboratory of Tropical Disease, U. S. Public Health Service

3:29 The Experimental Development and Significance of Pyrimethamine Resistance in Human Malaria. MARTIN D. YOUNG and ROBERT W. BURGESS, Laboratory of Tropical Diseases, U. S. Public Health Service

3:42 X-Radiation of Stages in the Life-Cycle of the Rat Tapeworm, *Hymenolepis diminuta*. WILLIAM E. BRILLHART, Emory University

3:55 The Occurrence and Characterization of Ascorbic Acid Oxidase in Certain Bacteria. DWIGHT W. LAMBE and LORETTA C. ELLIAS, Florida State University

4:08 Significance of Virulence and Viability as Related to Quantitative Immunigenic Properties of Several Antituberculosis Vaccines. H. M. VANDIVIERE and MARGARET R. VANDIVIERE, North Carolina Sanatorium System

ECOLOGY SESSION

FRIDAY, APRIL 18th, 1:45 p.m.
Room 228 Conradi

Presiding: W. S. Flory, University of Virginia

1:45 A Virgin Forest Remnant in Berkely County, South Carolina. W. T. BATSON, WILLIAM E. HOY, WILLIAM R. KELLEY and J. T. PENNEY, University of South Carolina

1:58 The Natural Vegetation of English Mountain, Tennessee. JOE A. CHAPMAN, Carson Newman College

2:11 Radiation Ecology Research Program at the Lockheed Reactor Site. ROBERT B. PLATT, Emory University

2:24 Photosynthetic Studies of Three Granite Outcrop Endemics: *Amphianthus pucillus* Torr., *Isoetes melanospora* Englem., and *Diamorpha cymosa* (Nutt.) Britton. WILLIAM T. LAMMERS, Emory University

2:37 A Progress Report on Studies of Mixed Hardwood Stands in the Southeastern Coastal Plain. ELSIE QUARTERMAN and CATHERINE KEEVER, Vanderbilt University and Millersville State College

2:50 Studies on the Ecological Life History of *Portulaca smallii*. DAVID J. COTTER, Emory University

3:03 The Seasonal Effect of Ecological Factors on *Drosophila* Populations, JAMES F. JONES and J. M. CARPENTER, University of Kentucky

3:16 Yeasts Isolated from the Crops of Seasonally Fluctuating *Drosophila* Populations. JAMES K. KOMATSU and J. M. CARPENTER, University of Kentucky

3:29 Gravel Bars and Flood Control. ROBERT A. DIETZ, Troy State College

CRYPTOGAMIC BOTANY SESSION

FRIDAY, APRIL 18th, 1:45 p.m.
Room 115 Conradi

Presiding: Harold Humm, Duke University

1:45 The Anatomy of the Blister Gall Caused by *Asteromyia carbonifera* on *Solidago* Leaves. EDWIN G. BECK, University of Georgia

1:58 Synopsis of Louisiana Polypores. BERNARD LOWY and ARTHUR L. WELDEN, Louisiana State University, Tulane University

2:11 Flagellation and the "pseudoflagellum" in the swarmcells of the Myxomycete, *Didymium nigripes*. ARTHUR L. COHEN, Oglethorpe University

2:24 *Stereum* and its Segregates in Jamaica. ARTHUR L. WELDEN, Tulane University

2:37 Zoosporangia of *Sorosphaera veronicae*. CHARLES E. MILLER, University of North Carolina

2:50 A Fungus Parasite of Barnacle Ova. T. W. JOHNSON, JR., Duke University

3:03 Distribution of Some Estuarine Fungi. HARVEY S. GOLD and T. W. JOHNSON, JR., Duke University

3:16 A Marine *Labyrinthula* in *Rhizoclonium riparium*. DIANE TESTRAKE, Duke University

3:29 Observations on *Chlorosarcina* (Gerneck) Vischer, TEMD R. DEASON and WALTER R. HERNDON, University of Alabama

GENERAL SESSION

FRIDAY, APRIL 18th, 8:15 p.m.

Lecture Hall, The University Library

Presiding: Howard K. Wallace, President of the ASB, University of Florida

1. Address of Welcome: Dr. Charles S. Davis, Dean of the Faculties, Florida State University
2. Presentation of Awards
3. Address: The Search for Competence. George C. Kent, Jr., Immediate Past President of ASB, Louisiana State University
4. Smoker: Following the Friday Evening Session, Second Floor, Conradi Building

GENETICS SESSION

SATURDAY, APRIL 19th, 9:00 a.m.

Room 228 Conradi

Presiding: C. W. Edington, Florida State University

9:00 Diploid Males and Triploid Females in *Habrobracon and Mormoniella*. P. W. WHITING, University of Pennsylvania

9:13 Relation of the Nucleolus to Mitotic Activity as Revealed by Ultraviolet Microbeam Irradiation. MARY E. GAULDEN and ROBERT P. PERRY, Oak Ridge National Laboratory

9:26 Cytological Demonstration of Cleavage Anaphase Bridges in *Drosophila melanogaster*. CLAUDE W. HINTON, University of Georgia

9:39 Mutant Analysis of Amino Acid-Keto Acid Relationships in *Neurospora crassa*. H. E. BROCKMAN and A. GIB DEBUSK, Florida State University

9:52 The Effect of Sodium Iodoacetate Under Anoxia on Chromosome Aberration Frequency. A. V. BEATTY and JEANNE W. BEATTY, Emory University

GENETICS SYMPOSIUM

SATURDAY, APRIL 19th, 10:15 a.m.

Room 228 Conradi

Presiding: A. Gib DeBusk, Florida State University

"Metabolic Aspects of the Mutation Mechanism"

The influence of respiration, protein synthesis and nucleic acid synthesis on mutation will be discussed by four speakers whose names will be announced later.

NOTES ABOUT THE MEETING

Lodging and Meals. A partial list of hotels and motels was published in the December Bulletin. A complete list may be obtained from Dr. A. W. Ziegler, Dept. of Biological Sciences at FSU. Reservations should be made *directly with the management as early as possible*. A section of the University Dining Hall will be reserved for the noon meal on Friday. Those white patrons registered for the meeting, and their families, may use the facilities of the dining halls (cafeterias) during their stay. A list of local restaurants and several nearby which specialize in sea food was published in the December 1957 ASB BULLETIN.

Registration. Registration for attendance at the meeting will be held from 6:30-8:30 on Thursday and 8-12 on Friday in room 232 Conradi (Biological Sciences) Building. A registration fee of $1.00 will be charged. At registration, badges will be issued and programs and field trip reservations may be obtained. Sight-seeing brochures and campus maps will be available. The registration desk will be open as an information center during the meeting.

Placement Service. In room 207, Conradi Building, a do-it-yourself placement service will be available. Bulletin boards will be provided and applicants and employers may post notices of availability and position vacancies.

Commercial Exhibits. Rooms 239 and 242 of the Conradi building will house commercial exhibits. These rooms are located at the east end of the second floor. Exhibits will be open all day Friday.

Field Trips. Three field trips are scheduled by private car. Those interested should register for the trips at the registration desk by Friday noon. The trips will begin propmtly at 8 a.m. Saturday and will return by 1:30 p.m. See the December ASB BULLETIN for details.

1. Chipola Experimental Forest, Drs. Frank Woods and R. K. Godfrey
2. St. Marks Wild Life Refuge, Dr. Henry Stevenson
3. Alligator Harbor Marine Laboratory, Dr. Winston Menzel

Sight Seeing. The Friday night meeting has been set at a late hour to allow time for sightseeing. Points of interest include FSU campus, City of Tallahassee, Killearn Gardens, and Wakulla Springs. Brochures are available in the registration room. At Wakulla Springs, the registrant should inform the ticket office that he and his family are eligible for a reduced rate.

General Remarks. The north and south parking lots at the Conradi building will be reserved for ASB members. A windshield card will be issued at registration. The months of April and May are usually dry months at Tallahassee. The average temperatures for April 17-19 are 80-81 maximum, and 55-56 minimum.

Local Arrangements Committee: Irene Boliek, Ruth Breen, Leland Shanor, Robert Short and A. W. Ziegler, Chairman.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

In the December ASB Bulletin **Robert L. Wilbur** was erroneously reported as having moved from North Carolina State College to Florida State University. Dr. Wilbur is actually now a member of the Botany Department at Duke University.

I. D. Wilson retired from his position as head of the Biology Department at Virginia Polytechnic Institute, which he had held since 1923, on December 31. Dr. Wilson has accepted a two year contract from the International Cooperation Administration to be a consultant to universities in India.

Samuel P. Meyers is now with the Marine Laboratory, 1 Rickenbacker Causeway, Virginia Key, Miami, Florida.

L. R. Hesler of the Department of Botany at the University of Tennessee will retire at the end of the current academic year. Dr. Hesler has been professor of botany since 1919 and dean of the College of Liberal Arts since 1934.

Howard F. L. Rock, formerly of the Gray Herbarium, Harvard University, is now an instructor in botany at the University of Tennessee.

Karl M. Wilbur of Duke University has accepted an appointment by the Board of Directors of the AAAS to serve as secretary of Section F (Zoological Sciences) for a four-year term beginning January 1, 1958.

Elizabeth F. Sprague, after a two-year leave of absence to complete her doctorate at the Rancho Santa Ana Botanic Garden, Claremont, California, has resumed her teaching in the Department of Biology at Sweet Briar College.

F. A. Wolf, James B. Duke Professor, retired, Department of Botany, Duke University, was honored by the Cigar Manufacturers Association, at a recent meeting in Atlantic City, New Jersey. Dr. Wolf received a plaque and a cash award in recognition of his services to the tobacco industry through his contributions in tobacco breeding and pathology of tobacco.

Hugo L. Blomquist, Professor of Botany, retired, Duke University, has accepted the invitation to serve as visiting professor at the Marine Laboratory, Puerto Rico. Professor Blomquist will spend six months in Puerto Rico, studying the marine algae of the coastal areas.

James R. Dugger, Associate Entomologist, North Carolina State College, Raleigh, has resigned to accept the position as head of the department, North Dakota State College.

Merl Mizell, Ph.D., University of Illinois (Embryology) and **John L. Laurie,** Ph.D., Johns Hopkins University (Experimental Embryology) have been appointed to the faculty in zoology, Tulane University.

Fred R. Cagle has been elected Executive Secretary of the editors of biological journals. This organization is concerned with the problems of communication in the biological sciences. He has also been appointed editor of the sections on Amphibians and Reptiles of Biological Abstracts.

The long term study of bird life of British Honduras under the direction of **George H. Lowery,** Department of Zoology, Physiology and Entomology at Louisiana State University is being continued by two graduate students this semester. **Douglas Lancaster,** now on this third expedition, having spent some eight months in Honduras, is investigating the life histories of three species of *Tinamous* in the interior of the country. **Jared Verner** is studying the biology of Pink-footed Booby on Half Moon Cay, which is 50 miles off the coast of British Honduras.

George H. Mickey, Chairman of the Department of Zoology, Physiology, and Entomology at Louisiana State University was elected national president of Beta Beta Beta, honorary biological society, at its biennial meeting which was held in conjunction with that of the American Association for the Advancement of Science in Indianapolis during the Christmas holidays.

H. J. Roberts, Department of Zoology, Physiology and Entomology at Louisiana State University, was elected president of the Louisiana Ornithological Society for 1958.

The University of Kentucky, through a contract with the International Cooperation Administration, has given two staff members in zoology and one in botany teaching assignments in Indonesia. **R. W. Barbour,** Department of Zoology, is teaching at the University of Indonesia at Bandung, **J. M. Edney,** Department of Zoology, and **J. A. B. Garner,** Department of Botany, are teaching at the University of Indonesia at Bogor. The staff members will be in Indonesia for a two year period.

R. C. Dugdale has joined the Zoology Department at the University of Kentucky. A graduate of the University of Wisconsin, Dr. Dugdale will do research and teaching in the field of limnology.

The University of Kentucky, Department of Zoology, has recently added **E. G. Burcham** to its staff. A graduate of the Ohio State University, Dr. Burcham will do teaching and research in the field of entomology and parasitology.

Staff changes at the Biology Division, Oak Ridge National Laboratory, include the following: **Daniel Billen** of the Mammalian Recovery Group has resigned to accept a position with the M. D. Anderson Hospital and Tumor Institute in Houston. **Alan K. Bruce** of the Microbial Protection and Recovery Group has resigned to accept a position on the staff of the Department of Biology of the University of Buffalo. **C. W. Edington** of the Cytology and Genetics Group has resigned to join the staff of the Department of Biological Sciences, Florida State University, Tallahassee. **Palmer Rogers, Jr.** has joined the Enzymology and Photosynthesis Group for a period of two years under an American Cancer Society fellowship. **Miguel Patetta-Queirolo** has completed a four-months' International Cooperation Administration fellowship in the Pathology and Physiology Section and has returned to the Uni-

versity of Montevideo, Uruguay. **Kamla Kant Pandey**, of India, joined the Cytology and Genetics Group in October. Dr. Pandey holds a fellowship from the Ohio State University to continue research at ORNL. **Robert P. Perry** has left the Division for Philadelphia where he will work with the Johnson Foundation for Medical Physics at the University of Pennsylania. **Melvin P. Stulberg** has joined the Enzymology and Photosynthesis Group for a period of approximately one year as a Research Associate. **Charlotte Auerbach**, of Great Britain, has joined the Cytology and Genetics Group as a visiting investigator. Dr. Auerbach completed her undergraduate study in Germany, following which she received the Ph.D. and D.Sc. in geneties from the University of Edinburgh. Since that time she has been at the University of Edinburgh on the faculty of the Institute of Animal Genetics. Dr. Auerbach is a Fellow of the Royal Society. **Raymond Shapira**, who has been associated with the Biochemistry Group, left the Division December 31, 1957. Dr. Shapira has accepted a position on the staff of Emory University. **Sohei Kondo**, of Japan, has joined the Biophysics Section as a visiting investigator. Dr. Kondo has been in charge of radiation faclities at the National Institute of Genetics in Misima, Japan.

Institutions and Organizations

The Eighth Annual Wildflower Pilgrimage will be held in the Great Smokies, April 24, 25, 26, 1958. It is sponsored jointly by the Department of Botany of the **University of Tennessee** and the Gatlinburg Chamber of Commerce in cooperation with the Naturalist Service of the Great Smoky Mountains. The program includes short and long hikes, motorcades, photographic trips and illustrated evening lectures. Details can be obtained by writing the Chamber of Commerce, Gatlinburg, Tennessee.

The Photoperidism Subcommittee of the Committee on Photobiology of the **National Research Council** held an International Symposium on "Photoperiodism in Plants and Animals and Related Phenomena" in Gatlinburg, Tennessee, October 29 through November 2, 1957. This conference was supported by the National Science Foundation. N. E. Tolbert of the Biology Division, Oak Ridge National Laboratory, is secretary of the Symposium Committee.

Ground was broken on December 10th for the multimillion dollar medical center at the **University of Kentucky**. The center will be known as the Albert B. Chandler Medical Center. Construction of the first unit, a Medical Sciences Building, which will cost $5,247,000.00, will begin within a few weeks. Cost of the entire center has been estimated at between 26 and 27 million dollars. The College of Pharmacy has been moved from Louisville to the Campus at Lexington, where it is occuying a new $670,000 building.

The Southern Section of the **American Society of Plant Physiologists** met with the **Association of Southern Agricultural Research Workers** at Little Rock, Arkansas, in February 1958. The attendance was one of the largest in the history of the Section with a two day program of interesting papers followed by the Annual Plant Physiologist's breakfast at which Dr. L. M. Rohrbaugh, University of Oklahoma, spoke on "Effect of Growth Regulators on Plant Metabolism." Symposiums on "Gibberellins" and "Recent Research on the Nutrition of Plants" highlighted the programs. S. B. Hendricks, Vice President of ASPP was leading speaker of the latter. The new officers are Chairman, Aubrey W. Naylor, Duke University; Vice Chairman; Howard J. Teas, University of Florida; Secretary-Treasurer, Robert E. Burns, USDA, ARS., Experiment, Georgia.

A Metropolitan Branch of **Louisiana State University**, to be known as L.S.U.N.O., will commence operations in New Orleans beginning with the fall semester. Commencing initially as a single college of a modified liberal arts type, the branch is expected to develop rapidly into an institution offering a large variety of subjects in many technical and liberal arts fields. A well-equipped department of biology will be established as soon as facilities can be readied. It is anticipated that the New Orleans Branch will ultimately rival the Baton Rouge Campus in number of students enrolled. Present plans envision the institution as a commuter's college serving Greater New Orleans and its environs.

The **Louisiana Mosquito Control Association** was organized and incorporated in December, 1957 for the purpose of promoting in every feasible way the abatement and control of mosquitoes and other arthropods directly injurious to man or to domestic animals. The following officers were elected: President, Charlie S. Wilkins; Executive Vice President, George H. Mickey; and Secretary-Treasurer, A. B. Ritter. The Board of Directors includes Fred G. Deiler, Edw. P. Marshall Jr., Guillermo Vasques and E. S. Hathaway. Dr. Hathaway is also chairman of the Technical Advisory Committee.

A radioisotope laboratory for the study of animal nutrition, physiology and disease is being constructed at **Louisiana State University**. The project involves the renovation of the zoology research laboratory with addition of a 40-foot wing, and will cost $62,000. Scientists in five departments will use the new facility; these are animal industry, poultry, dairy, veterinary science and zoology.

The twenty-first session of the **Duke University** Marine Laboratory, Beaufort, North Carolina, will open on June 10, 1958. During the first term (June 10-July 16) Harold J. Humm will offer a course in Marine algae and I. E. Gray will give Marine Ecology. The second term (July 18-August 23) course offerings are Marine Parasitology, Wanda S. Hunter, and Marine Invertebrate Zoology, C. G. Bookhout. In addition to the marine algae course, the Department of Botany, Duke University, will offer research and special problems, both terms, on marine mycology.

Grants in Aid

Ernest L. Hunt of Emory University has received a grant from the **U. S. Public Health Service** for a study of the effects of induced diabetes on the reproductive cycle and pregnancy of rats.

Norman C. Negus of the Louisiana State University is studying cyclic changes in mammalian populations on Breton Island, the research being supported by a grant of $18,000 from the **Atomic Energy Commission.**

Research grants awarded during 1957 to members of the Department of Zoology at Duke University include; **E. W. Horn,** studies on cytotoxic antisera, and characterization of nucleoproteins, **National In-**

stitutes of Health; Calvin Ward, genetic sensitivity of gametogenesis to radiation, **National Institutes of Health; Knut Schmidt-Nielsen,** factors affecting the rates of oxygen supply to tissues, **National Science Foundation; C. G. Bookhout,** larval development of acorn barnacles, **National Science Foundation; J. D. Costlow, Jr.,** factors controlling growth and molting of acorn barnacles; **Donald J. Fluke,** funds for the purchase of a one MEV der Graaff accelerator for use in studies on active sites on enzymes, **National Institute of Health.**

Recent **National Science Foundation** grants include the following: University of Arkansas: **Herndon G. Dowling,** Department of Zoology, "American Species of Elaphe (Reptilia)," two years, $9000.

University of Florida. **Howard J. Teas,** Department of Zoology, "A Study of Alaskan Lakes," "Biosynthesis of Lysine and Tryptophan," two years, $14,000.

Florida State University: **Robert K. Godfrey,** Department of Biological Sciences, "Vascular Plants of Aquatic Marsh Habitats of Western Florida," two years, $6000. **R. B. Short,** Department of Biological Sciences, "Taxonomic Studies of Dicyemid Mesozoa," two years, $6300. **A. W. Ziegler,** Department of Biological Sciences, "Factors Influencing Seasonal Occurrence of Water Fungi," two years, $9500.

Emory University: **Elliot Juni,** Department of Bacteriology and Immunology, "Bacterial Oxidation of Simple Aliphatic Alchols," three years, $17,000.

Duke University: **C. G. Bookhout,** Department of Zoology, "Environmental Influences in the Development of *Balanus Nauplii*," three years, $26-000.

University of Kentucky: **R. C. Dugdale,** Department of Zoology, "A Study of Alaskan Lakes," $8,100.

University of North Carolina: **Albert E. Radford,** Department of Botany, "Flora of North and South Carolina," two years, $16,000.

North Carolina State College: **Ernest Ball,** Division of Biological Sciences, "Growth *In Vitro* of the Shoot Apex of Certain Seed Plants," three years, $23,000.

University of Tennessee: **Aaron J. Sharp,** Department of Botany, "Vascular Plants of Tennessee," three years, $15,000.

University of Virginia: **Horton H. Hobbs, Jr.,** "Improvement of Research Facilities at the Mountain Lake Biological Station," one year, $5200. **Donald W. Kupke,** Department of Biochemistry, "Protein Component Involved in the Photochemical Transformation of Protochlorophyll to Chlorophyll-a," three years, $23,000.

Virginia Polytechnic Institute: **Perry C. Holt** Biology Department, "Systematic Studies of Branchiobdellidae," two years, $5800.

Velma Dare Matthews

Velma Dare Matthews, Professor of Biology and head of department at Coker College since 1934, died in Duke University Hospital on January 7, 1958 after a prolonged illness. Born in Burlington, North Carolina on August 3, 1904, the daughter of the late J. Marvin and Cora Moore Matthews, she grew up in High Point where she finished high school in 1921.

In May 1925 she graduated with the B.A. degree from the Woman's College of The University of North Carolina and in the following September entered the University at Chapel Hill for graduate study in the Department of Botany. Here she won the M.A. in 1927 and the Ph.D. in 1930 under the guidance of the late Dr. W. C. Coker. During her graduate study, she was working part time as a student assistant in botany.

For the year 1930-31 Doctor Matthews was Professor of Biology in the Agricultural and Mechanical College at Monticello, Arkansas, a position which she gave up during the serious illness and death of her mother. For the years 1931-1934 she served as Research Assistant in the Department of Botany at Chapel Hill. In September 1934 she became Professor of Biology and head of the Department of Biology of Coker College, Hartsville, South Carolina, a position which she filled with distinction until her death. The Coker students praise her as an inspiring, patient teacher, always willing to explain difficult exercises over and over.

At Coker she soon assumed responsibility for beautification of the campus, on which there now bloom something like seventy varieties of camellias, many azaleas, other shrubs, flowering bulbs, and annuals which she planted. She frequently entered her choice varieties in camellia shows over the state and took many prizes. Dr. Matthews found time in a busy schedule to assist with community planning for beautification of the town of Hartsville and its environs. Many lovely trees of the town are still living because of her emphatic protests against cutting any more than were absolutely essential for safety.

Her twenty-two publications include seven in the field of mycology, three in the taxonomy of the higher plants, and nine on horticultural topics. She was an active member of several scientific societies including the A.A.A.S. (Fellow), Sigma Xi, Association of Southeastern Biologists, South Carolina Academy of Science (past president), Mycological Society, North Carolina Academy of Science, American Fern Society, Torrey Botanical Club, and the Botanical Society of America. We honor Dr. Velma D. Matthews as an able scientist, an earnest teacher, and a sincere friend.—EZDA M. DEVINEY,
Coker College

The ASB BULLETIN

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Contents

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THE ASB BULLETIN

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists and is published at Chapel Hill, N. C. in March, June, September and December. Letters, news items, other contributions, and all communications about editorial matters should be addressed to the Editor, Department of Botany, University of North Carolina, Chapel Hill, N. C. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harold H. Humm, Department of Botany, Duke University, Durham, N.C. Subscription orders from libraries and other institutions should be sent to the circulation manager at the Department of Biology, Woman's College, UNC, Greensboro, N. C. Subscription rate for non-members of ASB: $2.00 per year. Printing and typography by the Orange Printshop, Chapel Hill, N. C.

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Executive Committee—William Burbanck, Emory University; W. S. Flory, University of Virginia; I. C. Kitchen, University of Mississippi; Elsie Quarterman, Vanderbilt University; D. C. Scott, University of Georgia; Harry E. Wheeler, Louisiana State University. All officers are *ex officio* members of the executive committee.

ASSOCIATION AFFAIRS

Emeritus Members

The following were elected to emeritus membership in the ASB at the Tallahassee meeting: H. L. Blomquist, Duke University, G. L. Carver, Mercer University, Ezda Deviny. Florida State University, and Ivey F. Lewis, University of Virginia. Any ASB member who knows of a person qualified for emeritus membership either now or by next year is urged to submit his name to the secretary.

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Goethe Awards

The recipients of Mary Gilde Goethe stipends for financial assistance in attending the Tallahassee meetings were John Blake of zoology and Charles E. Miller of botany at the University of North Carolina, James F. Jones of zoology at the University of Kentucky, and Smritiomy Bose of the Blandy Experimental Farm, University of Virginia. All recipients were authors or co-authors of papers presented at the meetings. Professors are urged to advise their graduate students of the availability of the Goethe funds in ample time so that those who may wish to prepare a paper and apply for a stipend for the Knoxville meeting may do so.

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Executive Committee Actions

At its meeting in Tallahassee the Executive Committee of the ASB discussed many matters and took action on a number of them. Among the actions of general interest to the members of the Association are the following:

The proposed constitutional revision printed in the March issue of the ASB Bulletin was approved. The invitation of the AAAS to participate in its Washington meeting in December and to co-sponsor the symposia being planned by the Society of Systematic Zoologists was accepted with the provision that there would be no cost to the ASB. The invitation of the University of Tennessee to hold the 1959 meeting in Knoxville was accepted. The resignations of Victor A. Greulach as editor and of Hollis J. Rogers as circulation manager of the ASB Bulletin, effective December 31, 1958, were accepted. G. M. Jeffery of the USPHS in Charleston was appointed as editor of the BULLETIN for a three year term. The committee decided to accept the suggestion of the Mountain Lake Biological Station that its new Bruce D. Reynolds Memorial Scholarship be awarded by the ASB Research and Awards Committee in consultation with the director of the Station. All the actions of the Executive Committee were later approved by the members in the business meeting.

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Treasurer's Report

Receipts

Balance on hand April 1, 1957	1462.92
Dues and subscriptions collected	1204.50
Interest on savings	12.50
Gifts, The Mary Glide Goethe Fund	300.00
Total Receipts	2979.92

Expenses

Bulletin (mailing costs, printing, circulation, AIBS service, etc.)	787.08
Meritorious Teaching Award to Ezda Deviny	100.00
Awards from the Mary Glide Goethe Fund	39.00
Miscellaneous expenses	226.58
Total Expenses	$1152.66
Balance on hand March 31, 1958	
in savings account	1012.50
in checking account	814.76
	1827.26

Respectfully submitted,
ARTHUR W. JONES,
Treasurer, ASB

The Search for Competence

GEORGE C. KENT, JR.

Dr. Kent is professor of zoology at the Louisiana State University and is well known to members of the Association of Southeastern Biologists as the able and energetic president of the Association during 1956-57. The following article is his address as immediate past president, delivered at the annual meeting of the ASB in Tallahassee on April 18. It illustrates his interests in biological education and in the problems of education in general. Dr. Kent has long been interested and active in the ASB, having been a member of the executive committee in one capacity or another for many years, and vice president in 1950-51. Dr. Kent secured his bachelor's degree at Maryville College and did his graduate work at Vanderbilt University, receiving his Ph.D. in 1942. Since that time he has been a member of the zoology staff at Louisiana State. His field of specialization is vertebrate anatomy and he has also been interested in the physiology of reproduction of hamsters.

I have selected for discussion tonight a consideration of a phenomenon known as competence. Ironically, had it not been for the achievement of a dictatorial communistic state the question of competence in democratic America might still remain unexplored. Recent public utterances by national figures have evoked among the American people a realization that they must examine the competence of the public educational services to which they subscribe. Since the Russian satellite there has emerged, I believe, a realization that there have been factors in the American scene which militate against competence; or, perhaps, I should say there has been a lack of positive factors which might have militated in favor of competence. There has been restored, also, at least to some degree, the prestige of the intellectual. No longer, at least, do we hear derogatory references to the "egg head."

But these new attitudes are in the nature of only a slight stirring of the heretofore sleeping national organism. The stimuli have not yet succeeded in awakening it fully. Unless we shake the public body violently, and again and again, it will most certainly revert, like the ground hog that saw its shadow, to peaceful slumber.

With reference to competence in secondary education, a problem on which I shall not dwell, the professional educators have already developed conditioned responses to outside criticism. Almost to a man, they refer to scientists who concern themselves with high school operations as "subject matter specialists." This phrase is designed to disqualify, as incompetent observers, those who are not "education generalists." In my first draft of this discussion I had a definition of an education generalist. My better judgment told me to delete it. There is another conditioned response which you will hear more and more if, as scientists, you decide to enter the struggle for competence in the secondary school. This is the assertion that, "Some of the worst teaching is going on in the colleges." This assertion is a diversionary defensive tactic, for which there is a very effective, and surprising, countermove. That is, to admit forthrightly that it is true, indeed, that some mighty poor teaching is going on in the colleges. This countermove demoralizes the attack. To capitalize on the advantage a new offensive maneuver is launched: The proclaimation that two wrongs do not make a right.

And with these whimsical observations, I will abandon (but for tonight only) the role of critic of super-progressive education and its effects on competence. I wish to consider, instead, certain factors which, I believe, militate against greater competence in the higher education of biological scientists. We shall not concern ourselves wth obvious barriers such as heavy teaching loads, lack of qualified instructors, low salaries, or shortages of graduate students, which are like chariot names on the educational merry-go-round. I would like, instead, to examine two matters which we might be able, in certain instances, to take steps to rectify. These two

factors are: 1) inadequate undergraduate preparation in the fundamentals of the several fields of biology; and 2) the fragmentation of higher educational facilities. Concerning the latter, I shall have more to say shortly.

The general public hears little criticism of college curricula and there are valid explanations for this. Most parents want their children to have a college education, but have no opinion as to what the college should do for the student. They accept the college philosophy for whatever it amounts to, as they accept the Sunday supplement or television, and let it go at that. Secondly, because only a small proportion of the qualified high school graduates are attending college, this level of our educational system affects a smaller segment of the population than does secondary education. Finally, most colleges do a better job of self-evaluation than do the high schools, if only because of the necessity of meeting requirements of the forty accrediting agencies which seek to tell the faculty what specific curricula to install. It might be anticipated, therefore, that evaluation of the training of future biological scientists would originate among the biological scientists themselves, and, for the most part, would remain a matter of intra-disciplinary discussion.

It is almost axiomatic that everybody in the field of education blames any incompetence of his students on the fellows who taught them last. The first grade teacher blames the nursery, the high school blames the grammar school, the college blames the high school; and now, it appears, the graduate school blames the colleges. I suppose that the foundations, the institutes, the federal services, and industry blame the graduate schools. In the role of undergraduate instructor, which I am in part, I would like to consider, in general terms, aspects of undergraduate education which are negative factors in the competent preparation of the undergraduate biology major for graduate work. In this connection, it is interesting that some of the criticisms we have levelled at the high school are equally applicable to our colleges.

One of our principal complaints concerning secondary education has been that the student is permitted to elect a large number of inconsequential courses rather than being required to select challenging course work in fundamental subject matter. This very complaint can sometimes be leveled at the undergraduate department training future graduate students in biology. Often, these students are permitted to elect a hodge-podge of unrelated, nonsequential biology courses, or courses with a superficial approach to life sciences, instead of being required to restrict their selection to more challenging subject matter relating to fundamental principles. (See G. C. Kent, ASB Bull., 4:8, 1957.)

To suggest specific undergraduate subject matter fields for potential graduate students in the broad fields of biology would be presumptious of any single biologist. Even a conservative attempt at generalization would be in total disregard of the circumstances that exist in our diverse institutions, small and large, public and private, some of which offer graduate instruction and others of which do not. For this reason I have appropriated a technique from the Greeks, and present my ideas as an analogy.

Many college departments of biology resemble mental cafeterias. The four years the prospective graduate student spends in the undergraduate department are spent in the cafeteria line. Moving steadily past the steam tables he must select one dish, then another, and then another. Finally, at the end of the line, he looks down at his tray to see what he has accumulated. In a large cafeteria, an inexperienced patron may find that he has selected too many vegetables, too much dessert, or that he has failed to select a meat and forgot to get his bread. A little guidance from an experienced patron might prevent this and the student might end up with a well-balanced meal consisting of a selection of foods which complement one another and which provide suitable nourishment for the rest of the day. A small cafeteria with a small number of cooks, no matter how capable, should not attempt to provide the same wide selection of foods as does the large one. When they do provide such a selection, the patron may find himself with cold, stale food. A small number of cooks can prepare only a small number of nourishing dishes. On the other hand, the small cafeteria that operates under the policy of offering a narrow selection of highly palatable, and well prepared foods will provide just as excellent a meal as the large one for, obviously, the patron can consume only a limited number of courses. The meal could be of the highest quality. I think, by analogy, you will understand my point. The majority of our future graduate students dine in small cafeterias.

Undergraduate college staffs overburdened by heavy teaching loads might well consider deleting some of the supernumerary courses in the catalogue and concentrating on a core of foundation subjects leading to significant comprehension of biological principles. Such courses would have enhanced cultural values even for liberal arts students. If the genuine biology major (including premeds!) could take a single, four-year course in the morphology, physiology, genetics, and ecology of an amoeba, or of a green alga, and no other courses whatsoever in biology, he would have a better biological education than I have, to be sure, and perhaps greater biological insight than many a Ph.D. candidate.

Of course, the dean's Curriculum Committee

could never permit the introduction of a single four-year course. This would evoke prompt frustration on the part of the registrar who, of necessity, deals with education in corpuscular packets. Such a visionary program would be impracticable. Besides being radical, hence anathema, it would present problems to the department that has also to provide courses in physiology and anatomy for the nurses, courses in so-called human physiology for the education major, courses in elementary physiology for the home economics major, and courses in kinesiology for the physical education major, all of which overlap in subject matter. These courses represent the multitudinous and repetitive electives which, presenting themselves to the future graduate student, lure him from fundamental biological principles and offer an opportunity to take it easy for a semester.

In addition to the elimination of courses with overlapping subject matter and of specialized courses that might better be taught in graduate school, certain existing, supposedly fundamental, courses can sometimes profit by re-evaluation. Let us take two examples. Genetics, as a discipline, should not place chief emphasis on facility in writing capitals and small letters in boxes and deriving a series of symbols predicting whether or not the next baby will have green eyes. Genetics should be, for the most part, an introduction to the effects of enzymes, or their absence, on cell replication and differentiation. As an exercise chiefly in prediction it is an unsophisticated and unrewarding tic-tac-toe. As a study of the physiological basis for variation, which any competent college student could comprehend if similarly challenged in the previous year, it is an experience that no undergraduate liberal arts student, let alone a biologist, should miss. Such a course, because of its nature, should occupy half of a competent instructor's study and teaching time in any college; and, if certain less significant courses must be dropped to make this possible, little harm, and much good, would result. Similarly, animal physiology courses regarding primarily the number of red cells in a mm^3 of blood, the names of the bones of the wrist, a list of the digestive enzymes that reduce peptones to amino acids, and the action of the biceps muscle, are not courses in physiology. They might well be described in the catologue as, "Interesting little facts about our bodies." The student presenting himself at graduate school with such a course is in for a rude awakening when he later realizes that he has had no course in physiology at all. This situation, too, is reminiscent of something for which we criticize the high schools. We declare, that because the high school student does not achieve competence in fundamental subject matter, the college is forced to reteach that which the high school was supposed to have taught. Yet, many students who must repeat an introductory course in physiology present themselves at graduate school.

I do not maintain that the student should necessarily have had a course in physiology before he goes to graduate school. I do believe, if he has had one, he should not have to repeat it for graduate credit.

If it is necessary in the biology department to delete a few courses such as anatomy and physiology, and human physiology in order to offer a basic course in physiology, then arrangements should be made for the physiologist to offer such a course to the best of his ability. The same observation might be made with reference to other biological fields. If seems to me that the preparation of undergraduate biology students, no matter how few, for graduate study is every bit as important in a program for competence as is the servicing of other undergraduate departments.

Reducing the number of courses in the department should permit fewer course preparations for the present faculty. In certain institutions the administrators have readily agreed to such a move when it became clear that the anticipated increase of students could be handled with proportionately less increase in biology staff, and that the competence of the students would be increased.

The chief requirements for a competent curriculum in advanced biology are that it be challenging and that it seek significance in the phenomena. By challenging, I mean that each successive course should constitute a higher rung on the ladder to competence. The student should have to reach to grasp each successive rung. By seeking significance, I mean that it leads to insight and does not have as its ultimate goal the mastery of facts alone. Undergraduate education thus becomes a vertical progression toward greater insight into biological processes and not a horizontal pathway along which a student may meander to the awaited diploma.

Of the many other facets in the subject of competence in undergraduate education I would like to mention one more, very briefly. That two and two equal four is accepted in pragmatic circles as a fact. That the whole is equal to the sum of its parts proves to be a more difficult concept for some students. That the whole is equal to any of its parts appears to be good enough for half credit in some courses. The granting of half credit because the student shows he has learned some of the words is another factor which militates against competence in education at all levels.

In summary, we might agree that the role of the undergraduate department in the training of biologists for graduate school should be the presentation

of a core of foundation courses geared to the capable student, in which the student is expected to seek significance of phenomena, is challenged to reach a little higher at each successive course level, and in which credit is given only for competent performance and not for partial or compromising performance in the subject matter presented. An appropriate number of such courses, offered by a faculty with adequate time to study, realistic teaching loads, and qualified by prior training, is the best preparation for graduate study.

Important as is suitable undergraduate preparation in our search for competence, there is a far more insidious factor militating against competence in American education today. This is the ubiquitous fragmentation of graduate education. I refer to the increasing tendency on the part of the legislatures of many states indiscriminately to expand undergraduate facilities into institutions with full-fledged graduate programs. Whereas, at one time there were one or two tax-supported institutions offering graduate programs in each state, we can now count 17 independent publicly-supported graduate schools in one state adjacent to the Southeast. In our own region three, four, and six tax-supported graduate schools in each state are not uncommon. But the fragmentation has only just begun. During the next decade we may anticipate that practically every state-supported college, many having recently come to full college status via the junior college or teacher's college route, will seek to add graduate instruction. In retrospect, we may deplore our lack of concern when these schools first proposed to offer graduate instruction in educational methods. The move to graduate courses in education was only the beginning. There soon evolved among such institutions the attitude that graduate work in *subject matter fields* could be offered by the existing faculty, and at no extra cost to the taxpayer. Following Sputnik, impetus was given to this trend by interpreting, naively or with tongue in cheek, the plea for *more scientists* as a plea for *more new facilities* to teach scientists. Supporters of these institutions envisioned the situation as an opportunity to justify expansion into highly specialized fields of graduate education in the basic sciences. These supporters are confidently expecting the federal government, under the authority of either the Administration bill or the Hill-Elliott bill, to further foster the fragmentation of scientific education. The Administration bill, in particular, provides for underwriting half the cost of new graduate programs in basic sciences where no such programs now exist. Whether Federal funds will be employed in this manner may depend, in part, on the extent to which scientists are willing to make their voices heard. Regardless of the final disposition of Federal funds there is mounting evidence that the concept of the need for concentration of graduate facilities and specialized scientific programs in already established facilities has not been accepted by the majority of taxpayers of the several states. Indeed, it may not be an exaggeration to say that the concept has been repudiated in state after state and that the fragmentation of scientific education is being accelerated.

It is interesting to note that thereby there is being promoted at the graduate level a situation identical to one which we have so loudly protested in secondary education. It has been maintained that students in small high schools cannot obtain the education they might if the schools were to be consolidated. Yet, at the level of the highest educational facility we have, the graduate school, we are witnessing fragmentation whereas consolidation of our tax dollars should be our goal.

There are, I believe, three factors responsible for this fragmentation which places competent graduate scientific education in jeopardy. These are, 1) rising enrollments; 2) desire on the part of the local college to obtain a greater proportion of tax funds and thus to maintain a favorable financial position in relation to other institutions; and, 3) geographic jealousy or, more politely, local civic pride.

Just as rising enrollments have been reflected in the extension of the state college systems into more remote areas of the several states, so this factor becomes a basis for proposing additional centers for graduate education. In 1954-55 fourteen southern states had undergraduate enrollments of 600,000 students. In 1965-66 the number will be approximately 1,000,000. These are conservative estimates. Since rises in undergraduate enrollment constitute a reasonable basis for projecting future graduate enrollments, assuming the ratio of undergraduates to graduates will remain the same (which is unlikely), there should be an increase of about 50% in graduate enrollment in the Southeast in the next ten years or by 1970 at the latest. Other factors responsible for these increases are greater demands for specialized personnel on the part of new southern industry, a belief of the American people that additional education means increased subsequent earning power, the expansion of non-thesis programs, and the fact that teachers in elementary and secondary school systems are encouraged or required, in many states, to take additional courses after graduation with a bachelor's degree.

In the face of increasing enrollments, public institutions offering graduate work find it necessary to advise the citizens and their legislators of the imminent need for additional monies for increased faculty, staff, buildings, capital outlay, and operating

expenses. When these estimates are made public, a very natural phenomenon manifests itself. Administrators of the local colleges commence to wonder whether or not this increased demand for funds from one segment of the state educational system may ultimately mean insufficient money for their own institution. The institutions offering graduate work become the "haves," and the other schools describe themselves as the "have nots." They commence to think in terms of extra services they might render to attract more students and thus justify more funds. The administrators let it be known that they are willing and able to offer graduate work. Promised are additional scientists to man the new industry of the state and to protect America against Russian technological superiority. The propaganda to raise the school to graduate status rises to a crescendo.

The proposal is particularly appealing to local civic leaders. Changing the college to a university means more local homes to be built, more students to spend money in the local stores, more rooms to be rented, more business for everybody, and growth and prosperity for the home town, even in recessions. The civic leaders and the school administrators approach their local representatives in the state legislature.

In the meantime, rival institutions discover what is going on. *Their* school is not going to be left behind in the scramble for prestige! The fine people in *their* region of the state are entitled to, nay, require, graduate facilities near their homes, too! The legislators from the several communities get together and swap votes.

As a result of these three factors, one after another of the regional schools strides toward University status.

This fragmentation of graduate instruction might be thwarted if the public were cognizant of its unique nature. They do not realize, for example, that, compared with undergraduate instruction, graduate instruction is 250% more costly. Graduate instruction must be surrounded by an aura of research, and there must be money for this research. Because we are in the age of the enzyme and the ion, instrumentation costs are higher than ever before. Futhermore, to maintain competence, a graduate faculty in the sciences must have time to study recent developments. There must, therefore, be a lower student instructor ratio. This entails higher operating costs. A strong graduate program must be sustained, in part, by financial assistance to graduate students. Such assistance at one state-supported Southeastern University for the current year amounts to $612,000. Library facilities beyond the minimum requirements of an undergraduate institution are mandatory in a competent graduate program. A great proportion of the institutions eager to expand into graduate instruction have unbelieveably inadequate library facilities. The American Library Association classifies college libraries in three categories. Group III, composed of 109 schools, includes most of the institutions which, in the near future, may be expected to seek expansion. Twenty-seven institutions in this group already offer graduate instruction. These 27 institutions have an average book stock of 52,000 volumes. Several of these 27 institutions have stocks of only 22,000 volumes. The median book stock of all 109 schools in the group is 45,000. Compare these figures with the nearly 1,300,000 volumes in the Duke University Library, or the nearly 1,000,000 volumes at the Universities of Virginia or North Carolina. Schools with libraries of 45,000 volumes may graduate fifth and sixth year students who know more about science, but they will scarcely produce more scientists.

The general public are not aware of these pertinent facts. They are beguiled into believing that the same services offered by established graduate schools can be rendered more economically at the four-year schools. When the cost of instruction per student at the college is contrasted indiscriminately with that at the Universities, the latter appear in an unfavorable light. The public cannot be expected to recognize that the figures are not comparable. Sooner or later, of course, the institution with the newly-expanded program comes face to face with the financial facts of life. So do the general public, but the committment, once made, is irrevocable. The tax dollars available for higher education have been permanently diluted.

What effect does this have on established facilities? In one Southeastern state appropriations to all education increased between 1940-1955 in the same proportion as did state revenues,—nearly 700%. During the same interval the only State University received less than a 200% increase in appropriations. This despite the fact that operating costs more than doubled, enrollment doubled, and the facilities have been expanded. With continuing fragmentation all institutions must either share, and share alike in the tax dollar, or else the regional schools will indeed be "have-nots" and must curry favor of the taxpayers by making it easier to obtain advanced degrees at these institutions. The effects on educational competence in either case are self-evident.

I was in attendance by coincidence at a faculty meeting at one institution at which graduate work was being offered for the first time. The President of the institution addressed the faculty in this vein: "These men and women have made great sacrifices to come here to school this year. Many of them have families at home whom they have had to neglect while trying to better themselves as teachers. They

are all fine people. We don't want any of them to go away from here without a degree for their efforts, if we can possibly help it." I would not presume to render sweeping condemnation of this attitude. However, there were among the candidates, those seeking the degree of Master of Science in biology. Several of these had as few as eight hours of biology prior to enrolling in the graduate school. Some of these "Masters" of science will inevitably find their way into the teaching of biology in liberal arts colleges in the South. You will recall that the South will need a minimum of 37,000 new faculty members by 1965, according to estimates of the Southern Regional Education Board.

I would think that expansion to graduate study might proceed in planned stages. We plan the orderly development of our highway systems, our recreational facilities, and even our welfare programs. Should we not plan the orderly development of our tax-supported institutions of higher learning? Step one might be the financing of a five-year plan of library expansion among the petitioning institutions. This would be like dipping the taxpaying foot into the cold water of a mountan stream before plunging the body headlong in for a swim. During these five years the institutions would expand their library acquisitions at the rate of perhaps 20% per year with funds appropriated for the specific purpose. At the end of the fifth year the libraries (if group III institutions) would have approximately 90,000 volumes, and a basic subscription list of journals. There would be a gentleman's agreement between the institutions and the appropriate state authorities that, at the end of five years, funds would be waiting for the construction of a library building suitable to house twice that many volumes. If, after fulfilling these initial obligations, the taxpayers manifest a continuing interest, a second and final five-year program could be instituted. During the second stage, appropriations to the institutions would be increased in accordance with a prearranged plan, scientific equipment would be acquired, research programs on the part of the faculty would be encouraged, and teaching loads would be adjusted to permit current research, and in anticipation of graduate status. If, during the planning stages, the public should waiver in their financial committment, the graduate program should be abandoned. If we can draw any conclusion from our experience in education in the past thirty years it is that our sacrifice of quality in the anxiety to achieve quantity has been a national disgrace.

Who, among us, can insinuate our convictions into the public consciousness? Those of us in already established tax-supported graduate programs may be vociferous, but because of our affiliation our opinions are discounted. From the public viewpoint it seems evident that we are seeking our own advantage. I am convinced that the only persons who can effectively influence the general public in educational matters relating to finance are the faculty and officers of the private institutions. On these, already the guardians of academic standards, falls the role of scholarly critic of education at all levels, and especially at the higher levels. You must grasp every opportunity, nay, create opportunity, to use your unbiased position to mold public opinion in whatever direction you deem proper. If the personnel at the state institutions cannot win an audience on these matters, and if the personnel at the private institutions fail to seek an audience, then whose voice, in all America, will be raised in defense of educational competence?

The South is a region of great potential. The natural resources of the South have scarcely begun to be tapped, but the greatest resource is its fund of human talent. Nations have remained poor in the midst of abundant natural resources for the reason that they have failed to develop this human resource. Others have grown rich in the midst of poor natural resources because they have developed this human resource. Standing between servitude and the human resources of any nation are its great Universities. Here are places where "those who hate ignorance may strive to know, those who perceive truth may strive to help others see." But great Universities are the product of the vision of determined peoples who, having established them, cherish them. By their very nature they are uncommon, like cool springs in the desert, not ubiquitous, like mesquite bushes. They are strong, like the Sequoia, not disturbed by every breeze, like a reed. The more space they have in which to spread their branches, the farther will they cast their shadows. Sow them thick, make them compete for nourishment, and growth will be scrubby.

We must give the lie to the fallacy that there can be competent graduate facilities in every section of every state. Such dispersal of facilities will mean that all will be equal, none will be superior. All will be competitors, none will be competent. Somewhere in the South the people will have a vision. Inhabitants of the northern part of the state will not demand facilities equal to those in the southern part; citizens in the eastern part will not demand facilities equal to those in the western part. They must and will create additional facilities for higher education, but they will not lose the vision of superiority for the few. Thereby will they ensure the competence to keep our nation free.

Proceedings of the Tallahassee Meeting

The Nineteenth Annual Meeting of the Association of Southeastern Biologists was held at Florida State University, Tallahassee, Florida, April 17-19, 1958. Meeting with ASB were the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Southeast District Convention of the Beta Beta Beta Biological Society and the Southeatern Division of the American Society of Ichthyologists and Herpetologists. Total registration for the meeting was 378, the largest atendance yet recorded for an annual ASB meeting.

On Thursday evening, April 17, Dr. W. F. Loomis of the Loomis Laboratory at Greenwich, Connecticut, spoke on "Chemical Control of Sexual Maturation in Hydra." Dr. Loomis described some of his interesting experiments designed to define the chemical nature of factors controlling the process of differentiation.

On Friday and Saturday morning 95 individual contributed papers were presented in ten sessions. In addition, a symposium was held on Saturday morning entitled "Metabolic Aspects of the Mutation Mechanism." This symposium was organized by Drs. A. Gib DeBusk and Charles Edington of Florida State University with the following speakers: Sheldon Wolff of Oak Ridge National Laboratory, Dale Steffensen of Brookhaven National Laboratory, Arthur Koch of the University of Florida and C. O. Doudney and Felix L. Haas of University of Texas.

The annual business meeting of ASB was held on Friday at 11:00 a.m. with President H. K. Wallace presiding. Seventy-three persons were elected to membership in ASB and on recommendation of the Executive Committee four members were elected to emeritus membership: H. L. Blomquist, G. L. Carver, Ezda M. Deviney, and I. F. Lewis.

The following officers were elected: Horton H. Hobbs, University of Virginia, President-elect; Victor A. Greulach, University of North Carolina, Vice President; Harold H. Humm, Duke University, Secretary; William Burbanck, Emory University, and Elsie Quarterman, Vanderbilt University, members of the Executive Committee.

The reports of the Secretary, Treasurer, and Auditing Committee were presented and accepted. The Association voted to accept the invitation received from the University of Tennessee, Knoxville, Tennessee, to hold the 1959 annual meeting on its campus. Rising votes of appreciation for services rendered were given Victor A. Greulach, Editor, and Hollis Rogers, Circulating Manager, of ASB BULLETIN, who have resigned. It was announced that the Executive Committee had appointed Geoffrey M. Jeffery, U. S. Public Health Laboratory in Columbia, South Carolina, as new editor of the BULLETIN. A rising vote of appreciation was also given J. C. Dickinson, Jr., who completed his three-year term of office at this meeting.

The Association adopted an amendment to the Bylaws of the Constitution (printed in full in ASB BULLETIN, Vol. 5, No. 1, p. 2) which simplifies election of new members. Resolutions were adopted expressing thanks (1) to the Florida State University and its local committee for the cordial and pleasant arrangements that contributed to a successful meeting; (2) to Carolina Biological Supply Company, Phipps and Bird Corporation and the Will Corporation of Georgia for their generous contributions that make possible the awards offered by ASB; and (3) to Victor A. Greulach who has faithfully served as the first and only editor of the ASB Bulletin and who has established a high quality of publication. The Association also adopted a resolution to be sent to all congressmen in the southeast that urges Congress and its appropriate committees to take favorable action upon proposals for improving public education in this country that are regarded desirable by responsible scientific organizations. A resolution was also adopted expressing a deep sense of loss in the death of a charter member and former president, Bruce Dodson Reynolds.

On Friday evening the annual address by the Retiring President was given and presentation of awards was made. J. Paul Reynolds, Dean of Liberal Arts College, Florida State University, and a past officer of ASB, extended an official welcome to the Association and the organizations meeting with it. George C. Kent, Jr., gave an address entitled "The Search for Competence." Announcements of the annual awards were made: Meritorious Teaching Award to H. R. Totten, University of North Carolina; Research Award to Charles E. Jenner, University of North Carolina, and Honorable Mention to Robert J. Knight, Jr., Blandy Experimental Farm, University of Virginia; Mountain Lake Fellowship to Peggy Walton, Lynchburg, Virginia.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

A. E. Radford of the department of botany at the University of North Carolina has been given the Tanner Award for excellence in undergraduate teaching. The award is given annually to two members of the University of North Carolina faculty.

Jack C. Jones, medical entomologist of the U. S. Public Health Service, has been appointed associate professor of entomology at the University of Maryland.

Herbert P. Riley of the University of Kentucky has been appointed as one of the six members of the foreign advisory board of *The Nucleus,* a new international journal of cytology being published in Calcutta, India. The only other American on the board is B. P. Kaufmann.

L. R. Hesler, dean of the University of Tennessee College of Liberal Arts, will retire from the university at the end of the academic year, although he will continue botanical research.

Part 3 of the work "Flora of West Virginia," by **P. D. Strausbaugh** and **Earl L. Core,** has gone to press with publication expected in July. It will include descriptions and illustrations of West Virginia representatives of the families Linaceae to Plantaginaceae, inclusive, and will be a volume of about 260 pages. The fourth and final part of this work, it is hoped, may be published in 1959 or 1960. The completed work will be over 1000 pages in length. Part 1, including the Pteridophyta, Gymnospermae, and Monocotyledoneae, was published in 1952, and Part 2, including the families of Dicotyledoneae from the Saururaceae to the Leguminosae, in 1953. The work is the result of collaboration in field, herbarium, and library studies by two authors over a period of 35 years, during which time every county in the state was surveyed. Most of the pen-and-ink sketches are being made by **William A. Lunk** of the University of Michigan.

The University of South Carolina recently announced the retirement plans of **William E. Hoy.** Dr. Hoy, who has been Head of the Biology Department for thirty years, expects to retire at the end of this year. He plans to remain in the department throughout the summer to carry out contract research. **Wade T. Batson** has been appointed acting head.

Through the generosity of the Phipps and Bird Company of Richmond, Virginia the annual Jefferson Award has been given to **John L. Kice** and **Fred M. Parham** of the University of South Carolina for a meritorious paper presented at the annual meeting of the South Carolina Academy of Science.

H. G. M. Jopson of Bridgewater College and **M. J. Murray, Jr.** of Washington and Lee University each spent a number of weeks at the Oregon Institute of Marine Biology, Charleston, Oregon, during the summer of 1957.

George H. Mickey, Louisiana State University, was an invited participant in the Mid-Western Conference on Genetics and Radiobiology held in St. Louis on May 2. The conference, conducted under the auspices of the Committee of Biological Effects of Atomic Radiations of the National Academy of Sciences, was one of three in the United States at which geneticists and radiobiologists are exchanging views concerning genetic effects from the medical use of X-rays. In his capacity as National President of Beta Beta Beta, Dr. Mickey addressed the chapter at Texas Women's University at Denton, Texas, on the occasion of their annual initiation banquet, on "Methods of Protection Against Radiation Damage." On April 12 he was guest speaker at the annual meeting of the North Texas Biological Association, held at Denton, Texas.

Robert F. Smart has been named dean of Richmond College. **J. C. Strickland** has been promoted to the chairmanship of the department of biology at the University of Richmond, succeeding Dr. Smart. **J. D. Burke** of that department was appointed research fellow of the American Physiological Society for the summer of 1957 and spent the time working with **F. G. Hall** in the department of physiology at Duke University. **W. R. Tenney** formerly of West Virginia University and of Camp Detrick, Maryland, whose main interest is the physiology of fungi, has been appointed assistant professor in the department of biology at Richmond.

Longwood College has added **E. F. Stillwell,** a recent graduate in physiology from Duke University, to its staff as an assistant professor. **Robert E. Merritt** of Longwood, presently on leave at the University of Tennessee, is replaced this year by **Jacobus M. L. Lodewijks,** an exchange teacher from the Netherlands. Dr. Lodewijks was the first president of the World Federation of Aquarists. **Aaron O'Bier,** who received his master's degree from the University of Richmond is now working on the AEC project at Longwood under the direction of **R. T. Brumfield.**

At the University of Virginia **Richard D. McKinsey** has been appointed instructor in biology. Mr. McKensey will complete a doctorate in physiological mycology at Stanford University in January. **Addison E. Lee** from the biology faculty of the University of Texas is serving as visiting professor of biology. Dr. Lee is primarily responsible for the Department's contribution to the NSF-sponsored Acadmic Year Institute for High School Science Teachers being held at the University.

Jay D. Andrews of the Virginia Fisheries Laboratory has been appointed chairman of the editorial committee of the National Shellfisheries Association. **J. L. McHugh** has been named chairman of the scientific advisory committee of the Atlantic States Marine Fisheries Commission and presided at the meetings of that group in New York in September 1957.

Frederick S. Orcutt, professor of bacteriology at Virginia Polytechnic Institute, has been named acting head of the department of biology. **J. M. Grayson** of VPI attended and presented an invitation paper on insect resistances to insecticides at the Fourth International Congress of Crop Pro-

tection, held in Hamburg, Germany, September 8-15. **J. R. Rooney II,** professor of animal pathology, biology department, has returned from a twelve months leave of absence. During this period he studied in the Royal Veterinary College, Stockholm, Sweden. **W. E. Field,** a graduate of Michigan State College and Wayne University, has joined the staff of animal pathology section, department of biology as assistant professor of animal pathology. **William Van Dresser,** a Michigan State graduate in dairy science and in veterinary medicine, has joined the staff of animal pathology. **C. J. Ackerman,** associate biochemist, Virginia Agricultural Experiment Station, Blacksburg, was on leave for a 6-week period during the summer of 1957. Dr. Ackerman served as chief biochemist on a nutrition survey team in Lybia, North Africa.

George S. Ramseur, who is receiving his Ph.D. in botany at the University of North Carolina this year, has accepted a position in the biology department at the University of the South.

Max H. Hommersand, who holds his doctorate in phycology from the University of California, has been appointed instructor in botany at the University of North Carolina, Chapel Hill, effective February 1, 1959. At present Dr. Hommersand is an NSF post-doctoral fellow at Harvard University. **William Dennison** of Swarthmore College will be a visiting assistant professor of botany at Chapel Hill during the coming year. Dr. Dennison is a mycologist and is working on the Discomycetes.

Institutions and Organizations

At its annual meeting in Tallahassee the **Southeastern Section of the Botanical Society of America** elected Royal E. Shanks of the University of Tennessee as chairman, Joseph C. O'Kelley of the University of Alabama as secretary, and Robert Godfrey of Florida State University as a member of the activities committee.

The new officers of the **Southern Section of the American Society of Plant Physiologists** are Aubrey W. Naylor of Duke University, chairman; Howard Teas, University of Florida, vice chairman; and Robert Burns of the Georgia Experiment Station secretary-treasurer.

A conference of biologists teaching in the **Academic Year Institutes** for High School Science and Mathematics Teachers, which are being conducted at 18 universities under the sponsorship of the National Science Foundation, was held in Charlottesville, Va. April 14-15. Southeastern biologists who were invited to participate were Addison Lee of the University of Virginia and Victor A. Greulach and Claibourne S. Jones of the University of North Carolina. Dr. Lee served as co-chairman of the conference and Dr. Greulach was the summarizing speaker for the conference.

On May 5 the committee on biotrons of the **Botanical Society of America** met at Duke University with a group of southern biologists who might be interested in the use of such a facility to discuss its desirablity, feasibilty and possible location. The committee subsequently met with similar regional groups at Yale University, the University of Wisconsin, and the California Institute of Technology. The committee plans to advise the National Science Foundation as regards the establishment of one or more biotrons, which would be available for use by biologists on a regional basis as well as by biologists at the institution or institutions at which the biotrons would be located. The biotrons would be extensive controlled environment facilities similar to the phytotron at Cal Tech, now the only one in the country. As the change in name suggests, the proposed biotron woud be available for use by zoologists as well as botanists. The members of the committee are Sterling Hendricks, Paul J. Kramer, C. S. Pittendreigh, C. L. Prosser, A. J. Riker, and F. W. Went. Among the biologists who met with the committee were Aubrey W. Naylor, Wm. Billings and Kurt Schmidt-Nielson of Duke University, Charles E. Jenner and Victor A. Greulach of the University of North Carolina, Robert Platt of Emory University, James H. Henderson of the Tuskeege Institute, Howard Teas of the University of Florida, James Liverman of the A. & M. College of Texas, Jack E. Myers of the University of Texas, and Norman Anderson of the Biology Division, ORNL.

The annual Poteat Award of the **North Carolina Academy of Science** was given this year to an outstanding paper presented in the botany section. The paper selected by the judges and members of the section to receive the award was "Possible mechanisms of resistance in solanaceous plants to *Pseudomonas solanacearum*" by E. C. Maine and Arthur Kelman of North Carolina State College.

Two biologists are among the new officers of the **North Carolina Academy of Science** elected during its annual meeting held at Duke University May 2-3. L. A. Whitford of North Carolina State College is vice president and John A. Yarbrough of Meredith College was re-elected for a seventh year as secretary-treasurer.

The biology department of the **University of Virginia** has sponsored a rather full program of guest speakers and conferences for the winter and spring, 1958. Among the guest speakers were John Buck of the National Institutes of Health; William H. Weston and Caroll Williams of Harvard University, Thomas Hall of Washington University, and Oswald Tippo of Yale University.

At a recent meeting of the **South Carolina Academy of Science** these officers for the coming year were unanimously elected:

President: H. W. Freeman, University of South Carolina; President-elect: J. C. Aull, Jr., Medical College of South Carolina; Vice-President: J. G. Dinwiddie, Clemson College; Councilors: W. E. Anderson, The Citadel, J. C. Loftin, Wofford College, J. D. Reynolds, Coker College.

At the annual meeting of the **Louisiana Academy of Sciences** at Centenary College George C. Kent was named President-Elect. Other officers with unexpired terms include: Roland Abegg, Southeastern Louisiana College, President; Walter Moore, Loyola University, Retiring President; George Ware, Northwestern State College, Secretary; Frederick Deiler, Freeport Sulfur Company, Treasurer; B. Theodore Cole, L. S. U., Editor; Harry Bennett, L. S. U., Chairman of the Junior Academy.

A new greenhouse has been acquired by the **Hollins College** biology department. The structure

is a single span one with aluminum frame and redwood rafters.

The **Gulf Coast Research Laboratory** at Ocean Springs, Mississippi, received National Science Foundation funds for scholarships to teachers wishing to take courses in marine biology during the current summer. Gordon Gunter is director of the Laboratory. Harry J. Bennett of the Lousiaina State University is again teaching at the Laboratory this summer.

The **Louisiana Ornithological Society** held its annual spring meeting at Cameron on April 26. The president of the society is **J. H. Roberts**, professor of zoology at Louisiana State University. Considerable interest among the society members has arisen as to whether hurricane Audrey modified conditions sufficiently to affect the bird life of the area.

The radiation pit at the Blandy Experimental Farm of the **University of Virginia** was completed and the Cobalt-60 source was installed and put into operation beginning July 19, 1957. The radiation field, as well as the Orland E. White Arboretum, were open to visitors at a field day held on August 15.

The **Oak Ridge Institute of Nuclear Studies** is offering the services of 106 Oak Ridge scientists who will be available to lecture on college campuses on more than 150 topics that span every field of scientific endeavor. They will tailor their talks for either undergraduate consumption, or more technical graduate and faculty gatherings.

Eighty-nine of the lecturers are ORNL staff members; four are with the University of Tennessee-Atomic Energy Commission Agricultural Research Laboratory in Oak Ridge; seven are on the ORINS staff; and six are with the AEC Oak Ridge Operations Office.

The program is designed to serve colleges of all sizes, without cost to the requesting institution. In the interest of efficiency, substitutions of lecturers and dates must sometimes be made, so colleges are asked to give alternate choices, and to make their requests as far in advance as possible, preferably this summer or early fall. When several colleges in the same area can consolidate their needs to request the same speaker during the same general period, scheduling is greatly facilited. The brochure listing the lecturers and their topics is available from the University Relations Division, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tennessee.

Grants in Aid

J. D. Burke of the University of Richmond has received a grant from the **National Institutes of Health** for the purchase of special equipment to continue his study of oxyhaemoglobin in fish.

At Mississippi Southern College **J. Fred Walker** has received a grant of $2,200 from the National Institutes of Health to continue his study of blackspotting in shrimp and **Robert A. Woodmansee** is continuing his study of plankton communities along a salinity gradient by virtue of a grant of $1,700 from the National Science Foundation.

Research grants have been awarded by the South Carolina Academy of Science to **Thomas R. Scott**, State Hospital, Columbia, South Carolina and **Gordon R. Thurow**, Newberry College, Newberry, South Carolina.

The recent grants from the **National Science Foundation** for biological research in southeastern universities include the following:

Duke University: H. L. Blomquist, Department of Botany, "Systematics of Sphagnum in North America," two years, $8400.

Emory University: Charles Ray, Jr., Department of Biology, "Cytogenetic Studies of *Tetrahymena pyriformis*," two years, $13,500.

Florida State University: A. G. DeBusk, Department of Biological Sciences, "Enzymes and Enzyme Systems in Mutation," one year, $9200. Sidney W. Fox, Oceanographic Institute, "Biogenesis: Thermal Prebiochemical Reactions," two years, $10,000.

North Carolina State College: D. U. Gerstel and L. L. Phillips, Department of Field Crops, "Artificial Amphidiploids in the Genera Gossypium and Nicotiana," three years, $17,000. Clyde F. Smith, Division of Biological Sciences, "Catalogue of the Homoptera of the World," one year, $6900.

University of Georgia: Robert G. Eagon, Department of Bacteriology, "Synthesis of Polysaccharide by *Pseudomonas fluorescens*," two years, $6,000. Bernard S. Martof, Department of Zoology, "Behavior of Amphibians," two years, $9300. Robert A. Ragotzkie, Marine Biology Laboratory, "Repowering and Refitting of a Vessel for Marine Biological Research," one year, $14,200.

University of Kentucky (Kentucky Research Foundation): Richard C. Dugdale, Department of Zoology, "Nutrient Supply of Certain Alaska Lakes," one year, $8100.

University of Maryland: G. W. Wharton, Department of Zoology, "Basic Research in Acarology," three years, $27,800.

University of Miami: Charlotte J. Avers, Department of Botany, "Histochemical Studies of the Differentiating Root Epidermis," two years $13,800.

Vanderbilt University: Charles R. Park, Department of Physiology, "Glucose Transport in Mammalian Cells," three years, $32,000.

Virginia Polytechnic Institute: P. C. Holt, Department of Biology, "Systematic Studies of the Branchiobdellidae," two years, $58,000.

The Division of Biological and Medical Sciences of the **National Science Foundation** announces that the next closing date for receipt of basic research proposals in the life sciences is September 15, 1958.

Samuel P. Maroney and **J. N. Dent** of the University of Virginia have been granted $8,000 by the **National Science Foundation** for the purchase of equipment for use in research involving radioisotopes.

John N. Couch of the University of North Carolina has been informed that his grant of $4,500 from the Committee on the Taxonomy of Actinomycetes of the **Society of American Bacteriologists** has been renewed for a second year. The grant is for a study of the taxonomy of the Actinoplanaceae. Charles E. Miller has been serving as research associate to Dr. Couch during the first year of the grant.

The ASB BULLETIN

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Contents

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The Association of Southeastern Biologists

THE ASB BULLETIN

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ASSOCIATION AFFAIRS

About the Bulletin

Readers may wonder why this issue of the ASB BULLETIN is designated September - December. The explanation is that this has been done to permit dating of the four issues as January, April, July, and October in the future, bringing them more in line with the times when they appear (except for the July issue, which will appear in June). Despite the fact that this is a double issue no issues will be skipped, the one appearing in January simply being designated as Vol. 6, No. 1, January 1959 rather than as Vol. 5, No. 4, December 1958 as would have been the case had the change not been made.

As far as the editor is concerned the change has another advantage: it relieves him of the task of preparing another issue, since the new editor of the BULLETIN, Geoffery M. Jeffery of the USPHS, Columbia, S. C., assumes his duties with the first issue of Volume 6. The present editor wishes to thank all those who have given so generously of their time in helping get out the first five volumes of the BULLETIN, in particular the state correspondents and the circulation manager, Hollis Rogers.

The editor also wishes to acknowledge with thanks the many kind remarks about the BULLETIN made by members of ASB and others. Whether deserved or not, they have all been greatly appreciated. Though editing the BULLETIN has, at times, been rather taxing it has on the whole been a most pleasant experience and the editor regrets that the press of other duties has made it necessary for him to resign. The retiring editor extends his best wishes to the incoming editor, with the assurance that his tenure will be successful and the hope that it will be long.

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The Knoxville Meeting

The members of ASB and the other societies which meet with it annually are reminded that the annual April meeting will be held at the University of Tennessee in Knoxville and that the call for papers will appear in the January issue of the BULLETIN. Prospective contributors to the program would do well to begin planning for the meeting now. The local arrangements committee will consist of J. G. Carlson, Chairman, A. J. Sharp, J. C. Howell, R. E. Shanks, Fred Norris, and R. Fraser. On the Thursday afternoon before the meeting begins the Biology Division of the Oak Ridge National Laboratory will conduct tours of its building for the benefit of those en route to the meeting who would like to inspect the facilities of the Division and visit with the staff.

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ASB at AAAS

The ASB will participate in the Washington meeting of the AAAS by co-sponsoring the three-session symposium on systematics being sponsored by the Society of Systematic Zoology. G. W. Wharton of the University of Maryland, an ASB member, is program chairman for the sessions of the Society of Systematic Zoology at Washington. For further information about the Washington meetings see page 42 of this issue.

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From Mrs. Reynolds

Dr. Mary Esther Gaulden
President, ASB
Oak Ridge, Tennessee

Dear Dr. Gaulden:

The children and I deeply appreciate the resolution adopted by the Association of Southeastern Biologists expressing sorrow over the death of my husband.

The many expressions of sympathy received from individuals and scientific organizations, all have been greatly appreciated; but none more highly than the resolution adopted by this Association which meant so much to him and for which he held a very special affection.

Please express my gratitude to the Association, and my best wishes to the many friends we valued among its members.

Sincerely,
MRS. BRUCE D. REYNOLDS

Charlottesville, Va.
June 23, 1958

Educational Activities of the Biology Division of the Oak Ridge National Laboratory

ALEXANDER HOLLAENDER

Dr. Hollaender, Director of the Biology Division since it was established in 1946, is a biophysicist who did his graduate and undergraduate work at the University of Wisconsin. Before coming to Oak Ridge, he was on the staff of the National Institutes of Health. Dr. Hollaender is a member of the National Academy of Sciences, President of the Comité International de Photobiologie, Chairman of the Committee on Photobiology of the National Research Council, Professor of Radiation Biology at The University of Tennessee, and a member of the board of editors for several journals. He was President of the International Congress of Radiation Research held in Burlington, Vermont, in August, 1958. In a previous article (AIBS Bulletin 7(1):10-14, Jan. 1957) Dr. Hollaender described the research activities of the Biology Division in some detail.

Since its beginning in 1946, the Biology Division of the Oak Ridge National Laboratory has held the view that cooperation with colleges and universities in the southeastern part of the United States is one of its important functions and one of its greatest sources of strength. With this as a focus, the educational activities of the Division now extend to include such diversified areas as the local high schools and a postdoctoral program under which recent Ph.D.'s from schools in this country and abroad spend a year here working on independent research problems. Several programs, such as the Research Participation, Traveling Lecture, and Pre-Doctoral Fellowship Programs and the Biology Student Trainee plan for undergraduates are all carried on in cooperation with the Oak Ridge Institute of Nuclear Studies, whereas others are administered entirely by the Laboratory.

Under the Research Participation Program, faculty members of colleges and universities spend from three to fifteen months in the Biology Division working on research projects. Participants work on problems of their own selection, alone or in collaboration with members of the Division. In some cases, graduate students of participants have obtained fellowships to work in this laboratory on investigations in which the professor, the student, and the laboratory have an interest.

This program has been especially effective in the southeastern region of the United States, since 80-90% of the participants have been from southern schools.

Outstanding scientists are appointed as consultants to the Division, and several investigators who have worked here as Research Participants have been appointed consultants after returning to their universities. Under this contract they visit the laboratory from time to time to consult with Division members on mutual research problems. This provides a means of exchange of information between scientists in the Biology Division and others in universities all over the country.

The Traveling Lecture Program is part of the Atomic Energy Commission's program of exchange of scientific and technical information with colleges and universities, particularly in the South. Members of this Division give approximately a hundred lectures each year to institutions located in the southeastern, midwestern, and eastern parts of the United States. Faculty members of colleges and universities often visit the Division to speak before seminars and participate in discussion groups.

Members of the Division have taught graduate courses at Duke University, the University of North Carolina, Vanderbilt University, and Florida State University while on leaves of absence granted for that purpose. Three summer courses in radiation biology have been taught at Mountain Lake Biological Station. In the summer of 1956, a Biology Division staff member assisted with the radiation biology course for high school science teachers which was held at the Duke Marine Biological Station under the joint sponsorship of the National Science Foundation and the Atomic Energy Commission.

Under a cooperative agreement between The University of Tennessee and the Oak Ridge National Laboratory, members of the Division give lectures in the formal courses of the University's Institute of Radiation Biology. Six Division members are included in the faculty of the Institute. The same agreement makes it possible for thesis research to be carried on in the Biology Division by Institute students. The Division Director has an appointment as professor at The University of Tennessee and serves on the Research Committee of The University of Tennessee Memorial Research Center and Hospital.

Biology Division personnel contribute to courses and conferences conducted by the Oak Ridge School of Reactor Technology and the Oak Ridge Institute of Nuclear Studies. The Oak Ridge Institute's recent courses in "Radiation Chemistry" and "Atomic Energy and Veterinary Medicine" included lectures by senior staff members of the Division.

The Research Associate Program, which was inaugurated in 1954, is an arrangement whereby outstanding graduates who have recently received a doctoral degree and who have demonstrated definite interest and ability in fundamental research are given temporary one-year appointments. Information concerning this program is sent to department heads of colleges and universities throughout the country, and they are asked to call it to the attention of students who qualify as applicants. Since the program started, twenty-five research associates have spent a year here.

A similar somewhat more limited program is planned to begin in the fall of 1958 for young Ph.D.'s from other countries to enable them to come to this laboratory for a year, and the Division expects to have three or four postdoctoral investigators from abroad before the end of the year.

An increasing number of young scientists from this country and abroad are coming here to work under fellowships from outside sources, such as American Cancer Society, Rockefeller Foundation, U. S. Public Health Service, and others. In addition to the United States, countries represented in this program have been France, Uruguay, Portugal, India, Chile, Belgium, Denmark, Japan, Germany, England, Scotland, and The Netherlands. The majority of these foreign investigators are connected with universities in their home countries and come here primarily for experience and training in radiation biology.

Under the predoctoral fellowship program of the Oak Ridge Institute of Nuclear Studies, students complete their Ph.D. thesis research in this Division. One Ph.D. candidate has completed his thesis research here under a grant from the U. S. Public Health Service. Regular employees are granted leaves of absence to continue work towards a graduate degree and in these cases, thesis research is usually done in the Division.

In the summer of 1958 nine undergraduate college students, eight of whom were from small southeastern colleges, came to the Division for a 10-week training course. This course was designed specifically to give students who have completed three years of college the experience of working in a laboratory devoted to full time basic research. The students were selected on the basis of scholastic records and interest in scientific research, and they were assigned to groups where the work going on was closely related to their individual interests. The course consisted of work on a specific problem, attendance at Division seminars, observation of the work of others, and frequent informal discussions with research scientists. It is too soon to evaluate this program, but the indications are that it will ontinue as one of the educational functions of the Division.

The Division's close association with educational institutions has extended to an interest in the problems that arise when students arrive at the college level without sufficient training to pursue scientific studies. On the theory that national laboratories can accept at least a small portion of the responsibility for improving this situation, three high school teachers were invited to work in the laboratory during the summer of 1956 and four in 1958. The teachers believe this is an excellent method of broadening and improving the instruction that they can offer their students.

Several members of the Biology Division are serving on a committee set up by the local school board to study the problem of improving education in the Oak Ridge schools. This committee is interested in improving, not only science education, but all subjects covered by the secondary schools.

In an effort to attract more high school students to the field of biology, a program of demonstration lectures has been initiated at the Oak Ridge High School. Biology Division investigators regularly serve as advisors to science students of the local high school who participate in the National Science Fair competition and frequently contribute articles to the high school newspaper. The Oak Ridge school system is making a serious effort to emphasize science at all grade levels, and the articles, lectures, etc., are an important part of this program.

A general seminar is held each Thursday afternoon, and the guest speaker is usually a visitor from another laboratory in this country or abroad. These seminars are an effective supplement to the literature as a means of keeping informed on work going on in other laboratories. Since the Biology Division is now in an unclassified area, scientific

personnel of educational institutions in and around Oak Ridge and Knoxville are invited to attend the regular Division seminars.

Lecture courses are given in the Division each year on such subjects as Radiological Physics, Basic Genetics, Biochemistry, Physical Tools in Biological Research, Biostatistics, Physical Chemistry, and General Pathology.

The Division holds an annual research conference on topics of biological interest. Papers are presented by outstanding scientists from the United States and abroad. The topic for the 1958 conference was "Genetic Approaches to Somatic Cell Variation," and the subject of the 1959 meeting will be "Enzyme Reaction Mechanisms." The proceedings of these conferences are published as monograph supplements to the *Journal of Cellular and Comparative Physiology* and are distributed to scientists working in the field covered by each symposium.

Other small conference are organized from time to time by the Division when people working in specific fields are invited to meet for a one-or two-day discussion. Several meetings on bone marrow transplantation have been held during the past year, and photoreactivation and photosynthesis have been the subjects of recent meetings.

A weekly bulletin is published by the Division which contains a checklist of current literature in biology, chemistry, microbiology, genetics, and physiology, compiled by the Division Library. This bulletin has a limited circulation but is now being sent to many laboratories in this country and abroad in response to specific requests by the laboratory heads. The literature checklist is the chief reason given by most scientists for requesting the weekly bulletin.

The personnel of the Biology Division numbers approximately 200, which includes about 70 investigators at the Ph.D. or M.D. level. The Biology Division is part of Oak Ridge National Laboratory, which is operated by Union Carbide Nuclear Company for the Atomic Energy Commission. Oak Ridge National Laboratory, the Atomic Energy Commission's largest nuclear center, is an outgrowth of the wartime Clinton Laboratories (a branch of the Manhattan Project's Metallurgical Laboratory) and has had a role in virtually every major scientific operation and activity of the atomic energy program.

The Division concentrates on research in fundamental biology and biochemistry with emphasis on the cytogenetic effect and the biochemical, biophysical and pathological-physiological changes produced by radiation. The different groups and sections in the laboratory are, for all practical purposes, located in one building, which makes it possible for investigators working on related or overlapping problems to maintain very close cooperation. Much of the research here is understandably oriented toward radiation biology, but the imporance of fundamenal research on other biological problems has in no sense been subordinated to the studies of radiation effects. There is a distinct relation between fundamental studies going on in some groups and radiation effects studies in others, just as there are collaboration and mutual exchange of information between groups working on related basic studies that may or may not involve radiation. For example, investigations by the biochemists of nucleic acid structure and function are of interest to the insect cytologists, who, with the aid of radioactive isotopes as tracer substances, are doing experiments on synthesis of nucleic acids and the effects of radiation on this synthesis. In the same manner, the work being done by cell physiologists on isolation of cellular organelles and their proteins is related to a biochemistry project that is receiving considerable attention at this time—amino acid activation and its relation to protein synthesis.

Communication between individual scientists and groups is facilitated by informal luncheon seminars that are held daily: Biochemistry and Genetics seminars are held three days a week; Cellular Physiology, Mammalian Radiation Recovery and Radiation Immunology seminars meet weekly on an alternating schedule. At these seminars, investigators report on their work, and all members of the laboratory are invited to attend. Some groups hold daily meetings to discuss progress on individual work or interesting journal articles.

The buildings that house the Division were designed originally for chemical processing but were never actually used for that purpose. An abundance of space has already been cleared in these buildings and there is additional room for expansion. The Division has its own facilities for electronic instrument construction and repair, and its own machine, carpentry, and glass blowing shops. Ample radiation sources and facilities are provided.

Oak Ridge is now undergoing the transition from a city owned and operated by the government to an independent municipality. Although civic affairs have been regulated to a certain extent by the Atomic Energy Commission, the city has developed into a well-rounded community. Personnel in the Biology Division have provided much of the leadership needed in civic and cultural organizations, including Town Council, Civic Music Association, Community Art Center, Children's Theatre, and similar groups. Oak Ridge is within a two-hour drive from the heart of the Great Smoky Mountains, which provide a beautiful backdrop for the Laboratory and the residential area.

The AAAS Washington Meeting

The American Association for the Advancement of Science will hold its 125th meeting in Washington, D. C. December 26-31, 1958. Most of the sessions of interest to biologists will be held in the Shoreham and Sheraton Park Hotels, which are both located just off Connecticut Avenue near Rock Creek Park. Although the ASB will not have a special event, such as the ASB breakfast at the Atlanta meeting, it is participating in the meeting by co-sponsoring the symposia on systematics being sponsored by the Society of Systematic Zoology in celebration of the bicentennial of the publication of the tenth edition of Linnaeus' *Systemma Naturae*.

Three addresses will be of particular interest to biologists: the presidential address on medical genetics by Laurence H. Snyder, the vice presidential address for Section F (Zoology) by Harold H. Plough, and the vice presidential address for Section G (Botany) by Oswald Tippo. A special feature of the Washington meeting will be a series of sectional programs, essentially teaching demonstrations, employing a new and much improved technique in closed circuit color TV using a large screen. This new research and teaching tool, to be shown publically for the first time, has been lent by Ciba Pharmaceutical Products, Inc.

Contributed papers are being accepted by the following societies: American Society of Zoologists, Ecological Society of America, Society for Industrial Microbiology, Section F (Botany) and Society of Systematic Zoology. As at other recent AAAS meetings, emphasis will be placed on symposia in which leading scientists will discuss topics of current interest and importance. The following symposia will be of particular interest to biologists:

1. Some Unsolved Problems in Biology. Dec. 30. Sponsored by Sections F & G and arranged by Karl M. Wilbur and Barry Commoner.
2. Congenital Heart Disease. Four sessions, Dec. 29-30. Sponsored by Section N (Medical Sciences).
3. Calcification in Biological Systems. Three sessions, Dec. 29. Sponsored by Section Nd (Dentistry).
4. Botanical Symposium to be announced. Sponsored by Section F and co-sponsored by the Botanical Society of America.
5. Water and Agriculture. Four sessions, Dec. 29-30. Sponsored by Section O (Agricultural Sciences).
6. Premedical and Predental Education. Sponsored by Alpha Epsilon Delta.
7. Space Medicine. Two sessions, Dec 30-31. Sponsored by the American Physiological Society.
8. Integrative Mechanisms in Biology. Sponsored by the American Society of Naturalists.
9. Vertebrate Morphology. Three sessions, Dec. 27-28. Sponsored by the American Society of Zoologists and arranged by Alfred S. Romer.
10. Peacetime Benefits from Biological Warfare Research. Three sessions, Dec. 27. Sponsored by the Society for Industrial Microbiology.
11. Microbiology in Outer Space Research. Two sessions, Dec. 27. Sponsored by the Society for Industrial Microbiology.
12. Systematics. Three sessions, Dec. 28-29. Sponsored by the Society of Systematic Zoology and co-sponsored by ASB and other societies.

The speakers at the first session of the Systematics Symposium *(Linnaeus and Nomenclatural Codes)* will be W. T. Stearn of the British Museum, who will discuss Linnaeus' work and its bearing on the present day understanding and use of the Linnaean method of recording and nomenclature, H. W. Rickett of the New York Botanical Garden, who will discuss the botanical code, R. E. Buchanan of Iowa State College, who will discuss the bacterial and viral code, and R. L. Usinger of the University of Califorina, who will present his and E. G. Linsley's joint paper on the zoological code.

At the second session (*Basic Concepts of Systematic Order*) M. R. Irwin of the University of Wisconsin will speak on interrelations of genetic characters which differentiate species of doves, H. H. Ross of the Illinois Natural History Survey will speak on the systematic significance of differential evolution in larval and adult caddisflies, and C. H. Seevers of Roosevelt University will speak on the evolution of interspecies systems: Termitophiles, Myrmecophiles and their hosts.

The third session (*Systematics, Present and Future*) is devoted to speakers who have been active in making the NSF-supported surveys of systematic botany and zoology. F. A. Stafleu of the Internation Bureau for Plant Taxonomy and Nomenclature will speak on the status of systematic botany and David D. Keck of the New York Botanical Garden on its future. Richard E. Blackwelder, secretary of the SSZ, will speak on the status of systematic zoology, and a speaker to be announced on its future.

On December 30 two panel discussions will follow the symposium: one devoted to the London Meeting on Nomenclature featuring Curtis Sabrosky and other participants in the meeting and the other to problems brought up in the symposium sessions.

Directory of ASB Members

1. Alphabetical Directory

This directory of the members of the Association of Southeastern Biologists is based on the membership files of the Secretary and the Treasurer of the Association and is, as far as known, up to date as of October 15, 1958. Any errors or omissions should be reported immediately to the Secretary of ASB, Dr. Harold Humm, Department of Botany, Duke University, Durham, N. C.

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ZIEGLER, ARTHUR W., Botany Department, Florida State University, Tallahassee, Fla.

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2. Geographical Directory

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PERU: B. Lowy.

PUERTO RICO: University of Puerto Rico: R. E. Coker.

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TEXAS: Lamar State College of Technology: R. K. Strawn. **Southwestern University:** G. B. Wolcott. **Stephen F. Austin State College:** W. H. Lewis. **University of Dallas:** A. A. Walker. **University of Texas:** L. S. Dure III, H. T. Odum.

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The Southeast as a Source of Botanists

Two reports (1, 3) on the academic origins of botanists provide information as to the contribution of the southeastern colleges and universities to the supply of American botanists. As Table I indicates, our region does not rate high in this respect at either the bachelor's or doctor's level, either in absolute numbers or in proportion to the total number of college students or the number of colleges and universities.

The data in columns 1 through 3 are from the earlier of the two studies, and are based on a tabulation of the botanists listed in the seventh edition of American Men of Science (1944). The data in column 4 are from the later study (3) and are derived from the ninth edition of AMS (1955).

TABLE I. REGIONAL DISTRIBUTION OF DEGREES IN BOTANY

Region	1. No. graduates in AMS, Ed. 7		2. Graduates/10,000 students, AMS, Ed. 7		3. Graduates/institution[1]		4. No. graduates in AMS, Ed. 9		5. Bachelors as % of total		6. Doctors as % of total	
	Bach.	Ph.D.	Bach.	Ph.D.	Bach.	Ph.D.	Bach.	Ph.D.	Ed. 7	Ed. 9	Ed. 7	Ed. 9
Northeast	501	562	14.7	16.5	2.2	17.6	342	660	25.8	22.8	34.3	29.2
Midwest	697	805	24.4	28.2	3.1	40.3	638	1116	35.9	42.5	49.1	49.3
Northwest	218	36	32.9	5.4	3.2	7.2	127	45	11.2	8.6	2.2	2.0
West Coast	187	146	21.2	16.5	4.0	18.3	239	265	9.6	16.0	8.9	11.7
Southwest	52	11	8.4	1.8	1.0	2.8	32	21	2.7	2.1	0.7	0.9
Southeast	160	38	12.5	2.9	1.0	4.2	35	99	8.3	2.3	2.3	4.4
Canada	124	42	30.0	10.2	5.0	6.0	84	57	6.5	5.7	2.5	2.5
Total	1939	1640	19.1	16.2	2.4	19.3	1497	2263	100.0	100.0	100.0	100.0

1 For bachelors, all colleges and universities in region used as the base. For Ph.D., institutions in region granting this degree used as the base. Data based on AMS, Ed. 7.

Columns 5 and 6 convert the number of students from each region to per cents of the total, to permit more ready comparison between the two sets of data representing an eleven year interval. The comparisons are interesting but must be made with caution at the bachelor's level since the two samples are different. In the earlier study the data are based on the entire listing, while in the latter one they include only the graduates of the 50 most productive institutions, who constituted only 55 per cent of the total of 2711 botanists listed. For the Ph.D graduates the data are more comparable, since the 66 universities listed in the later study produced all but 25 of the graduates tabulated.

Both sets of data reveal the Midwest as by far the most productive of all the regions and the Southwest as the least productive, with the Southeast not too far ahead of it. During the eleven year interval the West Coast and the Southeast gained in the per cent of the total doctorates granted, while the Northeast lost and the other regions remained essentially stable. The percentage changes at the bachelor's level probably lack significance for the reason mentioned above. The marked drop for the Southeast is probably due to the fact that graduates in our region are widely dispersed, only three institutions having enough graduates in botany to be included in the list of the fifty most productive colleges and universities. That the type of regional distribution secured for botany is not unique, but rather characteristic for science as a whole, is indicated by other studies such as that of Knapp and Goodrich (2).

In the earlier study the most productive Southeastern institutions, with their ranks and number of graduates, were 26. Clemson (20), 36. West Virginia (15), 46. Maryland (12), and Mississippi A. & M. (12). At the Ph.D. level the ranked institutions were 14. Maryland (28), 26. Virginia (13), 27. Duke (12), 38. North Carolina (6), 42. Louisiana State (4), and 46. West Virginia (3). Eleven years later only three southeastern institutions ranked among the top fifty at the undergraduate level: 32. Clemson (19), 42. North Carolina (16), and 48. West Virginia (15). At the Ph.D. level the southeastern list increased to eight: 19. Duke (34), 20. Maryland (31), 27. North Carolina (21), 31. Virginia (16), 33. Louisiana State (11), 40. North Carolina State (7), 44. West Virginia (6), and 54. Vanderbilt (4).

Although many possible reasons for the regional differences in the productivity of botanists come to mind, it is difficult if not impossible to assess their importance. Regardless of the reasons, the South is not producing its fair share of botanists and we should make every effort to improve our standing in this respect. Indications are that improvement is already underway, at least at the graduate level, and it is likely that a similar survey based on the next edition of AMS would reveal considerably increased productivity in our region, with a number of additional colleges and universities added to the ranking list of most productive institutions.

VICTOR A. GREULACH, *University of North Carolina.*

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2. Knapp, R. H. and H. B. Goodrich. Origin of American scientists. Chicago: University of Chicago Press, 1952.
3. Lyon, Charles J. Origins and status of American botanists. *Science* 125: 1071-1075, 1957.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

K. W. Cooper, research professor of biology at the University of Florida, has been appointed an associate editor of *Evolution* for a three year term.

Wilbrod St. Amand, until recently with the Biology Division, ORNL, has accepted a professorship of biology at the University of Mississippi.

Ouida Carolyn Wells, who recently received her Ph.D. in biology from Emory University, has accepted a position with the cytology and genetics group at the Biology Division, ORNL.

A. C. Clement of Emory University has been named program director for developmental biology in the Division of Biological and Medical Sciences, National Science Foundation. Dr. Clement is on leave from Emory.

The following biologists have returned to their academic duties after being associated for the summer in the indicated capacities with the Biology Division, ORNL: **George C. Royal, Jr.** of the A. & T. College of North Carolina, research participant: **James N. Dent,** University of Virginia, consultant; **Robert T. Brumfield,** Longwood College, consultant; and **A. H. O'Bier, Jr.,** Longwood College, assistant to Dr. Brumfield.

Donald B. Anderson has been named provost and vice president of the University of North Carolina and will assume his duties in Chapel Hill November 1. For many years Dr. Anderson has been professor of botany, chairman of the division of biological sciences, and dean of the graduate school at the North Carolina State College division of the University, and during the past several years has been on leave of absence to serve as program director in the scientific personnel and education division of the National Science Foundation.

Robert S. Leisner, who recently received his Ph.D. in botany from the University of North Carolina has accepted a position as assistant to the executive director of the American Institute of Biological Sciences.

Memorials to the late **Arthur Sperry Pearse,** formerly professor of zoology, Duke University, have been erected at the Duke Marine Laboratory, to honor the man who was largely responsible for establishment of the Laboratory. The A. S. Pearse Memorial Scholarship in Marine Biology was awarded to **George H. Rees,** graduate student in zoology, Duke University.

James H. Eads, Jr., formerly of Middle Tennessee State College, Murphresboro, is now assistant professor of biology, Meredith College, Raleigh, N. C.

John A. Yarbrough, Meredith College, is now chairman of the Collegiate Academy Conference of the AAAS.

Rolf Siepmann, Christian Albrechts University, Kiel, Germany, is research associate in mycology, Duke University.

The first annual Pearse Memorial Lecture was given in July by **H. L. Blomquist,** Duke University. Dr. Blomquist spoke on his travels in Puerto Rico.

Wm. Burbanck has resumed his duties in the Emory Biology Department after a year leave spent in study and research at the Woods Hole Biological Station.

Rosamond McMillan, who has been a visiting professor in the department of biology at Agnes Scott College is now in the department of agricultural chemistry and biochemistry at Louisiana State University in Baton Rouge, where she will do research on the lipid metabolism in *Ankistrodesmus.*

S. Leonard Doerpinghaus has accepted a position as assistant professor in the department of biology at Agnes Scott College. He comes from the department of botany at Louisiana State University.

John Davis of the University of Florida is now at the University of Mandalay, Mandalay, Burma. He left July 1, 1958 and will be there for 3 years on a grant with the University of Florida and the Ford Foundation. Dr. Davis is teaching botany and zoology and will also have an opportunity to do some ecological field work and some work in phytogeography.

Lillian Arnold retired after 30 years service as curator of the herbarium, Agricultural Experiment Station, University of Florida. **Daniel Ward,** a recent Ph.D. graduate of Cornell, is to replace Miss Arnold. He will also teach taxonomy in the botany department.

Alan Conger, formerly of the Oak Ridge National Laboratory, has joined the staff of the botany and biology Department at the University of Florida as professor of radiation biology. He will develop a teaching and research program in radiation biology.

Yoneo Sagawa, assistant professor of botany at

the University of Florida, spent the summer as guest collaborator at the Brookhaven National Laboratory.

Three members of the department of zoology of the University of North Carolina attended intersational congresses during the summer: **Maurice Whittinghill, Donald P. Costello**, and **Melbourne R. Carriker.** Dr. Whittinghill presented the paper "Distribution of Rheumatoid Arthritis and Spondylitis and Still's Disease in a Single Large Kindred" at the Xth International Congress of Genetics at Montreal, Canada, in August. His grant from the U. S. Atomic Energy Commission has been extended for another term, and concerns the relation between spontaneous and induced mutations and crossovers. Drs. Costello and Carriker attended the XVth International Congress of Zoology in London, England. Dr. Carriker spoke on "Comparative Functional Morphology and Evolution of the Drilling Mechanism in *Urosalpinx* and *Eupleura*". After the Congress he visited marine laboratories at Burnham-on-Crouch and Plymouth, England; Millport, Scotland; and Menai Bridge and Conway, Wales. His grant for research on oyster drills has been extended for another period by the U. S. Fish and Wildlife Service, and he was re-elected president of the National Shellfisheries Association.

Charles E. Jenner, Chairman of the department of zoology at the University of North Carolina, spent the latter half of the summer at the Marine Biological Laboratory, Woods Hole, Massachusetts, continuing studies of aggregation and schooling behavior in the mud snail. **C. D. Beers** of the department spent the summer at Mt. Desert Island Biological Laboratory, Maine, studying ciliates of the foot and mantle cavity of *Mytilus*. **H. E. Lehman** officiated as chairman of one of the sessions of metings of the Society for the Study and Growth and Development in Massachusetts in June.

Lillian Lehman (formerly Lillian Youngs) has accepted an appointment as assistant professor in the department of zoology at the University of North Carolina for the current school year. Dr. Lehman did her graduate work at Chapel Hill.

William A. Arnold of the Biology Division, ORNL, spent the summer months working with Albert Szent-Gyorgyi at the Institute for Muscle Research, Woods Hole, Massachusetts. Dr. Arnold's studies concern energy transfer in biological systems, particularly in muscles.

John S. Kirby-Smith has returned to the Biology Division ORNL, from a one year's leave of absence spent at St. Bartholomew's Hospital, London, England. Dr. Kirby-Smith is head of the biophysics group.

Karl Bruce Jacobson has reported to work in the Nucleic Acid Chemistry Group at the Biology Division, ORNL. Dr. Jacobson received the Ph.D. degree from the McCollum-Pratt Institute of the Johns Hopkins University and for the past two years has been associated with Dr. Linus Pauling at California Institute of Technology, Pasadena.

N. E. Tolbert, who has been head of the plant biochemistry group of the Biology Division, ORNL, has accepted a position as professor of agricultural chemistry at Michigan State University, East Lansing.

A. C. Cole of the University of Tennessee department of zoology and entomology spent the summer in Mexico studying the "harvesting" ant. This work was supported by a National Science Foundation grant. Dr. Cole's work includes collecting specimens and accumulating field data on distribution, habitats, populations, and life histories.

Four members of the University of Tennessee botany department spent the summer studying plant life in the tundra of northern Alaska for the Arctic Institute of North America. The project was directed by **Royal E. Shanks** who has spent the previous three summers in Alaska. Other botanists participating in ths project are **John Koranda, Harry Sherman,** and **A. J. Sharp,** head of the botany department at Tennessee.

Warren M. Deacon retired in the spring from the chairmanship of the department of biology at Vanderbilt University. Prof. Deacon, who was recently honored by the 1958 graduating class as Yearbook Sponsor and by the Highlands Biological Laboratory in having one of the newly erected buildings named the Deacon Cottage, will continue to teach bacteriology. No appointment to the chairmanship of the department has yet been made.

R. B. Channell of Vanderbilt University taught a course in marine botany at the Gulf Coast Marine Lab, Ocean Springs, Miss., during the summer. For the last term of the summer session, **J. J. Friauf** taught at the Mountain Lake, Va. Biological Station. Among the Vanderbilt personnel assisting with the NSF Institute for Science Teachers at Murray State College, Murray, Ky., were **Ilda McVeigh** and **Elsie Quarterman.**

James T. Blackwell, a recent Vanderbilt University graduate in bacteriology, has accepted a position as assistant professor at Pensacola Junior College.

Wm. C. Sloan has been appointed instructor in zoology at Vanderbilt University.

Ronald C. Rustad, who received his doctor's degree from the University of California, is now an instructor in physiology in the department of biological sciences at Florida State University. Dr. Rustad spent last semester as a research associate at the University of Edinburgh.

Robert Kral, formerly of Florida State University, is now instructor in biology at North East Louisiana College, Monroe, Louisiana.

James Hardin, assistant professor of botany at North Carolina State College won the Cooley Award for the best published paper of the preceding calendar year dealing with the flora of the southeastern U. S. The award was made at the AIBS meetings in Bloomington.

A. M. Winchester, head of the biology department at Stetson University, attended the International Congress of Zoology in London, England from July 16 to July 26.

E. C. Prichard of the biology department at Stetson University spent the past summer at Camp Rockmont near Black Mountain, N. C. as associate director in charge of nature study for the camp.

Adrian W. Poitras joined the faculty of the department of biological sciences at Florida State University in September. He was formerly associate professor of botany and plant pathology at Alabama Polytechnic Institute, Auburn.

Relis B. Brown, formerly visiting associate professor at Vanderbilt University, is this year a research associate at Florida State University.

Leland Shanor, head of the department of biological sciences at Florida State University, participated in a National Science Foundation Summer Institute at Illinois Weslyan University, July 28-August 7.

Neil C. Hulings, who received his Ph.D. in biological oceanography from the Florida State University Oceanographic Institute in August, is now assistant professor in the department of biology and geology at Texas Christian University. **George Grice**, former Oceanographic Institute student, has received a Guggenheim Fellowship to study copepods of the Pacific. He is located in Hawaii.

John B. Morrill has returned from six months at the Hubrecht Laboratory, University of Utrecht, where he participated in the third International Embryology Teamwork session, and is now with the department of biology, Weslyan University. Dr. Morrill received his Ph.D. in zoology from Florida State University in February, 1958.

Sidney W. Fox, director of the Florida State University Oceanographic Institute, attended the International Seaweed Symposium in Galway, Ireland, this summer and was chairman of a scientific session at the meeting. He also attended the International Union of Biochemistry meeting in Vienna and was a delegate of the NAS-NRC to the general assembly.

Kurt Köhler of the Max-Planck-Institut für Meeresbiologie is a research associate with the Florida State University Oceanographic Institute working with **Charles B. Metz** in the experimental embryology laboratory. Dr. Köhler joined the Institute staff in February, 1958.

Alan J. Kohn, formerly of Yale University, is now assistant professor of zoology at Florida State University.

The extensive refresher course in protozoology given jointly by the American Society of Zoologists and the Society of Protozoologists at the recent AIBS meetings at Indiana University at Bloomington included amongst the demonstrations a display of over 200 models representing 50 species of amebas, prepared by **Eugene C. Bovee**, associate professor of biology at the University of Florida.

Allen L. Steinhauer has joined the staff of the department of entomology, Agricultural Experiment Station, University of Maryland. Dr. Steinhauer is a native of Canada and a graduate of the University of Manitoba. He recently received his Ph.D degree at Oregon State College. His research experience has been in the field of forage crop insects, fruit insects, insect physiology and toxicology. His principal duties at College Park will involve research on insects affecting alfalfa, clover, and other forage crops.

Gordon B. Wolcott formerly of the USPHS, Columbia, S. C. has accepted a position as professor of biology at Southwestern University, Georgetown, Texas. Dr. Wolcott had been at Southwestern for a number of years before going to Columbia, and has been active in ASB affairs while in the southeast.

A new manual of winter botany, "Woody Plants in Winter," by **Earl L. Core** and **Nelle Ammons** of West Virginia University has ben published by the Boxwood Press of Pittsburgh. The book contains keys to genera and species, and brief descriptions of the winter features, with sketches of buds and twig characters. About 300 species are included, representing the more common trees and shrubs of the northeastern United States and southeastern Canada ("Gray's Manual range").

R. F. Kimball has returned to the Biology Division, ORNL, after a nine months' leave of absence

spent at the Karolinska Institutet, Stockholm, Sweden. Dr. Kimball is head of the Cytology and Genetics Section.

Alexander Hollaender attended the Second United Nations International Conference on the Peaceful Uses of Atomic Energy in Geneva, Switzerland, September 1-13, as a member of the United States Delegation to serve as technical advisor. Dr. Hollaender then went to Milan, Italy, to consult with members of the Italian Radiobiology Committee in regard to the organization of a radiobiology program in Italy.

William L. Russell of the Biology Division, ORNL, also attended the International Conference on the Peaceful Uses of Atomic Energy in Geneva. Dr. Russell then went to Great Britain to confer with personnel concerning subjects having a bearing on the genetic hazards of radiation in man at University College, London, and the Chester Beatty Research Institute in London; Institute of Animal Genetics, Edinburgh; and the University, Glasgow, Scotland.

William C. Massey has been appointed associate professor of biology at the University of Florida. An archeologist and anthropologist, he holds A.B. (1940) and Ph.D. (1955) degrees from the University of California.

Frank J. S. Maturo has been appointed assistant professor of biology at the University of Florida. He comes to Florida from the University of North Carolina where he has been an assistant professor of zoology. He is a specialist on the marine bryozoa.

William J. Riemer assistant professor of biology at the University of Florida, and assistant curator of biology at the Florida State Museum, left in September for Tel Aviv, Israel where he will be on Fulbright Fellowship at the University of Israel for the academic year 1958-59. While at the University of Israel he will do research in herpetology and will teach classes in herpetology and zoogeography.

Coleman J. Goin, professor of biology at the University of Florida, was the principal speaker at the annual banquet of the American Society of Icthyologists and Herpetologists at the recent AIBS meetings at Indiana University in Bloomington. His topic was "The Evolution of Amphibian Life Histories."

Three biologists who recently received their Ph.D. degrees from the University of Florida have accepted positions in the Southeast. **Robert G. Weigel** is now assistant professor of biology at Howard College, Birmingham, **William C. Sloan** is interim assistant professor of biology at Vanderbilt University, and **William Jennings** is in the rabies control division of the Florida Fish and Game Commission.

Frances E. Silliman, recently of the University of North Carolina, has accepted a position in the biology department at Bridgewater College, Bridgewater, Va.

John Herr, who received his Ph.D. in botany from the University of North Carolina in 1957 and spent last year in India studying on a Fulbright Scholarship, has accepted a position at Pfeiffer College. Other botanists who received their degrees from the University of North Carolina and have accepted positions beginning this fall are **Charles E. Miller** at Emory University and **George Ramseur** at the University of the South.

Beatrice Exner has joined the staff in botany at Louisiana State Universty. Dr. Exner was previously associated with Francis T. Nichols College, Thibodeaux, Louisiana.

Richard E. Garth has been appointed assistant professor of biology at Northwestern State College (Louisiana). Dr. Grath comes from East Tennessee State College.

Robert E. Gordon has resigned from Northeast State College (Louisiana) to join the staff in the department of biology at Notre Dame. Dr. Gordon has been replaced at Northeast State by **Robert Kral.**

Harold A. Dundee, from University of Michigan (herpetology), and **Robert A. Norris,** from University of California (ornithology), have been appointed to the faculty of the department of zoology at Tulane University. Dr. Norris for the past three years has worked with the University of Georgia Ecological Studies Projects of the Atomic Energy Commission Savannah River Plant Area.

Fred R. Cagle, Tulane University, has just returned from a 40-day tour of the USSR as an official representative of the AIBS. The tour was arranged by the Soviet Academy of Sciences. Dr. Cagle visited 14 scattered sectors from Leningrad to Siberia. Among his assignments was that of exploring the possibility of expanding the inflow of Russian biological literature to the U. S. Following the Russian tour, Dr. Cagle visited research institutes in India, Hong Kong, and Japan.

Stuart S. Bamforth represented Tulane University this summer at the 15th International Zoological Congress in London.

René J. Bienvenu, Northwestern State College (Louisiana), served as visiting professor of bacteriology at the University of Texas during the second summer term.

Institutions and Organizations

The **Second Alligator Harbor Embryology Conference** was held at the **Florida State University** Oceanographic Institute's marine laboratory in March. Scientists from ten southeastern universities and institutions attended the informal meetings. The conference was jointly organized by C. B. Metz, FSU Oceanographic Institute; J. R. Fisher, FSU chemistry department; and J. W. Brookbank and James Gregg of the University of Florida biology department.

Twelve full weeks of coursework were offered at the **Florida State University** Alligator Harbor Marine Laboratory summer session this year, as the beginning of a fuller summer instruction program for the laboratroy. **Meredith L. Jones** taught Survey of Marine Science from June 9 to July 18 and **R. W. Menzel** offered a course in experimental marine biology from July 21 to August 29.

Facilities of the **Florida State University** Oceanographic Institute are available throughout the year for qualified visiting investigators. On the Tallahassee campus laboratory and office space are provided, along with standard research equipment. At the Alligator Harbor Marine Laboratory research cubicles, living accommodations, boats, collecting gear, and standard equipment are available without charge to visiting investigators. Any person desiring to use the facilities of the Institute is invited to apply to the office of the director, outlining his proposed research, probable length of his visit, and needs in space and equipment. The request preferably should be made at least two months before the proposed visit.

Duke University is constructing a new 3.5 million dollar biology-forestry building. The building, which wil be of brick and adjacent to the physics building, will provide much improved and enlarged facilities.

The department of biology at the **Woman's College of the University of North Carolina,** Greensboro, is conducting an NSF In-Service Training Institute for high school biology teachers under the direction of Hollis J. Rogers.

At the formal reopening of the **Highlands Biological Station** in June, Stanley A. Cain, University of Michigan, gave the address, "The Role of the Biological Station." On June 29 ceremonies dedicating the William Chambers Coker laboratory building, the Margaret Cannon Howell Cottage, the Henry Wright Cottage, and the Warren M. Deacon Cottage were held. These buildings were made possible by a grant from the National Science Foundation. The dedicatory address was made by Lewis E. Anderson, Duke University. New officers elected at the 31st Annual Meeting of the Station included: President, Leland Shanor, Florida State University; Vice-President, H. J. Oosting, Duke University; and Robert K. Godfrey, Florida State University, member Board of Managers. Florida State University is the ninth institution to become a Subscribing Institutional Member of the Station. The National Science Foundation has made a grant of $17,400 over the next three years to the Station for research grants-in-aid for work in the Southern Appalachians. Central heating of a part of the new laboratory building and the Margaret Cannon Howell Cottage will make the station available throughout the year for research.

A 6000 curie cobalt-60 source has been placed in operation by the Agricultural Experiment Station of the **University of Florida.** This facility was planned and built under the supervision of Howard Teas.

A series of popular lectures in the humanities and sciences was held at **Mississippi Southern College** during the summer. Representing the biological sciences, A. E. Harrises, Mississippi Southern, discussed "Parasitemias in Domestic Animals and Man in Mississippi"; George C. Kent, Jr., L. S. U., spoke on "Hormones in the Flux of Life."

The new Biological Sciences building at **Northwestern State College** (Louisiana) has been completed and classes were held in it for the first time during the summer session. A N.S.C. summer institute for 53 high school science teachers was conducted at the college. W. G. Erwin served as director.

Grants in Aid

During recent months the biology department at Emory University has been awarded research grants totaling almost $150,000. Three grants are from the Atomic Energy Commission: $7,000 to **A. V. Beatty** for a one year study of the biological effects of radiation, $12,708 to **Robert B. Platt** for a one year study of the long range effects of radiation on natural plant and animal populations, and $26,863 to Dr. Platt for a one year study on the ecological effects of radiation at the Lockheed reactor site. **A. A. Humphries** has a grant of $2,638 from the American Cancer Society for further studies on the influence of the oviduct on amphibian eggs, while **E. L. Hunt** has a $23,987 grant from the Public Health Service for a three year study of estrus cycle and gestation in diabetic rats. During the summer **W. D. Burbanck** studied the ecology of estuarine isopods on a $1,000 grant from the Office of Naval Research. The National Science Foundation has awarded two grants: $5,000 to **W. B. Baker** for a one year study of the biology cur-

ricula of the Atlanta area and the improvement of biology instruction, and $13,000 to **C. Ray, Jr.** for a two year study on the cytogenetics of *Tetrahymena pyriformis.*

Jack D. Burke of the University of Richmond has been granted $375 by the Society of the Sigma Xi to assist in the study of blood volume, oxygen capacity, and oxy-hemoglobin affinity of blood in armadillos.

Among the recent National Science Foundation grants are $34,000 to **T. B. Mitchell** of North Carolina State College for a three year study of native bees of the eastern U. S., $5,300 to **S. P. Myers** of the University of Miami for a one year study of the marine yeasts of Biscayne Bay, and $6,000 to **Arthur C. Cole, Jr.** of the University of Tennessee for a two year study of the ant genus *Pogonomyrmex.*

John M. Woodward, professor of bacteriology at the University of Tennessee, has received a grant of $15,960 from the Office of Naval Research to continue studies on tularemia.

D. Frank Holtman, head of the University of Tennessee bacteriology department, has received a National Science Foundation grant of $11,700 to continue studies on the effects of typhoid-type organisms on protein metabolism of laboratory animals.

Guy T. Barry of the University of Tennessee Memorial Research Center has received a grant of $84,000 from the National Institutes of Health to investigate the chemical nature of substances frequently found on the surface of bacteria.

New research grants to biologists at the University of Florida from the National Institutes of Health include $18,800 to **Henry M. Wallbrunn** for a two year period to study "Mutation Rates in Homozygotes and Heterozygotes"; $42,000 to **John W. Brookbank** over a five year period to study "Antigen Distribution in Developing Sea Urchin Embryos"; $60,000 to **James H. Gregg** to investigate "Physiology of Growth and Aggregation in the Slime Mold, *Dictyostelium*" through a five year term; and $20,500 to **Eugene C. Bovee** for a three-year "Study of the naked, lobose Amoebida."

C. W. Edington of Florida State University has received a grant of $15,000 from the Atomic Energy Commission for studies on gene and chromosome changes induced by ionizing radiations in *Drosophila melanogaster.*

The department of botany of the University of Florida received a $10,000 grant from the Atomic Energy Commission to purchase equipment to be used in teaching the use of radioisotopes in life sciences. The grant is under the supervision of **G. Ray Noggle.**

Robert B. Platt of Emory University has received a Guggenheim Fellowship for "Ecological Studies of communities with reference to their microenvironment." The work will be carried out at Emory through the fall and will be continued in northern Europe and the Scandinavian countries for seven months, beginning in February 1959.

A two-year grant of $1400 has been awarded **R. J. Neff** of the University of Tennessee by the National Institutes of Health to be used in studies on the nuclear physiology of a soil amoeba.

Norman C. Negus of Tulane University has received a renewal grant of $15,000 from the Atomic Energy Commission to continue his studies on cyclic changes in small mammal populations of Breton Island, Louisiana.

John S. Laurie, also of Tulane, has received a grant of $10,000 from the National Institutes of Health for studies on the comparative physiology of parasitic helminths.

Milton Fingerman of Tulane has received a renewal grant of $40,000 from the National Institutes of Health to continue his studies on the hormone systems of crustaceans.

René J. Bienvenu (Northwestern La. State) has received a renewal grant of $18,788 to continue his studies on Haptenes in immunity to Brucellosis.

As a result of the expansion of its budget from $40 to $130 million the **National Science Foundation** is now in a position to make more extensive grants in its research, fellowship, institute and other established programs and to establish new programs, particularly in science education. Among the latter for which proposals are now being invited are summer training programs for secondary school students, science projects of state academies of science, traveling science demonstration lectures, undergraduate research training, research participation program for training of high school teachers, specialized short courses in the sciences for teachers in high schools and small colleges, undergraduate science honors programs, work conferences on science teaching, and development of home study laboratory courses for high school science teachers. Information about these programs can be secured from Dr. W. J. Peterson, Head, Special Projects in Science Education, National Science Foundation, Washington 25, D. C. Two new fellowships programs have also been established: summer fellowships for high school teachers and summer study fellowships for graduate assistants. Information may be secured from the Fellowships Section of the NSF.

The ASB BULLETIN

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CONTENTS

The Official Quarterly Publication of
The Association of Southeastern Biologists

THE ASB BULLETIN

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GEOFFREY M. JEFFERY, EDITOR

HAROLD J. HUMM, ASSOCIATE EDITOR
A. W. JONES, BUSINESS MANAGER

ASSOCIATION AFFAIRS

The BULLETIN

The incoming editor views with some misgivings the prospect of continuing the ASB BULLETIN at the high level of quality established and maintained by the retiring editor, Victor A. Greulach. The good wishes and the assistance of the retiring editor are gratefully acknowledged. The editor is confident that the same cooperation from the officers of the ASB and from the State Correspondents which has been enjoyed in the past will continue in the future. Certainly without their encouragement and assistance the editor could hope for little success.

A change in editors implies no change in policy, format or size of the BULLETIN. The BULLETIN remains an instrument of the Association, and the editor welcomes suggestions and helpful criticisms from the members.

It will be noted that with this volume a new printer has been engaged. The change in printers was entirely a matter of convenience, that of having the printer in the same city as the editor. The Association is grateful to the Orange Print Shop, Chapel Hill, N. C., for faithful service through the early years of the BULLETIN. It is probable that an issue or two will be required before our present printer becomes accustomed to the BULLETIN, and the understanding of the members in this regard is solicited.

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The Knoxville Meeting

Attention of members is called to the announcement of the annual meeting of the Association, April 16 to 18, at the University of Tennessee in Knoxville appearing in this issue of the BULLETIN. The center insert section is provided, as usual, for the convenience of members in the submission of nominees, papers for presentation, *etcetera*. The deadlines given on the first page of this section are of particular importance.

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ASB Meeting Places

The president has appointed a committee to arrange for future meeting places and solicits suggestions from the membership. To aid in these suggestions the following list of former meeting places of ASB is provided:

1937 University of Georgia.
1938 University of Georgia.
1939 Duke University.
1940 Vanderbilt University.
1941 Alabama Polytechnic Institute.
1942 University of Miami.
1946 University of South Carolina.
1947 Emory University.
1948 University of Florida.
1949 University of Tennessee.
1950 University of Virginia.
1951 University of Alabama.
1952 Agnes Scott College.
1953 University of North Carolina.
1954 Louisiana State University.
1955 The Citadel.
1956 Duke University.
1957 University of Georgia.
1958 Florida State University.
1959 University of Tennessee.

●

Suggested Nominees

Every member has the opportunity to give careful consideration to the matter of selection of candidates for the various offices to be filled at the annual meetings and to indicate his preferences for those positions. All you have to do is fill out the Blank 1 from the insert in this issue and mail to H. K. Wallace, Chairman, Nominating Committee, Department of Biology, University of Florida, Gainesville. The other members of the Nominating Committee are Harry J. Bennett, Zoology, Louisiana State University, and Chauncey G. Goodchild, Biology, Emory.

The Role of the Oak Ridge Institute of Nuclear Studies (ORINS) in Biological Education and Research

ARTHUR L. SCHIPPER

Dr. Schipper holds the B.S. degree from Coe College and the M.S. and Ph.D. degrees from the State University of Iowa. He served in the Department of Biology at A. & M. College of Texas from 1937 to 1948; with the U. S. National Park Service during the summers of 1940-1941; and with the U.S.A.A.F. as an Aviation Physiologist 1943-45. From 1948 to 1957 he was in the Biology Department of the University of Notre Dame, and was Editor of the American Midland Naturalist, 1954-57. Since 1957 Dr. Schipper has been associated with the University Relations Division of the Oak Ridge Institute of Nuclear Studies. The following is the second in the series of articles describing the significant contributions of Oak Ridge installations to biological research and education in the southeast.

At the termination of World War II, there existed at Oak Ridge an extensive installation for the production of nuclear energy. With the transition to a peacetime status there was the possibility that a dispersion both of personnel and facilities would follow. The assemblage in this area of scientific manpower, if retained, represented a source which would serve to complement the expanding prominence of science on the campuses of southern colleges and universities.

The existing condition afforded a challenge of considerable magnitude, and one that could not be circumvented. The issue demanded prompt and vigorous action. Concerted effort by several colleges and universities was considered to be the most efficacious method for achieving the coveted goal. These then were the circumstances influencing the deliberations that were to lead to the ensuing organization of the Oak Ridge Institute of Nuclear Studies, a nonprofit educational corporation of southern universities.

The development of ORINS has been manifested, not only by an increase in the number of sponsoring colleges and universities, but also by the number and magnitude of the programs administered and conducted for the Atomic Energy Commission.

ORINS sponsoring universities, now numbering thirty-seven, are distributed among fifteen southern states and the District of Columbia. Although the Institute is regional in organization the programs administered are often national and, not infrequently, international in scope. Benefiting through these programs are colleges, universities, secondary schools, and professional people in science, agriculture, engineering, and medicine.

The major portion of the work of ORINS is conducted under contract with the United States Atomic Energy Commission. Approximately one-half of the Institute's programs are those which ORINS has petitioned the Atomic Energy Commission to carry out in behalf of universities. Additionally the Commission has called on the Institute to carry out programs which are of direct AEC concern.

Most of the Institute programs are carried out in cooperation with Union Carbide Nuclear Company, the major AEC contractor in Oak Ridge. This company has made available to universities the outstanding staff and research equipment at the Oak Ridge National Laboratory for those programs carried out jointly by the Institute and the Laboratory.

Numerous faculty members, under the Oak Ridge Research Participation Program, have made significant contributions to science as a result of being able to engage in research at Oak Ridge laboratories. As most appointments are made for the summer months, this program enables the university scientist to be actively engaged in research at a time when there is a minimum of interference with teaching commitments. The benefits obtained from research participation are numerous. Notable are the opportunities to associate with eminent research scientists, to utilize new and unusual types

of research facilities, and to become familiar with the most recently developed techniques.

The stimulus provided by research participation has been an important factor in the development of many research programs on the campus. Former participants often return to Oak Ridge for the purpose of consulting with laboratory scientists concerning research, either projected or in progress. The benefits accruing to the laboratory and to the participant ultimately extend to the campus and to the students as a natural consequence of more effective teaching and more productive research.

Most of the research participants receive appointments to the Oak Ridge National Laboratory and the remainder enjoy similar opportunities at the Oak Ridge Institute of Nuclear Studies and the University of Tennessee-Atomic Energy Commission Agricultural Research Laboratory. Areas of research which have attracted biologists include all phases of radiation biology. Since 1948, approximately 600 research participation appointments have been made. Of this number more than one hundred were in the ORNL Biology Division and ninety were divided equally among the ORNL Health Physics Division, the UT-AEC Agricultural Research Laboratory, and ORINS.

Similar opportunities are available to doctoral candidates who have completed all requirements for graduation except thesis research. The training and experience gained as an Oak Ridge Graduate Fellow contributes immeasurably to the future outlook of the individual who is beginning to fashion a career in teaching and/or research. This program may be regarded as one which provides the university with expanded research facilities, since most universities would assume a great financial burden were they to attempt to duplicate them. Since the inception of this program, more than fifty graduate students have completed their thesis research in Oak Ridge Laboratories, ten of whom were biology majors.

Bringing Oak Ridge to the campus is achieved by the Oak Ridge Traveling Lecture Program. Scientists from Oak Ridge National Laboratory, UT-AEC Agricultural Research Laboratory, ORINS, and Atomic Energy Commission lecture before seminars, colloquia, and assemblies. In addition to presenting results of his research, the speaker considers also recent developments in similar fields. Not infrequently the visitor consults with faculty members regarding campus research projects. Conferences with students are sources of inspiration and encouragement. This is another example of cooperation with southern colleges and contributes considerably to the scientific atmosphere of campuses.

The employment of isotopes has proven to be one of the most beneficial aspects of the peaceful uses of atomic energy. The Basic Radioisotope Techniques Course, conducted by ORINS for AEC, has provided training for persons from each of the forty-nine states as well as from a number of foreign countries. These courses, presented several times each year, continue to attract applicants in such numbers that registration is often completed many months in advance. The techniques learned are invaluable to physicians, veterinarians, agricultural scientists, and biologists as well as to those in physical sciences, industry, and engineering. Appropriately enough, these courses, by providing a comprehensive and basic knowledge regarding the use of isotopes, have contributed notably to research. As a consequence of this program, scientific research will continue to benefit, not only in the southern region, but also nationally and internationally. More than 3,500 persons have received training in the basic and advanced courses given by ORINS.

ORINS has been active in medical research and training. Among the research programs are those concerned with thyroid uptake of iodine-131, total-body irradiation and bone-marrow transplantation, dosimetry, rare-earth studies, alkaline-earth metabolism, and protein metabolism. Research is conducted by staff scientists, research participants, and visiting personnel. The latter includes foreign scientists and also those from various parts of the United States. Training in the use of radioisotopes is offered to physicians who wish to spend from three months to one year in residence.

ORINS has cooperated in the presentation of a number of symposia, among which were Cancer Therapy with Radioisotopes, The Role of Atomic Energy in Agriculture, and Radiation in Plant Breeding.

Among the AEC Special Fellowships of interest to biologists are those in Radiological Physics. The purpose of these fellowships is to provide training for persons who can become competent in the study, evaluation, and control of radiation hazards. Fellows are appointed for one year, nine months being spent in residence at a university campus and the remaining three months at a national laboratory.

The Oak Ridge Traveling Science Demonstration Lecture Program (popularly known as Traveling Science Teachers) is supported by the National Science Foundation in cooperation with the Atomic Energy Commission. The traveling teacher program, initiated less than three years ago, has been extremely successful. During the first two years all teachers were NSF-supported. More recently several of the states supplied teachers for this program. Currently there are seven NSF-supported and twelve state-supported teachers.

Selected high school teachers spend the summer months in Oak Ridge during which period they receive intensive training in biology, chemistry, mathematics, and physics. Each teacher builds much of the equipment which he will use in presenting lectures and demonstrations. After the completion of the training period, the teachers visit high schools throughout the country (state teachers remain within their respective states), spending one week at each school visited, giving lectures and demonstrations. Administrators and teachers alike, of the schools visited, have commented on the immense value of the program. It has not been possible to visit more than a small percentage of the schools requesting a visit from a traveling teacher, so great has been the demand for this program.

Nine undergraduate biology majors from small colleges were appointed, as student trainees, to ORNL Biology Division for a period of ten weeks during the past summer. The experience gained provided them with a better insight into the various facets of a research project.

The Museum Division of ORINS has been very active in public presentations of the uses of atomic energy. Part of this is accomplished by the American Museum of Atomic Energy located at Oak Ridge. In addition there are a number of traveling exhibits which are available to schools, colleges, academies of science, and science fairs. Illustrations and descriptions in the panels accurately depict many important uses of radioisotopes including those in agriculture, biology, and medicine.

Construction of a new ORINS administration building is scheduled for 1959. Concomitant with this physical development will be a continuation and strengthening of present programs of service in atomic energy, and the assumption of operating responsibility for programs, not only in this field, but in others as well.

As The President Sees It

Six years ago Victor A. Greulach agreed to serve as editor of a first publication for ASB. It was a memorable decision for the organization. I do not have the records at hand but as well as I can remember the only specific instructions handed Greulach by the executive committee, with Association approval, concerned the name (The ASB BULLETIN), how much money could be spent (a very small sum), and the kind of publication that was *not* wanted (a scientific journal). With this meager guidance, and, I might add, a goodly bit of pessimism not to mention outright disapproval by some members of a formal ASB publication, Greulach dug into the job. The results of his thought, planning and industry are five excellent volumes of The ASB BULLETIN, each of which has evoked the praise and thanks of the Association. With the publication of an index of these volumes Greulach asked that his tenure as editor be ended, and the executive committee regretfully accepted his resignation.

On behalf of the 700 members of ASB I want to extend to Dr. Greulach our heartfelt gratitude for the terrific job he has done in organizing and getting out the BULLETIN. It has served not only as an informative and unifying force within ASB and brought added dignity to the Association's activities, but it has also gained for ASB recognition from outside the Southeastern United States. We all wish for Dr. Greulach a happy "retirement."

We give a hearty welcome to our new editor, Geoffrey M. Jeffery of the U. S. Public Health Laboratory of Tropical Diseases in Columbia, South Carolina. A native of Dundee, New York, Dr. Jeffery received an A.B. from Hobart College, an M.A. from the University of Syracuse, and an Sc.D. from Johns Hopkins University. The past twelve years he has spent in Alabama, Georgia, and South Carolina doing field and laboratory research in parasitology and entomology, his main interest being human and avian malaria. Jef-

fery has been an interested and active member of ASB and thus assumes his duties with real awareness of the purposes and accomplishments of the Association. Your officers are most pleased with the enthusiastic and level-headed way in which he has tackled his new job and wish to assure you that The ASB BULLETIN is in good hands. We all appreciate Dr. Jeffery's willingness to take on the duties of editor and pledge him our support and help.

Please note the announcements on another page about the annual meeting of ASB to be held in Knoxville at the University of Tennessee in April. It promises to be a good meeting. I hope that you will plan to bring some of your students, *both graduate and undergraduate*, to Knoxville. As George Kent pointed out to us last spring, these young people are our greatest asset.

The Awards made available by some of the biological supply companies in the region will again be offered this year as well as the Mary Glide Goethe Awards made possible through the generosity of Mr. C. M. Goethe of California. I would like to ask you to call the attention of your gradute students to the Goethe Awards. This is the second year they have been offered to help some graduate students meet the expenses of going to an ASB meeting. Let's have lots of applications.

The executive committee had planned to hold its interim meeting in Washington right after Christmas during the meetings of the American Association for the Advancement of Science. Since this trip for some members of the committee would be a very expensive one, I did not feel it could be justified unless pressing matters required decisions. Consultation with the other officers revealed no such items so I cancelled the meeting. Most of the interim decisions have been and can be made by mail this year, and the committee will plan an extra long session in Knoxville.

A committee has been appointed to arrange for future meeting places of ASB; its members are Donald Scott (University of Georgia), chairman, Walter Herndon (University of Alabama), and Elsie Quarterman (Vanderbilt University). This committee would appreciate having your ideas and suggestions.

The Goethe Awards will be administered by Walter S. Flory (University of Virginia), chairman, William Burbanck (Emory University), and John Carpenter (University of Kentucky). The nominating committee will consist of H. K. Wallace (University of Florida), chairman, Harry Bennett (Louisiana State University), and Chauncey G. Goodchild (Emory University). Appointed to the program committee are S. R. Tipton, chairman, Fred Norris, Royal Shanks, and James Tanner (all of the University of Tennessee). Accepting 3-year appointments to the Meritorious Awards Committee and the Research Awards Committee are Roberta Lovelace (University of South Carolina) and Ralph Yerger (Florida State University) respectively.

Several plans designed to help and encourage high school and college teachers as well as undergraduate science students have been announced that may be of interest to some of you. The summer institutes for high school and college teachers of science and mathematics will again be sponsored by NSF during the summer of 1959. Of the 350 institutes planned, 65 or about 19 percent will be held in the Southeast. NSF is also inviting proposals from colleges, universities and nonprofit research institutions for grants "to provide, on an experimental basis, opportunities for properly qualified undergraduates majoring in the physical, biological, mathematical, and engineering sciences to participate in research projects currently being conducted by experienced scientific investigators. This experimental program may operate either during the academic year or during the summer; summer programs in particular may extend the benefits to students from other colleges." (From NSF News Release, October 24, 1958). Here is an excellent opportunity for us to get undergraduates interested in biological research. Inquiries about these programs should be addressed to the National Science Foundation, Washington 25, D. C. The American Physiological Society will offer awards to college teachers in the summer of 1959 for research training with research groups in various laboratories throughout the country. Inquiries should be sent to the Society at 9650 Wisconsin Avenue, Washington 14, D. C. All of these programs offer stipends for the participants.

MARY ESTHER GAULDEN

IMPORTANT DEADLINES

Please note the following deadlines, all of which are to be met by the time of our Twentieth Annual Meeting at University of Tennessee, Knoxville, Tennessee, April 16-18, 1959. You can help facilitate plans for the meeting by sending in all requested material as far in advance of the deadline dates as possible.

February 9—Suggestions for nominations for ASB officers and executive committee members (Blank 1).

February 20—Titles and abstracts of papers to be presented at the Knoxville meeting (Blank 4).

March 1—Applications for Goethe awards to graduate students (See Page 9).

March 1—Papers to be considered for the Association Research Prize (See Page 9).

April 1—Applications for Phipps and Bird Research Fellowship at Mountain Lake (See Page 9).

April 1—Nomination letters for the Meritorious Service Award (See Page 8).

THE ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

(Founded 1937)

Purposes

The Association of Southeastern Biologists was organized " . . . to encourage research and instruction in the fields of the biological sciences; to foster a spirit of cooperation among the membership; to emphasize the relation of fundamental knowledge in biology to the solution of biological problems; to strive toward the preservation of biological resources; and to serve as a medium for professional contacts among the membership."

Eligibility for Membership

Any person is eligible for membership who is engaged in (a) biological research, (b) the teaching of biological subjects, (c) graduate study in the biological sciences, or (d) work in various fields of applied biology. Members, in general, shall be residents of the Southeast. Membership shall be granted any person recommended and approved as eligible by two active members in good standing. Such recommendations shall be submitted to the treasurer of ASB and the new member shall achieve active status on the payment of the dues for the current year. Annual dues are $2.00, which includes a subscription to the ASB BULLETIN.

Activities

1. Annual meetings at which the results of investigations are presented for discussion, and at which appropriate symposia may be conducted. 2. Quarterly publication of the ASB BULLETIN containing programs of annual meetings and abstracts of papers presented, news of science and scientists in the Southeast, a record of Association affairs, and articles of regional or timely interest. The BULLETIN promotes personal and professional contacts among the members of the Association. 3. The discussion of subjects of general interest to biologists of the Southeast and the formulation of policies and plans of action in relation to such subjects. 4. Encouragement of research through research prizes awarded for especially meritorious papers presented at the annual meetings. 5. Presentation of a Meritorious Award for outstanding contribution to biology, especially in service to young people through teaching. 6. Awarding annually a research fellowship at Mountain Lake Biological Station. 7. Representation on the Council of the AAAS. 8. Affiliation with the AIBS.

1. Deadline: February 9

SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

President-Elect_____ Vice-President_____

Treasurer_____ Executive Committee Members (2)_____

_____

Mail to: DR. H. K. WALLACE
Dept. of Biology
University of Florida
Gainesville, Fla.

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2. STATEMENT OF ASB DUES FOR 1959

Your ASB dues of $2.00 for 1959 are now payable. This sum includes your subscription to the ASB BULLETIN for 1959. Please make your check payable to *The Association of Southeastern Biologists*, and mail to the treasurer with this statement at the address given below. Please be sure to write your name and correct mailing address on this statement. If you still owe dues for 1958 you will receive a separate statement from the Treasurer, but you may add this amount to your check for your 1959 dues if you wish. The ASB constitution provides that members whose dues are in arrears two years will automatically be dropped from membership.

Name_____

Address_____

City_____ State_____

Check here if you are also enclosing your 1958 dues_____.

If retired, check here _____
If retiring within a year, check here _____

DR. ARTHUR W. JONES, Treasurer ASB
Department of Zoology
University of Tennessee
Knoxville, Tennessee

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3. ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

Application for Membership

NAME (in full)_____ Date_____

DEGREES (institutions and dates)_____

_____

PRESENT POSITION: (1) Title_____ (2) Department_____

(3) Institution_____ (4) City, State_____

SPECIALTY (e.g., physiology)_____

SPECIFIC INTERESTS (e.g., respiration)_____

RECOMMENDED BY (1)_____ (2)_____

Fill out this blank, enclose check (or money order) for $2.00 as dues for one year and mail to:

DR. ARTHUR W. JONES, Treasurer ASB
Department of Zoology
University of Tennessee
Knoxville, Tennessee

4. **Deadline: February 20**

CALL FOR PAPERS FOR THE KNOXVILLE MEETING

This form and *two* typewritten copies of the abstract must reach the secretary, Dr. Harold J. Humm, Botany Department, Duke University, Durham, North Carolina, not later than Friday, February 20, if the abstract is to be included among the abstracts to be published in the April issue of the ASB BULLETIN. Papers to be submitted for the Research Prize must be included in the program. Please type or print the following information. All papers are limited to 10 minutes, with 3 minutes for discussion.

1. Author(s):_____

2. Title of paper:_____

_____

3. Institution(s) represented:_____

4. Check organizations to which author(s) belong:

_____ _____ Association of Southeastern Biologists.

_____ _____ Southeastern Section, Botanical Society of America.

_____ _____ Southern Appalachian Botanical Club.

_____ _____ American Society of Ichthyologists and Herpetologists.

5. Projection equipment needed:_____ 2x2 slide projector; _____ 3¼x4 slide projector; other equipment:

6. If your paper is being submitted for the Association Research Prize please check here:_____.

7. This form must be accompanied by *two* double-spaced typewritten copies of an abstract, not to exceed 200 words. Longer abstracts are subject to cutting by the editor without approval of the author. Please use the following form in typing the heading of the abstract in order to avoid unnecessary editing:

Dimorphism of Embryonic Hooks of *Hymenolepis nana.*
Arthur W. Jones, *University of Tennessee*

Start the text of the abstract here, on a separate line with paragraph indentation. In general, the abstract should appear as a single paragraph, though two paragraphs are acceptable if really needed.

8. *Reprints.* Reprints of individual abstracts are available at the rate of $2.00 for the first 100 and 75 cents for each additional 100, postpaid. In order to secure this price it is necessary to attach your check for the proper amount to this form and send it along with the form and the two copies of the abstract. Checks should be made payable to the Cary Printing Company.

Indicate here how many reprints of your abstract you want:_____.

University Center, University of Tennessee, Knoxville

About The Knoxville Meeting

The Twentieth Annual Meeting of the Association of Southeastern Biologists will be held at the University of Tennessee, Knoxville, April 16-18, 1959. Four organizations will meet with ASB: The Southeastern Section of the Botanical Society of America, Southern Appalachian Botanical Club, Southeastern Division of the American Society of Ichthyologists and Herpetologists, and the Southeastern Regional Beta Beta Beta.

The meeting will begin on Thursday afternoon, April 16, with a tour of the Biology Division of the Oak Ridge National Laboratory. Arrangements are being made for an address by an outstanding biologist on Thursday evening followed by a Smoker. On Friday there will be several sessions of contributed papers and the annual business meeting. Presentation of awards and an address by the retiring president of ASB will take place Friday evening. Two field trips are scheduled for Saturday morning.

Registration and all ASB sessions on the University of Tennessee campus will be held in the University Center.

Members of the committee on local arrangements at the University are J. Gordon Carlson, Chairman, Ronald Fraser, Joseph Howell, Fred Norris, Royal E. Shanks, A. J. Sharp, and James T. Tanner.

Transportation

Knoxville is served by the Southern and L and N railroads, Greyhound and Trailways bus lines, and American, Capitol, Delta, Piedmont, and Southeast Airlines.

Meals

All the University dining facilities will be open to persons attending the meeting and their families. These include the cafeteria and grill in the University Center, where the different sessions will meet, and the University Cafeteria in Sophronia Strong Hall within a block of the Center. In addition, there are a number of privately run eating places near the campus, and the downtown area with many cafeterias, restaurants, and hotel dining rooms is within five minutes driving time or fifteen minutes walking time from the University Center. The downtown area can also be reached by bus.

Housing Facilities

Knoxville is a tourist center and so has large numbers of motels and tourist courts on most main highways outside the city. Those handiest to the University campus are located on Chapman Highway (U. S. 441) southeast of Knoxville, Kingston Pike (U. S. 11 and 70) west of the city, and Alcoa Highway (State 73) south of the city. The downtown hotels are within fifteen minutes walking distance of the campus. All reservations should be made directly with the management. The list below is by no means complete, but includes the better and larger establishments. Additional names of accommodations can be obtained from the Knoxville Tourist Bureau, 811 Henley Street, S.W., Knoxville, Tennessee.

Hotels

Andrew Johnson—Gay Street and Hill Avenue. Single $5.25 up; double $8.50 up.
Arnold—Locust Street and Church Avenue. Single $4.50 up; double $6.00 up.
Farragut—Gay Street and Clinch Avenue. Single $5.00 up; double $9.00 up.
YMCA—Clinch Avenue and Locust Street. Single $1.75-$2.50; double $3.00 (double-decker bed).

Courts and Motels

On Kingston Pike (U. S. 11 and 70 approximately 3-5 miles west of the campus)
- Alhambra Court—Single $3.50; double $4.00 up.
- Biltmore Tourist Court—Single $3.00; double $4.00; family $6.00; 2-room unit $8.00.
- Colony Tourist Court—Single $4.00 up; double $5.00 up.
- County Squire Motel—Single $6.00 up; double $8.00 up.
- Delrose Motel—Single $4.00 up; double $6.00 up.
- 11-70 Motor Court—Single $5.00; double $6.00 up.
- Highland Court—Single $4.00 up; double $5.00 up.
- McKee Motel—Single $4.00 up; double $6.00 up.
- Mt. Vernon Motel — Single $6.00 up; double $7.00 up.
- Sequoyah Motel—Single $5.00; double $5.00 up.
- Sharp's Motel—Double $6.00 up; family unit rates.
- Terrace View Motel—Single $6.00 up; double $7.00 up.
- Vol Motel—Single $5.00 up; double $7.00 up.
- White City Court—Single $5.00 up; double $6.00 up.

On Chapman Highway (U. S. 441 approximately 2-8 miles to the southeast of campus)
- Smoky Mountain Tourist Court—Double $5.00 up.
- Sunset Motel—Single $5.00; double $6.00 up.
- Town Lodge Motel—Single $8.00; double $10 up.
- Way-oma Motel—Double $5.00 up.

On Alcoa Highway (State 73 south about 2 miles)
- Dean Motel—Single $5.00; double $7.00.

Field Trips

Three trips are scheduled for the annual meeting. Full information about them will be available at the registration desk.

Thursday, April 16

A tour of the Biology Division of Oak Ridge National Laboratory is scheduled for Thursday afternoon. *All persons interested in taking this trip should submit their intention before April 11.* Those taking this trip will leave the Knoxville campus at 1:15 p.m. on Thursday, April 16. Arrangements for transportation and for the tour of the Division at this early time during the meeting makes it highly desirable for the local committee to have previous knowledge of the number of interested members. Transportation for the field trip will be by bus and/or private conveyance, and will be determined by the demand. Round trip from Knoxville is about 45 miles.

If you plan to take this trip, please inform: Ronald C. Fraser, Department of Zoology and Entomology, University of Tennessee, Knoxville, Tennessee.

Saturday, April 18

Botany field trip: Observation of the vegetation pattern in the Great Smoky Mountains National Park will begin at 9:00 a.m. at Headquarters in the Park and will terminate at 12:30 p.m. at Clingmans Dome (6,300 ft.). Transportation will be by private cars. The trip will include short excursions into representative vegetation areas along the way. Opportunities for photography will be provided but plant collecting will not be permitted in the National Park. Round trip mileage from Knoxville is about 125 miles; those participants returning home to the east or south may proceed directly from the Smokies rather than return to Knoxville.

Additional afternoon field trips can be arranged to meet special interests.

Inquiries should be addressed to Royal E. Shanks, Botany Department, University of Tennessee, Knoxville, Tennessee.

Bird field trip: Saturday, April 18, a field trip for observing birds will be made to the Great Smoky Mountains. Private cars will meet at the National Park Headquarters, two miles above Gatlinburg, at 9:00 a.m. Observations will be made there and along the way at varying elevations, and in the spruce-fir forest above Newfound Gap. This trip will be completed about noon, and those wishing to do so can leave from there. Others who wish to observe the birds in the lowlands in the afternoon can return to Gatlinburg for lunch, after which these areas will be visited.

If enough people are interested in a field trip on Saturday to see the birds of the Knox County area, such a trip will be arranged.

Inquiries should be addressed to James T. Tanner, Department of Zoology and Entomology, University of Tennessee, Knoxville, Tennessee.

Sight-Seeing

Great Smoky Mountains National Park with a relatively large area and several peaks above the 6,000-foot level is situated 40 miles to the southeast of Knoxville. It contains many trails for hiking, camp grounds, and picnic areas.

Norris Dam lies about 25 miles north of Knoxville. An overlook affords a good view of the dam and Norris Lake. The powerhouse with its generators at the base of the dam is open to the public.

The *Museum of Atomic Energy* in Oak Ridge, 25 miles northwest of Knoxville, is open to the public. There are guided tours of the museum with demonstrations of many interesting facts about atomic energy.

General Information

1. Registration will be at a desk in the University Center on Cumberland Avenue (U. S. 11 and 70) and 15th Street.
2. A fee of $1.00 will be charged for registration.
3. Knox County is dry.

Call for Meritorious Award Nominations

The Committee on the Meritorious Award for Teaching asks that nominations and supporting material be sent to them as soon as possible. The regulations governing the award are as follows:

"The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the departmental level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees."

The recipient receives, in addition to the honor of being named, an honorarium of $100.00 provided by the Will Corporation of Georgia. Members of the ASB are urged to make nominations and send the needed supporting materials to Robert F. Smart, Dean's Office, University of Richmond, Va.; or to Fred T. Wolf, Department of Botany, Vanderbilt University, Nashville, Tennessee; or to Roberta Lovelace, Department of Biology, University of South Carolina, Columbia, S. C.

Association Research Prize

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This applies to *all* names on the submitted paper. Applicants for membership are *not* eligible to submit papers for the Research Prize.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Judges will be eminent biologists outside the Southeast. They will set their own criteria, and may withhold the award if no paper is judged to have sufficient merit.

5. Papers must be submitted in *triplicate* and in their entirety not later than *March 1, 1959,* to J. N. Dent, Department of Biology, University of Virginia, Charlottesville, Virginia. One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Phipps and Bird Research Fellowship

A Research Fellowship of $150.00 for summer research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and, especially in the case of younger workers, by references and educational data. Applications should be sent to J. N. Dent, Department of Biology, University of Virginia, Charlottesville, Virginia, not later than *April 1, 1959.* The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

Mary Glide Goethe Travel Awards

Through the generosity and interest of Mr. C. M. Goethe funds are available to assist graduate students of merit and ability with their expenses to the ASB annual meeting in Knoxville, Tennessee, April 16-18, 1959. It is anticipated that most awards will be for maintenance (lodging and meals) since students can often travel with staff members in institutionally owned vehicles. Maintenance awards will be made on the basis of $8.00 per day. Travel allowance will also be awarded in exceptional cases.

Preference will be given advanced graduate students presenting papers at the April meetings. Any graduate student needing financial assistance in order to attend the 1959 meeting is eligible, however, and applications are invited from graduate students whether or not they are presenting papers at the meeting.

Staff members are requested to call the availability of these awards to the attention of qualified students in their respective institutions.

Rules to follow in making application for the Goethe Awards are as follows:

1. Indicate if application is being made for maintenance or travel or both. Give details, such as how many nights and days are involved, how much travel allowance is requested, the number of miles involved, the proposed method of transportation (rail, bus, etc.) and other pertinent information.

2. Give information as to whether or not a paper is being presented.

3. In a paragraph give a brief history of your education to date, of how many years you have been—and plan to be—in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details.

4. Grants will be made on the basis of financial need. Give information on factors concerning this, as marital status, family responsibilities, etc.

5. Have at least one sponsor write a letter supporting your application.

6. Have applications and supporting letters, in triplicate if at all possible, in the hands of W. S. Flory, The Blandy Experimental Farm, Boyce, Va., by March 1, 1959. Applicants will be notified of the decision of the Committee during March.

COMMITTEE
W. D. BURBANCK
J. M. CARPENTER
W. S. FLORY, *Chairman*

Final Report: Horn Island Committee

News of major importance was received by the committee to promote the establishment of Horn Island, Mississippi Sound, as a nature preserve on June 10, 1958, in a letter from Mr. George B. Fell, Executive Secretary of the Nature Conservancy. Mr. Fell advised the committee that Secretary of the Interior Fred A. Seaton announced on May 26 that Horn Island National Wildlife Refuge was established by withdrawal of 2,431 acres of public land.

Creation of this new refuge was the direct result of a request by the Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service, to the Bureau of Land Management.

The first person to take action toward this goal was Dr. Hurst Shoemaker, formerly of the University of Illinois and the Gulf Coast Research Laboratory, now Chairman of the Department of Biology of the American University of Beirut, Lebanon. Dr. Shoemaker saw the need for a nature preserve on Horn Island as a result of his work at the Gulf Coast Research Laboratory and suggested this as a worthy project to the Nature Conservancy. The proposal was favorably received and the Nature Conservancy made application to the Bureau of Land Management for 640 acres to be set aside as a natural reservation, the maximum area that could be requested by a non-governmental agency.

Several months later, Past President of ASB George C. Kent appointed the Horn Island committee to help promote the project. Both the Nature Conservancy and the Horn Island committee contacted the Fish and Wildlife Service in an effort to interest them in establishing a wildlife reservation on Horn Island. Fish and Wildlife responded favorably and Nature Conservancy then withdrew its request to the Bureau of Land Management in favor of a request by the Fish and Wildlife Service. After contending with mining claims of private individuals and other obstacles to the proposal, the Bureau of Sport Fisheries and Wildlife succeeded in obtaining their request in the spring of this year.

Horn Island is one of the islands forming Mississippi Sound in the northern Gulf of Mexico and is an important feeding and resting area for migratory waterfowl, water birds and shore birds. The island is approximately 13 miles long and up to three-quarters of a mile wide. It is composed mainly of sand and supports a 500-acre pine forest as some of the island is 10 to 20 feet above sea level. There are about 700 acres of salt and fresh water marshes and several ponds on the island, some of them of fresh water. In total area Horn Island is 3,700 acres of which 1,269 are privately owned.

The island was surveyed in 1846 and again in 1939. During this period it lost 170 acres at the east end and gained 550 acres at the west end, a process that is characteristic of sand islands of the northern Gulf coast at the present time.

Except for the remains of a barracks-like building, used by the Army during World War II, there are no buildings on the island.

Petit Bois National Wildlife Refuge is located a few miles eastward near the Alabama boundary.

REV. P. H. YANCEY, S. J.
GORDON GUNTER
HURST H. SHOEMAKER, *Consultant*
HAROLD J. HUMM, *Chairman*

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

George H. Mickey, Louisiana State University, was invited to prepare a part of the *Drosophila* exhibit at the Tenth International Congress of Genetics held in Montreal in August. Dr. Mickey also presented a paper at the Congress.

G. Robert Lunz, Director, Bears Bluff Laboratories (South Carolina), was re-elected Vice-Chairman of the Atlantic States Marine Fisheries Commission. Dr. Lunz was awarded an honorary Doctor of Science degree by Clemson College last June.

G. Leon Howell, who completed requirements for the Ph.D. degree in the Biology Department of the University of Alabama in September, 1958, has been appointed Assistant Professor of Biology at High Point College, High Point, N. C.

Walter Herndon, Biology Department, University of Alabama, will join the staff of the Marine Botany Course at the Marine Biological Laboratory at Woods Hole, Mass., during the summer of 1959.

Herbert T. Boschung, Biology Department, University of Alabama, will join the staff of the Gulf Coast Research Laboratory at Ocean Springs, Miss., during the summer of 1959 to teach Marine Vertebrate Zoology and Ichthyology and to do research.

Temd R. Deason has completed the requirements for the M.S. degree in the Biology Department of the University of Alabama and is now studying

for the doctorate at the University of Texas with Professor Harold Bold.

Ben Q. Ward has rejoined the Biology Department at Mississippi Southern College after having completed his Ph.D. in Bacteriology at the University of Texas.

F. A. Varrelman has retired after being with the Biology Department at Mississippi Southern College for ten years.

Erwin Goldberg joined the staff of the Department of Biology, West Virginia University, as assistant professor at the beginning of the 1958-59 term. Dr. Goldberg, a graduate of the State University of Iowa, has his training in the field of animal physiology.

S. Benton Talbott, head of the Department of Biology at Davis and Elkins College, Elkins, West Virginia, died on July 16, 1958, at the age of 56. Dr. Talbott was a former dean of the college and a president of the West Virginia Academy of Science.

Martin D. Young and **Geoffrey M. Jeffery,** Laboratory of Tropical Diseases, U.S.P.H.S. (Columbia, S. C.) attended the Sixth International Congresses of Tropical Medicine and Malaria in Lisbon in September; both presented invited papers and Dr. Young served as co-chairman of the Clinical Section of the Malaria Division.

Huseyin Gokcora, Associate Professor, University of Ankara, Turkey, and **Josip Gotlin,** Associate Professor, Zagreb University, Yugoslavia, worked with **W. Ralph Singleton,** learning new techniques and methods, at the corn breeding radiation laboratory at The Blandy Experimental Farm, University of Virginia, during the summer of 1958. Drs. Gokcora and Gotlin were Fellows of the International Cooperation Administration.

There have been three new appointments made in the Biology Department, Madison College: **Doris Poole** and **W. F. Jones** were named Assistant Professors of Biology and **James K. Grimm,** Instructor of Biology.

Edwin Betts, Professor of Botany, University of Virginia, died on September 27, 1958. He was an authority on the gardening and farming practices of Thomas Jefferson.

Robert E. Merritt, Longwood College, has been awarded a grant by the Research Council of the Richmond Area University Center to support his research on avian competition for nesting sites.

George W. Jeffers, Longwood College, spent last summer touring Europe.

Franklin F. Flint, Randolph-Macon Woman's College, Lynchburg, was promoted to Associate Professor of Biology at the beginning of the present academic year. Dr. Flint was on sabbatical leave last session working with Dr. Donald Johanson, Pomona, California, on problems concerned with gametogenesis and sporogenesis in higher plants.

Paul A. Walker, who is an ordained Episcopal priest in addition to serving as Professor and Chairman of Biology at Randolph-Macon Woman's College, is one of twelve nationally selected teacher-priests to participate in a special conference at the Institute for Advanced Pastoral Studies, to be held at Cranbrook House, Bloomfield Hills, Michigan, from December 11th to 14th, 1958.

Charlotte Lyle, Emory and Henry College, Emory, Virginia, spent part of the past summer studying at Virginia Polytechnic Institute.

Lee Douglas, Chairman of Biology Department, Emory and Henry College, spent the past summer studying the embryology of tetraphyllid cestodes at the Oregon Institute of Marine Biology. His current research project, which is concerned with the osmotic properties of cestode germ cells, is supported by a grant of $5,895 from the United States Public Health Service.

W. L. Threlkeld, Virginia Polytechnic Institute, recently announced the personal publication of his book, "Some Nematode Parasites of Domestic Animals".

Frances S. Silliman has returned to the Biology Department, Bridgewater College after completing doctoral studies and receiving her degree at the University of North Carolina.

Harry G. M. Jopson, Bridgewater College, participated in the National Science Foundation Institute for College Teachers of Biology held at Oregon State College, Corvallis, Oregon, during the past summer.

Paul J. Osborne, Lynchburg College, spent the past summer at the Duke Marine Laboratory, working on the energy cycles of marine invertebrates. Dr. Osborne's work was made possible by a research grant from the American Physiological Society.

John G. Mahan, Lynchburg College, was a member of a team from that college which participated in the Danforth Foundation College Community Workshop, Colorado Springs, Colorado, for three weeks last summer. The theme of the Workshop was the place of the small college in modern education.

Harry L. Holloway has been promoted to Professor of Biology at Roanoke College. He has recently received a grant-in-aid from the Sigma Xi-RESA Research Fund for the purchase of equipment for studies on the helminths of wild mammals in Virginia.

J. L. Lodewijks who substituted for **Robert E. Merritt** last session at Longwood College has returned to his home country, The Netherlands.

Mary E. Picinich, Aaron H. O'Bier, and **Robert T. Brumfield,** of Longwood College spent the past summer at the Biology Division, ORNL conducting research on the control of growth in the roots of higher plants.

Recent additions to the staff of the Department of Botany of the University of Maryland include **Richard Rhode** in Plant Nematology and **Raymond Galloway** in Plant Physiology.

Harris J. Linder has joined the staff of the Department of Zoology, University of Maryland, as an assistant professor. Dr. Linder was formerly with the Biology and Medical Division of the Argonne National Laboratory.

H. F. Robinson has been appointed head of the newly organized Department of Genetics at North Carolina State College. **S. G. Stephens,** previously in charge of the genetics faculty, has been awarded a Guggenheim travel grant to collect and study species in Central America.

T. William Schneider, professor of horticulture at North Carolina State College, has been appointed as chairman of the Horticulture Department at the University of Kentucky.

Kimball C. Atwood, formerly with the Biology Division of the Oak Ridge National Laboratory, now heads the work in medical genetics at the University of Chicago.

Panel members at a discussion of Junior Academies at the Academy Conference (AAAS, Washington, 1958) included **Harry Bennett** (LSU), **Robert Boyer** (Ky.), **Clyde Reed** (Tampa), and **Karlem Riess** (Tulane). **A. M. Winchester** (Stetson) is President of the Conference; **John Arnold** (Loyola) is Secretary.

New staff members in the Biology Department, University of South Carolina, include Assistant Professors **B. C. Smith** and **W. H. Norman.** Dr. Smith has his Ph.D. from the University of Georgia and is working in invertebrate zoology and ecology. Mr. Norman is a candidate for the Ph.D. degree at the University of Texas and works in the fields of physiology and microtechnique. Appointed as Instructor in the same department was **Sara B. Eggleston.**

Institutions and Organizations

The **Mississippi Institute of Microbiology** has recently been established as a Unit of the Department of Biology of Mississippi Southern College. Dr. B. Q. Ward, Bacteriologist and Associate Professor of Biology, has been designated as Director of the Institute. The Institute of Microbiology is essentially a research establishment and is empowered to accept and administer pertinent grants found acceptable to the college. The staff of the Institute also has the duty of preparing an annual report of its opinions and suggestions relative to teaching and course work within the academic department. The members of the Institute for the coming year and their specialty fields are as follows: J. F. Walker (Chairman, Department of Biology) Physiology and Histology; B. Q. Ward (Director of the Institute) Bacteriology and Microbotany; R. A. Woodmansee, Ecology and Marine Plankton; A. E. Harrises, Parasitology; C. R. Ball, Embryology; S. W. Rosso, Malacology. Further information regarding the Institute can be obtained from the director, Box 264, Station A, Hattiesburg, Mississippi.

The **New Orleans Branch of Louisiana State University** (LSUNO) opened in the fall of 1958 with 1,500 students. The science staff includes biologists Dolores Dundee, Rosamond McMillan and Stephan Russell.

A "classified directory" of research opportunities available to college and university scientists, to be carried out in Oak Ridge, Tennessee, has been issued by the **Oak Ridge Institute of Nuclear Studies.** The "directory" is a brochure describing the Oak Ridge Participation program, now in its tenth year, that the Institute administers for the U. S. Atomic Energy Commission. It outlines the numerous opportunities for research involving the application of nuclear energy to basic sciences, agriculture engineering and medicine, utilizing facilities not generally available to any single university or college. Copies are available on request from the University Relations Division, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tennessee.

Seven ASB members were registered participants in the annual meeting of the **American Society of Tropical Medicine and Hygiene** in Miami Beach, November 5 to 8. These included J. Fred Denton, C. G. Goodchild, George W. Hunter, III, G. M. Jeffery, J. Fred Landt, Clarence J. Weinman, and Martin D. Young.

The Biology Departments of **Lynchburg College, Randolph-Macon Woman's College** and **Sweet Briar College** inaugurated this fall a series of Tri-College Biology Seminars. The topic of the October meeting at Randolph-Macon Woman's College was "Teleology in Biological Science". At the November meeting, held at Lynchburg College, Dr. John Tyler Bonner of Princeton University led the group in a discussion of "Animal Communication". The December meeting, at Sweet Briar College, had as its subject the question, "What is Life?".

At the meeting of the Eastern Branch of the **Entomological Society of America** in Baltimore the latter part of November, nine papers were presented by staff members of the Department of Entomology of the University of Maryland.

Grants in Aid

Robert A. Woodmansee of Mississippi Southern College has received a renewal grant of $4,630 from the **Atomic Energy Commission** to continue his studies on the plankton communities occurring along a salinity gradient.

J. David Deck, Department of Anatomy, School of Medicine, University of Virginia, recently received a 3-year grant of $17,500 from the **National Science Foundation** for "A Study of Limb Regeneration in Larval and Adult Amphibians". The grant includes money to continue studies on the role of nerves in larval amphibian limb regeneration and a study of experimentally induced limb regeneration in adult frogs.

A new course entitled, "Techniques of Handling Radioisotopes" was made possible at Emory and Henry College by equipment grants totaling $26,000 from the **Atomic Energy Commission** and **The Methodist Church.**

The Mountain Lake Biological Station has recently been advised by the **National Science Foundation** that its grant of $18,000 for three years has been renewed (1959-1961). This grant has made available funds for the establishment of awards for research and study at the Station. Three types of awards are available: Post-Doctorates, for research; Pre-Doctorates, for supervised research; and Post-Graduates, for training in field or laboratory research techniques, thus permitting course work. Application blanks for these awards may be secured from the Director, Mountain Lake Biological Station; Department of Biology; University of Virginia, and must be submitted by April 1, 1959.

The Biology Department at Emory University has received a grant of $100,000 from the **U. S. Public Health Service** for the addition of a wing to the present biology building.

The Department of Entomology of the University of Maryland has recently contracted with the **Fish and Wildlife Service** of the Department of Interior for Studies on the Effect of Changes in Water Level on Mosquito and Wildlife Populations in Maryland Salt Marshes. The principal investigator is William E. Bickley.

W. R. Kelley, Associate Professor of Biology at the University of South Carolina, has been granted $8,756.50 by the **Atomic Energy Commission** to make an ecological study of the vascular shore plants of a reservoir site on the Savannah River Plant. The contract runs for one year.

Harry W. Freeman, Associate Professor of Biology at the University of South Carolina, has received a one year contract renewal of $15,426 from the **Atomic Energy Commission** for an ecological study of the fishes of the Savannah River Drainage.

The ASB BULLETIN

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The Official Quarterly Publication of
The Association of Southeastern Biologists

THE ASB BULLETIN

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ASSOCIATION AFFAIRS

Nominations for ASB Officers

The Nominating Committee, composed of H. K. Wallace, Chairman, Harry J. Bennett and Chauncey G. Goodchild, has submitted the following slate of officers to be acted on by the members at the Knoxville meeting:

President-Elect—Earl L. Core, West Virginia University, and Victor A. Greulach, University of North Carolina.

Vice President—Thelma Howell, Wesleyan College, and Royal E. Shanks, University of Tennessee.

Treasurer—Asa A. Humphries, Jr., Emory University, and Elsie Quarterman, Vanderbilt University.

Executive Committee (two to be elected) — Robert B. Short, Florida State University, Robert T. Brumfield, Longwood College, Glenn R. Noggle, University of Florida, and Eugene P. Odum, University of Georgia.

The Annual Meeting

Attention is called to the program and notes of the Annual Meeting in Knoxville, April 16-18, 1959. The committee on local arrangements has, as usual, done an excellent job. They wish to have particular attention called to the deadline of April 11 for those wishing to participate in the Thursday afternoon (April 16) field trip to the Oak Ridge National Laboratory. It will be noted that the Smoker is to be held following the Thursday evening General Session, rather than the usual Friday evening Session. Dr. Karl Sax, noted botanist and geneticist, will be the guest speaker at the Thursday evening Session.

A record 378 registrants attended the meeting in Tallahassee last year; it is to be hoped that this trend will be continued and that a new record will be established at Knoxville.

ASB Guest Speaker

Dr. Karl Sax, noted botanist and Professor of the Arnold Arboretum, Harvard University, will be guest speaker at the evening session of the ASB meeting in Knoxville on Thursday, April 16th. His address "The Population Explosion" will deal with the timely topic of human populations and their associated problems.

Dr. Sax is for the spring semester Visiting Professor of Forestry at the University of Florida. He is widely known for his research in cytology, genetics, and horticulture and is this year President of the Genetics Society of America. In recent years his interest in the problems of rapidly increasing populations has found expression in two excellent publications: the book "Standing Room Only" and the booklet "The Population Explosion." Not content merely to call attention to the problem, Dr. Sax became active in the Planned Parenthood League of Massachusetts and is currently president of that organization. Dr. Sax is a member of the National Academy of Science and an honorary member of the Japanese Genetics Society and the French Academy of Agriculture.

As The President Sees It

Should ASB concern itself with undergraduate students? If so, in what way can it serve them and their teachers?

These are questions I have been pondering and that I feel should be seriously studied. Undergraduates represent a group of individuals vital to the future of biology. I recently visited biology departments in several of the many small liberal arts colleges in the Southeast and was tremendously impressed with the interest and enthusiasm of the students and professors.

In the past no special effort has been made by ASB to attract undergraduates. Last year a small group of them attended the Tallahassee meeting as representatives of the 26 Southeastern chapters of Beta Beta Beta, a National Biological Society. Tri Beta will again meet with ASB in Knoxville and will open its meetings to all undergraduates. I would like to urge those who have promising students to bring them to the Knoxville meeting.

Please think about the above questions and give expression to your opinions.

MARY ESTHER GAULDEN

Program of the 20th Annual Meeting Association of Southeastern Biologists

University of Tennessee, Knoxville, Tennessee, April 16-18, 1959

A Joint Meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Southeastern Division of the American Society of Ichthyologists and Herpetologists and the Southeastern Region of the Beta Beta Beta National Honor Biological Society.

SESSION SCHEDULE

Thursday, April 16

9:30 a.m. Meeting of the Executive Committee, Room 218, University Center.

1:15 p.m. Tour of the Biology Division, Oak Ridge National Laboratory.

2:00-8:15 p.m. Registration, Lobby, University Center.

8:20 p.m. General Session followed by Smoker, Ballroom, University Center.

Friday, April 17

8:00-12:00 noon. Registration, Lobby, University Center.

8:00-9:00 a.m. Southern Appalachian Botanical Club Breakfast, University Cafeteria, Sophronia Strong Hall. Members will go through the cafeteria line and take their trays to an adjoining private dining room.

8:00 a.m. Commercial Exhibits, Lobby, University Center.

9:00 a.m. Contributed Papers.
Vertebrate Zoology, Ballroom, University Center
Cytology and Genetics, 112 University Center
Invertebrate Zoology, 113 University Center
General Botany, 114 University Center
Plant Physiology, 115 University Center

11:15 a.m.-12:15 p.m. Business Meeting, Association of Southeastern Biologists, Ballroom, University Center.

1:15 p.m. Business Meeting, Southeastern Section, Botanical Society of America, Ballroom, University Center.

1:45 p.m. Contributed Papers.
Animal and General Ecology, Ballroom, University Center
Animal Physiology, 112 University Center
Parasitology, 113 University Center
Cryptogamic Botany, 114 University Center
Ichthyologists and Herpetologists, 115 University Center

5:45 p.m. Special Registration for Beta Beta Beta Members, University Cafeteria, Sophronia Strong Hall.

6:00 p.m. Dinner, Beta Beta Beta Society, University Cafeteria, Sophronia Strong Hall. Members will go through the cafeteria line and take their trays to the adjoining private dining room.

8:30 p.m. General Session, Ballroom, University Center.

Saturday, April 18

8:00 a.m. Field Trips. Members should leave Knoxville in private cars on route U.S. 441 at 8:00 a.m., in order to meet at National Park Headquarters two miles above Gatlinburg at 9:00 a.m.

8:30-12:00 noon. Student Papers, Beta Beta Beta Society; Eastern District, 54 Biology Building; Western District, 317 Biology Building.

12:00-1:00 p.m. Business Meeting, Beta Beta Beta Society; Eastern District, 54 Biology Building; Western District, 317 Biology Building.

GENERAL SESSION

THURSDAY, APRIL 16, 8:20 p.m.
Ballroom, University Center
Presiding: Mary Esther Gaulden

Address of Welcome: C. E. BREHM, President of The University of Tennessee.
Address: The Population Explosion, KARL SAX, Harvard University and University of Florida.
Smoker following address.

VERTEBRATE ZOOLOGY SESSION

FRIDAY, APRIL 17, 9:00 a.m.
Ballroom, University Center
Presiding: Donald C. Scott, University of Georgia

9:00 Polysaccharide Histochemistry of the Oviduct of the Newt, *Triturus viridescens*. A. A. HUMPHRIES, JR. and W. N. HUGHES, Emory University.

9:13 Experimental Morphogenesis of Adrenal Glands. LAURA G. ANDERTON, University of North Carolina.

9:26 Minimum Light Values Needed for Schooling in the Minnows, *Rhinichthys* and *Semotilus*. ROBERT A. KUEHNE, University of Kentucky.

9:39 Factors Affecting the Return of Stranded *Fundulus similis* to Water. JOE ANN SHEARER, University of Mississippi.

9:52 *Intermission.*

10:02 An Analysis of Small-Mammal Population Trends and Movements. H. E. SHADOWEN, Louisiana Polytechnic Institute.

10:15 Relationships of *Mus musculus* and *Peromyscus polionotus* in an outdoor enclosure. LARRY D. CALDWELL, University of Georgia.

10:28 The Vertebral Column of the Golden Hamster. MOHAMMED S. SALIH, Louisiana State University.

10:41 Hematological Observations in the Orders Insectivora, Rodentia and Carnivora. S. S. KILGORE, Louisiana Polytechnic Institute.

CYTOLOGY AND GENETICS SESSION

FRIDAY, APRIL 17, 9:00 a.m.
Room 112, University Center
Presiding: J. Gordon Carlson, University of Tennessee

9:00 A Cytological Study of the Genus *Habranthus.* W. S. FLORY and R. O. FLAGG, The Blandy Experimental Farm, University of Virginia.

9:13 Cytotaxonomic Relations among some Species of *Sansevieria* Thunb. (Liliaceae). M. Y. MENZEL, J. B. PATE and F. D. WILSON, Crops Research Div., Agr. Res. Service, USDA.

9:26 Chromosomes in Parthenogenetic Miracidia and Embryonic Cercariae of *Schistosomatium douthitti.* ROBERT B. SHORT and MARGARET Y. MENZEL, Florida State University.

9:39 A Cytochemical and Quantitative Study of Protein-Bound Sulfhydryl and Disulfide Groups of Sea Urchin Eggs. NAOKO KAWAMURA, University of Tennessee.

9:52 *Intermission.*

10:02 The Effects of Radiation on Mitotic Rate of Individual Stages of Mitosis in the Grasshopper Neuroblast. JEAN STEVENS and MARY ESTHER GAULDEN, Biology Division, Oak Ridge National Laboratory.

10:15 Formation and Behavior of Spindle Body in Neuroblast of Grasshopper, *Chortophaga viridifasciata.* KEN-YA KAWAMURA, University of Tennessee.

10:28 Chromosome Assortment in Oogenesis of Triploid *Mormoniella* Females. P. W. WHITING, University of Pennsylvania.

10:41 The Detection and Interaction of Body Size Factors Among Ranch-Bred Mink. CLYDE KEELER, Georgia State College for Women.

10:54 Posttreatment Effects on Radiation-induced Chromosomal Breaks. ALVIN V. BEATTY, Emory University.

INVERTEBRATE ZOOLOGY SESSION

FRIDAY, APRIL 17, 9:00 a.m.
Room 113, University Center
Presiding: Horton Hobbs, University of Virginia

9:00 A New Dysterian Ciliate from Warm Mineral Springs, Fla. EUGENE C. BOVEE, University of Florida.

9:13 Some "Spunkwater" Protozoa, including a Previously Unnamed Amoeba. ROBERT H. MOUNT and EUGENE C. BOVEE, University of Florida.

9:26 The Ultrastructure of the Tail of *Himasthla quissetensis.* ROBERT R. CARDELL, JR. and DELBERT E. PHILPOTT, University of Virginia and Marine Biological Lab., Woods Hole, Mass.

9:39 Observations on the Structure and Ultrastructure of the Cheliped Muscle of the Crayfish (*Cambarus longulus*). ROBERT R. CARDELL, JR. and LARRY L. FARMER, University of Virginia.

9:52 *Intermission.*

10:02 A Report on the Study of the Tardigrada in the United States. G. T. RIGGIN, JR., Virginia Polytechnic Institute.

10:15 Studies on the Attraction of Plant Nematodes to Roots. MARVIN L. CHILTON, University of Kentucky.

10:28 Notes on the Distribution and Ecology of *Cyathura* sp., an Estuarine Isopod. W. D. BURBANCK, Emory University.

10:41 Studying Nymphs of the Odonate Genus *Argia* in the Southwestern United States. MINTER J. WESTFALL, JR., University of Florida.

GENERAL BOTANY SESSION

FRIDAY, APRIL 17, 9:00 a.m.
Room 114, University Center
Presiding: Elsie Quarterman, Vanderbilt University

9:00 Weeks Island, a Botanically Interesting Area in the Louisiana Marshes. WILLIAM D. REESE, Southwestern Louisiana Institute.

9:13 Composition of an Alabama Forest in 1821. ROBERT A. DIETZ, Troy State College.

9:26 Preliminary Notes on a Region of Floristic Overlap Between the Upper and Lower Austral Zones in Northeastern Alabama. WILLIAM H. ADAMS, JR., Wildlife Research Unit, Alabama Polytechnic Institute.

9:39 Progress Report on the Flora of the Carolinas. ALBERT E. RADFORD, University of North Carolina.

9:52 *Intermission.*

10:02 Recent Plant Records in Virginia. A. B. MASSEY, Virginia Polytechnic Institute.

10:15 Blade Tissue Structure of some Species of *Atriplex* from the Southern California Deserts. JANE PHILPOTT, Duke University.

10:28 The Systematic Embryology of *Aletris aurea* Walt. EDWARD T. BROWNE, JR., University of North Carolina and Alabama Polytechnic Institute.

10:41 Better Trained High School Science Teachers — A Desperate Need. ELTON C. COCKE, Wake Forest College.

PLANT PHYSIOLOGY SESSION

FRIDAY, APRIL 17, 9:00 a.m.
Room 115, University Center
Presiding: Victor A. Greulach, University of North Carolina

9:00 Acetate Dependence for Sexuality in *Polytoma uvella.* FRANZ MOEWUS, Applied Research Laboratories, Miami Springs, Florida.

9:13 The Effect of Kinetin and Red Light on Growth and Cell Size. MILDRED M. GRIFFITH and ROBERT D. POWELL, University of Florida.

9:26 Chromatographic Studies of some Alcohol-Soluble Materials in Male and Female Papaya (*Carica papaya*) Plants. M. P. SINGH and G. RAY NOGGLE, University of Florida.

9:39 An Evaluation of the Andreae Chromatographic Technique for the Determination of Maleic Hydrazide. JOHN G. HAESLOOP and VICTOR A. GREULACH, University of North Carolina.

9:52 *Intermission.*

10:02 A Substance Controlling Growth in Timothy Roots. ROBERT T. BRUMFIELD, Longwood College and Oak Ridge National Laboratory.

10:15 The Production of Indole Acetic Acid by *Taphrina deformans* and *Dibotryon morbosum*. EVELYN E. CRADY and FREDERICK T. WOLF, Vanderbilt University.

10:28 Nonrespiratory Gas Released from Seeds During Moistening. NANCY BRASSINGTON and ALAN H. HABER, Winthrop College and Oak Ridge National Laboratory.

10:41 Respiratory Patterns in Diseased Plants. HARRY WHEELER and ROBERT GRIMM, Louisiana State University.

10:54 Influence of Respiratory Inhibitors on Absorption of Sugars by Plant Cells. THERESA PARTLOW and JOSEPH C. O'KELLEY, University of Alabama.

ANIMAL AND GENERAL ECOLOGY SESSION

FRIDAY, APRIL 17, 1:45 p.m.

Ballroom, University Center

Presiding: W. D. Burbanck, Emory University

1:45 Organic Production and Turnover during the First Seven Years of Old Field Succession on the AEC Savannah River Area. EUGENE P. ODUM, University of Georgia.

1:58 Concentrations of Radionuclides in the Natural Vegetation of a Contaminated Area. H. R. DeSELM and R. E. SHANKS, University of Tennessee.

2:11 Avian Uptake of Fission Products. WILLIAM K. WILLARD, University of Georgia and Oak Ridge National Laboratory.

2:24 Seasonal Lipid Levels in Key Population Groups of an Old Field Ecosystem. CLYDE E. CONNELL, University of Georgia and Valdosta State College.

2:37 Energy Flow in Two Salt Marsh Animals. ALFRED E. SMALLEY, University of Kentucky.

2:50 *Intermission.*

3:00 Trophic Relations within the *Zostera* "Community". EDWIN B. JOSEPH, Birmingham-Southern College.

3:13 Food Habits of the Canada Goose at Lake Mattamuskeet, North Carolina. THOMAS L. QUAY and CARL S. YELVERTON, North Carolina State College.

3:26 The Effect of Photoperiod on the Duration of Nymphal Development in Several Species of Odonata. CHARLES E. JENNER, University of North Carolina.

3:39 Studies of Yeasts Ingested by *Drosophila* Populations. JOHN M. CARPENTER and JAMES K. KOMATSU, University of Kentucky.

3:52 Comparative Tolerance of some *Drosophila* Species to Low Temperature. WALLACE D. DAWSON, JR., University of Kentucky.

ANIMAL PHYSIOLOGY SESSION

FRIDAY, APRIL 17, 1:45 p.m.

Room 112, University Center

Presiding: I. C. Kitchin, University of Mississippi

1:45 The Effects of pH and Viscosity on Surface Membranes in *Paramecium multimicronucleatum*. J. WARREN LEE and WILLIAM McCALL, Southern University.

1:58 Studies on the Metabolism of *Astasia longa* (Jahn). FRISSELL R. HUNTER and J. WARREN LEE, Southern University.

2:11 The Effect of Na L-thyroxine on Viability and Regeneration of *Planaria maculata*. WILLIAM L. MENGEBIER, Madison College.

2:24 The Effect of Sodium Fluoroacetate on Blood Glucose Levels in the Bullfrog (*Rana catesbeiana*). B. THEODORE COLE, Louisiana State University.

2:37 Fractionation of Peptides from Serum Albumin and Microsomes. N. G. ANDERSON and J. A. LEVINSON, Oak Ridge National Laboratory.

2:50 *Intermission.*

3:00 A New Approach to the Detection of Synergistic Doses in Combination Chemotherapy. JACK H. MOORE and J. RICHARD THOMSON, Southern Research Institute.

3:13 Antibiotic Beers as a Source of Anticancer Agents. J. RICHARD THOMSON and W. RUSSELL LASTER, JR., Southern Research Institute and Kettering-Meyer Laboratory.

3:26 Energy Flow through the Cotton Rat, *Sigmodon hispidus*. FRANK BENJAMIN GOLLEY, University of Georgia.

3:39 An Analysis of Factors Contributing to the Successful Reanimation of Mice from Less than 1° C. JAMES A. MILLER, JR. and FAITH S. MILLER, Emory University.

3:52 Uptake, Tissue Concentration, and Loss of Cesium-137 and Strontium-85 in the Common Prawn *Palaemonetes pugio* Holthuis. FRED K. PARRISH, Emory University.

PARASITOLOGY SESSION

FRIDAY, APRIL 17, 1:45 p.m.

Room 113, University Center

Presiding: Arthur W. Jones, University of Tennessee

1:45 Parasites of Commercial Shrimp. DWAYNE N. KRUSE, Florida State University.

1:58 "Swimmer's Itch" in Colorado. GEORGE W. HUNTER III, University of Florida and the Rocky Mountain Biological Laboratory.

2:11 The Initiation of Penetration of *Schistosomatium douthitti* Cercariae. ALVIN WAGNER, Florida State University.

2:24 A New Strigeid Trematode (*Diplostomatidae: Alariinae*) from the Pancreatic Duct of the Raccoon. REINARD HARKEMA and GROVER C. MILLER, North Carolina State College.

2:37 Observations on the Structure and Distribution of the Metacercaria, *Diplostomulum trituri* (Trematoda: Strigeida). EDWARD W. LAUTENSCHLAGER and ROBERT R. CARDELL, JR., University of Virginia.

2:50 *Intermission.*

3:00 Studies on the Survival of Trophozoites of *Plasmodium berghei* in Glycerolized Whole Blood at Low Temperatures. GEOFFREY M. JEFFERY, U. S. Public Health Service.

3:13 The Effect of Alloxan Diabetes on *Plasmodium berghei* Infections in Albino Rats. M.

GUTHRIE TOLBERT and R. BARCLAY McGHEE, University of Georgia.

3:26 Effect of Cobalt-60 Gamma Radiation on the Development of Acquired Immunity in the Rat to Larval *Hydatigera taeniaeformis*. KATHLEEN D. WYANT, HAROLD H-K. LEE, and ARTHUR W. JONES, University of Tennessee.

3:39 Chromosomal Abnormalities in the Embryos of Gamma-Irradiated *Hymenolepis diminuta*. RAYMOND L. KISNER, University of Tennessee.

3:52 Development of the Taeniid Embryophore. HAROLD H-K. LEE, University of Tennessee.

CRYPTOGAMIC BOTANY SESSION

FRIDAY, APRIL 17, 1:45 p.m.

Room 114, University Center

Presiding: Lewis E. Anderson, Duke University

1:45 Studies on the Development of Chlortetracycline-resistant Staphylococci in Chlortetracycline-treated Beef. JAMES M. JAY and J. WARREN LEE, Southern University.

1:58 Studies on *Ligniera verrucosa*, a plasmodiophoraceous parasite. CHARLES E. MILLER, Emory University.

2:11 The Rediscovery of the Chytrid, *Pringsheimiella dioica*. J. THOMAS MULLINS, University of North Carolina.

2:24 Aquatic Phycomycetes of the Highlands Region. WILLIAM J. KOCH, University of North Carolina.

2:37 Benthic Algae of Phosphorescent Bay, Puerto Rico. LUIS R. ALMODOVAR and H. L. BLOMQUIST, Institute of Marine Biology, University of Puerto Rico and Duke University.

2:50 *Intermission.*

3:00 Marine Chlorophyta of the Upper West Coast of Florida. H. J. HUMM and SYLVIA EARLE TAYLOR, Duke University.

3:13 The Concentration of Growth Promoting Substances in Certain Bryophytes. PAUL M. PATTERSON, CAROLYN BOLTON, and JENNIE JOE LAWRENCE, Hollins College.

3:26 Life History of *Rhodobryum roseum* (Weis) Limpr. NARINDER CHOPRA, University of Tennessee.

GENERAL SESSION

FRIDAY, APRIL 17, 8:30 p.m.

Ballroom, University Center

Presiding: Mary Esther Gaulden

Presentation of Awards: Mt. Lake Biological Station Fellowship offered by Phipps and Bird, Inc.
Research Awards offered by Carolina Biological Supply Company
Meritorious Teaching Award offered by Will Corporation of Georgia

Address: Spiders, HOWARD K. WALLACE, Immediate Past President of ASB, University of Florida.

Program for the Meeting of the Southeastern Region, Beta Beta Beta National Honor Biological Society

GENERAL SESSION

FRIDAY, APRIL 17

6:00 p.m. Dinner, University Cafeteria in Sophronia Strong Hall. Members will go through the cafeteria line and take their trays to the adjoining private dining room.

7:00 p.m. Address, University Cafeteria in Sophronia Strong Hall. Some Effects of Radiations on Cells, Dr. J. Gordon Carlson, University of Tennessee.

EASTERN DISTRICT SESSION

SATURDAY, APRIL 18

Room 54, Hessler Biology Building

8:30 a.m. to 12:00 noon. Contributed papers.
12:00 noon to 1:00 p.m. Business meeting.

WESTERN DISTRICT SESSION

Room 317, Hessler Biology Building

8:30 a.m. to 12:00 noon. Contributed papers.
12:00 noon to 1:00 p.m. Business meeting.

MEETING NOTES

Lodging and meals. A partial list of hotels and motels was published in the January issue of the BULLETIN. More complete lists may be obtained from the Knoxville Tourist Bureau, 811 Henley Street, S.W., Knoxville. The University dining facilities will be open to persons attending the meeting and their families. These include the cafeterias in the University Center and in Sophronia Strong Hall.

Registration. Registration will be in the Lobby of the University Center and will be held 2:00 to 8:15 p.m. on April 16 and 8:00 to 12:00 noon on April 17. A fee of $1.00 will be charged for registration.

Placement Service. A do-it-yourself type of placement service will be located in Room 202 of the University Center. Space will be provided for posting of available positions and personnel.

Directory. A directory of persons attending the meeting will be located in Room 202, University Center.

Commercial Exhibits. These exhibits will be in the Lobby of the University Center.

Field Trips. The three scheduled field trips were described in detail in the January issue of the BULLETIN. The Thursday afternoon (April 16) tour of the Biology Division of Oak Ridge National Laboratory will leave the Knoxville Campus at 1:15 p.m. It is of utmost importance that all persons interested in taking this trip inform Ronald C. Fraser, Department of Zoology and Entomology, University of Tennessee, before April 11. The two Saturday morning field trips include a botany trip and a bird trip, both in the Great Smoky Mountains National Park area. These trips will leave at 9:00 a.m.; full information will be available at the registration desk.

Local Arrangements Committee. J. Gordon Carlson, Chairman, Ronald Fraser, Joseph Howell, Fred Norris, Royal E. Shanks, A. J. Sharp and James T. Tanner.

Items of Interest: Knoxville Meeting

Biological Sciences at the Host Institutions

Biological sciences at the University of Tennessee are divided between three departments of the College of Liberal Arts and various divisions of the College of Agriculture. The Departments of Bacteriology, Botany, and Zoology and Entomology are located in one building on the Liberal Arts campus. This building was completed in 1935, after the previous biology building was destroyed by fire in January 1934. The present building was named Hesler Hall in honor of L. R. Hesler, botanist, on his retiring from the position of Dean of the College of Liberal Arts last June. In addition to the three departments named above, the building houses the Department of Anthropology and the Biological Sciences Library.

The Department of Bacteriology occupies one floor of Hesler Hall with its offices, laboratories, and classrooms. Major research projects are the study of host-parasite relations in tularemia in rodents by Dr. J. M. Woodward and in *Salmonella pullorum* infections in chicks by Dr. D. F. Holtman, head of the department. Dr. J. O. Mundt is working on the implications of streptococci found in foods to agriculture and the food industry. In the department is also a branch of the State testing laboratory for brucellosis and leptospirosis in cattle.

The Department of Botany and its herbarium are located on one floor of the building with additional space in the basement and greenhouses which are behind the building. In the basement is a newly constructed laboratory, planned by Dr. G. E. Hunt, to be used for instruction in the use of radioisotopes in plant physiology. Members of this department have been working for several years under Dr. A. J. Sharp, head of the department, on a definitive "Flora of Tennessee". Dr. L. R. Hesler and Dr. T. H. Campbell are continuing their study of the fungi of the southeastern states. Dr. R. E. Shanks and his students are working on the flora and plant ecology of the arctic slope of Alaska and also on the plant ecology of an area at Oak Ridge which has been contaminated with radioactive deposits.

The Department of Zoology and Entomology occupies all or parts of three different floors of Hesler Hall. Some of the research activities in this department have resulted in laboratories for special purposes. Dr. J. G. Carlson, department head, has assembled equipment for research on radiation effects on mitosis and other cellular activities. Dr. S. R. Tipton, studying hormone effects on mammalian respiration, and Dr. R. C. Fraser, studying biochemical aspects of embryology, have both recently received grants which aided in equipping laboratories for their research. The first air-conditioned laboratory in the building was constructed for the rearing and study of *Drosophila* and is now used by Dr. J. I. Townsend. Drs. A. W. Jones and Kathleen Wyant are conducting research on the effects of radiation on the host-parasite relation between helminths and mammals. Collections have been assembled, largely from Tennessee, of helminths by Dr. A. W. Jones, of insects by Dr. A. C. Cole who has also made extensive collections of ants of western North America, and of vertebrates by Drs. J. C. Howell and J. T. Tanner.

The proximity of Oak Ridge to the University of Tennessee has stimulated research at the University on the biological effects of radiation and on the use of radioactive isotopes and has resulted in fruitful cooperation between agencies and individuals at both places. An example of this is the establishment of the UT-AEC Agricultural Research Laboratory at Oak Ridge. Lying on the other side of Knoxville from Oak Ridge are the Great Smoky Mountains, and their accessibility has enabled both botanical and zoological research in ecology. JAMES T. TANNER

The Participating Societies

The ASB is honored again in 1959 to have four other organizations join in the annual meeting. While the Southeastern Section of the Botanical Society of America and the Southern Appalachian Botanical Club have been participating in these joint meetings for a number of years and are well known to the members, the Ichthyologists and Herpetologists and the Beta Beta Beta Societies are relative newcomers. Although space problems prohibit it in this issue, it is hoped to include descriptive information about these societies in an early issue of the BULLETIN.

Program reprints

Reprints of the program will be available to registrants at Knoxville, but reprints of the abstract section will not be provided. Those wishing to have access to the abstracts are reminded to take along the April issue of the BULLETIN.

Abstracts of Papers Presented at the Twentieth Annual Meeting of the Association of Southeastern Biologists

All except one of the 80 papers submitted for presentation at the Twentieth Annual Meeting of the Association of Southeastern Biologists in Knoxville, Tennessee, April 16-18, 1959, are abstracted here. Reprints of abstracts marked with an asterisk are available from the authors.

Preliminary Notes on a Region of Floristic Overlap Between the Upper and Lower Austral Zones in Northeastern Alabama*

WILLIAM H. ADAMS, *Alabama Polytechnic Institute*

The region described is the Ashland Plateau, a higher topographic division of the Piedmont Upland, and represents the southernmost outlier of the Appalachian chain of mountains in Alabama. This mountainous region is peculiar in that it was originally a longleaf pine forest even though it is some distance removed from the extensive longleaf belt of the Coastal Plain. This dominance has since been replaced by other pines and hardwoods through repeated cutting and complete fire protection. According to some authors, the area studied lies within Merriam's humid Upper Zone of the transcontinental Austral Region or Carolinian Life Zone. Results of this study indicate that this area more accurately represents a point of transition between the Upper and Lower Austral Zones. This contention is based on the large number of plants characteristic of both Zones that occur here thereby swelling its total number of plant species far above that of either of the separate Zones considered alone. Typical Upper Austral species reaching their southward limits here include *Juglans cinerea, Calycanthus fertilis, Stewartia ovata, Chimaphila maculata, Galax aphylla, Pycanthemum pycanthemoides* and *Solidago bicolor.* Typical Lower Austral species reaching their northward limits here include *Persea borbonia, Crotalaria purshii, Pilostaxis nana* and *Angelica dentata.*

Benthic Algae of Phosphorescent Bay, Puerto Rico

LUIS R. ALMODOVAR, *Institute of Marine Biology, University of Puerto Rico*
and
H. L. BLOMQUIST, *Duke University*

A small embayment (45 acres) on the southwestern coast of Puerto Rico has become famous for its spectacular luminescence. According to Margalef (1957), this is due to an unusual concentration of dinoflagellates. This phenomenon has led to several investigations on the biota present and its ecological aspects, compared with surrounding areas where the luminescence is not so striking. However, no investigation has been done previously on the benthic marine algae. On the basis of substrata and the algae present, this area may be divided into three more or less distinct zones. In this investigation, carried out during February, 1958, and from December, 1958, to January, 1959, 47 entities of marine algae were identified. Their distribution among the algal divisions are: Chlorophyta, 20; Phaeophyta, 6; Cyanophyta, 2; Rhodophyta, 19.

Fractionation of Peptides from Serum Albumin and Microsomes

N. G. ANDERSON and J. A. LEVINSON
Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee

Microsomal peptides (Anderson and Albright, Federation Proc., 17:9, 1950) and peptides obtained from hydrolysis of proteins synthesized on the microsomes must be fractionated if we are to determine whether the microsomal peptides are incorporated intact into the protein. To avoid loss of material in analysis, we perfected a chromatographic technique monitored by far-UV peptide bond absorption. Serum albumin tryptic peptides are chromatographed on XE64 resin at pH 8.5 using a sodium phosphate buffer. Peptides which move rapidly through the column are rechromatographed at pH 7.5. This procedure is repeated at successively lower pH's until resin in the acid form is reached. A fraction of the effluent is used for paper chromatography, butanol-propionic acid being used to determine whether more than one peptide was eluted with each peak. Separation of microsomal peptides by this method was initially unsatisfactory since a large number of amino acids were also present. A countercurrent dialyzer having seven dialysis stages effectively separates the peptides and amino acids before chromatography. Application of these methods to the problem of peptide intermediates in protein synthesis will be discussed.

Experimental Morphogenesis of Adrenal Glands*

LAURA G. ANDERTON, *University of North Carolina*

A specific type of adrenal gland occurs normally in each of the vertebrate classes but cases of anomalies which resemble adrenals of another class are also found. The adrenal anomaly in man of accessory adrenal tissue has recently attracted medical interest. This type of gland abnormal in mammals, normally occurs in urodeles. The purpose of this investigation was to study factors which affect the origin and union of the widely separated adrenal components of different germ layer origin into various morphological types of adrenal glands. The trunk neural crest was extirpated bilaterally from 100 *Amblystoma punctatum* neurulae. A second series of experiments involved the transplantation of neural crest mid-ventrally on embryos deprived of trunk neural crest. In the first experiment, sympathetic ganglia and adrenal medullary cells developed in late larval life but did not replace the normal cell complement. In the second experiment, it was found that normal pathways of neural crest migration are not essential for the development of sympathoblasts and adrenal medullary cells. The morphogenesis of normal adrenals in urodeles and of accessory adrenals in man is described in terms of intrinsic migratory powers of the neural crest, chronological determination, tissue affinities, and hormonal stimulation via the blood stream.

Posttreatment Effects on Radiation-induced Chromosomal Breaks

ALVIN V. BEATTY, *Emory University*

Since oxygen, through oxidative metabolism, has been found to influence the rejoining process in X-radiation-induced chromosome breaks, several experiments involving post-X-irradiative treatment of material have been carried out. Material irradiated in helium has been posttreated in helium and in oxygen while material irradiated in oxygen has been posttreated in oxygen, helium and carbon monoxide. Total doses of 200r and 400r, different intensities and temperatures have been used. Post-X-irradiative effects were found and can be explained and predicted on an energy-supplying basis.

A New Dysterian Ciliate from Warm Mineral Springs, Florida

EUGENE C. BOVEE, *University of Florida*

Amongst a varied and multitudinous fauna of ciliates in the Warm Mineral Springs, Florida, the majority are identical with or similar to marine ciliates, due in part to the brackish nature of the waters, approximately half as "salty" as sea water.

This ciliated assemblage includes a *Dysteria* sp. which resembles in size and general contours the type species, *Dysteria armata* Huxley, but in some specific characters more closely resembles *Dysteria pectinata* Nowlin and *Dysteria navicula* Kahl. A flattened ciliate, distribution of cilia upon it is limited to an adoral, anterior groove, and a postoral, marginal groove which is continuous with the former. At the rear of the marginal groove there projects a spine-like structure which houses a group of five or six "anal" cilia (perhaps cirri). When the *Dysteria* sp. from the Warm Mineral Springs is compared to its above mentioned relatives there are differences in the morphology relative to the anterior and marginal grooves, the posterior "spine", the cytostome and gullet, and the general shape of the body and its pellicular striations sufficient to warrant its consideration as a separate species.

Nonrespiratory Gas Released from Seeds During Moistening

NANCY BRASSINGTON and ALAN H. HABER
Winthrop College and *Biology Division, Oak Ridge National Laboratory*

When seeds were wetted in Warburg flasks, there was an immediate output of gas. Since this gas was not absorbed by alkali, it was not respiratory. Seeds killed by heating or freezing, as well as other dried plant material, also released gas when moistened. Thus the gas released upon moistening dry seeds was a physical phenomenon having no relation to viability. From considerations of the amounts of gas released and the temperature dependence of the effect, we concluded that the gas was probably air adsorbed on surfaces within the seeds. The duration of nonrespiratory gas production was prolonged for several hours by moistening lettuce seeds slowly, although the total amount of gas so produced was unaltered. If unrecognized, such release of air during water imbibition would lead to calculation of mistakenly high values of the respiratory quotient (R. Q.). This may explain the observations of several investigators who reported that many kinds of seeds have a relatively high R. Q. soon after they begin to take up water, and that the R. Q. decreases and finally levels off with increasing time during imbibition.

The Systematic Embryology of *Aletris aurea* Walt.*

EDWARD T. BROWNE, JR., *University of North Carolina*[1]

The systematic position of *Aletris* is widely disputed since there are both primitive and advanced characteristics in the genus. Only Hutchinson has recognized a relationship of *Aletris* with the other genera of the Liliaceae-Narthecieae. This relationship was substantiated by cytological evidence (Browne, ASB BULL. 5:5, 1958). Positive evidence of a similar nature was obtained from comparative embryology. Embryological development of *A. aurea* is very similar to that of *A. foliata* (Ono, 1929), and species of *Tofieldia, Heloniopsis, Narthecium* and *Metanarthecium*. The ovules are anatropous (as in *Pleea, Tofieldia, Narthecium*), crassinucellate, and bitegmic (*Pleea, Tofieldia*), and the cover cells (*Pleea, Tofieldia, Heloniopsis, Narthecium, Metanarthecium*) and MMC are formed from a single archesporial cell. Embryo sac development is of the Polygonum (Normal) type (*Tofieldia, Heloniopsis, Narthecium, Metanarthecium, A. foliata*). The long-persisting antipodals are small (*Narthecium, Metanarthecium*), and the mature embryo sac is narrowly constricted at the chalazal end (*Pleea, Tofieldia, Heloniopsis, Narthecium, Metanarthecium*). Microspore delimitation is of the successive type (*Narthecium*), and the anthers are introrse in all genera of the tribe except *Heloniopsis*. Capsule dehiscence is loculicidal (*Heloniopsis, Narthecium, Metanarthecium*). Where genera are not indicated for a particular embryological feature, this information is not known other than for *Aletris*. Both embryological and cytological similarities indicate a close relationship between *Aletris* and the other genera of the Liliaceae-Narthecieae.

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1. Present address: Alabama Polytechnic Institute.

A Substance Controlling Growth in Timothy Roots

ROBERT T. BRUMFIELD, *Longwood College* and *Oak Ridge National Laboratory*

A transparent, colorless, gelatinous substance covers the root cap and distal growing point of the timothy seedling root. The substance is especially apparent on air-grown roots when immersed in water and varies considerably in quantity in individual roots. Ultraviolet radiation stimulates growth of meristematic cells near the tip and individual roots vary in degree of response. A nonirradiated root is stimulated by the transfer of material from an irradiated one, but transfer from a nonirradiated root is inhibitory. The substance is apparently digested by RNase (50 mg/1) which is stimulatory to some roots and inhibitory to others. The rate of digestion by RNase is enhanced by the presence of 2,4,6-trichlorophenoxyacetic acid (30 mg/1) a compound inhibiting growth effects of UV as well as geotropism. IAA inhibits the digestion but does not influence the UV effects or geotropism. The biochemical nature of the substance is unknown but there is circumstantial evidence that RNA is a component.

Notes on the Distribution and Ecology of *Cyathura* sp., an Estuarine Isopod*[1]

W. D. Burbanck, *Emory University*

In contemporary literature on the isopod *Cyathura carinata* (Kryer), the geographical distribution given includes the coasts of eastern North America, Greenland, western Europe, the Mediterranean, West Africa, South Africa, China, and Asiatic Russia. Recent unpublished work by Dr. Milton A. Miller, University of California (Davis), and collections by the author indicate that the *Cyathura* which occurs from Lake Ponchartrain, Louisiana, to Chewonki Creek, Maine, is not the same as the *C. carinata* (K.) originally described from Denmark, but a new species. Associated with a characteristic annelid and crustacean fauna, it is a member of a community with a recognizable habitat. As observed in some sixty estuaries and tidal marshes in nine states, *Cyathura* sp. (Maximum length, 27 mm.), lives only where fresh and salt water mix. The water covering the substrate where they are found is in motion due to the slope of the land, tide, or wave action. They live to a depth of 3-4 inches in simple unlined tubes of their own construction or possibly in worm burrows. Some sand, variable in amount, is always present in the substrate which also contains an admixture of vegetable debris and at times, particularly in New Hampshire and Maine, blue clay.

1. Supported by the McCandless Fund of Emory University and an Office of Naval Research-Marine Biological Laboratory Institutional Grant.

Relationships of *Mus musculus* and *Peromyscus polionotus* in an Outdoor Enclosure

Larry Caldwell, *University of Georgia*

Following a two year intensive field study of relationships of *Mus musculus* and *Peromyscus polionotus* in old field succession on the AEC Savannah River Area, a one-acre enclosure was stocked with two pair of each species. Both species have occurred naturally for the past 7 years at the site of the enclosure. A live trapping program is being used to keep track of the mice and their breeding activities. Nest boxes have also proved useful in locating the mice.

The study so far has shown that: (1) the activity ranges of individuals of both species may overlap and sometimes almost coincide, (2) in nature the two species do not share the same burrow but laboratory observations show that under crowded conditions they will sometimes use the same nest box, (3) *Mus* is the more excitable and far ranging of the two species and maintains a less stable population density, (4) there is a high rate of disappearance of young of both species after they leave the nest.

Observations on the Structure and Ultrastructure of the Cheliped Muscle of the Crayfish (*Cambarus longulus*)*

Robert R. Cardell, Jr., and Larry L. Farmer, *University of Virginia*

Muscle tissue from the cheliped of the crayfish was removed and immediately fixed in Bouin's, formalin or FAA. Studies were made with the light microscope on the tissue. Other tissue was fixed *in situ* with buffered formalin, stained with 1% osmic acid and the ultrastructures were studied by means of the electron microscope. Further observations were made with the phase microscope utilizing material neither fixed nor stained. The results of these studies reveal that the striated muscle is composed of A and I bands that measure approximately one and 1.5 micra, respectively. The Z membrane in the I band is not evident but more studies with the electron microscope are needed to clarify this point. In longitudinal section the myofibrils are relatively large and appear to be continuous throughout the muscle fibril. In cross section the fibrils are loosely arranged in the fiber, and the filaments, composing the fibrils, are arranged in an hexagonal pattern. Nuclei are embedded in the fibrils of the muscle; therefore, it is believed the nuclei are scattered throughout the muscle fiber.

The Ultrastructure of the Tail of *Himasthla quissetensis**

Robert R. Cardell, Jr., *University of Virginia*
and
Delbert E. Philpott, *Marine Biological Laboratory*

The following observations were made in the tail region of the free swimming cercarial form of *Himasthla quissetensis* (fixed in 1% osmic acid) by means of an electron microscope. The cuticle of the tail was found to be one micron thick, possessing an outer single membrane with many indentations and a smooth double basement membrane. Within the cuticle were found many osmiophilic bodies that appeared to be small mitochondria. These bodies were scattered throughout the cuticle but were concentrated near its inner surface adjacent to its basement membrane. Layers of smooth muscle, forming concentric bands approximately 0.5 micron in thickness, were apparent beneath the basement membrane. A layer of striated muscle approximately three micra thick was located internal to the smooth muscle. The fibers of the striated muscle were found to run obliquely around the tail and many large mitochondria were found concentrated in the sarcoplasm below the myofibrils of the muscle. A study of the ultrastructure of the muscle did not reveal the A and I band arrangement characteristic of vertebrate muscle. Z membranes approximately 0.8 micron apart were evident in otherwise homogeneous cytoplasm. The central portion of the tail was found to be composed of parenchyma cells.

Studies of Yeasts Ingested by *Drosophila* Populations*

John M. Carpenter and James K. Komatsu, *University of Kentucky*

During the last three years over 500 wild yeast strains have been isolated from the crops of several species of *Drosophila*. Of the 145 strains thus far identified to species, 26 were taken from *D. melanogaster*, 21 from *putrida*, 40 from *affinis*, and 58 from *robusta*. Of these strains, 100 (69%) were of four yeast genera — *Candida*, *Kloeckera*, *Pichia*, and *Saccharomyces*. Fourteen species were represented in these genera. On the basis of crop dissections, *Drosophila affinis* shows a "preference" for *Kloeckera* and *Candida*, *robusta* and *putrida* for *Pichia* and *Saccharomyces*, and *melanogaster* for *Candida* and *Pichia*. In some cases there appears to be a correlation of such yeast "preferences" with the seasonal distribution of some *Drosophila* species, e.g. *Candida* and *Kloeckera* species are more frequent in the cool months when *D. affinis* is highest in frequency, *Pichia* or *Saccharomyces* is frequent throughout the entire collection period — as is

robusta. Decisive information of these trends awaits the analysis of the remaining yeast strains and certain environmental data.

Studies on the Attraction of Plant Nematodes to Roots*

MARVIN L. CHILTON, *University of Kentucky*

It has been taken for granted by most workers in the field of plant nematology that there is some substance which roots secrete that has an attraction for parasitic plant nematodes from the surrounding soil. The presence of this hypothetical substance has not been shown conclusively by experimentation.

This report is an attempt to further the knowledge in this area by presenting revised techniques and methods. Nematodes were placed on various media made to simulate soil conditions. Experimentation was done under sterile conditions. Various conditions studied included: (1) distance of nematodes from roots, (2) age of roots, (3) nutrient, and (4) physical constitution of media. Aqueous solutions in which seeds had been germinating for various lengths of time were also tested for attractiveness.

A medium containing only agar in a 2% concentration appears to be most satisfactory. Distance from roots, and age of roots were both found to be concerned in attraction. Tentative results indicate the presence of an attractive substance in the aqueous solutions.

Life History of *Rhodobryum roseum* (Weis.) Limpr.

NARINDER CHOPRA, *University of Tennessee*

Rhodobryum roseum (Weis.) Limpr. is strictly dioicous. Its spore germination is typical of true mosses. The spore germinates into ordinary green protonema, some branches of which are transformed into rhizoidal filaments. Bud origin and its transformation into a gametophore is found to be very similar to that in *Funaria hygrometrica* (Brown, 1919), *Bryum argenteum* and *Tortula indica* (Chopra, 1957) except in a few minor details. The apical cell of the gametophore is three-sided, which cuts off segments in regular succession, while the apical cell of the leaf is two-sided. The development of the leaf, the stem, the antheridia and archegonia is described in detail, and is similar to that in *Funaria hygrometrica* (Campbell, 1918), *Physcomitrellopsis indica* (Pandé and Chopra, 1957), *Tortula indica* (Pandé and Chopra, 1958a), *Pogonatum* (Chopra and Sharma, 1958), and *Pogonatum stevensii* (Pandé and Chopra, 1958b). The apical cell of the antheridium has two cutting faces, while in the archegonium the apical cell has two cutting faces initially, but changes into a three-sided apical cell after cutting a few segments. Spermatogenesis is very similar to that in *Mnium hornum* (Wilson, 1910) and *Mnium affine* (Woodburn, 1915). The development of the sporophyte from the fertilized egg is also described. The archesporium arises from the outermost layer of the endothecium. The peristome teeth develop from endothecial cells. The chromosome number of this species is $n = 10$ (Chopra, 1957).

Better Trained High School Science Teachers — A Desperate Need

ELTON C. COCKE, *Wake Forest College*

A study of applications submitted for participation in National Science Foundation Summer Institute for High School Teachers of Science and Mathematics indicate that many of our high school science and mathematic teachers are very poorly trained. Some have had little or no training in the subject which they are teaching, while others have had no training in the last twenty years and are not keeping up with the progress in their fields. The high schools of the Southeast are desperately in need of better trained teachers. The colleges have a real opportunity and responsibility in this matter.

The Effect of Sodium Fluroacetate on Blood Glucose Levels in the Bullfrog (*Rana catesbeiana*)*

B. THEODORE COLE, *Louisiana State University*[1]

Sodium fluoroacetate (SFA) is a metabolic poison which varies in toxicity with various warm blooded animals. Man appears to be most resistant, the dog most sensitive and the rat intermediately so. The lethal dose is some 1,000 times greater for cold blooded animals than for the rat. Bullfrogs which ranged in weight from 300-600 grams were maintained in a fasted condition at a temperature of 25 degrees for a period of 2-6 days prior to experimentation. Twelve animals were anesthetized by an intra-sinus injection of 3-5 mgms nembutal per 100 grams body weight. Surgery was performed to expose the heart and control blood drawn by cardiac puncture. Animals were then injected i.s., with 100 mgms SFA. Subsequent blood samples were drawn at intervals of 1, 2, 4, and 6 hours. The animals remained anesthetized during the entire period and were kept under cool, dripping water. The wound was closed to prevent loss of body fluids with wound clips. Blood filtrates were prepared and analyzed for glucose by a modified Somogyi method. Optical densities were read on the Spectronic 20 colorimeter (Bausch and Lomb). The data shows a steady hyperglycemia from a control level of 30 mgms% to 48, 66 and 90 mgms% at 1, 2, and 4 hours respectively. The blood sugar above 4 hours remained constant with a value of 89% at 6 hours.

1. This research supported in part by a grant from the University Research Council, Louisiana State University.

Seasonal Lipid Levels in Key Population Groups of an Old Field Ecosystem*

CLYDE E. CONNELL, *University of Georgia and Valdosta State College*

Samples of three of the key population components of an old field ecosystem were collected at seasonal intervals and extracted for total lipid content. This work was done in connection with the University of Georgia's Program for Ecological Studies at the Savannah River Plant of the Atomic Energy Commission. Population groups sampled were: (1) the Savannah Sparrow (*Passerculus sandwichensis*), (2) the Old Field Mouse (*Peromyscus polionotus*), and (3) the grasshopper, *Schistocerca americana*. The animals were dried in a vacuum oven, macerated, and total lipids were extracted; ethyl alcohol and petroleum were used as solvents. Fat was expressed as per cent of the weight (wet and dry) of the individual animals. Savannah sparrows show three fairly distinct seasonal fluctuations in fat content. Peak periods for this group were: (1) early fall, during actual migratory flight, (2) mid-winter, and (3) immediately prior to migration in spring. *Peromyscus* has two

peak periods, one in winter and another in midsummer. *Schistocerca* has one fairly distinct peak, in autumn. Only adults of this group were extracted.

The Production of Indole Acetic Acid by *Taphrina deformans* and *Dibotryon morbosum*

EVELYN E. CRADY and FREDERICK T. WOLF,
Vanderbilt University

Taphrina deformans and *Dibotryon morbosum*, when grown in media containing tryptophane, produce indole acetic acid as a metabolic product. The highest concentrations of indole acetic acid found by colorimetric tests were 20.5 ugm./ml. in the case of *D. morbosum* and 81.2 ugm./ml. in the case of *T. deformans*. The rate of synthesis, as well as the total quantity synthesized, is greater for *T. deformans* than for *D. morbosum*, and is greater in shake cultures than in stationary cultures. For both organisms, the available evidence strongly favors tryptamine as the probable intermediate in the conversion of tryptophane to indole acetic acid.

Comparative Tolerance of Some *Drosophila* Species to Cold Temperature*

WALLACE D. DAWSON, *University of Kentucky*

In order to learn the possible effect of cold temperature on *Drosophila* species with a view to understanding their overwintering capabilities, several lines of study were initiated. (1) Weekly collections were made during the months of December through March, 1957-58 and 1958-59 at Dry Branch Station near Lexington, Kentucky. Adult flies of three species, *D. affinis, putrida* and *tripunctata*, were obtained in these collections. Of these, *affinis* was the most frequent during both winters. (2) Winter collections of material which might contain eggs or pupae did not prove fruitful. (3) A series of direct cold temperature response experiments in the laboratory, using the species *affinis, robusta* and *melanogaster*, indicated that *affinis* is more tolerant of cold at all levels than either *robusta* or *melanogaster*, and that *robusta* is more tolerant than *melanogaster*. This is consistent with previous populations studied during other seasons which suggest that *D. affinis* may overwinter in the wild in greater numbers than many other species, and that *D. melanogaster* probably survives the winter only in protected domestic situations.

Concentrations of Radionuclides in the Natural Vegetation of a Contaminated Area

H. R. DESELM and R. E. SHANKS,
The University of Tennessee

Recent estimates of future nuclear power use suggest that radioactive wastes will be produced in great quantity and that a certain proportion of them will be released into natural ecosystems.

The fate of nuclides released into the White Oak Lake at Oak Ridge is under study and is of particular interest as the lake is now drained and the radioactive surface exposed to invasion by plants.

The dispersion and absorption of variable amounts of radiocesium in parts of the ecosystem are discussed.

The Composition of an Alabama Forest in 1821

ROBERT A. DIETZ, *Troy State College*

A previous study of the original vegetation of Pike County, Alabama, has been extended to include an analysis of tree size and forest composition by forest types. Four of these have been recognized, as follows: pine forest, pine-hardwood forest, upland hardwood forest and bottomland forest. The analyses are based upon surveyor's records.

A Cytological Study of the Genus *Habranthus**

W. S. FLORY and R. O. FLAGG,
The Blandy Experimental Farm, University of Virginia

Until recently *Habranthus* has been considered as essentially a South American genus, with species having either 12 or 24 comparatively large chromosomes, or aneuploid or hybrid numbers derived from these.

This report gives chromosome numbers for fifteen taxa involving 8 described and 3 undescribed species, 3 varieties of some of the 11 species, and a hybrid between two of them. New somatic numbers reported are: *H. immaculatus* - 22, *H. cardenasiana* - 24, *H. concolor* - 36, *H. incaica* - 54, *Habranthus* sp. (S13281-55) - ca. 48 and *Habranthus* sp. (13462-56) - 108. Species with 22, 36 and 108 chromosomes are from Mexico. Numbers now known for the genus are 12, 14, 18, 22, 24, 36, 48, 54 and 108, most falling in the euploid series based on 6. An exceptional species, in addition to *H. immaculatus*, is *H. juncifolius* ($2n = 14$). The predominant somatic number encountered is 24. Four species and three of the minor taxa, have this number. In addition one species has half the number (12), a hybrid traces from one of the 24 chromosome species, and the two aneuploids may be explained as originating from taxa with either 12 or 24 chromosomes. Descriptions are given for the karyotypes of most taxa; in some cases these are detailed, and in others preliminary. Factors concerning evolution of karyotypes, as well as taxonomic relationships, are discussed where suggestions seem warranted by the data. (*Research supported by National Science Foundation Grant G2716.*)

Energy Flow Through the Cotton Rat, *Sigmodon hispidus**

FRANK B. GOLLEY, *University of Georgia*

As part of a broad study of energy flow through the broom-sedge ecosystem, energy intake and loss in individual cotton rats was investigated in the laboratory. Preliminary results from two experiments indicate that the technique of confining wild rats and measuring their food intake and feces and urine output, and their maintenance metabolism provides adequate information for calculation of an energy flow chart for each individual. In these studies the cotton rat consumed an average of 43.7 kg.cal., and lost an average of 4.4 kg.cal. in feces, 5.1 kg.cal. in urine, and 27.8 kg.cal. in respiration per 24 hours. Weight gain or production during the experiments was minimal - 2.98 kg.cal. Energy intake should equal outgo, any discrepancy between these indicating experimental error. Here, the discrepancy between intake and outgo ranged from —11.2 to +2.46 kg.cal. and averaged 14 percent of the energy intake.

The Effect of Kinetin and Red Light on Growth and Cell Size*

MILDRED M. GRIFFITH and ROBERT D. POWELL,
University of Florida

Disks of uniform size were cut from the first foliage leaves of etiolated bean seedlings. One sam-

ple of disks was treated with solutions of kinetin of several concentrations; the second was exposed to red light; the third was treated both with kinetin and exposed to red light. A control was maintained. After forty-eight hours, all disks were measured and histological preparations were made. Overall growth and palisade cell size for each treatment were determined. The results indicated: (1) treatment with kinetin or exposure to red light increases growth; (2) treatment with kinetin stimulates cell enlargement; (3) exposure to red light increases the number of cells. From these results, it appears that kinetin and exposure to red light affect growth through different biological mechanisms.

An Evaluation of the Andreae Chromatographic Technique for the Determination of Maleic Hydrazide*

JOHN G. HAESLOOP and VICTOR A. GREULACH,
University of North Carolina

Andreae (*Can. Jour. Biochem. Physiol.* 36:71, 1958) devised a two-dimensional paper chromatographic technique for identifying maleic hydrazide (MH), using a ferric chloride-potassium ferricyanide developer that gives royal blue spots. The only other substance he tested was indole acetic acid. Since we were interested in using the method with plant extracts we determined the color reactions of 58 metabolites including sugars, amino acids, vitamins, hormones, purines, pyrimadines, and Krebs cycle acids, and 75 chemicals (including 31 hydrazides) assembled for a study of their effects on plant growth. In spot tests 21 metabolites, including some amino acids, sugars, vitamins, and Krebs cycle acids gave the blue reaction, as did all the hydrazides (but few other compounds) in the second group. IAA, IBA, 2,4-D, a-naphthaleneacetic acid, and gibberellic acid failed to give a blue spot. Bases give a distinct white spot. Rf values of compounds giving a blue color were determined. Since sugars, amino acids and other organic acids differ in color reaction the method may also be useful as a supplement to other developers for these groups of compounds. The technique is useful for class demonstrations of chromatography since no heat is required to bring out the blue spots.

A New Strigeid Trematode (*Diplostomatidae: Alariinae*) from the Pancreatic Duct of the Raccoon

REINARD HARKEMA and GROVER C. MILLER,
North Carolina State College

Examination of a raccoon on December 15, 1957, revealed the presence of 86 specimens of a trematode in the pancreatic duct. These worms had caused marked hypertrophy of the pancreatic duct and consequent swelling of the pancreas. The specimens proved to be a strigeid which is sufficiently different from any known form to constitute a new genus. This trematode is characterized by the presence of a very large, elongated holdfast organ contained within an elongated pouch of the ventral body wall. In this respect it is similar to the genus *Duboisiella*, but differs from it in the structure of the holdfast, which is not lobed; testes side by side; the absence of an ejaculatory pouch; and the presence of pseudosuckers. It also shows similarity to *Pharyngostomum* and *Pharyngostomoides* in the arrangement of the testes. However, the distinctive holdfast and ventral pouch separate it from these genera.

Marine Chlorophyta of the Upper West Coast of Florida

H. J. HUMM and SYLVIA EARLE TAYLOR,
Duke University

A study was made of the marine green algae (*Chlorophyta*) of the upper west coast of Florida from Tampa Bay to Pensacola, based upon numerous collections by the authors and others and upon herbarium records and literature. Fifty-eight species are recorded, 27 of which are newly reported for the area north of Tampa Bay.

In general, species found as far north as Tampa Bay may be expected to have a continuous distribution northward around the Gulf to Texas and Mexico, as minimum winter temperatures of the water seem to be sufficiently similar at intermediate depths offshore to permit development where salinity fluctuations are not great. The algal flora of the northern Gulf is not limited to those species characteristic of brackish waters and salt marshes. While these types are conspicuous along shore, a wide variety of stenohaline and tropical species occurs at depths of 15 to 100 feet or more throughout the area wherever the bottom provides a suitable substrate.

An artificial key, illustrations of nearly all species, and a systematic list of species with descriptions and habitat notes have been prepared for the area involved.

Polysaccharide Histochemistry of the Oviduct of the Newt, *Triturus viridescens**

A. A. HUMPHRIES, JR. and W. N. HUGHES,
Emory University

As one phase of an investigation of the nature of the jelly layers surrounding the amphibian egg and the way in which they are secreted by the oviduct, the polysaccharide histochemistry of the secretory epithelium of the oviduct of the newt was studied. The oviduct is grossly divisible into five secreting regions, called here A through E. There is a corresponding histological and histochemical differentiation. All regions gave a positive PAS reaction which was unaffected by glycogen digestion. Regions A, B, and D were metachromatic with toluidine blue and gave a positive reaction with alcian blue. The other regions responded negatively. Region A gave a strong violet metachromasia distinctly different from that of regions B and D. Treatment with hyaluronidase did not alter the metachromasia of region A or the reactions of B, C, or D. Treatment with ribonuclease failed to change the reactions of regions A or B. Other regions were not tested. The most probable explanation of the differences in staining reactions seems to be that regions A, B, and D contain acid polysaccharide, probably heparin-like, while regions C and E do not. There is evidence that the differentiation is of significance in certain aspects of the physiology of the maturing oocyte.

Studies on the Metabolism of *Astasia longa* (*Jahn*)*

FRISSELL R. HUNTER and J. WARREN LEE,
Southern University

Previous studies have demonstrated that "Kreb's Cycle" intermediates stimulate the oxygen consumption of *Astasia longa* (*Jahn*). The present report is concerned with enzymatic mechanisms underlying the previously observed oxidations. Colorimetrically or spectrophotometrically, numerous enzymes have

been demonstrated. Colorimetrically, the condensing enzymes have been demonstrated directly; pyruvic oxidase, acetic-thiokinase, and oxalacetic carboxylase indirectly. Aconitase, TPN - isocitric dehydrogenase and succinic dehydrogenase have been spectrophotometrically demonstrated, and preliminary experiments suggest the presence of fumarase and malic dehydrogenase. The results suggest the "Tricarboxylic Acid" cycle as a metabolic pathway in this species.

"Swimmer's Itch" in Colorado*

GEORGE W. HUNTER III, *University of Florida and the Rocky Mountain Biological Laboratory*

Reports received in the summer of 1957 suggested an outbreak the previous year of schistosome dermatitis among bathers at an elevation of nearly 9,000 feet. Investigations in 1957 revealed the presence of two families of mallard ducks. An examination of snails yielded brevifurcate cercariae from seven specimens of *Physa propinqua* Tryon. These parasites were identified as *Trichobilharzia physellae* (Talbot 1936), a bird schistosome found in mallard ducks. Exposure of six human volunteers yielded minimal responses in four persons and a hypersensitive reaction in one, thus indicating that the cercariae penetrated the skin of five of the six individuals.

This is believed to be the first record of schistosome dermatitis from Colorado.

Studies on the Development of Chlortetracycline - resistant Staphylococci in Chlortetracycline-treated Beef

JAMES M. JAY and J. WARREN LEE, *Southern University*

Various strains of *Staphylococcus aureus* were exposed serially to low concentrations of chlortetracycline (Aureomycin) in beef held at 28 C. The organisms were inoculated into twenty-gram samples of beef using needle and syringe. The antibiotic was administered in a similar manner. The samples were incubated at the above temperature for four days and homogenized in a Waring blendor. Additional samples of beef were inoculated with the homogenate. Aliquots of the homogenate were streaked onto the surface of 7.5% salt agar plates. Staphylococci were picked from these plates and their antibiotic sensitivity was determined using the tube dilution method.

Chlortetracycline-resistant strains of the original sensitive organisms have been demonstrated after as few as three beef-to-beef passages. Similar resistant strains could not be demonstrated as frequently when the organisms were passed from beef-to-agar-to broth-to beef.

A thirty-fold increase in resistance has been demonstrated after six passages by the beef-to-beef technique. Mannitol fermentation, coagulase production, and bacteriophage sensitivity were determined on the organisms and the results will be reported.

Studies on the Survival of Trophozoites of *Plasmodium berghei* in Glycerolized Whole Blood at Low Temperatures

GEOFFREY M. JEFFERY, *U. S. Public Health Service*

The preservation of viable mammalian and avian malaria parasites in the frozen state has been of inestimable value during recent years in the maintenance of experimental strains of *Plasmodium* without continual passage through the vertebrate hosts. Although good results have been obtained using parasites in whole citrated blood, it is known that freezing and thawing causes extensive parasite and red cell destruction. The prior successful use of glycerine as an additive in the preservation of sperm cells, red blood cells and other living materials dictated trials with similar preservation of malaria parasites. Using *Plasmodium berghei* in mice as the experimental parasite, varying amounts of glycerine were added to blood samples prior to freezing. Final concentrations of glycerine varying from 4.2 to 16.6 per cent proved to be protective to the red blood cells and parasites, regardless of the temperature of freezing or maintenance (—20 or —70° C.), of whether the freezing was slow or rapid, or of variation of temperature during maintenance. Maximum protection was usually achieved by the use of a buffered glycerine additive rather than glycerine-saline or glycerine-water solutions.

The Effect of Photoperiod on the Duration of Nymphal Development in Several Species of Odonata*

CHARLES E. JENNER, *University of North Carolina*

In experiments conducted at approximately 22° C., photoperiodism was demonstrated in the dragonfly *Tetragoneuria cynosura* and in the damselflies *Ischnura posita, Enallagma signatum, Enallagma basidens, Enallagma divagans,* and *Enallagma traviatum.* Long photoperiods of 13 or 14 hours duration promoted nymphal development; 11-hour photoperiods prolonged development, but the degree of influence differed with the different species. Thus development in *I. posita* was delayed only slightly on an 11-hour photoperiod, compared with those on a 14-hour photoperiod; in contrast, development was very greatly retarded on an 11-hour photoperiod in both *E. divagans* and *E. traviatum.* The responses of *T. cynosura, E. signatum* and *E. basidens* were intermediate between the two extremes. Diapause appears to occur only in the last nymphal instar in *T. cynosura* and *I. posita,* in both the last and penultimate instar in *E. signatum* and *E. basidens,* in the penultimate in *E. divagans* and in several instars in *E. traviatum.* These preliminary experiments make it clear that photoperiodism is an important factor in the control of seasonal attunement in the Odonata. The group offers extremely favorable material for the experimental investigation of photoperiodism, especially with regard to the opportunity for comparative studies of different species of varying degrees of relatedness.

Trophic Relations within the *Zostera* "Community"

EDWIN B. JOSEPH, *Birmingham-Southern College*

During the summer of 1958, community composition and trophic relations within the *Zostera* "community" were investigated. A specific aim was to determine the degree of competition among closely related species of fishes occupying this habitat. Community composition was determined by sampling all levels, including quantitative bottom samples, of the community. Well over 100 species were identified as members of the community; however, less than half were considered significant in the total trophic relations. The pipefishes, *Syngnathus floridae* and *Syngnathus fuscus,* appear to compete directly for food and, in addition, compete with the juveniles of several other species.

A Cytochemical and Quantitative Study of Protein-bound Sulfhydryl and Disulfide Groups of Sea Urchin Eggs*

NAOKO KAWAMURA, *University of Tennessee*

By a new method with colored sulfhydryl reagent, 1-(4-chloromercuriphenylazo)-naphthol-2, protein-bound sulfhydryl and disulfide groups in the eggs of *Arbacia punctulata* during the first cleavage were studied cytochemically and quantitatively. The amount of sulfhydryl groups decreased after the syngamy stage and then increased up to the original level at the cleavage stage. Changes in the amount of disulfide groups were the reverse of sulfhydryl groups, that is, the amount increased at the streak stage and decreased at the cleavage stage. A cytochemical observation showed that before the mitotic stage sulfhydryl groups localized in the cytoplasm uniformly but not in the nucleus. At the mitotic stage the spindle and astral fibers were rich in sulfhydryl groups. Disulfide groups were present in eggs except for the nucleus at all stages, and for the centrosphere at the mitotic stage. The results suggest that the spindle and astral fibers are composed of proteins rich in sulfhydryl groups which arise from disulfide groups in the region of the centrosphere.

Formation and Behavior of the Spindle Body in Neuroblasts of the Grasshopper, *Chortophaga viridifasciata**

KEN-YA KAWAMURA, *University of Tennessee*

From observations of both living and stained cells, it is clear that the formation of the spindle body begins in the cytoplasm, and after disappearance of the nuclear membrane its further development depends principally on the nuclear substances. The shift of the spindle body toward the side of the neuroblast where the ganglion cell will eventually form occurs during anaphase with elongation of the spindle body. It seems probable that this shift is induced by the asynchronous development in the asters, and by the spindle elongation. During telophase, attachment of the furrow region of the cell surface to the middle part of the spindle body is followed by a remarkable decrease in the spindle volume. Reconstruction of the nuclear membrane occurs at the same time. These findings suggest that the formation of the cleavage furrow, the decrease in the spindle volume, and the reconstruction of the daughter nuclei may be a closely related phenomena.

The Detection and Interaction of Body Size Factors Among Ranch-Bred Mink

CLYDE KEELER, *Georgia State College for Women*

Annually expanded populations of colorphase and standard Dark ranch-bred mink totalling 108,717 individuals were studied throughout twelve years. Presence of Moyle Buff, Silverblu, and Pastel in males and females tended to produce animals larger than normal; Breath of Spring, Aleutian, Palomino, Black Cross, and Ambergold animals were smaller than normal. (Mutants are listed in descending order of body weight.) Associated size tendencies are probably due to color genes themselves rather than to linked genes because size effects did not change radically in amount or direction, suggesting that no cross-overs occurred. Moyle Buff, Palomino, and Ambergold manifest their size tendencies in both homozygotes and heterozygotes. Two large size genes in an individual make it still larger; two small size genes together in an individual make it still smaller; a large size gene and a small size gene in an individual tend to cancel each other's size effects. One hundred and sixty comparisons between mean weights of populations are listed. Vector models drawn to scale for forty comparisons were found in keeping with our analysis. Body length studies revealed correlated size tendencies, although certain alterations in bodily proportions were also characteristic of some colorphase types.

Hematological Observations in the Orders Insectivora, Rodentia, and Carnivora

S. S. KILGORE, *Louisiana Polytechnic Institute*

This study deals with the red blood count, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemaglobin, concentration, diameter, white blood count and differential leucocyte count. The families included are Sciuridae, Soricidiae, Cricetidae, Zapodiae, and Mustellidae. A total of 73 animals was studied after being live-trapped at altitudes ranging between 300 feet and 9,500 feet.

Chromosomal Abnormalities in the Embryos of Gamma-Irradiated *Hymenolepis diminuta**

RAYMOND L. KISNER, *The University of Tennessee*

Adults of the rat tapeworm, *Hymenolepis diminuta*, were subjected to either 400 or 800 r of gamma rays (8.35 r per minute by whole-body irradiation of hosts). Worms were removed from rats and fixed in Carnoy's fluid eight to forty-eight hours after irradiation. Observation of aceto-orcein squashes revealed abnormal chromosomes in a number of cells of embryos at early cleavage. There are normally six pairs of chromosomes, all acrocentric, and ranging in length from three to seven microns. Abnormal cells contained one to several strands of nuclear material in the interzonal region of late anaphases and early telophases. These resembled typical bridges described from other irradiated material. Most of these were found in worms fixed eight hours after irradiation. Some cells contained abnormally long chromosomes observable in metaphase plates and at anaphase, suggesting possible earlier translocations. Work is presently in progress to determine more fully the nature and extent of these changes. This study is being supported in part by the U. S. Atomic Energy Commission under Contract AT(40-1)1749.

Aquatic Phycomycetes of the Highlands Region*

WILLIAM J. KOCH, *University of North Carolina*[1]

The last two summers have been spent at the Highlands Biological Station, North Carolina, in a study of the aquatic Phycomycetes of that region. A general survey and certain special studies were begun. The latter involved descriptive and culture work of algal parasites and various saprophytes, many of which were grown in the laboratory on pollen, hemp seed, cooked *Paspalum* leaves, cellophane, filter paper, hair, cow horn, or shrimp exoskeleton and some of which were cultured on agar media. Seventy-three species in forty-two genera

1. National Science Foundation Grant-in-aids administered by the Highlands Biological Station are gratefully acknowledged.

are known from our studies at Highlands. Among these are several apparently undescribed species of *Catenochytridium*, *Chytridium*, *Entophlyctis*, *Mitochytridium*, *Phlyctochytrium*, *Rhizidiomyces*, *Rhizophydium*, and *Rozella*. Species of *Phlyctochytrium*, old as well as new, are especially abundant and exhibit a wide variety of morphological types. The most interesting finds were two chytrids. One has a thallus like *Catenaria* of the Blastocladiales, and the other is a Cladochytriaceous species with an unusual type of sporangial proliferation. Pure culture studies revealed sexuality for the first time in *Chytriomyces hyalinus* Karling. Knowledge of the sexual mechanism in *Chytriomyces* permits a more definitive diagnosis of this perplexing genus.

Parasites of Commercial Shrimp

DWAYNE N. KRUSE, *Florida State University*

Three species of commercial shrimp (*Penaeus aztecus* Ives, *P. duorarum* Burkenroad and *P. setiferus* Linnaeus) were examined for parasites. The shrimp were collected in the summer and fall of 1958 from the northwest Gulf coast of Florida. The following parasites were recovered: metacercariae of *Opecoeloides* encysted in the tissue surrounding the stomach and digestive gland; three new species of trypanorhynchan larvae encysted in the digestive gland; unidentified cestode larvae from the lining of the mid-intestine; immature nematodes of the genus *Contracaecum* in the digestive gland and tissue surrounding the stomach; two gregarines, *Nematopsis penaeus* Sprague and a representative of a new genus, from the intestine and stomach respectively; and a microsporidian of the genus *Thelohania* in the musculature. The taxonomy, morphology, incidence and biology of these parasites will be discussed.

Minimum Light Values Needed for Schooling in the Minnows, *Rhinichthys* and *Semotilus**

ROBERT A. KUEHNE, *University of Kentucky*

There is good reason to accept the view that vision is the primary sense involved in the schooling of *Semotilus atromaculatus* (Mitchill) and *Rhinichthys atratulus* (Hermann). It follows that light intensity is the critical factor controlling aggregating behavior. Groups of three fish were tested using an apparatus in which light intensity could be varied between zero and 107.6 luxes (1 lux = 0.0929 foot candles) at the water surface. Threshold values for schooling were found to be about 1.35 luxes for *Rhinichthys* and 1.79 luxes for *Semotilus*. Performance improved up to 6.7 luxes but not beyond that point. Below the threshold values fish swam slowly, as did blinded specimens. Swimming speed increased over the same light intensity range in which schooling performance improved.

Observations on the Structure and Distribution of the Metacercaria, *Diplostomulum trituri* (Trematoda: Strigeida)*

EDWARD W. LAUTENSCHLAGER and ROBERT R. CARDELL, JR., *University of Virginia*

Diplostomulum trituri Kelley, 1934, is found as a parasite of the brain case, brain, and eyes of the newt, *Triturus v. viridescens*, which serves as an intermediate host of this trematode. Further information regarding diagnostic characteristics and structural details are added to the description of this form. Observations on the ultrastructure of selected organs are considered. The range of *D. trituri*, previously limited in the literature to western Pennsylvania and possibly Ohio, is extended to central Virginia.

Development of the Taeniid Embryophore*

HAROLD H-K. LEE, *The University of Tennessee*

Development of the striated embryophore surrounding the onchosphere was studied by histochemical techniques with the use of apochromatic and phased contrast microscopes. Embryos were examined unstained, or stained with methyl-green pyronin or dilute haematoxylin. The striation of the mature embryophore is due to hexagonal, radially arranged rods cemented together by pepsin-trypsin digestible material. During early cleavage the onchosphere is surrounded by 4 to 6 large nuclei with compact chromatin. As the onchosphere differentiates a thin embryophoral primordium forms outside the region of the giant nuclei. Immediately underlying the primordium are DNA positive granules which form a gradually thickening layer. The granules form groups, which become more compact as development proceeds, eventually comprising the rods of the completed embryophore. The giant nuclei meanwhile disappear. On the basis of the observed changes, the presence of DNA positive material, the reported polyploidy of the giant cells, and the opinions of other workers, it may be concluded that the formation of the embryophore is largely a function of DNA and protein synthesis by the giant nuclei.

The Effects of pH and Viscosity on Surface Membranes in *Paramecium multimicronucleatum**

J. WARREN LEE and WILLIAM MCCALL, *Southern University*

Paramecium multimicronucleatum grown in a buffered desiccated lettuce medium maintained at pH 7.5, with *Aerobactor aerogenes* the main bacterial source. The maximum expansion in length and width at pH 8.5. The paramecia were usually stouter at pH levels 7.0 except at pH 5.5 and generally more slender at pH 7.0.

The pH of the medium affected the size of food vacuoles as indicated by the fact that the maximum food vacuolar diameter was at pH 6.0, the minimum at pH 7.0.

The fastest and greatest expansion of food vacuoles diameter was at a relative viscosity of 8; the minimum food vacuolar diameter was in controls (without gum arabic) having a viscosity of 1.3.

Recent Plant Records in Virginia

A. B. MASSEY, *Virginia Polytechnic Institute*

As investigations of the flora in Virginia progress species new to the State are found, from time to time. Fernald during his survey of the flora in the southeastern corner of the State recorded a number of plant species which had not been previously recorded in the State. The writer and another State worker have recently reported new additions to the flora. *Alternanthera philoxeroides*, Griseb; *Aegilops cylindrica*, Host.; *Bunias erucago*, L.; *Calepina irregularis*, (Asso.) Thell. (= *C. corvini*, Desv.) have been found to occur naturally in the State. The occurrence of these will be discussed.

The Effect of Na L-thyroxine on Viability and Regeneration of *Planaria maculata*

WILLIAM L. MENGEBIER, *Madison College*

Recent reports (Gilbert and Schneiderman) indicate that contrary to general opinion, vertebrate hormones may have a specific effect on invertebrate growth. To study the effect of thyroxine derivatives on regeneration of *Planaria maculata*, animals were transversely cut at the region of the pharynx and each half placed in 100 ml. of distilled water. Experimental fragments received 0.25 ml. of 1% Na L-thyroxine during each 24 hour period. Over a 4 day experimental period, treated fragments had a mortality of 30%; control fragments over the same interval had an 84% mortality. Complete regeneration of tail fragments was measured by the appearance of fully formed eye spots. Experimental tail fragments reached this stage 24-48 hours earlier than parallel control fragments.

Cytotaxonomic Relations Among Some Species of *Sansevieria* Thunb. (Liliaceae)

MARGARET Y. MENZEL, *Agric. Res. Service, U.S.D.A.*, JAMES B. PATE, *U.S. Cotton Field Station, Knoxville*, and F. DOUGLAS WILSON, *Everglades Experiment Station*

In connection with breeding of cordage fiber plants for Florida, chromosomes and hybridization of sansevierias in the collection at the Everglades Experiment Station are being studied. Assuming that $x = 20$ in *Sansevieria* (forms with $2n = 40$ form only bivalents), 13 diploid, 3 tetraploid and 6 hexaploid taxa have been investigated. Mitotic karyotypes of all species examined are similar except for differences in ploidy. Morphological and cytological evidence from diploid species and from five diploid interspecific hybrids suggests that little chromosome differentiation has accompanied speciation. Data from the polyploids appear to conflict with this conclusion: (1) Morphology of most of the polyploid forms suggests amphiploid origin, though amphiploidy usually is not prominent in genera lacking chromosome differentiation. (2) While all the polyploids form multivalents, the average number of chromosomes associated in multivalents ranges from 9% in *S. canaliculata* to over 35% in *S. stuckyi*, suggesting origin from diploids with various degrees of chromosome non-homology. (3) Pachytene chromosomes in the polyploids differ from those of the diploids in having pronounced proximal chromatic regions. Possible ways of reconciling evidence from diploids and polyploids will be discussed.

Studies on *Ligniera verrucosa*, a Plasmodiophoraceous Parasite*

CHARLES E. MILLER, *Emory University*

A study of the roots of *Veronica persica* and *V. hederaefolia*, host plants of *Sorosphaera veronicae* (another plasmodiophoraceous parasite), revealed intracellular cystosori and zoosporangiosori of *Ligniera verrucosa*. The zoosporangial phase of this species has been heretofore unknown. The plasmodia of *L. verrucosa* are found in root hairs, other epidermal and sub-epidermal cells of the roots. Zoosporangial and cystosoral plasmodia are indistinguishable until cleavage has started. It is thought that plasmodia produced during early infection develop into zoosporangia, while those produced later develop into resting spores. No evidence for any sexual process was observed. The spherical-shaped zoosporangia making up a single zoosporangiosorus are interconnected; a single discharge pore may serve to liberate zoospores from different zoosporangia.

In the Plasmodiophorales the classical basis for generic distinction has been the arrangement of the cysts in the sorus. *Ligniera*, because of the supposedly uncharacteristic nature of its cystosori, has been suggested as a host-variety of *Sorosphaera*. Because the parasites can be distinguished while growing in the same host species, both in nature and under laboratory controlled host-parasite experiments, they should be considered as distinct taxa.

An Analysis of Factors Contributing to the Successful Reanimation of Mice from Less Than 1° C*

JAMES A. MILLER, JR. and FAITH S. MILLER, *Emory University*

Hypothermia protects newborn and adult mammals from experimental asphyxia and recently has been successfully tried for asphyxia pallida in human babies (Westin, Miller, Nyberg, Wedenberg, '59). By contrast, a simple and very effective method for cooling animals to 0°C with subsequent recovery utilizes partial asphyxiation during the first stage of cooling. Experiments were designed to resolve this apparent paradox using mice cooled by the Goldzveig-Smith method. After one hour in sealed vessels the 0_2 content was 6%, CO_2 was 11%, deep colonic temperature approximately 15°C. The relative importance of hypoxia, hypercapnia and high humidity was tested by the addition of soda lime, silica gel, or both. Hypercapnia proved most beneficial, hypoxia next, and increased humidity of least value for recovery of postural reflexes, prevention of hind limb weakness and indefinite survival. Tests of the efficacy of air, 100% 0_2, 95% 0_2 + 5% CO_2, and 90% 0_2 + 10% CO_2 for artificial respiration during rewarming demonstrated the superiority of 95% 0_2 + 5% CO_2, whether the hypothermia was of short duration (15 min. below 5°C) or of long (30 or 60 min.). X-ray studies on mice injected with "Micropaque" suggested that vasodilation produced by the sealed vessel technique may be the mechanism behind the success of the method.

Acetate Dependance for Sexuality in *Polytoma uvella**

FRANZ MOEWUS, *Applied Research Laboratories, Miami Springs, Florida*

Strain WH of *Polytoma uvella* can be grown in the presence and absence of acetate. With acetate the asexual growth phase is separated from the sexual phase by a transitory stationary phase, which is expressed by a bisegmented growth curve. The graph resembles to so-called "diauxie-graphs" which indicate that two different metabolic systems are involved. Without acetate only the asexual phase is exhibited. If acetate is added to stationary cultures, grown without acetate, about 30% of the cells are directly transformed into gametes (sex induction), while the remaining cells undergo gametogenesis. Finally 90% of all cells have mated and formed zygotes. Butyrate leads to gametogenesis, propionate has no effect. Induction of sexuality and gametogenesis are not due to pH changes. It is obvious, that during the transitory stationary phase the acetate-independent metabolism is replaced by an acetate-requiring metabolism. The addition of

a coenzyme A inhibitor, liosol (= d — (4-diphenylyl—)—butyric acid), to different stages of the cultures demonstrated, that the "asexual" metabolism is not affected, while 1 g/ml liosol prevents sex induction and gametogenesis. These data indicate that in *Polytoma* sexuality is linked to an acetate requiring pathway.

A New Approach to the Detection of Synergistic Doses in Combination Chemotherapy

JACK H. MOORE and J. RICHARD THOMSON,
Southern Research Institute, Birmingham, Alabama

The problem of drug-resistance in cancer cells, similar to drug-resistance in bacteria, presents an ever-present stumbling block to the successful chemotherapy of leukemia. For several years the striking but temporary antileukemic activity of the folic acid antagonists and the purine antagonists has been reported in experimental neoplasms as well as in clinical use. It is generally suspected that the existence of drug-resistant mutants in populations of leukemic cells is at least one limiting factor preventing successful chemotherapy.

We have previously reported (ASB BULLETIN 2(1), 1955, p. 11) combinations of agents demonstrating potentiating antitumor activity. This synergistic activity was noted by combining equal fractional doses of two drugs. In an effort to determine the most effective combination of two drugs, we have recently employed a better selective method by combining drugs with dosages arranged in a uniformly-graded manner. In such a selection of dosages, certain potentiating combinations which show the effect of a major dose of one drug aided by a minor dose of another become immediately apparent. The same scheduling will also show the effects of combinations of equal fractional doses. Data will be presented demonstrating the potentiation of activity of such agents as azaserine and 6-mercaptopurine using mouse leukemia L1210.

Some "Spunkwater" Protozoa, Including a Previously Unnamed Amoeba

ROBERT H. MOUNT and EUGENE C. BOVEE,
University of Florida

A literature search, during a protozoology course taken by RHM and taught by ECB, revealed nothing about protozoa in water-filled tree cavities. In such water from the laurel oak, *Quercus laurifolia*, 28 species of protozoa were found, including an amoeba depicted by Leidy in 1879 as "an amoeba of uncertain reference," determined by us to be assignable to Schaeffer's *Mayorellidae*, genus *Mayorella*. Ten species of flagellates were found; eight sarcodina; and ten ciliophora, including: Flagellates; *Chilomonas paramecium, Astasia longa, Astasia* sp., *Distigma* sp., *Heteronema acus, Peranema trichophorum, Peranema* sp., *Bodo edax, Cercomonas crassicauda,* and *Mastigamoeba* sp. Sarcodinids; *Actinophrys vesiculata, Mayorella* sp. #1, *Mayorella* sp. #2, *Arcella* sp. #1, *Arcella* sp. #2, *Cochliopodium vestitum, Centropyxis constricta,* and *Difflugia* sp. Ciliates; *Spathidium serpens, Cyclidium* sp. *Tetrahymena pyriformis, Tetrahymena* (Leucophrys) *patula, Tetrahymena* sp., *Spirozona caudata, Oxytricha hymenostoma, Parauroleptus musculus* var. *minor, Vorticella microstoma,* and *Epistylis* sp. A water sample taken from a sweet gum tree stump, *Liquidambar styraciflua,* yielded only one protozoan, the zooflagellate, *Bodo edax*. Only two protozoans were found in more than one sample; *Bodo edax* from one oak cavity and from the sweetgum hole; and *Tetrahymena pyriformis* from two different oak tree cavities.

The Rediscovery of the Chytrid, *Pringsheimiella dioica**

J. THOMAS MULLINS, *University of North Carolina*

Pringsheimiella dioica Couch, an endobiotic holocarpic chytrid parasitic in *Achlya flagellata,* was collected from Mirror Lake at Highlands, North Carolina. Isolates were obtained on three dates, July 30, August 7 and October 11, 1958. This proved to be a significant find in that *Pringsheimiella* had not been seen since it was originally described by Couch in 1939. Laboratory crosses between the isolates have shown that the collections include two mating strains which produce abundant resting bodies.

Organic Production and Turnover During the First Seven Years of Old-field Succession on the AEC Savannah River Area*

EUGENE P. ODUM, *University of Georgia*

Annual net production and heterotrophic utilization in croplands abandoned in 1951 have been estimated from harvest samples taken at monthly intervals during the growing season for the past seven years when shallow-rooted, short-lived forbs and grasses have dominated the vegetation. Rainfall appears to be most important single physical factor influencing annual variations, while clay-silt fraction of the subsoil has been key factor controlling local or horizontal differences. When these major limiting factors are ruled out (as, for example, calculating gms/M^2/ unit of rainfall on the same soil) it was found that: (1) net primary production declined during the first two years and remained virtually constant for next five years; (2) species diversity increased greatly along with the expected changes in species composition; (3) production became spread out over the season with result that terminal autumn standing crop declined; (4) surface litter increased but reached an equilibrium after only three years; (5) soil organic matter and certain macronutrients (P & Ca) leached (decreased in topsoil, increased in subsoil). These results suggest that from the functional standpoint secondary succession may involve a series of temporary steady-states rather than a continuous change as is usually postulated. Also, it is evident that an increase in number of species and successional changes in species composition within the same life form do not automatically result in an increase in productivity.

Influence of Respiratory Inhibitors on Absorption of Sugars by Plant Cells

THERESA PARTLOW and JOSEPH C. O'KELLEY,
University of Alabama

Sugar absorption by germinating pollen and by other plant cells is inhibited when these cells are supplied respiratory inhibitors. A study of the effect of 2,4 - dinitrophenol (DNP) on sugar absorption reveals that at molar concentrations of 5×10^{-5} and lower, oxygen consumption is not depressed. In contrast, at levels of DNP of 5×10^{-5} and 2×10^{-5} M glucose absorption is strongly depressed. At these concentrations of DNP phosphorylation in plant cells is reported to be uncoupled from oxidation. Results of this study suggest the presence of an absorption process dependent upon the formation of "high energy" phosphate bonds in respiration.

The Concentration of Growth Promoting Substances in Certain Bryophytes

PAUL M. PATTERSON, CAROLYN BOLTON, and JENNIE JOE LAWRENCE, *Hollins College*

By the pea-root growth inhibition method, tests were run on bryophytes during the fall and winter while they were in their seasonal dormant period. The growth inhibiting extractives, in terms of their IAA equivalents, varied from undetectable amounts (IAA at 10^{-12}) to 5 or less micrograms per gram of desiccator-dry bryophyte tissue. Tests are now being run on these same plants as they resume growth to test for expected increases.

Blade Tissue Structure of Some Species of *Atriplex* from the Southern California Deserts

JANE PHILPOTT, *Duke University*

There are thirteen species of saltbush in the alkaline and gravelly regions of the California deserts. Most of the shrubs are erect and intricately branched with gray or yellowish brown branches. The leaves are numerous, evergreen, and silvery white with a dense persisting scurf. Although the size and shape of the leaves vary from species to species, there are characteristic features of internal blade anatomy. The epidermis is two cells thick; vesicular hairs account for the scurfy appearance of the leaf surface. The mesophyll consists of palisade parenchyma which encompasses the well developed border parenchyma of the vascular bundles. Although there are chloroplasts distributed throughout the palisade, the chief chloroplast bearing cells are those of the border parenchyma.

Food Habits of the Canada Goose at Lake Mattamuskeet, North Carolina

THOMAS L. QUAY and CARL S. YELVERTON, *North Carolina State College*

The food habits of the Canada goose (*Branta canadensis*) at Lake Mattamuskeet were studied by the analysis of 263 gizzards and 31 crops collected primarily in the hunting seasons of 1951-52 and 1953-54. Of the ten major habitats on the refuge, the most important to geese as feeding grounds were the *Eleocharis* drawdown flats, *Eleocharis-Scirpus* low marsh, *Salix-Myrica* low marsh, *Andropogon*-Compositae upland, and farmland. Sedges (Cyperaceae) constituted 63% of the total food volume, and grasses (Gramineae) 33%. The remaining 4% was distributed among 31 other families. Animal matter totaled only 0.01%. The most important species, and the principal parts eaten, were: (1) *Eleocharis olivacea* and *E. parvula* (dwarf spike-rushes) — roots and culms; (2) *Scirpus americanus* (three-square) — roots and rhizomes; (3) *Zea mays* (corn) — grains. Other species and genera measuring at least 1% of the total food volume were: *Typha* (pistillate flowers), *Paspalum boscianum* (florets), *Spartina patens* (roots and rhizomes), *Eleocharis quadrangulata* (achenes more than vegetative parts), *Cyperus* (roots and tubers), and *Fimbristylis* (roots and basal culms). Leaves (mostly blades) and stems of grasses not identified to genus amounted to 8.23%. The vast beds of Characeae (17,000 acres) in the lake were practically unused by the geese.

Progress Report on the Flora of the Carolinas, January 1, 1956-December 31, 1958

ALBERT E. RADFORD, *University of North Carolina*

Initially the flora project was organized into three major work phases: (1) the general collection of vascular specimens for distribution and descriptive data in the physiographic provinces of the two states, (2) the identification of field collections, study of herbarium specimens, and the plotting of distribution data, and (3) the preparation of a manuscript, including diagnostic illustrations and keys. The first phase has been completed. Collections and field observations have been made in all 146 counties of the two states. Over 120,000 miles have been traveled while collecting approximately 175,000 specimens in the Carolinas during the last three growing seasons. In the second phase nearly sixty-five percent of the collections have been identified and plotted on distribution maps. Progress has been made on the third phase. Some keys and descriptions have been written. Diagnostic illustrations have been made of 110 genera. Completion date of the manuscript should be 1962.

Weeks Island, a Botanically Interesting Area in the Louisiana Marsh

WILLIAM D. REESE, *Southwestern Louisiana Institute*

Weeks Island, a salt dome formation rising about 150 feet from the coastal marshes of south-central Louisiana, offers a sharp contrast to the surrounding brackish marsh-lands, and provides a variety of habitats for plants not otherwise found in the area. The island, several hundred acres in area, is covered mostly by dense woods and is cut by numerous, deep ravines. Among the more interesting plants so far discovered there are the following mosses: *Callicostella pallida*, otherwise known in the U. S. only from peninsular Florida; *Syrrhopodon parasiticus*, the second collection from west of the Mississippi river; *Solmsiella kurzii*, otherwise known only from the type locality in northern Florida.

A Report on the Study of the Tardigrada in the United States

G. T. RIGGIN, JR., *Virginia Polytechnic Institute*

Although this group has been extensively studied in Europe, the publication of only five short papers indicates the neglect accorded the Tardigrada in this country. To date sixteen species of Tardigrades included in seven genera have been reported from the confines of this country. The present study has been carried out primarily on the tardigrades of mosses from the eastern United States. Techniques of collection and mounting in Hoyer's medium are modifications of procedures employed by previous workers. One new genus, *Itaquascon*, previously collected only in Brazil has been collected in several moss samples. Studies of specimens collected indicate the presence of twenty species not previously reported from the United States including two undescribed species.

The Vertebral Column of the Golden Hamster*

MOHAMMED S. SALIH, *Louisiana State University*

The vertebral formula is: C-7, T-13, L-6, S-4, Cd-13/14. Foramina transversaria may be lacking on one or both sides in C7. The transverse processes

of C6 always, and C5 occasionally, exhibit inferior laminae. Those of C7 are in contact with those of C6. Those of T1-T4 exhibit apical facets for articulation with the tubercula of the first four ribs. Homologous facets on T5-T10 occur on definitive diapophyses. T11-T13 exhibit demifacets for capitular heads only. A ventral hypapophysis occasionally occurs on L2. The four sacrals are united by their centra, and the first three are also united by their transverse processes. Only S1 articulates with the ilium. Centra and processes are reduced caudal to Cd5. Cd9-13/14 lack pedicles. Cd6-8 may exhibit incomplete pedicles on one or both sides, or the pedicles may be lacking. Cd7-13/14 lack neural spines. Cd11-13/14 lack prezygapophyses. Cd6-13/14 lack postzygapophyses.

An Analysis of Small-mammal Population Trends and Movements

H. E. Shadowen, *Louisiana Polytechnic Institute*

Small-mammal populations were studied in two uncultivated fields near Baton Rouge, Louisiana, for a period of one year. The quadrants were 1.67 acres and 2.98 acres in size, and 100 live traps, placed in rows of ten, were used on each plot. The trapping periods varied from two to sixteen days with an average of eight days. The sex of all trapped mammals was determined, and the animals were weighed, marked for later identification, and released. The total number of mammals taken was 1,488. The species trapped were: *Sigmodon hispidus*, 669; *Reithrodontomys fulvescens*, 491; *Reithrodontomys humulis*, 185; *Cryptotis parva*, 67; *Oryzomys palustris*, 55; *Mus musculus*, 18; *Peromyscus leucopus*, 1; *Peromyscus gossypinus*, 1; and *Blarina brevicauda*, 1. Frequency of recapture varied from one to 36 times with no pattern of consequence as to species. Immature Cotton Rats were trapped throughout the year with the peak occurring from April through June. The sex ratio of *Sigmodon hispidus*, based on the entire study, was 50:50, but from March through September 75 per cent of all initial captures on both plots consisted of females. Trapping reached its low point in late summer and fall when only 77 Cotton Rats were trapped from July to November.

Factors Affecting the Return of Stranded *Fundulus similis* to Water

Joe Ann Shearer, *University of Mississippi*

The flipping of *Fundulus similis* stranded on a beach is remarkably successful in returning the fish to the water. Experiments with a simulated beach of controlled slope at water edge showed that greatest movement was down slope whether slope was toward or away from water. View of the water (or of the lighter horizon formed by water) also affects the movements. An opaque screen between stranded fish and water results in a lessened degree of movement toward water. In night experiments using an open box with removable sides movement was enhanced if the side closest to the water was removed. With all sides in place, flipping was random in direction. Experiments using artificially brightened horizons have not been completed.

Chromosomes in Parthenogenetic Miracidia and Embryonic Cercariae of *Schistosomatium douthitti*

Robert B. Short and Margaret Y. Menzel, *Florida State University*

This paper presents final results, part of which have been reported (Short and Menzel, 1955, *J. Parasitol. 41: Sect. 2, 24-25.*). Herein we shall use X and Y for the sex chromosomes instead of Z and W as in previous reports.

In 168 parthenogenetic miracidial embryos from unisexual mammalian infections a haploid X set of chromosomes occurred in 160 and a diploid XX set in three; an additional five were probably diploids. In 153 miracidial embryos from bisexual infections there were the following constitutions: haploid X in four embryos, diploid XX in 69, diploid XY in 78, triploid XXY in one and triploid XYY in one.

Chromosomes analyses from cercarial embryos derived from parthenogenetic miracidia gave the following results: of ten male infections, three were haploid X, six were normal diploid XX, and in embryos from one snail both haploid X and diploid XX cells were observed. All seven female infections were XY diploids. It is believed that haploid individuals developed from reduced eggs, and the absence of the haploid Y constitution indicated that the X chromosome is necessary for viability. Possible methods of origin of XX and XY constitutions from parthenogenetic eggs are considered briefly and it is suggested that diploids arose as a result of meiotic irregularities.

Chromatographic Studies of Some Alcohol-Soluble Materials in Male and Female Papaya (*Carica Papaya*) Plants

M. P. Singh and G. Ray Noggle, *University of Florida*

The papaya (*Carica papaya*) is generally dioecious but some plants bear perfect flowers. There are also all gradations and variations, sometimes on the same tree, between these two conditions. It would be of value to be able to determine the sex of a plant before it is set out in the orchard. We have used chromatographic techniques in an attempt to find some chemical differences between male and female plants. The leaves of flower-bearing plants were extracted with ethanol and the alcohol-soluble constituents were separated by paper chromatography and by paper electrophoresis. No striking differences were found in the kinds or amounts of amino acids or sugars found in the extracts. A number of fluorescing spots showed up on the chromatograms when they were examined under ultraviolet light. Several yellow fluorescing spots have tentatively been identified as flavonoids but no differences were noted between the extracts of the male or female plants. A blue fluorescing material, as yet unidentified, was noted in a number of the extracts from the leaves of male plants. This material was either absent or present in very low concentrations in the extracts from female plants.

Energy Flow in Two Salt Marsh Animals*

Alfred E. Smalley, *University of Kentucky*

The utilization of energy by two animals living in a salt marsh near Sapelo Island, Georgia, was studied. *Littorina irrorata*, a snail, is a detritus-aufwuchs feeder; *Orchelimum fidicinium*, a grasshopper, is a primary consumer, living exclusively on *Spartina alterniflora*. Population densities were measured on a seasonal basis, and converted to standing crop in Calories per meter square per year. Ingestion, respiration and growth were determined and expressed in the same units. Energy flow in the grasshoppers was not as variable seasonally as was biomass or numbers. The entire growth period of the grasshoppers occurred during the spring and summer when *Spartina* was growing at a maximum rate. Energy flow of the *Littorina* population showed

little seasonal variation which correlated well with the relatively constant supply of detritus available in the tidal waters which flush the marsh. The more rapidly growing, shorter-lived *Orchelimum* population tended to assimilate a smaller proportion of ingested food, but was more efficient in converting the assimilated food into protoplasm, than the slow-growing, longer-lived *Littorina* population. These differences in efficiency are correlated with the food available to the two species.

The Effects of Radiation on Mitotic Rate of Individual Stages of Mitosis in the Grasshopper Neuroblast

JEAN STEVENS and MARY ESTHER GAULDEN,
Biology Division, Oak Ridge National Laboratory

The effects of radiation on mitotic rate have been studied by determining the inhibition produced in the individual phases of the mitotic cycle. The stages of mitosis as observed in the living neuroblast of the grasshopper embryo can be subdivided, on the basis of morphological characteristics of cell structures, into 14 distinct phases. Thus it is possible to analyze in considerable detail the mitotic processes in this cell. Neuroblasts in known phases were located in culture preparations of embryos. Some served as unirradiated controls; others were irradiated with 8, 32, or 64 r of X rays. The time required by cells irradiated in a given phase to reach the next metaphase was compared with that required by unirradiated cells of the same phase to reach this point. All cultures were kept at 38° C during observations. Metaphase was chosen as the end point because it is an easily identifiable stage and because cells reaching this stage usually complete division. The mitotic inhibition of the neuroblast to X rays varied greatly with the stage of mitosis at the time of treatment and with the dose of X rays. The data suggest that the effects of radiation on mitosis will not be found to be explicable in terms of a single phenomenon.

Antibiotic Beers as a Source of Anticancer Agents

J. RICHARD THOMSON and W. RUSSELL LASTER, JR.,
Southern Research Institute,
Birmingham, Alabama

The Cancer Chemotherapy National Service Center, an agency of the National Institutes of Health, has recently enlarged its primary screening for anticancer agents to include very large numbers of crude antibiotic beers. These beers are isolated as the metabolic by-products of molds and other microorganisms collected throughout the world. These organisms are grown in different media, and the end products of fermentation are first screened to eliminate any known antibiotics. If the crude beer shows anticancer activity, that lot is refermented. If the anticancer activity of the original is present in the referment, a larger sample of the beer is prepared, and the active fraction is isolated for more intensive study.

Data will be presented to demonstrate the unequivocal anticancer activity of certain of these new antibiotic preparations against solid mouse and rat tumors, as well as experimental mouse leukemias. Certain of the crystalline material isolated from beers are active against neoplasms resistant to known antimetabolites. The significance of these findings will be discussed. The screening data suggest that there are statistically more active agents found in random samples of antibiotic beers than in an equal number of synthetic compounds selected at random.

The Effect of Alloxan Diabetes on *Plasmodium berghei* Infections in Albino Rats

M. GUTHRIE TOLBERT[1] and R. BARCLAY MCGHEE,
University of Georgia

Earlier workers reported that hyperglycemic canaries showed higher levels of parasitemia when infected with *Plasmodium cathemerium* than nonhyperglycemic canaries. In the present study, albino rats were rendered diabetic by alloxan monohydrate treatment to determine the effect of hyperglycemia on *P. berghei* infections. All rats were infected by intracardial injection of blood from another heavily infected rat. The control group received no alloxan treatment. A second group were those in which the alloxan dose was ineffective in producing diabetes. The third group were the animals which became diabetic in response to alloxan treatment. The course of infection was followed by parasite counts made from blood films stained with Giemsa's stain, erythrocyte counts, and blood sugar determinations. The first two groups showed courses of infection not significantly different from each other and very similar to those reported by other workers. The diabetic group, however, showed levels of infection significantly lower than those of the other two groups. Apparently diabetes in the rat produces conditions unsuitable for normal growth and reproduction of the malaria parasite, *P. berghei.* This is in contrast to the findings of the effect of hyperglycemia in canaries on *P. cathemerium* infections.

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The Initiation of Penetration of *Schistosomatium douthitti* Cercariae*

ALVIN WAGNER, *Florida State University*

In 98% of the observed cases cercariae of *S. douthitti* penetrated into ears of adult white mice within 10 minutes after being placed on the surface. Cercariae placed on ears that had been extracted with ether for several days were not stimulated to penetrate. Cercariae, when exposed to the residue obtained by evaporation of ether extracts of whole mouse skins, made "penetrating movements", shed their tails and discharged the contents of their penetration glands. Ether extracted ears rubbed with this residue stimulated cercariae to penetrate. Cercariae were exposed to various chemical substances which are soluble in ether and believed to be present in skin. Free fatty acids elicited reactions similar to those observed when cercariae were exposed to the residue from ether extracts of skins. Ether extracted ears when rubbed with fatty acids in a lanolin base stimulated cercariae to penetrate.

The presence of free fatty acids has been reported in the lipid surface layer of the skin, and in the keratinized layer of the epidermis. From this fact, and from the experimental results given above, it is suggested that free fatty acids are partially, perhaps entirely, responsible for the stimulation of *S. douthitti* cercariae to penetrate into the definitive host.

This work was supported by the National Science Foundation, and by grant E-1142 (C2) from the U. S. Public Health Service.

Studying Nymphs of the Odonate Genus *Argia* in the Southwestern United States

MINTER J. WESTFALL, JR., *University of Florida*

During the summers of 1956 and 1958 I made trips to the Southwestern United States to collect Odonata with the aid of grants from the National Science Foundation and the Penrose Fund of the American Philosophical Society. A special effort was made to obtain life history material in the genus *Argia* for inclusion in the Manual of the Zygoptera of North America now in preparation. Twelve species of this genus were reared, most of them species whose nymphs are undescribed. Adults of five other species were collected and studied. Interesting observations were made regarding habits, and different ecological niches occupied by several species in the same stream. Studies of the nymphs of this genus, as in other genera, throw much helpful light on the problem of species relationships. Several adults which had been described as subspecies were found to have distinct nymphs and should be accorded full specific rank. Likewise in establishing genera the nymphal characters should be considered. After collecting many nymphs of *Hyponeura lugens* (Hagen) I have still not found any good characters to separate it from *Argia*, thus showing its very close relationship to this genus.

Respiratory Patterns in Diseased Plants

HARRY WHEELER and ROBERT GRIMM, *Louisiana State University*

Augmented respiration, a characteristic feature of infected plant tissues, has been induced by treatment with victorin, a toxic product of the fungus *Helminthosporium victoriae*. Moreover, treatment with victorin rendered plants insensitive to 2,4-dinitrophenol, an uncoupler of oxidative phosphorylation, and caused a marked increase in the rate of ascorbic acid oxidation. These effects of victorin were restricted to one group of oat varieties susceptible to the pathogen, *H. victoriae*. Studies of susceptible oats, artificially infected with *H. victoriae*, have revealed a similar series of effects. Three days after inoculation the respiratory rate of infected tissue was nearly twice that of controls and this high rate was maintained until the tenth day when the rate dropped. During this period of high respiratory activity, infected tissues failed to respond to treatment with 2,4-dinitrophenol. In homogenates of infected tissues, ascorbic acid oxidation was increased 2-4 times. Further work is required to determine the relation of these effects to the nature of susceptibility and resistance to this disease.

Chromosome Assortment in Oogenesis of Triploid Mormoniella Females*

P. W. WHITING, *University of Pennsylvania*

Triploid females lay many eggs but, due presumably to aneuploidy, very few develop. All offspring of an unmated triploid are euploid and male, — haploid and diploid, the latter developing more slowly and being only half as numerous. This deficiency may be due, not to lower viability, but to loss of one of the three chromosomes of the hexads in oocyte-I division so that only one reaches each pole. When the three chromosomes derived from a single hexad were marked by triple alleles, it was shown that their distribution was not random among the reduced eggs. Each of the two homologous paternal chromosomes (from the diploid sperm of the diploid father) was only two-thirds as frequent as the single maternal chromosome. This was shown by relative frequency of the three genotypes of equally viable haploid males. A method is now being devised for measuring the relative frequency of the three diploid male genotypes. *(Research aided by U. S. Atomic Energy Commission contract AT(30-1)-1471.)*

Avian Uptake of Fission Products*

WILLIAM K. WILLARD, *University of Georgia and Oak Ridge National Laboratory*

White Oak Lake bed at the Oak Ridge National Laboratory is contaminated by low-level wastes containing a variety of radioactive isotopes. The lake bed supports a productive natural community of pioneer vegetation which, in 1958, exhibited two zones, a bushy zone of shrubs, sedges, forbs and grasses on the lake bed proper and a thicket zone of willows and alders along the old shore line. The bushy zone was inhabited by such birds as Song Sparrows, Yellowthroats and Field Sparrows while the thicket zone included Catbirds, Yellow-breasted Chats, White-eyed Vireos, etc. Goldfinches and Indigo Buntings were collected frequently in both zones. During the summer of 1958 radioassays of bird tissues, content of bird stomachs and major food items (insects, berries) were carried out. Gross beta activity and also Sr^{90} and Cs^{137} levels were determined. In general, bird species living in the bush zone had about twice the body burden of isotopes as did species living in thickets or those using both thickets and bushes, although there was wide individual variation. Sr^{90} and Cs^{137} occurred together in approximately equal amounts in food items (insects, berries) but in birds, the specific activity of Sr^{90} in bone was greater than that of Cs^{137} in muscle. There was an unexplained high activity in the eyes of one species, the Yellow-breasted Chat. Observed isotope levels are considered in terms of possible effects on the birds, and also in terms of the role that birds may play in the distribution of radioactivity in the ecosystem.

The Effect of Cobalt-60 Gamma Radiation on the Development of Acquired Immunity in the Rat to Larval *Hydatigera taeniaeformis**

KATHLEEN D. WYANT, HAROLD H-K. LEE, and ARTHUR W. JONES, *University of Tennessee*

Rats were immunized by intraperitoneal injections of larval *Hydatigera taeniaeformis* homogenate, irradiated one to five weeks later, and infected with *H. taeniaeformis* eggs one day thereafter. Development of the "early" immune response (decrease in total number cysts) in rats receiving 480r one week after immunization was not affected, probably because preformed "early" antibody was present at the time of irradiation. Results in rats receiving 240r, 480r, and 720r five weeks after immunization were not conclusive because the control, immunized rats did not develop the expected "early" immunity; no irradiation effects were noted. The "late" immune reaction (increase in dead cysts) normally elicited by immunization, and present in the controls, was completely suppressed in rats receiving 480r one week after immunization, and in rats receiving 240r, 480r, and 720r five weeks after immunization. Perhaps "late" antibody formation, elicited by the growing parasite, and/or the inflammatory response of lymphatic origin were depressed by irradiation. This study is being supported in part by the U. S. Atomic Energy Commission under Contract AT(40-1)-1749.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

James N. Dent, Biology Department of the University of Virginia, was invited to Atlanta on the Visiting Scholars Program by the University Center in Georgia, February 17 and 18. One day was spent at Oglethorpe University and the other at Emory University and Agnes Scott College. Dr. Dent presented a lecture, "The relations of the thyroid and pituitary glands," at a joint Agnes Scott-Emory Seminar.

Robert Weigel has joined the Department of Biology of Howard College as Assistant Professor. Dr. Weigel is a recent graduate of the University of Florida and has special interests in vertebrate zoology and paleontology.

The following new personnel have recently joined the staff of the Biology Division of the Oak Ridge National Laboratory: **Roderick K. Clayton** (Microbiology Group) — Dr. Clayton, who has been at Oxford University and Trondheim, Norway, under a National Science Foundation Fellowship, received the Ph.D. degree in Physics and Biology from the California Institute of Technology; **Manfred S. Engel** (Microbial Protection and Recovery Group) — Dr. Engel received the Ph.D. in Microbiology from Cornell University; **Jean Maisin** (Mammalian Recovery Group) — Dr. Maisin received degrees in Pathology and Electroradiology from Louvain University, Belgium; **Johan H. Stuy** (Microbial Protection and Recovery Group) — Mr. Stuy, who received the Doctorondus degree in Chemistry from the University of Utrecht, Netherlands, has been associated with the Department of Biology at Brandeis University for the past year; **Otto Vos** (Mammalian Recovery Group) — Dr. Vos received the Ph.D. from the State University of Groningen and has been employed as a histologist with the Medical Biological Laboratory, National Defense Research Council, Rijswijk, Netherlands.

A. J. Speece has joined the faculty at Northeast Louisiana State College at Monroe. Dr. Speece received his training in cytology at the University of Texas.

Bernard Lowy has returned to the Botany Department at Louisiana State University after an extended trip to South America.

Jack R. Collier has resigned from the Zoology Department at Louisiana State University to take a research position.

George H. Mickey, Louisiana State University, will deliver the annual Mendel Lecture at the initiation banquet at Beta Alpha chapter of Beta Beta Beta at Spring Hill College, Alabama, on March 19. The title of Dr. Mickey's lecture will be "Opportunities for Research in Cytogenetics." On April 2 he will address the chapter at Northwestern State College (Louisiana).

C. M. Loveless and **Edwin L. Tyson** of the Florida Game and Fresh-Water Fish Commission attended the North American Wildlife Conference in New York in early March. Both presented papers to the Conference.

Charles B. Metz, Professor and Associate Director of the Florida State University Oceanographic Institute, has been named Secretary of the recently organized Section of Developmental Biology of the American Society of Zoologists.

Sidney W. Fox, Professor and Director of the Florida State University Oceanographic Institute, has been elected Chairman of the Division of Biological Chemistry of the American Chemical Society.

A. Gib DeBusk, Assistant Professor of Biology at Florida State University, has been named as a member of the National Science Foundation Panel on Undergraduate Research Programs.

Henry Stevenson of Florida State University will participate in the study of the imported fire ant and its effect on wildlife. Dr. Stevenson will be a representative of the Department of Game and Fresh Water Fish.

Fred R. Cagle, Professor of Zoology at Tulane University, has been relieved of his duties as Chairman of the Arts and Sciences Department of Zoology and has been promoted to the position of University Coordinator of Research. **George H. Penn,** Professor of Zoology, is handling the affairs of the Department as Acting Chairman.

G. R. Lunz, Director, Bears Bluff Laboratories (South Carolina) is now Chairman of the Atlantic States Marine Fisheries Commission.

Alan Conger, formerly of the Oak Ridge National Laboratory, has joined the staff of The Botany and Biology Department at the University of Florida as Professor of Radiation Biology.

Warren M. Deacon has recently retired as Chairman of the Department of Biology at Vanderbilt University.

Donald B. Anderson, formerly Professor of Botany, Chairman of the Division of Biological Sciences and Dean of the Graduate School at North Carolina State College, has been appointed Provost and Vice President of the University of North Carolina at Chapel Hill.

John Tyler Bonner, Princeton University, delivered a series of lectures at Virginia colleges on November 4-6, as a University Center in Virginia Visiting Scholar.

J. L. McHugh, Director of Virginia Fisheries Laboratory since 1931, has resigned to accept an appointment as Chief of the Division of Biological Research, Bureau of Fisheries, U. S. Fish and Wildlife Service. **William J. Hargis** has been appointed Acting Director of the Laboratory.

Morris L. Brehmer, a recent graduate of Michigan State University, has assumed duties as shellfish investigator at the Virginia Fisheries Laboratory.

Evelyn Clare Wells, formerly with the Academy of Natural Sciences in Philadelphia, has been appointed as the first full-time Librarian at the Virginia Fisheries Laboratory.

B. F. D. Runk has been appointed Dean of the University of Virginia, effective March 1, 1959. Dr. Runk will continue to teach some courses in the Department of Biology.

A. Randolph Shields, a candidate for the Ph.D. degree in Botany at the University of Tennessee, has been appointed Assistant Professor of Biology at Roanoke College, effective September 1, 1959.

A. B. Massey, Professor of Botany, Virginia Polytechnic Institute, will retire at the end of the 1958-59 academic session. He has been granted

the privilege of continuing his work on the State flora as Emeritus Professor of Botany and Curator of the Herbarium. Dr. Massey is one of three faculty members at V.P.I. honored by the Alumni Association with the Wine Award for excellency as teachers.

Rose Mary Johnson, a candidate for the Ph.D. degree in Biology at the University of Virginia, will replace **Jane Belcher** at Sweet Briar College during the academic session 1959-60. Miss Belcher will visit Nigeria on a sabbatical leave.

Louis G. Williams, formerly at Furman University, is now at the Taft Sanitary Engineering Center in Cincinnati as an Aquatic Biologist in charge of plankton analysis.

Institutions and Organizations

The **Ninth Annual Spring Wildflower Pilgrimage** will be held in Gatlinburg, Tennessee, and the Great Smoky Mountains National Park April 23 to 25, under the sponsorship of the Botany Department of the University of Tennessee, the Great Smoky Mountains National Park and the Gatlinburg Garden Club and Chamber of Commerce. Motorcades, trail hikes, bird walks, photographic tours and evening programs feature this year's pilgrimage. Registration opens at 9:00 a.m., April 23, in the Gatlinburg Civic Auditorium.

Florida State University will sponsor two summer institutes for teachers in the 1959 summer session. One of these is an Institute for High School Teachers of Science and Mathematics, with one of four sections devoted to work in Biology. The second is an Institute for Junior College Teachers, also with a separate section for Biology teachers.

The **University of North Carolina** has received a grant from the National Science Foundation for support of a Botany Conference for teachers of general biology and general botany in colleges. The Conference will be held from July 27 through August 14 and is under the direction of Victor A. Greulach, Professor of Botany at the University. Application forms may be obtained by writing him at P. O. Box 1268, Chapel Hill, and must be completed no later than April 18.

The Annual Meeting of the **Georgia Academy of Science** will be held at Mercer University, April 24-25.

The **Louisiana Academy of Science** will hold its annual meeting at Louisiana Polytechnic Institute on April 24-25.

A tract of approximately sixty acres has been set aside by the Board of Trustees of **Howard College** to be used by the Department of Biology as a natural area for teaching and research.

The National Science Foundation will again support a Summer Institute for Secondary School Teachers of Mathematics and Science at **Randolph Macon Woman's College**. Paul A. Walker, Professor and Chairman of the Biology Department, will serve as director.

Three new departments will be formed from the present Biology Department at **Virginia Polytechnic Institute**, effective about July 1. The new departments to be formed are Forestry and Wildlife Conservation, Veterinary Science, and Entomology. They will be in the School of Agriculture and heads of the new departments will be announced later. The present Biology Department will be in the School of Applied Science and Business Administration and will offer work in general biology, zoology, botany, genetics and microbiology. The Biochemistry and Nutrition Department will be enlarged in the area of graduate study.

Grants in Aid

E. Peter Volpe, Associate Professor of Zoology at Newcomb College of Tulane University, has received a grant of $12,000 from the **National Science Foundation** to continue his studies for an additional two years on the genetics and systematics of anurans.

Merle Mizell, Instructor in Zoology at Tulane University, has received grants of $2,000 each from the **National Institutes of Health** and the **Louisiana Division of the American Cancer Society** for studies on the effects of amino acid analogs on newt limb regeneration and to test whether the factors responsible for normal tissue dedifferentiation can also cause adrenal adenocarcinoma to dedifferentiate.

Herbert P. Riley, Professor and Head of the Department of Botany, University of Kentucky, has received a grant of $6,000 for two years from the **National Science Foundation** for a project entitled "Cytology and Evolution in South African Plants". **Dale M. Smith**, Assistant Professor in the same Department, has received a **National Science Foundation** grant of $12,000 for a three-year project entitled "A Study of the Origin of the Polyploid Sunflowers with Particular Reference to *Helianthus decapetalus*".

H. E. Shadowen, Louisiana Polytechnic Institute, has received a grant from the **Southern Forest Experiment Station** of the U. S. Department of Agriculture for a study of small mammal populations.

A three-year grant of $30,000 from the **National Science Foundation** and a grant of $4,000 from **General Foods, Inc.**, have been received by **Sidney W. Fox**, Director of the Florida State University Oceanographic Institute, in support of his investigations of biochemical origins.

Ralph W. Yerger, Associate Professor at Florida State University, has received a **National Science Foundation** grant for a two-year study of the distribution and ecology of the freshwater fishes of Florida.

President Colgate W. Darden, Jr., of the **University of Virginia** recently announced that an anonymous donor has given $535,276 to strengthen biology teaching and research. Simultaneously he announced that the **National Institutes of Health** will grant $612,000 for research facilities in the planned Life Science Building for which the General Assembly has appropriated $2 million.

Kenneth Wagner, Chairman of the Biology Department, College of William and Mary in Norfolk, has received a **National Science Foundation** Science Faculty Fellowship to study marine biology. He will spend two summers at the Marine Biological Laboratory, Woods Hole, and one summer at the University of Miami Marine Laboratory.

Bernard Robert Woodson, Jr., Associate Professor of Biology, Virginia State College, has received a grant of $340.00 from the **Research Council of the University Center in Virginia** for expenses incurred in his field collections and studies.

Jack Colvard Jones, Department of Entomology, University of Maryland, has received a grant for the calendar year 1959 in the amount of $28,456 from the **Public Health Service, National Institutes of Health**, to facilitate research on the physiology of insect reproduction.

The ASB BULLETIN

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The Official Quarterly Publication of
The Association of Southeastern Biologists

THE ASB BULLETIN

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GEOFFREY M. JEFFERY
EDITOR

HAROLD J. HUMM, ASSOCIATE EDITOR
ELSIE QUARTERMAN, BUSINESS MANAGER

ASSOCIATION AFFAIRS

Income Tax

On May 13, 1959, Past-President Mary Esther Gaulden, President Horton H. Hobbs and Mr. Calvin H. Cobb, member of a law firm that represents AAAS, met in Washington, D. C., with two representatives of the Internal Revenue Service, Mr. John A. Barber and Mr. J. A. Tedesco. This conference was requested in connection with our protest of a ruling made by the Internal Revenue Service that ASB is not organized and operated exclusively for scientific and educational purposes but that its activities and objectives are characteristic of a business league or professional association. Contributions made to a scientific-educational organization are deductible while those to a business league are not.

Drs. Gaulden and Hobbs were given a courteous and helpful hearing. The Internal Revenue Service must make its ruling on exempt status on the basis of an organization's constitution. Several of the reasons ASB's constitution falls short of being satisfactory for exemption as a scientific - educational organization are as follows: Sections B and E of Article II (Purposes) would apply to a business league or professional organization; the purposes of the organization are amendable; and no provision is made for disposition of funds should the organization be dissolved.

Two alternatives for action were open to us. We could accept a ruling that ASB is a business league. This was rejected because your officers felt that such a ruling would not be accurate and that it might prejudice a later application for exemption as a scientific - educational organization. Instead, it was decided that the constitution of ASB should be revised and that a new application for exemption as a scientific-educational organization under section 501 (c) 3 of the 1954 revenue code should be submitted.

Mr. Cobb is now preparing a draft of a revised constitution. This will be presented by President Hobbs to the Executive Committee for approval at its interim meeting and to the membership for adoption next April, after which a new application can be submitted to the Internal Revenue Service.

●

New Officers

Attention of the members is called to our new officers elected at the Knoxville meeting. The very able handling of the tax problem (above) assures us, were such assurances necessary, that the Association will continue to be in good hands through the presidency of Dr. Horton Hobbs. Other new officers include President-Elect Victor Greulach, Treasurer Elsie Quarterman, and Executive Committee members Eugene P. Odum and Robert B. Short. The election of Dr. Quarterman leaves a vacancy on the Executive Committee in one of the 1958-61 terms. The president, with the approval of the executive committee, has appointed J. C. O'Kelley of the University of Alabama to fill this unexpired term.

●

Committee Appointments

The president, with the approval of the executive committee, has made the following appointments for the year 1959-60:

Auditing Committee: C. S. Chadwick, Chairman; C. E. Farrell, J. J. Friauf.

Nominating Committee: M. E. Gaulden, Chairman; Leland Shanor, G. Robert Lunz.

Resolutions Committee: Fr. P. H. Yancey, Chairman; V. M. Cutter, Jr., Ruth McClung Jones.

The Program Committee is not as yet complete but Father John H. Mullahy of Loyola has agreed to serve as chairman.

New appointments on the awards committees are:

Meritorious Teaching Award: C. G. Goodchild.

Association Research Prize: C. E. Jenner.

Goethe Awards: R. B. Short.

TAXONOMY: ONE KIND, OR MANY?

C. Ritchie Bell

Dr. Bell received the A.B. and M.A. degrees from the University of North Carolina in 1947 and 1949, the Ph.D. degree from the University of California at Berkeley in 1953, and was with the U. S. Army Air Force from 1942 to 1945. He was employed as Instructor in Botany at the University of Illinois, 1953-1955, and as Assistant Professor at the University of North Carolina from 1955 to the present. Dr. Bell is a member of the Botanical Society of America, the Society for the Study of Evolution, the International Society of Plant Taxonomists, and others. He is the newly elected secretary of the American Society of Plant Taxonomists. Dr. Bell's current research is on the flora of the Carolinas and on the cytology of the Umbelliferae. The latter project will involve a four-month trip this summer and fall to Central America for collections in this group.

For the purposes of teaching, taxonomy can be, and usually is, divided into several sub-categories, each of which deals with a particular aspect of taxonomy. Often an entire course is devoted to a single one of these specialized aspects. Thus there are courses dealing primarily with the morphology of flowers and other plant parts, with plant evolution, with phylogeny, with the identification of plants — usually the plants of a small geographic area at one season of the year, or with the nomenclature of plants. So vast is the recorded knowledge and detail of each of these categories that no course, or series of courses, could cover in entirety all of the pertinent material within its scope. Thus there is always more to learn, and each of these individual courses tends to become an end in itself. Furthermore, some of these courses often come to be called "Taxonomy" courses, with the expected result that some people may be prone to regard the subject matter of any *one* of these courses *as* taxonomy. Soon after, we begin to hear of *kinds* of taxonomy and, of course, *kinds* of taxonomists.

Gross morphology (the standard phrase, "anything visible with a hand lens of no more than 10X power", can well serve for a definition here) is the very foundation of plant classification; it is only slightly less important in the study of plant relationships. But certainly it is not to be assumed that morphology, regardless of its basic nature in many areas of biological study, is synonymous with taxonomy. Nor can such special subjects as evolution, phylogeny, plant identification, or nomenclature be considered as synonyms for taxonomy. These are all subjects which, to some, may be complete within themselves; they are also subjects which serve collectively as the tools of taxonomy. These individual tools should not be equated with the science in which they are used.

However, unlike the teaching of taxonomy, taxonomy in practice cannot be subdivided into kinds of taxonomy. If every available tool is not used in the solution of a taxonomic problem, the taxonomist's work is incomplete and open to questions other than those of interpretation. In some cases involving plants from inaccessible areas of the globe, adequate material for definitive work may not be physically available to the taxonomist. In such cases one must do the best job possible with the material available and should acknowledge the relatively incomplete nature of the work. Taxonomists who realize the difficulty of such necessary pioneer work can make allowance for future revision. No allowance should be made, however, for work that is incomplete because certain ideas or taxonomic methods are, either from training or preference, unacceptable or mentally unavailable to the taxonomist.

Taxonomy, in practice, *can* be divided into steps, but to say that the first step — Morphological Taxonomy, Classical Taxonomy, Traditional Taxonomy, or Alpha Taxonomy — is also the last is just as wrong as saying that the second step — Biosystematics, Cytotaxonomy, Chromosome Botany, or Beta Taxonomy — is both the alpha and omega of taxonomy.

Ideally, the result of the taxonomist's work serves two purposes: it facilitates plant identification and indicates relationships. The "Classical Taxonomist" who today uses only gross morphological features in problems of identification and relation-

ship is only half a taxonomist. His work will usually enable one to place a name on a particular specimen, but in many cases data from hybridization or cytological studies can give a far more definite answer to questions of supposed close relationship than could be had from an endless amount of petal measuring or stamen counting. Conversely, the "Biosystematist" who uses only such things as chromosome behavior and statistical studies in taxonomic problems is only half a taxonomist. His work may indicate relationships but without permitting the necessary identification of individual plants. No amount of chromosome counting and statistical analysis will yield as accurate and useful a species description, or identification, as can be had from critical morphological studies.

Taxonomy is a single phase of biology. It cannot be divided into *kinds*, but it can be divided into *steps*. Thus there cannot be two kinds of taxonomists. It is to be hoped that all taxonomists will take all steps in their work whenever possible.

THE PARTICIPATING SOCIETIES: KNOXVILLE, 1959

The ASB was honored again in 1959 to have four other organizations join in the annual meeting. While the Southeastern Section of the Botanical Society of America and the Southern Appalachian Botanical Club have been participating in these joint meetings for a number of years and are well known to the members, the Ichthyologists and Herpetologists and the Beta Beta Beta Societies are relative newcomers. For this reason, so that ASB members may be better acquainted with all of these groups, the following information is offered:

The American Society of Ichthyologists and Herpetologists was officially organized in 1916, three years after the appearance of the first number of Copeia, a journal which had been founded and edited by John T. Nichols "to advance the Science of cold-blooded vertebrates." The society which was thus fostered by a journal took over its publication in 1923 as the society's official organ. Both society and journal have flourished, expanding from a publication committee of three to a membership of over a thousand and journal circulation of over 1,500.

In 1951, at the annual meeting of the ASIH in Gainesville, Florida, members from the southeastern states got together informally to organize the Southeastern Division within the structure of the national organization. The regional society has held annual meetings since 1951, although separate meetings are not held in years when the national organization meets in the southeast which is defined as all states south of and including Virginia (and the District of Columbia) and Kentucky and east of and including Arkansas and Louisiana. There are approximately 180 members in the Southeastern Division of the ASIH.

Beta Beta Beta is a National Biological Society which was founded in 1922 and which now has one hundred twenty-seven chapters distributed over the United States and Puerto Rico. Since 1930 the society has published a journal, BIOS, which serves as a medium for publication of scientific papers by student members as well as mature scientists.

The purpose of Tri-Beta is clearly expressed in its official booklet of information as follows:

> "Beta Beta Beta is a society for students of the biological sciences. It seeks to encourage scholarly attainment in this field of learning by reserving its membership for those who achieve superior academic records and who indicate special aptitude for the subject of biology. It desires to cultivate intellectual interest in the natural sciences and to promote a better appreciation of the value of biological study. It aims to advance the general objectives of education by making a noteworthy contribution to the curricular program of the life sciences. Beta Beta Beta endeavors, also, to extend the boundaries of man's knowledge of nature by encouraging new discoveries through scientific investigation. It emphasizes, therefore, a threefold program: stimulation of sound scholarship; dissemination of scientific knowledge; and promotion of biological research."

Beta Beta Beta is an affiliated society of the American Association for the Advancement of Science.

PROCEEDINGS OF THE KNOXVILLE MEETING

The University of Tennessee at Knoxville was host at the twentieth annual meeting of the Association of Southeastern Biologists which was held April 16 to 18, 1959, in the excellent facilities of the University Center. Meeting jointly with ASB was the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Southeastern Division of the American Society of Ichthyologists and Herpetologists, and the Southeastern Region of Beta Beta Beta, national biological honor society.

Again this year, the registration broke all previous records with a total of 387 (254 of whom were ASB members), nine more than the record-breaking Tallahassee meeting of 1958.

Thursday, April 16

The meetings began Thursday afternoon at 1:15 with a guided tour of the Biology Division of the Oak Ridge National Laboratory. At the traditional Thursday evening general session, President C. E. Brehm of the University of Tennessee gave an address of welcome. Dr. Karl Sax of Harvard and the University of Florida, who was introduced by President Mary Esther Gaulden, gave the address of the evening, "The Population Explosion". Dr. Sax' incisive analysis of his subject matter and his manner of presentation were received with obvious enthusiasm. The annual smoker, with its renewal of acquaintances, followed the address.

Friday, April 17

On Friday from 9 a.m. to about 4 p.m. 80 contributed papers were presented in nine sessions.

At the Friday evening general session three awards were made:

Dr. Margaret Hess of Winthrop College received the Meritorious Teaching Award, presented on behalf of the Will Corporation of Georgia by Manager Charles E. Waits.

Drs. James A. and Faith S. Miller of Emory University received the Research Award, presented annually by the Carolina Biological Supply Company of Elon College, N. C., for their paper, "An Analysis of Factors Contributing to the Successful Reanimation of Mice from Less than 1° C." Honorable Mention was given Dr. Charles E. Jenner of the University of North Carolina for his paper, "The Effect of Photoperiod on the Duration of Nymphal Development in Several Species of Odonata".

The $150 Research Fellowship at the Mountain Lake Biological Station, presented annually by the Phipps and Bird Company of Richmond, Va., was presented to Lucille Walton, Danville, Virginia.

In addition to the three major awards, 13 graduate students and one undergraduate representing six institutions received Mary Glide Goethe Travel Awards which defrayed at least part of their expenses in attending the meeting. The total amount awarded was $457. Each student received travel funds of 4 cents per mile (if requested) and a per diem of $7.50 if he were not on the program, $9.00 if he were presenting a paper. Two days per diem were allowed if the distance was less than 300 miles, three days if the distance exceeded 300 miles. Graduate students from the following institutions received the awards: Emory University 1, University of Florida 7, University of Kentucky 2, University of North Carolina 2, University of Virginia 1; the one undergraduate was from Winthrop College.

Following presentations of the awards, President Mary Esther Gaulden presented Immediate Past President H. K. Wallace whose address to the membership was entitled "Spiders". Dr. Wallace took the audience back, by means of excellent Kodachromes, to one of his summers in Michigan spent collecting the jumping spiders and showed enlarged views of various members of the group and characters used in separating the subgroups.

Saturday, April 18

The two field trips into the Great Smoky Mountains National Park scheduled for Saturday morning met with rain so that the groups were small. A group of botanists under the leadership of Dr. A. J. Sharp and ornithologists and others interested in bird life, led by Dr. J. T. Tanner, departed in rain coats.

Annual Business Meeting

President Mary Esther Gaulden called the annual business meeting to order at 11:15 a.m. Friday in the ballroom of the University Center. Election of officers was the first item of business. Since there were no nominations from the floor for any of the vacancies to be filled, the slate presented

by the Nominating Committee was voted on with the following results:

President-Elect, Dr. Victor A. Greulach, University of North Carolina.

Vice-President, Dr. Royal E. Shanks, University of Tennessee.

Treasurer, Dr. Elsie Quarterman, Vanderbilt University.

Executive Committee Members, Dr. Eugene P. Odum, University of Georgia; Dr. Robert B. Short, Florida State University.

Tellers for the election were W. G. Erwin, Robert R. Bryden, and Jean Kerschner.

The Secretary's report was a resume of the Executive Committee meeting held the previous day. Dr. Horton H. Hobbs was appointed as ASB representative on the AAAS Council replacing Dr. Mary Esther Gaulden. As of 10 a.m. Friday, 125 new members had joined since the Tallahassee meeting, bringing the total membership to 727. It was decided that members who do not pay dues for the current year by the last day of the annual meeting will not continue to receive the ASB Bulletin, although they will be retained on the membership list until they are two years in arrears, as provided by the constitution.

It was recommended that the Treasurer add to the savings account five percent of the total funds collected each year from dues and subscriptions if he feels that this is feasible.

Dr. Geoffrey M. Jeffery, new editor of the ASB Bulletin, reported that 900 copies of each issue were now being run off and that this number would probably be adequate if it were no longer sent to members delinquent in dues. He requested that undelivered copies, back numbers or volumes of the Bulletin be returned to him by any member who does not wish to keep them as the files are low. The Executive Committee commended Dr. Jeffery for the effective manner in which he has taken over the editor's duties.

A letter from the Exempt Organizations Branch of the Internal Revenue Service was read in part. This letter advised ASB of a ruling that it is not exempt from income tax under section 501(c)(3) of the internal revenue code because it is "an association of persons having a common business interest and your principal objective is the advancement of that common interest rather than an association organized and operated exclusively for one or more of the purposes specified" in the section of the code mentioned above. A protest to this ruling was filed and a meeting of representatives of the ASB with internal revenue officials was scheduled to be held in Washington early in May. For a report of the results of this meeting, see "Association Affairs", page 38.

The report of the Auditing Committee, presented by Dr. Ernest L. Hunt, and of the Treasurer by Dr. Arthur W. Jones, retiring Treasurer, followed the Secretary's report. Both were approved.

Dr. Donald C. Scott of the University of Georgia, Chairman of the Meeting Places Committee, announced the receipt of an invitation to meet on the campus of Loyola University, New Orleans, from Father John H. Mullahy of that institution. The invitation was accepted for the 1960 meeting which will be on April 21-23.

The Chairman of the Resolutions Committee, Margaret Y. Menzel of Florida State University, presented the resolutions of her committee. They were approved and are given below in summary form.

1. The membership of ASB expresses its sincere appreciation to President C. E. Brehm of the University of Tennessee for the invitation to meet on its campus, for the cordial welcome extended, and for the use of the fine campus facilities; and that special thanks be extended to the Local Arrangements Committee, Drs. J. Gordon Carlson (chairman), Ronald Fraser, Joseph Howell, Fred Norris, Royal Shanks, A. J. Sharp, and James Tanner.

2. Sincere appreciation was expressed to Thomas E. Powell, President of the Carolina Biological Supply Company (and ASB member) for the donation of $100 as a Research Prize.

3. and to Manager Charles E. Waits and the Will Corporation of Georgia for the $100 meritorious teaching award.

4. and to Lloyd Bird and the Phipps and Bird Corporation for the $150 Mountain Lake Fellowship.

5. Special recognition and sincere thanks of the membership were extended to Dr. George H. Boyd of the University of Georgia whose activities in 1937 and 1938 led to the establishment of the Association of Southeastern Biologists and who was a charter member and its first president. This recognition is accorded Dr. Boyd upon his retirement from academic duties at the end of this school year and includes a volume of testimonial letters, one of which was written by President-Elect Horton H. Hobbs.

ANNUAL AWARDS

Reflecting the views of the Executive Committee expressed at the recent Knoxville meeting that more attention be directed to the recipients of the annual Meritorious Award for Teaching and other Awards of the Association, the BULLETIN will in future issues present brief biographical accounts of previous recipients of the Meritorious Teaching Award. Nominations for next year's award will be solicited in a later issue; these may be made by any member and, together with supporting data, may be sent to any member of the Meritorious Award Committee, which currently consists of Dr. Roberta Lovelace (University of South Carolina), Dr. C. G. Goodchild (Emory University) and Dr. Frederick T. Wolf (Vanderbilt University) Chairman. The following biographical sketch of the current recipient has been prepared by this committee, as will be the biographies in future issues.

The Meritorious Award for Teaching

The Committee chose as the 1959 recipient of the ASB Meritorious Award for Teaching Dr. Margaret Hess, Professor of Biology and Head of the Department at Winthrop College, Rock Hill, South Carolina. As in former years, the award consists of a certificate and an honorarium of one hundred dollars contributed by the Will Corporation of Georgia.

Dr. Hess was born in Chesterfield, Virginia, November 15, 1899, and began her teaching career in high schools, in which she taught at various times from 1919 to 1927. Her academic training was received at the University of Virginia, from which she received the B.S. degree in 1929, M.S. in 1930, and Ph.D. in 1934. Upon completion of her doctorate, she accepted a position as associate professor and head of the department at Judson College, Alabama. In 1936 she was promoted to professor, and in 1938 received a further promotion to the chairmanship of the Science Division in that institution. In 1939 she became Professor of Biology and head of the Department at Winthrop College, which position she has held continuously for twenty years.

Miss Hess is a member of a number of professional organizations. In addition to ASB, in which she is a charter member and which she served as President in 1952, she is a fellow of the American Association for the Advancement of Science, is a member of the Society of Zoologists, the Genetics Society, the Association of Biology Teachers, and the South Carolina Academy of Science. She is a former Secretary-Treasurer of the latter organization and is currently Vice-President. Her research activities have in-

Dr. Margaret Hess, Professor of Biology
Winthrop College
Rock Hill, South Carolina

volved studies on the morphology and physiology of the Turbellaria.

Of a total of 239 students who majored in Biology at Winthrop in 1940-1956, and have thus been subjected to Miss Hess' influence, 107 have continued their studies in graduate or professional schools after graduation. This figure, which is equivalent to 45 per cent, is impressive by any standard. Four of her former students have gone on to attain the Ph.D. degree, ten have received the M.D., and 44 have attained the Masters degree. Others are now attending graduate schools, medical schools, schools of medical or X-ray technology, nursing, or physical therapy. At least six have obtained Masters degrees in fields other than Biology.

But mere statistics fall far short of giving a complete picture of Miss Hess as a gracious lady, and it is difficult if not impossible to evaluate the influence she has had upon her students. To quote from a letter from one of them: "It is certainly no overstatement to say that she has devoted her life for the last twenty years to her students. Her office and her home doors are always open to them. She has spent many, many hours in and out of college listening to our problems of all kinds, giving us understanding advice and help, and always encouraging us to better ourselves for good personal and professional lives. We all consider her a real personal friend."

The Association Research Prize

The Association Research Prize, made possible through the generosity of the Carolina Biological Supply Company, is awarded annually to the member or members presenting an especially meritorious paper at the annual meeting, and consists of a $100.00 honorarium. This year the prize was awarded to Drs. James A. and Faith S. Miller of Emory University for their paper, "An Analysis of Factors Contributing to the Reanimation of Mice from Less than 1° C.". Honorable mention was given Dr. Charles E. Jenner of the University of North Carolina for his paper, "The Effect of Photoperiod on the Duration of Nymphal Development in Several Species of Odonata". The abstract of the winning paper is reprinted below:

AN ANALYSIS OF FACTORS CONTRIBUTING TO THE SUCCESSFUL REANIMATION OF MICE FROM LESS THAN 1° C.

JAMES A. MILLER, JR. and FAITH S. MILLER,
Emory University

Hypothermia protects newborn and adult mammals from experimental asphyxia and recently has been successfully tried for asphyxia pallida in human babies (Westin, Miller, Nyberg, Wedenberg, '59). By contrast, a simple and very effective method for cooling animals to 0° C. with subsequent recovery utilizes partial asphyxiation during the first stage of cooling. Experiments were designed to resolve this apparent paradox using mice cooled by the Goldzveig-Smith method. After one hour in sealed vessels the 0_2 content was 6%, CO_2 was 11%, deep colonic temperature approximately 15° C. The relative importance of hypoxia, hypercapnia and high humidity was tested by the addition of soda lime, silica gel, or both. Hypercapnia proved most beneficial, hypoxia next, and increased humidity of least value for recovery of postural reflexes, prevention of hind limb weakness and indefinite survival. Tests of the efficacy of air, 100% 0_2, 95% 0_2 + 5% CO_2, and 90% 0_2 + 10% CO_2 for artificial respiration during rewarming demonstrated the superiority of 95% 0_2 + 5% CO_2, whether the hypothermia was of short duration (15 min. below 5° C.) or of long (30 or 60 min.). X-ray studies on mice injected with "Micropaque" suggested that vasodilation produced by the sealed vessel technique may be the mechanism behind the success of the method.

Research Fellowship

The Research Fellowship, made possible by the generosity of the Phipps and Bird Company was awarded to Lucille Walton of Danville, Virginia. This fellowship consists of an honorarium of $150 for use in summer research at the Mountain Lake Biological Station of the University of Virginia. The recipient is selected from applicants on the basis of planned work, references, education and other supporting data submitted.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

Dr. A. A. Humphries has been elected President of the Emory University chapter of Sigma Xi for the coming year.

Dr. Charles E. Miller of the Emory University Department of Biology has accepted a position of Assistant Professor of Biology at the A. & M. College of Texas.

Mrs. Marion T. Coleman of the Biology Department at Emory University has received a National Science Foundation Cooperative Graduate Fellowship for 1959-60.

Robert A. Pedigo of Emory University has been awarded a National Science Foundation Cooperative Fellowship for the year 1959-60. He will study the effects of low-level chronic radiation on physiological processes with special reference to photosynthesis and respiration rates at the Georgia Nuclear Laboratories at Dawsonville and the cobalt radiation field at Emory University.

William H. Adams, Wildlife Research Unit, Auburn, Alabama, has been accorded an Honorarium for Young Mammalogists based on an abstract of his dissertation presented at the annual meeting of the American Society of Mammalogists held at the U. S. National Museum, Washington, D. C., June 22-24.

Drs. Alexander Hollaender, W. L. Russell, and **Drew Schwartz** of the Oak Ridge National Laboratory attended the ninety-sixth annual meeting of the National Academy of Sciences in Washington, D. C., April 27-29. Dr. Russell attended a Symposium on Molecular Genetics and Human Disease at the State University of New York Upstate Medical Center in Syracuse, April 23-24 and presented a lecture on recent advances in genetics in mice. Dr. Hollaender attended a meeting of the Biological Effects of Atomic Radiation Committee on genetic effects of radiation at the Rockefeller Institute in New York on May 13.

Dr. Arthur C. Upton, ORNL, attended meetings of the Pathology Study Section of the U. S. Public Health Service, May 7-10.

Jean Moutschen of Belgium has completed a one-year period of research in the Biology Division, ORNL, and has returned to the University of Liege.

Dr. Howard I. Adler, ORNL, departed May 29 on a visit to European Laboratories. His itinerary includes attendance at the Symposium on Immediate and Low Level Effects of Ionizing Radiations at Venice, Italy, June 21-27, and participation in discussions concerning mechanisms of radiation damage to living cells with scientific investigators in Italy, Denmark and Sweden.

Dr. William Arnold, ORNL, will be at the Institute for Muscle Research, Woods Hole, Mass., from June 1 to September 7, where he will do collaborative research with Dr. Albert Szent-Gyorgyi.

Dr. Francis T. Kenney has joined the Enzymology Group at ORNL. Dr. Kenney received a B.S. degree in Biology from St. Michaels College, and M.S. degree in Zoology from the University of Notre Dame, and a Ph.D. degree in Biochemistry from the Johns Hopkins University. He has been associated with the Cornell University School of Medicine for the past two years.

Michael D. Coe has recently been appointed Assistant Professor of Anthropology at the University of Tennessee. He will soon receive his Ph.D. from Harvard University for work conducted in ancient Guatemalan ruins where he studied traces of early North and South American cultures.

Dr. Royal E. Shanks, University of Tennessee, is continuing his Alaskan studies for the fifth consecutive summer. For the first time Dr. Shanks is accompanied by his wife and two daughters, who will occupy quarters at the University of Alaska near Fairbanks while he conducts research farther north. Dr. Shanks, accompanied by **John J. Koranda**, University of Tennessee field and laboratory assistant, will continue studies in the Brooks Mountains during the early part of the summer, with emphasis on the soils and vegetation at elevations of 2,000 feet and above on the north side of the mountains. For the remainder of the summer studies will be continued using the facilities of the Biology Department at the University of Alaska.

Dr. A. M. Winchester, Head of the Biology Department at Stetson University, is spending the summer at the University of Michigan Medical School where he is participating in the Institute of Radiation Biology sponsored by the National Science Foundation. Dr. Winchester was one of twenty chosen for intensive advanced study in this field.

Dr. E. C. Prichard, Professor of Biology at Stetson University, will spend the greater part of the summer as chief Nature Counsellor at Camp Rockmont for Boys at Black Mountain, North Carolina.

Dr. Keith Hansen, Biology Department, Stetson University, will spend the summer in special research on the use of the Southern Toad and the Southern Leopard Frog as test animals for human pregnancy diagnosis.

Dr. William Preston Adams, who has recently received the Ph.D. degree from Harvard University joined the Biological Sciences Department, Florida State University on June 1 as Research Associate.

Dr. Lloyd M. Beidler, Professor of Physiology, Florida State University, has been selected to deliver the annual Bowditch Lecture at the fall meetings of the American Physiological Society at the University of Illinois. This lectureship was established to recognize and reward preeminence among the physiologists under 40 years of age and represents a signal honor of the Society. In addition to this recognition, Dr. Beidler has also been selected to receive a travel grant from the U. S. Committee on the International Union of Physiological Societies to attend the 21st International Congress of Physiological Societies to be held in Buenos Aires in August. At this Congress, Dr. Beidler will present the results of his research on sensory receptors that respond to chemical stimulation.

Dr. Charles F. Byers, long-term chairman of the Biological Sciences Department of the University College, ranking professor of Biology and Assistant Dean of the Graduate School, announced his retirement as a member of the staff and faculty of the University of Florida, February 1, 1959. He had joined the staff of the University of Florida as a member of the Biology Department in 1927,

and served the University from that time until his retirement. Dr. Lewis Berner was appointed Interim-Chairman of the Biological Sciences Department at the beginning of the spring semester following the retirement of Dr. Byers.

Dr. Arnold B. Grobman has been given a leave of absence from his dual posts in the Biology Department of the University of Florida and as Director of the Florida State Museum to head up the study group for AIBS on Biological Sciences Curricula. The study group is based at the University of Colorado and will spend two to three years developing suggested curricula for high schools and junior colleges in particular, but also for other educational levels. **Dr. Walter Auffenberg** will be on leave of absence from his post at Florida to assist Dr. Grobman during 1959-60. Dr. J. C. Dickinson, Jr., has been appointed acting director of the Florida State Museum while Dr. Grobman is on leave.

Dr. Kenneth Backhouse of the Anatomy Department, Charing Cross Hospital Medical School, London, England, has been at the University of Florida from October until May as a visiting associate with the Florida State Museum and the Anatomy Department of the J. Hillis Miller Medical Center. Dr. Backhouse is a specialist in the biology of marine mammals.

At the annual meeting of the Florida Academy of Sciences in December **Dr. E. Ruffin Jones**, Biology Department, University of Florida, was installed as President and Chairman of the Executive Council. Others from that Department elected to office include **Dr. J. B. Lackey**, secretary, **Dr. J. C. Dickinson, Jr.**, to continue as editor of the Quarterly Journal, and **Dr. Eugene C. Bovee**, chairman of the biology section. At the annual meeting of the Academy Conference of the AAAS, Washington, D. C., in December, Dr. Jones was elected secretary-treasurer of that group.

Dr. G. M. Armstrong retired on February 1, 1959, at the compulsory retirement age of 65 as Head of the Botany and Bacteriology Department at Clemson College, a post which he had held for 28 years. Dr. Armstrong earned his graduate degrees at the University of Wisconsin and the Henry Shaw School of Botany, Washington University, St. Louis. He has served as Chairman of the Southern Division of the American Phytopathological Society, as Chairman of the Tobacco Workers Conference, as first Chairman of the Cotton Disease Council and recently as President of the South Carolina Academy of Science. Dr. Armstrong's investigations have included studies of the wilt fusaria and some early work on the downy mildew disease of tobacco.

A recent addition to the staff of Clemson Agricultural College is **Dr. James E. Halpin**, who joined the Department of Botany and Bacteriology as Associate Plant Pathologist, to work on the diseases of white clover. Dr. Halpin obtained his Ph.D. degree from Wisconsin in 1955 and has been previously employed by the Rockefeller Foundation Agricultural Programs in Latin America working on forage crops improvements in Mexico, Colombia and Chile.

G. Robert Lunz, Director of the Bears Bluff Fish Laboratories in South Carolina, has been named acting director of the Division of Commercial Fisheries of the State Wildlife Commission as of June 1, and will continue his work at the laboratories in addition to the new post.

Dr. George C. Kent, Louisiana State University, is serving as a Visiting Lecturer at the National Science Foundation Summer Institutes for Teachers at Baylor University, Northwestern State College (Louisiana), Mississippi Southern College, and at the University of Mississippi during the current summer.

Dr. Howell V. Daly has accepted a position as Instructor in the Department of Zoology, Physiology and Entomology at LSU, commencing in the fall semester. Dr. Daly, an entomologist, is a graduate of Southern Methodist University and the University of Kansas.

Dr. George H. Mickey has resigned as Chairman of the Department of Zoology, Physiology and Entomology at LSU to assume the Deanship of the LSU Graduate School.

Dr. James Norman Dent will be on leave from the University of Virginia during the academic year 1959-60. He has been awarded a Guggenheim Fellowship and will carry out research at the Gatty Marine Laboratory of the University of St. Andrews, St. Andrews, Scotland.

Dr. Edward Lautenschlager, Instructor of Biology, has been named Registrar of the University of Virginia.

Dr. John G. Barker, Virginia Polytechnic Institute, has been promoted to Professor of Biology and Chairman of the Department at Radford College. He will teach the biology course in the National Science Foundation Summer Institute for high school science teachers this summer.

Donald H. Messersmith, Radford College, has received a faculty fellowship to continue graduate studies in entomology at Virginia Polytechnic Institute.

Dr. John L. Wood of the University of Cincinnati will join the staff of the Virginia Fisheries Laboratory in July to conduct research in fungus diseases of marine organisms.

Dr. W. J. Hargis, Jr., was appointed Director of the Virginia Fisheries Laboratory in May, 1959.

Dorothy Crandall was recently promoted to Associate Professor of Biology at Randolph Macon Woman's College. Professor Crandall received the J. Shelton Horsley Research Award at the 37th annual meeting of the Virginia Academy of Science for her work on ground vegetation patterns of the spruce-fir area in the Smoky Mountains National Park.

Dr. S. Bose, who received the Ph.D. degree in June from the University of Virginia, has accepted a position with the Baltimore Dental College. Another June graduate, **Dr. Te-Hsiu Ma**, has been appointed Assistant Professor of Biology at Emory and Henry College.

For the past two years **Dr. and Mrs. Orland E. White** have been conducting investigations on the flora of Central America and western South America, particularly Bolivia and Chile. They have recently embarked on a collection trip through Texas, New Mexico, and Arizona.

Vivian Bennet, Associate Professor of Biology, Sweet Briar College, will continue the study of rhythmicity in fiddler crabs at Woods Hole during the summer.

Helen Churchill, Associate Professor, Hollins College, attended the semicentennial celebration of the University of Michigan Biological Station, June 16-19.

Charlene McClanahan and **Virginia Yeatts**, June graduates of Radford College, have received National Science Foundation Fellowships to study genetics at Ohio State University. **Helen Floege**, also a June graduate, has received a graduate assistantship to study physiology at the University of Maryland.

Dr. C. Ritchie Bell and **Mr. James A. Duke** of the Department of Botany, University of North Carolina, will leave in July for a four months collecting trip though Mexico and Central America. The trip is in connection with a N. S. F. sponsored research program on the cytology of the Umbelliferae.

Dr. Robert Leisner, who received his Ph.D. in botany from U. N. C., is now assistant to the Executive Director of the A.I.B.S.

Dr. William C. Dennison, visiting professor at the U. N. C. Department of Botany, is returning to Swarthmore College.

Carol Ann Padgett, who holds the M.S. degree from A.P.I., has joined the faculty of Huntingdon College as Instructor in the Biology Department.

Dr. Mary Jane Brannon, Huntingdon College, recently completed a course in Laboratory Methods in the Diagnosis of Viral and Rickettsial Diseases held at the Communicable Disease Center Laboratories at Montgomery, Alabama.

Dr. James C. Wilkes, Jr., will attend a summer workshop in Field Biology which will be held in Wyoming. Dr. Wilkes has been appointed the permanent counsellor *pro tem* for the Junior Academy of Science in Alabama.

Dr. Leonard Doerpinghaus, Agnes Scott College, will attend the Institute for College Botany Teachers at Indiana State University during June and July.

Mrs. Netta Gray, Agnes Scott College, will present a paper at the IXth International Botanical Congress in Montreal in August.

Dr. A. A. Humphries was recently elected Chairman of the University Center (Georgia) Biology Group for the year 1959-60. **Dr. W. B. Cosgrove**, Department of Zoology, University of Georgia, was elected co-chairman. The University Center Group includes biologists from the University of Georgia, Emory University, Georgia Institute of Technology, Agnes Scott College, and Oglethorpe University.

Dr. Harold J. Humm, Duke University, is engaged in teaching during the summer months. Until July 25 he will teach "Survey in the Marine Sciences" at the Alligator Harbor Laboratory of the Oceanographic Institute, Florida State University. Following this he will teach in the Marine Ecology course at the Marine Biological Laboratory, Woods Hole, Massachusetts. On September 1, Dr. Humm will begin a one-year appointment as "Jacques Loeb Associate" in Marine Biology, a Rockefeller Institute — ONR fellowship; he will spend two months at the Rockefeller Institute in New York and the rest of the year at the Marine Biological Laboratory, Woods Hole.

The following new personnel will join the faculty of the Department of Zoology of Tulane University in September: **Dr. D. Eugene Copeland**, formerly Executive Secretary of the Cell Biology Studies Section, Division of Research Grants of the National Institutes of Health, will succeed Dr. Fred Cagle as Chairman of the Department; **Dr. William F. Brandom**, who received his Ph.D. degree from Stanford and who has been doing post-doctoral work in experimental embryology at Princeton, as Instructor; **Dr. Gerald E. Gunning**, who received his Ph.D. from Indiana University, as Instructor; **Dr. Guy Marlow**, who received his Ph.D. from Tulane, as Instructor; and **Dr. Alfred E. Smalley**, who received his Ph.D. from the University of Georgia, as Instructor.

Dr. Joseph H. Young, Assistant Professor, has resigned from the Department of Zoology at Tulane to accept a position on the faculty at San Jose State College, California.

Dr. Royal D. Suttkus, Associate Professor of Zoology at Tulane, has been granted a year leave of absence, during which he will travel to Europe to examine type specimens and to Mexico and Central America to collect gars in connection with a revisionary study of the group.

Dr. Milton Fingerman, Assistant Professor of Zoology at Tulane, will spend the summer at Woods Hole Oceanographic Institute where he will continue his research on crustacean hormone systems and teach the section on Mollusca in the Invertebrate Zoology course.

Dr. William E. Collins, formerly New Jersey State Extension Entomologist at Rutgers University, has accepted a position as Medical Biologist at the Laboratory of Parasite Chemotherapy, U. S. Public Health Service, Columbia, South Carolina.

Dr. Martin D. Young, Head of the Section on Epidemiology of the Laboratory of Parasite Chemotherapy in Columbia, S. C., will present a series of lectures on the Chemotherapy of Malaria at the W.H.O. course in Malaria Eradication in Jamaica, B. W. I., in August.

Two new books were published during 1958 by members of the staff of the Department of Biology of West Virginia University: *Woody Plants in Winter* by **Earl L. Core** and **Nelle Ammons**, and *Part 3, Flora of West Virginia* by **P. D. Strausbaugh** and **Earl L. Core.**

Dr. Nelle P. Ammons, Professor of Botany at West Virginia University, retires at the end of the 1958-59 school year. Dr. Ammons has been associated with the University as a member of the faculty since 1920 and has held the rank of Professor since 1953. She is known particularly for her work with the bryophytes and published in 1940 a "Manual of the Liverworts of West Virginia", which has been used as a textbook throughout the Appalachian region.

Institutions and Organizations

The **Florida Academy of Science** will hold its annual meeting in February of 1960 at Florida Southern College, Lakeland, Florida.

The **Georgia Academy of Science** had its annual meeting at Mercer University, Macon, April 24-25. Of interest to biologists was the election of Dr. J. J. Westfall, Botany Department, University of Georgia, as President for 1960-61. Officers of the Biology Section for next year are: Chairman, Dr. L. S. Luttrell, Experiment; and Secretary, Mr. William Brillhart, Emory University.

At **Limestone College**, Gaffney, South Carolina, a program of remodeling and enlarging the Hall of Science is being undertaken this summer. For the Department of Biology this will mean renovation of the present laboratories, an additional newly equipped laboratory for bacteriology, and a more adequate space for research in the department.

The Research Conference on "Enzyme Reaction Mechanisms" of the **Biology Division, Oak Ridge National Laboratory**, was held in Gatlinburg, Ten-

nessee, April 1-4. Dr. Alvin M. Weinberg, Director of the Oak Ridge National Laboratory, presented the welcoming address.

Eight members of the **University of North Carolina Department of Botany** plan to attend the International Botanical Congress at Montreal. They are J. N. Couch, A. E. Radford, V. A. Greulach, W. J. Koch, H. E. Ahles, J. E. Adams, J. G. Haesloop and J. T. Mullins.

A Botany Conference for College Teachers of General Botany and General Biology, directed by Dr. Victor A. Greulach and sponsored by the N. S. F., will be held at the **University of North Carolina** July 27 through August 14.

New officers of the **Louisiana Academy of Sciences** for 1959-60 include G. C. Kent (LSU), President; G. H. Bick (SLI), President-Elect; G. H. Ware (NSC), Secretary; Frederick Deiler (Freeport Sulphur Co.), Treasurer; B. T. Cole (LSU), Editor; C. J. Cavanaugh (Louisiana College), Chairman, Division of Biology; and H. J. Bennett (LSU), Chairman, Junior Academy.

Grants in Aid

Dr. A. A. Humphries, Emory University, was recently awarded a grant of $21,000 by the **United States Public Health Service** for support of a three-year program entitled, "Natural inhibition of meiosis in oocytes of Amphibia".

Dr. W. D. Burbanck, Professor of Biology, Emory University, received a three-year grant of $23,600 from the **National Science Foundation** to make a study of "the ecology and geographical distribution of the Estuarine Isopod, *Cyathura*".

Dr. Ernest L. Hunt, Professor in the Biology Department at Emory University, has received a three-year renewal in the amount of $26,000 of his grant from the **U. S. Public Health Service** for "Studies on the estrus and gestation in diabetic rats".

Dr. Arthur W. Jones, Associate Professor of Zoology at the University of Tennessee, is in charge of a new plan for qualified undergraduates majoring in science to participate in current research projects. The plan is being supported by a $7,140 **National Science Foundation** grant. Participants will be paid $1.50 an hour for up to 400 hours; the research includes current projects in Botany, Chemistry and Zoology.

In a study being aided by a $9,900 **National Science Foundation** grant, **Dr. Howard F. L. Rock** of the University of Tennessee Botany Department is directing a study on the revision of the Tetrodus section of Helenium, a genus of American herbs. Specimens will be collected in Mexico and the Southwestern United States.

Three grants totaling $99,625 for medical research have been awarded **Dr. McChesney Goodall** of the University of Tennessee Memorial Research Center at Knoxville by the **U. S. Public Health Service.** Dr. Goodall, who specializes in neurophysiology, joined the U. T. Memorial Research Center staff last October as research professor and assistant director, coming to U. T. from the Duke University School of Medicine.

The Division of General Medical Sciences, **National Institutes of Health**, has awarded $86,940 to **Dr. Robert K. Godfrey**, Department of Biological Sciences, Florida State University, for a five-year study of the Marsh Plants of Florida and adjacent areas.

The **Research Council** of the University Center in Virginia has recently announced a grant of $300 to **Elizabeth Fern Sprague**, Sweet Briar College, for expenses incurred in her study of, "Ecology and Anatomy of Species of California *Pedicularis*".

The **Science Division**, Hollins College, recently received a grant from the **National Science Foundation** which will permit superior students to participate in faculty research programs during the session 1959-60. The students will receive $1.00 per hour for up to 400 hours.

The **Blandy Experimental Farm**, University of Virginia, has recently been notified that its research contract with the **Atomic Energy Commission** for the study of radiation effects on growing plants has been continued for another year.

Dr. Harry Freeman, Department of Biology, University of South Carolina, has received an $11,000 contract from the **Atomic Energy Commission** to study the ecology of fishes in the Savannah River Plant area. The work this year will be mostly on the effects of high temperatures on stream fish.

The **Louisiana Academy of Sciences** has been granted the sum of $16,310 by the **National Science Foundation** for support of a program of the Junior Academy designed to increase interest and participation in science among high school students in Louisiana. Dr. Harry J. Bennett is director of the project. Louisiana State University is serving as fiscal agent.

Dr. James H. Barrow, Jr., formerly Head of the Department of Biology at Huntingdon College and now at Hiram College in Ohio, received a three-year grant from the **U. S. Public Health Service** in the amount of $30,000. His investigations will concern the immunological aspects of diseases under crowded environmental conditions.

The **National Science Foundation** has awarded grants to two in the Zoology Department at Tulane: **Dr. Royal D. Suttkus**, Associate Professor — $20,000 for revisionary study of the garfishes of the world (three years) and **Jerome O. Krivanek**, Assistant Professor — $24,600 for a study of the chemical analysis of the developing slime mold (three years). In the same department, **Merle Mizell**, Instructor, has received a grant of $15,679 from the **National Institutes of Health** for continued studies on the effects of regenerating anuran appendages on an anuran tumor (two years); and Assistant Professor **Norm C. Negus** has received a renewal of his grant ($7,345) from the **Atomic Energy Commission** to continue studies on cyclic changes in small mammal populations of Breton Island (one year).

Tulane University is among a number of other southeastern schools to receive grants from the **National Science Foundation** for "Undergraduate Research Participation Program." Under the terms of this grant, each participating advanced undergraduate student will receive a maximum of $600 per year and will be required to actually participate in the research program of some faculty member.

Dr. Michael Klein, Assistant Professor of Anatomy at the University of Tennessee Medical Unit in Memphis, has been awarded a $69,000 grant by the **U. S. Public Health Service** to investigate means of altering the course of skin cancer in mice.

The **University of Tennessee College of Medicine** has received a $1,000,000 research grant for a five-year study on the prevention of brain damage. The grant was made by the National Institute of Neurological Disease and Blindness of the **U. S. Public Health Service**, and funds will be made available at the rate of $200,000 per year.

The ASB BULLETIN

Volume 6, Number 4 October, 1959

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The Official Quarterly Publication of
The Association of Southeastern Biologists

THE ASB BULLETIN

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists and is published at Columbia, S. C., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to the Editor, U.S.P.H.S., P. O. Box 717, Columbia, S. C. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harold J. Humm, Department of Botany, Duke University, Durham, N. C. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tenn. Subscription rate for non-members of ASB: $2.00 per year. Printing and typography by the Cary Printing Company, Columbia, S. C.

GEOFFREY M. JEFFERY
EDITOR

HAROLD J. HUMM, ASSOCIATE EDITOR
ELSIE QUARTERMAN, BUSINESS MANAGER

ASSOCIATION AFFAIRS

1960 Annual Meeting

The next issue of the BULLETIN (Volume 7, Number 1) will carry the usual announcements of the 1960 Annual Meeting of the Association at Loyola University in New Orleans, Louisiana. However, since this announcement generally proclaims deadlines for the submission of award nominations, papers for presentation, et cetera, which follow the receipt of the announcement rather closely, a few reminders may be in order at this early date. Members are urged to be considering nominations and applications for the Meritorious Award for Teaching, the Association Research Prize, the Research Fellowship at Mountain Lake, and the Goethe Travel Awards for students. The deadline for papers for the program cannot be set as yet, but is generally only about a month after the announcement is received; the Editor urges the members to give some thought to these papers somewhat earlier, since it appears to be necessary to adopt a rather arbitrary attitude toward acceptance of papers after the deadline. The deadline is usually set at the latest possible time for ensuring the printing of the issue containing the abstracts prior to the meeting date.

The Program Committee for the meeting now consists of the following: Father John H. Mullahy (Chairman), Dr. Walter G. Moore, Miss Letitia Beard, Dr. Harry D. Brown, Dr. Robert C. Goss and Dr. Richard T. Jackson, all of Loyola University; Dr. Rosamond McMillan of L.S.U. (New Orleans); Dr. George Penn and Dr. Arthur Weldon of Tulane University.

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The BULLETIN

The Editor herewith completes the first volume of the BULLETIN with which he has been associated and is hopeful that it approaches the standard of quality previously established by his predecessor. Certainly any failure to do so cannot be due to any lack of cooperation and assistance of the officers and members of the Association. The assistance of the State Correspondents and of the contributors of feature articles is especially appreciated.

The problem of feature articles is a particularly difficult one for the Editor. We intend to continue the series on Biological Field Stations, including Marine Stations, similar to the one on the Highlands Station appearing in this issue, and have several scheduled for subsequent issues. However, it is hoped to have other types of articles which might be of interest to members. These would include points of view on various problems of interest to biologists, technical articles of a general or review nature, possible biographical sketches of biologists from our area, description of biology departments and studies at various colleges and universities in our area, and other subjects of interest. Suggestions for these articles are solicited, as are contributors, from the membership of the Association. All articles submitted will be given consideration by the Editor and by consultants familiar with the particular field. Restrictions as to size exist; two to four pages of the BULLETIN (about 2500 to 5000 words) is the usual length acceptable, although shorter and longer articles will be considered. The Editor at all times welcomes suggestions or expressions of opinion from members as to the content or organization of the BULLETIN.

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State Correspondents

Beginning with the next issue (Vol. 7, No. 1) the new correspondent for North Carolina will be Dr. William J. Koch, Botany Department, University of North Carolina. The Editor expresses his appreciation to the former correspondent, Dr. T. W. Johnson, Jr., and regrets that he finds it necessary to resign. The job of the state correspondents is a difficult one and it is hoped that all members will aid them by sending them news items.

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AIBS Meeting

The annual meetings of the Biological Societies affiliated with the American Institute of Biological Sciences were held at the Pennsylvania State University, August 30 to September 3. A number of these meetings were of interest to and attended by ASB members. A total of 37 ASB members were listed as authors of contributed papers in the programs of 10 of the participating societies.

THE HIGHLANDS BIOLOGICAL STATION

THELMA HOWELL

Professor Howell's association with the Highlands Biological Station dates to 1938 when she began researches there on the blood of plethodontid salamanders. In 1946 she was made Executive Director of the Station, serving in residence during the summer months. In a special resolution of appreciation passed by the Board of Trustees of the Station in 1958, Miss Howell was highly commended for her part in the progress and development of the Station. In April 1959, Miss Howell resigned as Professor of Biology, Chairman of the Biology Department, and Chairman of the Division of Natural Science and Mathematics at Wesleyan College in Macon, Georgia, to become full-time, in-residence Executive Director of the Highlands Biological Station. She holds the A.B. and A.M. degrees from Duke University and is a member of Sigma Xi. Her memberships in professional organizations include the ASB, the Academies of Science in Georgia, North Carolina and Tennessee, the Society of Ichthyologists and Herpetologists, Ecological Society, and others.

THE HIGHLANDS BIOLOGICAL STATION is situated in the town of Highlands, North Carolina, in the southwestern part of the State near the South Carolina and Georgia boundary lines. It is not in a valley nor on a mountain but on a plateau of several thousand acres, commonly called the *Highlands Plateau*. The town itself is 3,823 feet at the town square, being the highest incorporated town east of the Rockies. The average elevation within the town limits is 4,119 feet. Some of the surrounding peaks reach elevations of over 5,000 feet. A few miles to the east of Highlands is the continuation of the Blue Ridge; to the north are the Cowee Mountains and beyond them the Plott Balsams; to the northwest are the Great Smokies; and to the west the Nantahalas.

The area available for those whose researches bring them to the Highlands Biological Station is the southern section of the Blue Ridge Province, commonly called the Southern Appalachians. This area offers more opportunities than any other comparable area in Eastern North America for the student of bio-geography. The region is one of great antiquity, for the Appalachians represent an ancient land mass repeatedly raised into mountains and continuously eroded before the newer Appalachians were born. During periods of peneplanation, the vast mountain area became a refuge for plants and animals which were unable to find suitable habitats on the vast peneplain. As early as 1842 the great botanist, Asa Gray, called attention to many of the rare plants of the area, and again in 1884 emphasized the age of the flora and pointed out their Asiatic relationships. Recent investigators have likewise directed attention to many of the native species of plants which are thought to represent survivals from early geologic time and to many species and genera which have their nearest relatives at the present time in eastern Asia. Situated on the Blue Ridge Escarpment, the Station affords access to the Piedmont as well as mountains, so that, within a radius of 20 miles of the Station, one is near Oak - Hickory - Pine, Oak - Chestnut, Beech-Maple, Mixed Mesophytic, Hemlock-Hardwood, and Spruce-Fir communities.

The Highlands area also includes such remarkable escarpment gorges as those formed by the Whitewater, Chattooga, Thompson, Estatoe, Horsepasture, and Toxaway Rivers. Here, studies in relict species can be made, and these gorges harbor species which cannot be found elsewhere. There is a wealth of bird life and small mammals, while among the salamanders, insects, spiders, and snails are many forms that do not occur elsewhere, or are the unique southern representatives of groups living far to the north.

A few examples of more recent research problems conducted at the Station will indicate the wide variety of problems that may be pursued in the Southern Blue Ridge Province. As a group of distinguished biologists who evaluated the Station for a national agency pointed out, the ruggedness of the terrain of the mountainous region and its comparative inaccessibility have so retard-

ed biological exploration "that many years' work lie ahead before biologists who work in the area will be in a position to confine their efforts to more intensive, long term laboratory projects with full confidence that the natural environment is adequately understood". Some of the recent problems, therefore, may be classified as field exploration. Individuals working on the state floras of the Carolinas, Georgia, and Tennessee have used the Station as a base of operations. This work has resulted in new distributional records and the description of new varieties and species. Taxonomic problems and life history studies on the insects have included such groups as the fungus gnats, beetles, moths and butterflies, caddisflies, stone flies, craneflies, and mayflies. The ecological studies have been most interesting. They have included studies of the grass balds, and an investigation of the ecotone between deciduous and boreal coniferous forests. Some microclimatic studies have been conducted in the Whitewater Gorge. The most intensive work has been done on the fungi, liverworts, mosses, salamanders, birds, and mammals. The problems in these groups have included taxonomic, life history, and ecological studies.

In this day of almost frenzied attention to the promotion of basic research and training in the sciences, the story of the founding of the Highlands Biological Station over thirty years ago is of great interest. The parent organization of the Station was the Highlands Museum of Natural History, founded in 1927 for the purpose of preserving some of the private collections of the first settlers of the region. Impressed with the urgent need of promoting biological research in the South, and realizing that the Southern Appalachians offered unexcelled opportunities for the student of bio-geography, the Trustees of the Highlands Museum of Natural History invited the late Dr. Edwin E. Reinke of Vanderbilt University to serve as Director of the Museum for 1929. Dr. Reinke was also charged with the responsibility of preparing a report on the advisability of establishing a laboratory in connection with the Museum. Dr. Reinke's formal report, "Report on the Necessity of a Mountain Biological Research Station in the South", published in 1930, became Publication Number 1 of the Station.

As a result of the report, the Trustees of the Museum sponsored a conference of biologists in Highlands from June 20-22, 1930, for the purpose of discussing the feasibility of establishing a biological station in the Southern Appalachians. Those registered for the conference and their institutions were: Miss Laura Bragg, Director Charleston Museum; E. B. Chamberlin, Charleston Museum; E. G. Conklin, Princeton University; E. S. Hathaway, Tulane University; L. R. Hesler, University of Tennessee; W. E. Hoy, University of South Carolina; B. P. Kaufman, University of Alabama; I. F. Lewis, University of Virginia; Clifford Pope, American Museum of Natural History; J. M. Reade, University of Georgia; E. E. Reinke, Vanderbilt University; R. C. Rhodes, Emory University; J. S. Rogers, University of Florida. Mr. A. H. Howell and Mr. F. S. Burleigh of the U. S. Biological Survey were present on the last day of the conference.

Out of the conference came a motion offered by Dr. J. M. Reade that a committee be appointed to recommend the proper procedure for establishing a biological station in the Southern Appalachians. The motion was passed unanimously and on this committee were appointed the following: Reade, Hathaway, Hesler, Hoy, and Kaufman. This committee recommended to the Trustees of the Museum that incorporation of the "Highlands Museum and Biological Laboratory" under the laws of the state be effected immediately. On July 31, 1930, the Highlands Museum and Biological Laboratory was incorporated. On September 30, 1949, the Charter was amended and the name of the organization changed to THE HIGHLANDS BIOLOGICAL STATION, INC.

The corporation purchased tracts of land and Lake Ravenel (formerly called Lindenwood Lake). In 1931 a laboratory was built on the shore of the lake and dedicated as The Sam T. Weyman Memorial Laboratory Building. In 1940 there was constructed a Museum of Natural History Building. This building is a handsome and spacious stone building. It is in this building that an educational program for the layman is conducted through exhibits, nature study classes for children, and an illustrated lecture series for adults. Important collections of the Museum include the Cleaveland Collection of local Cherokee artifacts and a portion of the valuable Burnham S. Colburn Collection of North Carolina Minerals.

A new research laboratory, made possible by a grant from THE NATIONAL SCIENCE FOUNDATION, was completed in May 1958. It is named for the late distin-

guished botanist, William Chambers Coker, a former Station president and director. The Coker Building contains research cubicles for 18 investigators, the Reinke Library, executive offices, plant drying room, and store room. *Central heating permits use of the laboratory throughout the year.* The original laboratory building was remodeled in 1958 and converted into a dining hall which will seat 50 people. The kitchen is furnished with the most modern equipment.

Four cottages are available for housing of investigators. The Illges Cottage contains a living room with fireplace, five bedrooms, and two baths. In 1958, through a grant from the NATIONAL SCIENCE FOUNDATION, three cottages were built: the Henry M. Wright Cottage, the Warren McAllister Deacon Cottage, and the Margaret Cannon Howell Cottage. The last named cottage has central heating, permitting use throughout the year.

In addition to the land surrounding the lake, approximately six miles from town the Station owns the Margaret Cannon Howell Wildlife Refuge, an undisturbed tract of primeval forest, given the Station in 1948 by Mrs. Clark Howell, Senior, of Highlands and Atlanta, Georgia. In 1954, Mrs. W. C. Coker, Chapel Hill, North Carolina, gave the Station the William Chambers Coker Rhododendron Trail in memory of her husband.

The corporate powers of the Station are vested in a Board of Trustees. Twenty members of the Board are divided into four classes of five members, with staggered terms of four years. The President, Vice-President, the Treasurer, and the Executive Director are trustees *ex officio*. In addition, there are Honorary Trustees, individuals who may be elected from the Board of Trustees after having attained the age of seventy years. The President, Vice-President, and Executive Director must be biologists. At the present time, twelve additional biologists are serving on the Board of Trustees.

The Administrative Body of the Station is a Board of Managers composed of a representative of each of the Subscribing Institutional Members, the Executive Director, and the President of the Corporation who is a member *ex officio*. The Board of Managers, subject to the approval of the Board of Trustees, formulates the research and educational programs of the Station, recommends to the Board of Trustees the members of the staff, recommends a yearly budget, extends Subscribing Institutions Memberships, and awards research grants-in-aid. Currently, the Subscribing Institutional Members are, in the order of their applications and election to membership: Vanderbilt University, University of North Carolina, Duke University, Wesleyan College, University of Georgia, University of Tennessee, North Carolina State College, University of Florida, Florida State University, and Emory University. Biologists serving in official capacities at the Station are: Leland Shanor, *President*; H. J. Oosting, *Vice-President*; Thelma Howell, *Executive Director*; *Board of Trustees*: H. L. Blomquist, Lewis Anderson, H. R. Totten, A. J. Sharp, Elon E. Byrd, J. W. Hardin, R. B. Platt, J. R. Bailey, Warren McA. Deacon, Lewis Berner; *Board of Managers*: J. R. Bailey, Warren McA. Deacon, Lewis Berner, Robert K. Godfrey, James W. Hardin, Lillian M. Cowie, Eugene P. Odum, W. D. Burbanck, Royal Shanks, H. R. Totten.

At the Annual Meeting of the Corporation on June 28, 1959, President Leland Shanor made several announcements which reflect continued progress of the Station. On behalf of the Board of Trustees, he stated that the Station would be open throughout the year with the Executive Director serving on a year-round, full time basis. Dr. Shanor also reported that the North Carolina General Assembly had appropriated $7,500 to the Station in recognition of the important role the Station plays in higher education in North Carolina. Another important announcement was that 15 biologists had worked at the Station for varying lengths of time during the past year *on grants other than those provided by the Station* from funds it received from the National Science Foundation. Agencies which supported the work of the investigators indicated above included the American Philosophical Society, the National Institutes of Health, the Atomic Energy Commission, the National Science Foundation, and the institutions which the investigators represented.

The spirit which motivated the founding of the Station lives today. The principle upon which it was organized—primarily for investigation and dissemination of knowledge—has proved to be a sound one. In the years to come the path will be the same, modified to meet new conditions as they arise. The Station will continue its role of distinguished service as a regional biological research station in the Southern Appalachians.

SHOULD WE TEACH HUMAN EVOLUTION?

ARTHUR W. JONES

Dr. Jones received the B.A. (1934), the LL.B. (1936), the M.A. (1941) and the Ph.D. (1943) degrees from the University of Virginia. He served as Assistant Professor of Biology at Southwestern University, 1943-45, and since 1945 has been Associate Professor of Zoology at the University of Tennessee. Since 1953 he has been Principal Investigator in an A.E.C. Contract to study effects of radiation on host-parasite relationships. During the recent summer Dr. Jones has taken charge of the National Science Foundation Undergraduate Research Participation Program at the University of Tennessee. He is a member of a number of professional societies, including the American Society of Parasitologists, the National Association of Biology Teachers, the Society for the Study of Evolution, and the ASB, of which he is the retiring Treasurer. Dr. Jones' interests are much broader than those obvious from his more than 30 publications, most of which concern cestodes and other parasites, and include much interest and activity in community problems (especially education and human relations), church work and work with student organizations. The accompanying article was prompted by a desire for at least passing observance of the Darwinian Centennial; it represents a point of view for which the author must take credit, but which the BULLETIN is glad to present for the readers' consideration.

In 1871 Darwin wrote that although the fossil evidence for the descent of man was as yet scanty, the indirect evidence—comparative anatomy, human variability and embryology—"declare in the plainest manner, that man is descended from some lower form---." Since Darwin's time, fossil evidence has come to light which connects modern man through a dated series of preceding forms with ancestral primates which gave rise to man and apes (Clark, 1959). This evidence completes in a satisfactory way the data that Darwin lacked. Man is descended from some lower form.

This fact is now unquestioned by biologists. Yet it is not taught, or is still referred to as a theory or hypothesis, in high school and even college biology courses in many parts of the United States. Why is the teaching of human evolution neglected and suppressed? Riddle (1955) has written a long, well-documented answer. Very briefly, the teaching of evolution is suppressed because evolutionary thinking is considered offensive, sacrilegious and dangerous to custom.

Offensively, this teaching questions the characteristically human idea that man has a special place in nature, apart from all other living things. Just as each remote tribe calls itself "the people", and despises "the others", strangers and enemies, as different and inferior, so the human animal himself exhibits prejudice that sets his species apart and makes man the self-styled apex of creation. Recognizing our kinship with the other animals would be like a respectable family's recognizing kinship with criminals or paupers; poor relations are, if possible, disowned. It offends our human family pride to call attention to man's uncouth relations or undistinguished ancestors.

Sacrilegiously, evolutionary thinking questions the divine origin of man and the divinely ordered laws which the Bible gives for man's eternal governance. And this sacrilege extends, necessarily, to all the fragments of theological doctrine; each sect, each chosen people, cannot easily justify its peculiar rightness against the background of a common animal origin for all mankind. By substituting history for eternity in the human past, evolution insists upon the reality of change, and questions deeply the cherished belief in the permanence of revealed truth.

Dangerously, evolutionary thinking challenges not only the permanence of religious ideas but also the value of established custom. The origin of man has involved a very large number of chance events, through which a particular animal acquired the bi-

ological equipment to achieve culture. Culture has painfully developed through ages of trial, conflict, and synthesis. This fact exposes the absurdity of pretending that present truth is final, or that any human institution is either permanent or perfect. Evolutionary thinking is revolutionary.

Thus evolution is seen as a radical doctrine, unpopular, dangerous, and subversive. Most teachers, understandably, hesitate to teach the facts of human evolution, since by doing so they would antagonize the more powerful forces in society, and would risk the loss of their jobs. Yet some teachers have always come forward, risking unpopularity or dismissal, to teach a fact they believe is important, a truth that holds value for pupils and their society.

Is the evolution of man this kind of truth, a fact worth teaching even at some risk?

The arguments against teaching evolution deny that it has value. These arguments are emotionally based on the unpopularity of evolutionary ideas; their content, however, may appear to be rational.

For example, some argue that knowledge of the descent of man destroys human Faith. Faith in a Creator whose special plan is for man — his sin and his salvation — seems incompatible with the fact that man descended, imperceptibly becoming human through millions of years, from non-human ancestors. Faith in the Bible as a literal description of the nature of God and of the origin of man would indeed be shaken by an understanding of human evolution. If faith in a personal or tribal God, and faith in the literal meaning of the Bible would be destroyed by the knowledge of human evolution, it is argued that this knowledge should be withheld or suppressed.

Somewhat less naively, some insist that the effect of teaching the facts of human evolution would be to encourage a materialistic view of the world and man. The story of man's origin from lower animals seems to devalue the human spirit, in this view, since man's descent implies that man is merely an animal. As an animal, it is said, man cannot have conscience or soul, a sense either of sin or of responsibility. A simple ethic of material well-being would be justified as "rational" to man. Spirit, and idealistic yearnings, would be foreign to his animal nature. "Godless Communism" would fulfill whatever dreams the human animal might have.

If the above arguments, and others like them, are valid, then indeed the descent of man (like certain facts about the worst in human nature, demonic and psychopathic acts in historic times, the evils of man's nature revealed in crude pornography or elegant perversions) should be concealed from view. The "Origin of Species", with a hundred other works on evolution, should be kept in locked library rooms, with the writings of the Marquis de Sade and Edmund Wilson. Human evolution would seem a fact too strong for the childish mind, too dangerous for the common man.

But the arguments sampled above, that say human evolution destroys faith, encourages materialism, and devalues Man, are not valid. They can be easily answered.

Every important discovery destroys a certain kind of faith. Although faith, "the evidence of things unseen", may rest upon deep human need, springing as it does from fear of the unknown and from the hopeful poetry of prophetic souls, still it cannot stand against the evidence of fact clearly established. Faith that attempts to stand against reason can do little good, even for those whom it apparently nourishes and comforts. Those who cling in fear and ignorance to superstitious beliefs are weaker than they need to be. One of the great values of scientific discovery is that such discovery removes some of the need for superstition, cures some of the sickness of man's ignorance and fear. The faith that cannot stand in the light of scientific truth is best destroyed.

Evolution encourages another kind of faith. That man is part of the Universe, by his history as well as by his presence; that man shares with all living things a real relationship; that the world, with other worlds in which life probably arose, is much greater than man, who is yet a part of it; these ideas are close to the perennial philosophy that ennobles all religion, the great thought that man and God are in some manner one. Also, the fact of man's emergence from the distant time of his animal origin lends hope that is like the hope of resurrection; the promise of man's future is worthy of great faith indeed. If faith in a universal God, and faith in a human future where the dreams of poets and prophets may be realized, are valid substitutes for parochial beliefs the literal meaning of which is shaken by evolutionary truth, then the effect of teaching evolution is to encourage Faith, not to destroy it.

Is the effect of teaching evolution to encourage materialism? In the first place, materialism has had so much encouragement already that it is hard to see how one could encourage it more. Materialism is the ethic of Americans (and doubtless of Russians, Englishmen, and any other Western man one might name). The belief in goods, the worship of prosperity, the faith in material achievement by science and industry — these are American ideals, much as philosophers may wish otherwise. If a scientific truth is opposed because it encourages materialism, the American Way of Life itself should be opposed. And materialism is not necessarily bad. Galbraith (1959) has suggested that the proper use of prosperity is for human good; this is the new economic responsibility. Supporting this economic idea with great force is the evolutionary truth of man's emergence from his animal origin. Man has inherited, biologically, the brains to plan for his future. His cultural inheritance, including a knowledge of economics, makes it possible for him to use wealth for his own benefit. Whether the use will in fact be harmful or beneficial depends on man himself, not upon a set of unchanging laws, whether Biblical or Economic. Evolutionary thought, the knowledge of the descent of man, thus makes it reasonable for man to control and direct the material wealth that he himself has created.

Responsibility for economic destiny is not the only responsibility placed on the shoulders of modern man by the fact of his descent. It is the peculiar value of evolutionary thinking that it leads to a view of man which implies general responsibility — for the use of wealth, for the control of population, for peace, for education, in short for the future itself. Man evolved, together with the whole world of living things. But man alone has the brain and hands that make culture possible; culture is, and continues to be the product of human nature.

Why teach the evolution of man? No teaching can be more valuable, in these most troubled times, than the idea of man's responsibility, the duty and burden and crown he assumed when he became human during the evolutionary ages. Defenders of old and orthodox beliefs try to obscure, belittle and deny this truth. Beneficiaries of conservative and established political or economic structures fear the effect of evolutionary thought upon their vested interest. These actions and attitudes are understandable, but they lie across the path of human progress. If mankind is to emerge from the present age of terrible potentialities, neither sinking into a sub-human misery after nuclear war, nor settling into a rigid pattern of controlled and regimented behavior (due to the mutual imitation which great rival systems even now engage in), then we must recognize and use the power that evolution has given us. We must teach human evolution, in order that humanity may survive.

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Galbraith, John K., 1959, The Affluent Society, Houghton Mifflin, New York.

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THE AAAS MEETING, CHICAGO, DEC. 26-31, 1959

The 126th meeting of the American Association for the Advancement of Science will include sessions of 18 AAAS sections and of some 83 participating organizations. Many of the sections and organizations will have programs of contributed papers, but the emphasis again will be on symposia sponsored or cosponsored by various societies and sections, featuring discussions of subjects of current interest and importance by leading authorities in the various fields. Some of the symposia of particular interest to biologists are as follows:

1. Moving Frontiers of Science IV. December 26 and 27. A general symposium sponsored by the AAAS.
2. A symposium sponsored by the AAAS Committee on Science and the Promotion of Human Welfare. December 30.
3. Biochemistry of the Collagen. Sponsored by Section C (Chemistry) and arranged by Sidney Udenfriend.
4. Unsolved Problems in Biology. December 28 and 29; cosponsored by Section F (Zoological Sciences) and Section G (Botanical Sciences); principally on the cell and genetics; arranged by Norman G. Anderson and Barry Commoner.
5. The Impact of Electron Microscopy on Biology. Cosponsored by Section F

(Zoological Sciences) and the Argonne National Laboratory; arranged by E. L. Powers.

6. Aging Facts and Theories. December 29 and 30; cosponsored by Section N (Medical Sciences), Gerontological Society, and others; arranged by N. W. Shock.
7. Germ Plasm Resources in Agriculture: Development and Protection. December 28-31; cosponsored by Section O (Agriculture), Genetics Society of America, American Society for Horticultural Science, and others; arranged by R. E. Hodgson.
8. Space Medicine III. December 28; cosponsored by American Physiological Society and the American Astronautical Society; arranged by Fred A. Hitchcock.
9. The Roots of Behavior. December 28 and 29; sponsored by the American Psychiatric Association; arranged by Eugene L. Bliss.
10. Interactions in Nature. December 27 and 28; cosponsored by the Ecological Society of America and the American Society of Limnology and Oceanography; arranged by Arthur D. Hasler.
11. Physiology of Reproduction in Birds. December 30 and 31; sponsored by the Chicago Academy of Sciences; arranged by Richard A. Edgren.
12. Dune Ecology. December 29; sponsored by the Ecological Society of America; arranged by Jerry S. Olson.
13. Speciation and Raciation in Cavernicoles. December 28; sponsored by the National Speliological Society; arranged by Thomas C. Barr, Jr.

Other symposia of interest will be presented by the Mycological Society of America, The American Society of Plant Taxonomists, and the American Association of Clinical Chemists.

The AAAS Annual Exposition of Science and Industry (about 100 booths) and the AAAS Science Theater, with recent foreign and domestic films, will be prominent features of the meeting. The usual Biologists Smoker for all registrants will be held during the evening of December 30.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

Dr. Ruth S. Breen of the Department of Biological Sciences, Florida State University, has been elected chairman for 1959-60 of the Southeastern Section of the American Botanical Society.

Dr. Alvin Wagner, who received his Ph.D. degree in Zoology from Florida State University in August, is now at Harvard University as a U. S. Public Health Service post-doctoral fellow where he is working with Dr. Thomas Weller. At Florida State, Dr. Wagner studied under Dr. Robert B. Short, Department of Biological Sciences.

Dr. Anne Pates of the Department of Biological Sciences, Florida State University, has been elected a member of the Board of Directors of the Florida Society of Medical Technologists.

Dr. William D. Fisher, Department of Biological Sciences, Florida State University, was a summer research participant with the Biological Division, Oak Ridge National Laboratory, working on nucleoproteins and nucleic acids.

Dr. George W. Keitt, Jr., from the University of Michigan, and **Dr. Relis B. Brown**, from Vanderbilt University, have joined the staff of the Department of Biological Sciences, Florida State University. Dr. Keitt, a plant physiologist, will be Assistant Professor in the Division of Botany; Dr. Brown, Associate Professor in the Division of Zoology.

Dr. Maxwell Mozell, who received his Ph.D. from Brown University, has National Institutes of Health post-doctoral fellowship, studying with Dr. Lloyd M. Beidler at the Department of Biological Sciences, Florida State University.

New appointments in the Biology department of Furman University include **Dr. Julian T. Darlington**, Professor, and **Dr. G. Thomas Riggin, Jr.**, Assistant Professor. The special field of interest of both of these staff members is invertebrate zoology.

Dr. Kathleen D. Wyant has left the University of Tennessee where she has been Research Associate in Parasitology to accept a position as Assistant Professor of Biology at the Florence center of the University of South Carolina.

Madison E. Pryor, graduate student in Entomology at the University of Tennessee, has begun a study of insect life at the South Pole with the newly completed U. S. Antarctic Biological Research Laboratory as his home base. He is a member of the expedition financed by the National Science Foundation to study plant and animal life at the South Pole. Mr. Pryor's work is under the direction of Dr. A. C. Cole, Professor of Entomology at U. T. and director of the N. S. F. survey of land invertebrates in Antarctica.

New members of the staff of the Biology Division of the Oak Ridge National Laboratory include the following: **Mitzi L. Gwyn** (Biophysics Group), a graduate of Memphis State University; **Cynthia K. Myers** (Chemical Protection and Proteolytic Enzyme Studies Group), from Peabody College, Nashville, Tennessee; **Mary Lou Rekemeyer** (Drosophila Cytology and Genetics Group), University of Tennessee; **Catherine C. Hyde** (Cytology and Genetics

Group) a graduate of Louisiana State University; **Dr. Peter Mazur** (Cell Physiology Group), a graduate in Biology from Harvard University, and formerly with the Department of Biology, Princeton University; **Dr. Carl J. Wust** (Enzymology Group), a graduate in Microbiology from Indiana University; and **Dr. Rusty J. Mans** (Enzymology Group), a graduate in Biochemistry from the University of Florida.

Dr. B. Theodore Cole, Associate Professor of Zoology, Louisiana State University, has joined the staff of the Cell Physiology Group, ORNL, for a period of one year as a Research Participant.

Dora M. Furr has joined the Plant Physiology and Photosynthesis Group, ORNL, as an ORINS Postdoctoral Fellow. Mrs. Furr has been doing graduate work at Duke University for the past year.

Drs. Michael A. Bender and **John S. Kirby-Smith**, Biology Division, ORNL, presented papers at the Symposium on Intermediate and Low Level Effects of Ionizing Radiations in Venice, Italy, June 21-27. **Dr. Alexander Hollaender**, ORNL, was a member of the Organizing Committee of this Symposium and served as Chairman of the first session. While in Europe Dr. Hollaender visited a number of laboratories and, as President of the Comite International de Photobiologie, attended a meeting of the Executive Committee in Copenhagen to make plans for the Third International Congress of Photobiology which will be held in Copenhagen in 1960.

Drs. William L. and **Liane B. Russell** attended and presented papers at the Symposium in Venice, June 21-27 and the Ninth International Congress of Radiology in Munich July 23-30. While in Europe they visited universities in Rome, Edinburgh, Glasgow, Vienna and London.

Drs. Alexander Hollaender and **Charles C. Congdon** attended the XXI International Congress of Physiological Sciences in Buenos Aires, August 9-15. Dr. Hollaender was Chairman of the Symposium on Radiation Protection and Recovery.

Dr. R.C. von Borstel, Biology Division, ORNL, left in September for a one year stay in Italy. He has been awarded a National Science Foundation Senior Postdoctoral Fellowship for research and study at the Instituto di Genetica, Universita di Pavia, Pavia, Italy. He also plans to spend some time at the Stazione Zoologica, Naples.

Leaving the Biology Division, ORNL, are **Captain James A. Sproul, Jr.**, Pathology and Physiology Section, who has been assigned to the School of Aviation Medicine, Brooks AFB, Texas, and **Dr. Richard A. Goff**, Mammalian Genetics and Development Section, who returns to the University of Oklahoma after serving as a Research Participant.

Dr. Paul J. Kramer, Duke University, has been elected Vice-President of the Botanical Society of America.

Dr. Joseph R. Bailey, Duke University, and **Dr. James W. Hardin**, North Carolina State College, have been elected to the Board of Trustees of the Highlands Biological Station.

Dr. John Allen Boole, Jr., Professor of Biology at Georgia Teachers College, participated in the National Science Foundation sponsored botany conference held at the University of North Carolina, July 27 - August 14.

Dr. Samuel L. Meyer, President of the ASB in 1948-49 and now the Academic Vice-President of the College of the Pacific, Stockton, California, was named the outstanding faculty member of the academic year 1958-59 by the Pacific Student Association at the Awards Convocation on May 28, 1959. As the recipient of the Tully C. Knoles plaque, Dr. Meyer became the first first-year faculty member to be so honored.

Dr. George H. Bick, Associate Professor of Biology at Southwestern Louisiana Institute, has resigned to accept a position as Professor of Biology at Clarion State College, Clarion, Pennsylvania.

New members of the staff of the Department of Biology, West Virginia University, for the 1959-60 term are **Robert J. Tolbert** (Botany), **Leah Ann Williams** (Comparative Anatomy) and **Arnold Benson** (Aquatic Biology).

Dr. William E. Werner, Jr., Department of Biology, Blackburn College, Carlinville, Illinois, was a visiting professor for the summer term at West Virginia University.

Dr. J. T. Penney has been appointed head of the Department of Biology at the University of South Carolina.

New staff members in the Department of Biology at the University of South Carolina include **Dr. John M. Herr, Jr.**, Assistant Professor, and **Dr. Eric F. Thompson**, Instructor.

Dr. Martin D. Young, U. S. Public Health Service, Columbia, S. C., has been named Editor **pro tem** of the American Journal of Tropical Medicine and Hygiene. Dr. Young, formerly Chairman of the Editorial Board, will fill the position until a successor is appointed to replace the Editor, Dr. Martin Frobisher, who resigned because of illness.

Among Bryologists who have been in residence at the Highlands Biological Station to work with **Dr. Henry S. Conrad** are: **Dr. F. J. Hermann**, U.S.D.A., Beltsville; **Dr. F. J. Hilferty**, State Teachers College, Bridgewater, Massachusetts; **Mr. Robert E. Ireland**, Smithsonian Institution.

The Department of Zoology at Louisiana State University announces the following additional faculty: **Dr. Beryl Franklin**, from Del Mar College; **Dr. Mark Goldie**, embryology, from Brown University; **Dr. Robert A. Norris**, ecology, from Tulane University; **Dr. Shanta V. Iyengar Ellis**, genetics, from Texas University for Women.

Blanche Jackson, Department of Zoology at LSU, was a Research Associate in the Division of Biology and Medicine at the Argonne National Laboratory this past summer.

Dr. Aaron Seamster, formerly at Del Mar College, has joined the faculty in Biology at Northeast State College, Monroe, Louisiana.

George H. Lowery, Director of the Museum of Natural Science at LSU, has been elected 27th president of the American Ornithologists' Union.

Dr. Kenneth O. Phifer, a recent graduate of the Johns Hopkins University School of Hygiene and Public Health, has been commissioned in the U. S. Public Health Service and has joined the staff of the Laboratory of Parasite Chemotherapy in Columbia, S. C. Dr. Phifer's field of interest is in parasite physiology.

Dr. Dietrich Bodenstein of the Gerontology Branch of the Baltimore City Hospital will assume the Chairmanship of the Department of Biology, University of Virginia in February. Dr. Horton H. Hobbs, Jr., is presently serving as Acting Chairman.

Dr. James H. Starling, Professor of Biology, Washington and Lee University, served as Consultant in a National Science Foundation sponsored Science Institute at Appalachian State Teachers College in July. Later, he attended as a participant the N.S.F. sponsored Botany Conference held at the University of North Carolina.

Dr. Harry L. Holloway, Jr., Professor of Biology, Roanoke College, has been appointed Head of the Department of Biology.

The following appointments have been made in the Biology Department of Emory and Henry College: **Dr. Jack S. Brown**, Chairman and Professor; **Dr. Te-Hsui Ma**, Assistant Professor; and **Mr. Alvin Ciccone**, Assistant in Biology.

The following persons have recently joined the research staff of the Virginia Fisheries Laboratory: **Dr. E. B. Joseph**, formerly with Birmingham-Southern College, Head of the Ichthyology Research Section; **Dr. Bernard L. Patten**, formerly of Rutgers University, will study the plankton of Chesapeake Bay; **Mr. John J. Norcross**, formerly with Michigan State University, will work on fishes of Chesapeake Bay; and **Mr. H. D. Hoese**, formerly with the Texas Fish and Game Commission, will study population problems of Atlantic Ocean oysters.

Dr. Edwin M. Weller, Biology Department, Randolph-Macon Woman's College, has resigned to accept a position with the Utah Medical College.

Dr. Paul A. Walker, Department of Biology, Randolph-Macon Woman's College, attended a National Science Foundation sponsored Conference of Recent Advances in Genetics, held at Cold Spring Harbor Biological Laboratories August 2 through August 22.

Mr. James E. Perham has been appointed Assistant Professor of Biology, Randolph-Macon Woman's College. He received the M.S. degree from Northwestern University and has completed requirements for the Ph.D. degree at Florida State University.

Mr. A. Randolph Shields, Assistant Professor of Biology, Roanoke College, will be the principle Instructor in a National Science Foundation sponsored In-Service Institute to be offered through the Roanoke Extension of the University of Virginia. **Dr. Horton H. Hobbs, Jr.**, University of Virginia, is the Director of the Institute, which will meet in the Biological Laboratories of Roanoke College.

Effective January 1, 1960, **Dr. William R. Jenkins**, presently Assistant Professor, Department of Botany, University of Maryland, will accept a position as Associate Professor, Department of Entomology, Rutgers University. He will direct the work in nematology in teaching and research at Rutgers.

Dr. Lorin R. Krusberg will replace Dr. Jenkins at the University of Maryland. Dr. Krusberg is a graduate of the University of Delaware and N. C. State College. He is presently located at the Rothamsted Experimental Station, Harpenden, Herts., England, where he has been working on a one-year Post-Doctorate National Science Foundation Fellowship.

During the past year two new assistant professors have been added to the staff of the Department of Zoology, University of Maryland. They are **Dr. Harris J. Linder** who specializes in Invertebrate Zoology and **Dr. Raymond G. Stross** who specializes in Ecology.

Dr. William Burbanck of the Biology Department at Emory University attended the XIV International Limnological Congress in Vienna in August. He received a travel award from the Am. Soc. of Limnology and Oceanography to attend this Congress.

Dr. William Burbanck, Emory University, had the opportunity to do some special work on his **Cyathura** problem this summer when he investigated the estuaries near Plymouth, England, and of South Harbor, Copenhagen.

Dr. William H. Murdy has joined the Biology Department at Emory University as an instructor in Botany. He comes from Washington University in St. Louis.

Mr. William Brillhart has received a grant from the National Science Foundation to continue his graduate studies for his Ph.D. He is working at Emory University and is not teaching this fall.

Dr. Ronald A. Pursell has left the Department of Botany, University of Tennessee, to accept a position at the Penn State School of Forestry at Mont Alto, Pennsylvania.

Dr. Sinske Hattori, Japan's leading hepaticologist, of Nichinan, Miyazaki, spent most of September, 1959, at the University of Tennessee collecting hepatics in the Southern Appalachians and exchanging ideas with the staff.

New staff members of the Botany Department of the University of Tennessee include: **Dr. Donald Foard** from North Carolina State College, who has been appointed Assistant Professor; **Dr. Raymond Hatcher** from the University of Cincinnati, Instructor; and **Mr. Dan Morris**, Instructor.

Institutions and Organizations

A new $1,150,000 Animal Science Building on the Agricultural Campus at the **University of Tennessee**, Knoxville, was dedicated July 9, with Governor Buford Ellington and President O. S. William of Oklahoma State University as principal speakers.

The **University of Texas** Board of Regents, following action by the Legislature, have authorized construction and appropriated $250,000 for a research building at the Institute of Marine Science, Port Aransas, Texas.

The **University of South Florida** is being built and organized at Tampa; the first class is planned for September of 1960.

The **Virginia Fisheries Laboratory** and the **College of William and Mary** have cooperated in establishing the Department of Marine Science of the College. The faculty is as follows: Head of the Department — W. J. Hargis, Jr., Ph.D., Director of the Virginia Fisheries Laboratory; Professors — J. D. Andrews, Ph.D., and W. J. Hargis, Jr.; Associate Professors — M. L. Brehemer, Ph.D., D. S. Haven, M.A., E. B. Joseph, Ph.D., B. L. Patten, Ph.D., W. A. VanEnget, Ph.M., and J. L. Wood, Ph.D.; Assistant Professor — R. S. Bailey, M.A.; and Lecturers — W. H. Massmann, M.A., and J. J. Norcross, M.S.

The **Virginia Fisheries Laboratory** announces the establishment of its Eastern Shore Branch in temporary quarters at Wachapreaque on the Virginia peninsula. It is hoped that permanent quarters will be made available to the Laboratory and the College of William and Mary in the near future.

Randolph-Macon Woman's College held its second annual National Science Foundation sponsored Institute for Secondary School Teachers of Science and Mathematics, with 67 participants from widely scattered areas in the United States. Dr. Paul A.

Walker, Department of Biology, again served as Director, with Dr. Franklin F. Flint and Dr. Edwin M. Weller of the same Department participating.

The Laboratory Experiments subcommittee of the Education Committee of the **American Physiological Society** has just completed the preparation of a list of about 35 experiments for use in the laboratory of General Physiology at the junior-senior level. The list gives the title of the individual experiments along with a short abstract describing the contents, and is being circulated widely among college departments of Biology by Dr. Ray Daggs, secretary of the APS. The experiments have been tested in the laboratory, revised, and in many cases completely rewritten by the subcommittee under the chairmanship of Samuel R. Tipton. The detailed procedures will be made available shortly at a nominal cost and may be obtained from Dr. Daggs on request by title accompanied by appropriate funds to cover the cost. Further inquiries should be directed to Dr. Ray Daggs, Executive Secretary, The American Physiological Society, 9650 Wisconsin Ave., Washington 14, D. C.

Grants in Aid

The following grants have been awarded to members of the Department of Biological Sciences, Florida State University, Tallahassee, Florida:

Dr. Ruth S. Breen, a grant of $7,100 from the **National Science Foundation** in support of completion of a manual, **An Illustrated Guide to the Mosses of Florida; Dr. A. W. Ziegler,** an additional grant of $10,700 from the **National Science Foundation** toward a study of the effects of temperature on the distribution of non-saprolegniaceous aquatic fungi; **Dr. A. Gib DeBusk,** a two-year grant of $40,000 from the **U. S. Air Force** for a study of the genetics of space radiation; **Dr. Adrian W. Poitras,** a grant from the **Florida State University Research Council** for investigations on aquatic ascomycetes; **Dr. Dexter M. Easton,** a year's renewal, grant of $11,500 from the **U. S. Public Health Service** for investigations on spinal motorneuron intracellular potentials; **Dr. John Davison,** a three year grant of $11,000 from the **U. S. Public Health Service** for studies on the form of the elliptical red blood cells; **Dr. Harry Lipner,** a renewal grant of $6,800 from the **U. S. Public Health Service** for work on the effect of hormones on minimal content of tissues; **Dr. Lloyd M. Beidler,** a three year grant from the **National Institutes of Health** of $145,800 for a Sensory Physiology Post-doctoral Training Program.

Drs. Charles Norman and **Erwin Goldberg** of the Department of Biology, West Virginia University, have received a grant of $39,221 from the **U. S. Public Health Service** for a two-year investigation of the life and aging processes of living cells.

Roy B. Clarkson, Instructor in Biology at West Virginia University, was awarded an **NSF Summer Fellowship** in support of his investigations of the flora of the Monongahela National Forest.

Dr. Robert L. Amy, Associate Professor of Biology, Southwestern at Memphis, has been renamed principal investigator for a **U. S. Public Health Service** research grant ($20,000 — three years) awarded to the Southwestern Research Institute.

Southwestern at Memphis recently received a grant from the **National Science Foundation** to support an undergraduate research participation program.

Dr. Burton J. Bogitsh, Associate Professor of Biology at Georgia Teachers College, was recently awarded a grant-in-aid from **Sigma Xi** of $700 for further investigations pertaining to host-parasite relationships in fresh water fishes.

The **North Carolina Academy of Science** has received a grant from the **National Science Foundation** to conduct a NSF-Academy Institute of Science for high school teachers. The program is one of lectures-demonstrations on fundamental biological, chemical and physical concepts. **Dr. Herbert E. Speece,** North Carolina State College, directs the program.

Through funds granted by the **National Science Foundation** the **Duke University Marine Laboratory** will erect a new research laboratory on Piver's Island, Beaufort, North Carolina.

Recipients of **National Science Foundation** grants-in-aid for research at the Highlands Biological Station for 1959 are: **Dr. Robert E. Gordon,** University of Notre Dame; **Dr. Wesley Whitesides,** Florida State University; **Dr. Albert E. Reynolds,** DePauw University; **Dr. Henry S. Conard,** Lake Hamilton, Florida; **Dr. Lewis E. Anderson,** Duke University; **Mr. Fred Clifford Johnson,** University of Texas; **Mr. Julian R. Harrison,** Duke University; **Mr. Arthur R. Shields,** University of Tennessee. Biologists working under the NSF Research Participation Program for Teachers Training conducted at the Highlands Biological Station are: **Miss Jane P. Holt,** Catawba College; **Mrs. Ruth B. Slentz,** Wesleyan College; **Mr. Melvin Conrad,** Emory-at-Oxford.

Dr. Samuel R. Tipton, Professor of Zoology and Entomology at the University of Tennessee, has received a **National Science Foundation** grant of $15,000 to continue studies on the influence of thyroid hormones on mitochondria.

Dr. J. Gordon Carlson, Head of the Department of Zoology and Entomology at the University of Tennessee, has received a one-year contract for $9,057 from the **Atomic Energy Commission** for ***in vitro*** studies on the immediate effects of X-radiation on chromosome morphology and mitotic activity.

Dr. Ronald C. Fraser of the U T Department of Zoology and Entomology has received a **National Science Foundation** grant of $6,500 for a one-year study on changes in hepatic cells of chick embryos on stimulation of the liver by embryonic extracts. Dr. Fraser has also received a grant of $11,460 from the **American Cancer Society** for a 20 month study of immunization of mice against sarcoma by using sarcoma cells pre-treated by passing through embryonic chick tissue.

A study of the effects of radiation on cestodes and their hosts is being conducted at the University of Tennessee Department of Zoology and Entomology under the direction of **Dr. Arthur W. Jones.** This study is being supported by the fifth renewal of an **Atomic Energy Commission** grant of $10,915, and Raymond L. Kisner is replacing Dr. Kathleen D. Wyant as principal investigator.

Dr. Billy E. Frye, Visiting Assistant Professor of Biology, University of Virginia, has received a one-year grant from the **National Science Foundation** for the study of development of function in the islets of Langerhan.

Dr. Jacques Rappaport, Associate Professor of Biology, University of Virginia, has been advised that grants from the **Office of Naval Research** and the **U. S. Public Health Service** for the study of ovular tumors in interspecific plant crosses have been renewed for three years.

The A.S.B. BULLETIN

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CONTENTS

The Official Quarterly Publication of
The Association of Southeastern Biologists

THE A. S. B. BULLETIN

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists and is published at Columbia, S. C., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to the Editor, U.S.P.H.S., P. O. Box 717, Columbia, S. C. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harold J. Humm, Department of Botany, Duke University, Durham, N. C. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tenn. Subscription rate for non-members of ASB: $2.00 per year. Printing and typography by the Cary Printing Co., Columbia, S. C.

GEOFFREY M. JEFFERY, EDITOR

HAROLD J. HUMM, ASSOCIATE EDITOR
ELSIE QUARTERMAN, BUSINESS MANAGER

ASSOCIATION AFFAIRS

The New Orleans Meeting

Attention of members is called to the announcement of the annual meeting of the Association, April 21-23, at Loyola University in New Orleans appearing in this issue of the BULLETIN. The center insert section is provided, as usual, for the convenience of members. The particular attention of members is called to the deadlines for submission of nominations, titles and abstracts, given on the first page of this section.

Society of General Physiologists

A new group will be meeting with the ASB in New Orleans. The Council of the Society of General Physiologists plans to arrange yearly regional meetings of members to be held separately from the annual meeting. Samuel R. Tipton, University of Tennessee, chairman of the South Central Region, and Douglas Humm, University of North Carolina, chairman of the South Atlantic Region, are organizing a regional meeting of physiologists of the southeast which will be held with the ASB in New Orleans. Papers are invited from all plant and animal physiologists interested in topics of general physiology. Titles should be submitted to the ASB Program Committee in the regular manner and by the regular deadline dates given for all submitted titles.

Call for Nominees

The Nominating Committee is asking all members to give careful thought to selection of nominees for offices to be filled at the New Orleans meeting and to suggest nominees by filling out Blank 1 in the insert of this issue and mailing to Mary Esther Gaulden, Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee, who is chairman of the Committee. Other members are Leland Shanor, Division of Biology, Florida State University, Tallahassee, Florida, and G. Robert Lunz, Bears Bluff Laboratories, Wadmalaw Island, South Carolina. Attention is called to the fact that we must elect 3 members to the Executive Committee, 2 for three-year terms and 1 for a one-year term. The latter is necessary because Elsie Quarterman was elected Treasurer at the 1959 annual meeting at the end of her first year on the Executive Committee. The Executive Committee elected Dr. J. C. O'Kelley of the University of Alabama to serve in Dr. Quarterman's place until the annual election in 1960.

A Note from the President

It was almost a year ago that the officers and members of the Executive Committee of the Association became aware of the fact that the Association had been denied tax exemption under Section 501 (c) (3) of the Internal Revenue Code of 1954 (as amended). Since that time we have concentrated our efforts on investigating what must have appeared to the Internal Revenue Service to have been Business - League overtones in our Constitution. With the able assistance of Mr. Calvin H. Cobb, Jr., and the hard work of our President-Elect, Dr. Victor Greulach, a revision of our Constitution and By-Laws was prepared. An interim meeting of the Executive Committee was held in Atlanta on November 21 at which time the Committee spent a number of hours in studying the proposed revisions. On page 10 of this issue is a copy of the proposed revision of our Constitution and By-Laws that will be submitted to the membership for adoption by the Executive Committee at our Annual Meeting at Loyola in April. For your convenience, all proposed modifications and additions are set in capital and small capital letters, for purpose of ready comparison with the Constitution under which we are now operating; the latter appears in Volume 2, Number 2 of the Bulletin. A few amendments may be found in subsequent issues.

We hope to have definite recommendations concerning incorporation for proposal by April. If you are aware of matters which should come to the attention of the Executive Committee, I shall appreciate your advising me of them.

Plans for the Loyola Meetings are beginning to take shape, and I anticipate these meetings being among the best in the history of the Association.

Horton H. Hobbs, Jr.

VIRGINIA'S MARINE RESEARCH LABORATORY
THE VIRGINIA FISHERIES LABORATORY

WILLIAM J. HARGIS, JR., *Director*

Dr. Hargis is a native of Lebanon, Virginia. His B.A. degree was received from the University of Richmond, and his M.A. and Ph.D. degrees from Florida State University. After a year as Assistant Professor of Biology and Chemistry at The Citadel, Dr. Hargis became associated with the College of William and Mary and the Virginia Fisheries Laboratory. He is at present Director of the Virginia Fisheries Laboratory and Professor and Head of the Department of Marine Science of the Laboratory and of the College of William and Mary. Some of Dr. Hargis' society affiliations are the Society of Systematic Zoologists, American Society of Parasitologists, Atlantic Estuarine Research Society, ASB, Sigma Xi, Beta Beta Beta, and others. His research interests include the biology of the oyster drills and of the monogenetic trematodes of marine and fresh waters.

The Laboratory is situated on the lower York River, directly across from historic Yorktown and 13 miles from Colonial Williamsburg. Chesapeake Bay is within sight of the campus and the inshore reaches of the Atlantic are but a few hours away. The main Laboratory is located on a great estuary in the center of one of America's most important fishing and commercial regions with freshwater, estuarine, and strictly marine environments within easy reach. The Eastern Shore field station at Wachapreague, Virginia, offers access to barrier islands, salt bays, and marshes. Thus, a wide variety of aquatic habitats are available to researchers and students.

The Laboratory performs broader functions than its official name, the Virginia Fisheries Laboratory, implies. As Virginia's only marine research station it is active in research, teaching and public education. The research program encompasses so-called basic and applied problems; the teaching program is designed for advanced undergraduates and graduate students; and the public education program involves lectures and demonstrations to public school and civic groups and a system of educational displays and news releases.

Established in 1940 as an independent state agency, the Laboratory is affiliated with the College of William and Mary, the Commission of Fisheries, and the seafood industry through a Board of Administration composed of representatives of each group. Since 1940 the responsibilities, personnel, and facilities have evolved and enlarged until today the program is one of general marine and fisheries research.

At first the group was located on the campus of the College of William and Mary at Williamsburg. Later it was moved to Yorktown, and in 1950 to the present permanent site at Gloucester Point on the north bank of the York River opposite the Victory Monument at Yorktown. Since 1949 the staff has grown from a total of nine persons to one containing seventeen biologists, six at the doctoral, eight at the master's, and three at the baccalaureate level of academic training; an administrative assistant; a research librarian; a microtechnician; seven laboratory aides; five secretaries; and a maintenance group of four full-time and three part-time persons. Thus at present 37 full-time, 2 part-time, and 4 graduate assistants make up the personnel. In summer the staff is increased by four or five professors and 20 to 25 students.

Demands for increasing research efforts into the effects of industrial and domestic pollution, engineering projects, insecticides and herbicides, and agricultural pollution on the marine environment will necessitate several additions to the staff in the very near future.

At present, the research group is organized into sections each with its chief scientist and other major and minor biologists and their aides. Thus a vertical and horizontal arrangement of research responsibility and autonomy is possible within the sections even though one scientist acts as a coordinator for each. The sections are:

Crustacea Research, Ichthyology Research, Mollusk Research, Pathology Research, Basic Ecology (Pollution), and Parasitology.

The main building, built in 1950, contains the administrative offices, a student laboratory, an embryology research laboratory, a darkroom, and the Public Education Department on the first floor; and the Mollusk, Pathology and Parasitology sections, a basic ecology laboratory, chemistry laboratory, a cold room, and the library on the second. The annex building, completed in 1958, houses the Ichthyology and Crustacea research units, the second student laboratory, a plankton and productivity laboratory, the illustration - photography laboratory and darkroom, seven dormitory rooms, and the dining room, galley and lounge on two floors.

A two-story workshop, wet laboratory and storage loft is located at the foot of the large pier which bears a tide-gauge station and the continuously - running, centrifugal salt-water pumps which supply the main building and the five outside tanks.

The present buildings are inadequate for housing the rapidly growing staff and student body, but plans are underway for construction which will alleviate the crowded conditions. The research and teaching programs will be greatly accelerated when these facilities are acquired.

The floating equipment includes a specially designed 55-foot diesel-powered research vessel, the PATHFINDER, five outboard powered skiffs and two row boats.

Close cooperation is maintained with other laboratories in the region, especially the Chesapeake Bay Institute of The Johns Hopkins University, the Chesapeake Biological Laboratory of the Maryland Department of Research and Education, and the Annapolis Shellfish Laboratory of the U. S. Bureau of Commercial Fisheries. The services of the Chesapeake Bay Institute are available in connection with problems involving the physical or chemical variables in the environment, and the two laboratories also exchange graduate students for brief training in Physical and Chemical Oceanography and Biological Oceanography respectively.

The research program encompasses studies of oyster spawning, setting, growth, and mortality, including work on diseases and predators; along with the distribution, spawning, growth, mortality and availability of the blue crab; and distribution, spawning, growth, aging, migration, and availability of fishes. Studies of the biology of mollusks, crustacea, fouling organisms, trematodes, micropathogens, periphyton and plankton are also underway.

In addition, invertebrate embryology, the physiology of fish muscles, primary productivity, and tropic levels, estuarine hydrography and water conditions are regular subjects for research. The scientific staff is enlarged in summer by four or five visiting professors who spend half their time in teaching and half in research in their special fields of interest. Plans are being made to increase the number of summer researchers to a total of six or eight.

A Master's degree in Marine Science is offered by the Department of Marine Science, a joint venture of the Virginia Fisheries Laboratory and the College of William and Mary. To participate the students usually take up residence at or near the Laboratory about 13 miles from the main campus. Most of the courses are offered at the Laboratory, though some may be conducted on the main campus at Williamsburg. Four or five halftime assistantships are available. Plans call for the establishment of three or four more. Course offerings include Invertebrate Ecology, Ichthyology, Biometry, Population Dynamics, Physiology of Marine Organisms, General Oceanography and Limnology, Theoretical Biology, Biology of Plankton, Marine Pollution, Radiobiology, and Invertebrate Embryology. Students can get training in both Marine Science and Fisheries Biology. Field work and research are emphasized and students are encouraged to participate in all phases of the regular research program of the Laboratory. A low teacher-student ratio, and the facts that the full facilities of the main campus are a mere half-hour away, and the station is in full operation the year-round makes the Laboratory somewhat unusual among marine stations and most attractive to prospective students.

The public education program includes visits by elementary and high school classes for a day's introduction to marine science and fisheries. Talks and demonstrations are also given to schools, teacher's groups, service clubs, sportsmen's and commercial fishermen's groups. Television programs and public exhibits are also prepared and presented and a public exhibit room with live and static demonstrations is maintained.

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INSTITUTE OF FISHERIES RESEARCH UNIVERSITY OF NORTH CAROLINA

A. F. CHESTNUT, *Director*

Dr. Chestnut is a native of Stoughton, Massachusetts. He received the B.S. degree from the College of William and Mary, and the M.S. and Ph.D. degrees from Rutgers University. He was Research Associate in charge of the Oyster Research Laboratory at Rutgers University from 1943 to 1948. He joined the Institute of Fisheries Research in June of 1948 and has been director since 1955. Dr. Chestnut holds the rank of Professor in the University of North Carolina. Some of his research interests are in the ecology of mollusks, feeding mechanisms of lamellibranchs and behavior of oyster larvae. He is a member of a number of societies, including Sigma Xi, American Society of Limnology and Oceanography, Ecological Society, National Shellfisheries Association (Pres., 1953-55) and Atlantic Estuarine Research Society (Sec.-Treas., 1952-53).

The Institute of Fisheries Research was established as a branch of the University of North Carolina on September 29, 1947, from the cumulative effort of several divergent activities. The proposal of an Institute resulted from a request in October, 1944, by President Frank Graham of the University for a project in marine biology. Early in 1946 a "Survey of Marine Fisheries of North Carolina" was organized with Dr. Robert E. Coker as Chairman and Dr. Harden F. Taylor as Executive Director to compile available information with respect to the status of marine resources in North Carolina. The survey was intended to serve as a background for the projected Institute. In 1947 the General Assembly of North Carolina created a Shrimp Commission and appropriated $50,000 for a survey of the shrimp fisheries and scientific studies of shrimp in North Carolina. Dr. Harden F. Taylor was appointed Scientific Director of the Shrimp Survey on August 27, 1947. Thus the two surveys were brought together in close collaboration.

In mid-1947 the Knapp Foundation, Inc., offered a grant to the University for a fisheries research project on condition that the state match the contribution. The grant from the Knapp Foundation was "A tribute to Joseph P. Knapp's lifelong interest in the betterment of mankind". By agreement the survey of marine fisheries and shrimp survey were joined under the leadership of the established Institute. An additional sum of money was diverted to the Institute from another appropriation by the General Assembly of 1947 for a shellfish rehabilitation project, to be used for research on economic mollusks. Dr. Robert E. Coker was appointed as Director of the Institute on September 30, 1947. With cooperation of the Department of Conservation and Development a hospital building and other accessories of a former Marine Section Base in Morehead City, N. C., were made available for a laboratory and headquarters of a permanent Institute under the leadership of the University. The building, located along the north shore of Bogue Sound, nearly five miles west of Beaufort Inlet, was formally occupied in June, 1948.

The purpose of the Institute is to endeavor, through research, to arrive at a better understanding of the complex problems of marine science. Four interrelated phases were envisioned in the operations of the Institute: biological, oceanographic, economic and educational. During the formative period emphasis was placed on practical applications of research to fisheries problems. This was necessary in part because of the nature of funds from the state appropriations. It became evident that applications of scientific findings in one area do not imply the same degree of success in another area. The need for basic or fundamental research in local areas was apparent and research activity was modified. With the limited staff and funds studies were concentrated on biological and oceanographic aspects.

The present full-time research staff consists of A. F. Chestnut, Ph.D. (Director and Malacologist), Earl E. Deubler, Ph.D. (Ichthyologist), William E. Fahy, Ph.D. (Ich-

thyologist), Hugh J. Porter, M.Sc. (Malacologist), Gerald S. Posner, Ph.D. (Oceanographer) and Austin B. Williams, Ph.D. (Carcinologist). Temporary research assistants and technicians assist the staff on occasions. Four full-time personnel are concerned with maintenance and operations of the vessel and buildings. Five of the research staff are members of the Graduate Faculty of the University. No formal courses are given at the Institute but research programs of graduate students are directed in cooperation with various departments of the University.

Each staff member is responsible for the initiation and development of his own program of research. Current research in progress includes: life-history studies of crustaceans, fishes and mollusks; oceanographic studies and plankton ecology of North Carolina sounds; ecological studies of shrimp, flounders and oysters; laboratory studies on the influence of environmental factors upon meristic structures in developing fishes; taxonomic studies of fishes, crustaceans and mollusks.

The Institute's staff cooperates through lectures and guidance in the graduate program of the University. Studies of socio-economic aspects of the fishing industry are conducted in cooperation with the Department of Conservation and Development. Advice and technical assistance are provided on request to the industry, agencies and individuals with interests in marine resources.

The Institute functions in an advisory capacity to the Department of Conservation and Development on proposed regulatory measures and problems relating to marine and estuarine resources. Through a memorandum of agreement between the University and Department of Conservation and Development the Institute serves the state as an agency for scientific research and endeavors to serve the needs of the Department, within the limits of its staff and facilities, in respect to immediate problems that may arise. Contributions to the general welfare of the fishing industry have resulted from basic research on various commercial species. Ecological and life history studies have shown the potentialities of resources present and have resulted in programs of management and development.

A one-story, wood-frame building with approximately 7,700 square feet of space, houses the laboratories, offices, and library. The building contains standard equipment, a running salt-water system, constant-temperature room, histology laboratory, photographic dark room, and research collections of fish, crustaceans and mollusks. A research library contains approximately 350 volumes, 80 current periodicals relating to marine biology and over 10,000 reprints and separates. In a nearby building, a two-story wing of 12,000 square feet contains a shop with power tools, a net loft and some dormitory space.

The Institute has a 47-foot, diesel-powered research vessel, "Machapunga", equipped with a hydraulic power winch for trawling and dredging. Outboard motors and aluminum skiffs are available for shallow-water collecting.

The immediate coastal and estuarine areas afford a variety of habitats with rich fauna and flora. Wharf piling, stone jetties, extensive sand flats and mud flats, ocean beaches, sand dunes, oyster reefs and marshes are among the habitats available for study of crawling, sessile and burrowing animals. The open sea, sounds, rivers, canals, and creeks abound in swimming and drifting forms.

There are limited facilities for visiting investigators and graduate students. Requests for additional information concerning the Institute should be addressed to: Director, Institute of Fisheries Research, Morehead City, North Carolina.

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VIRGINIA'S MARINE RESEARCH LABORATORY, THE VIRGINIA FISHERIES LABORATORY

Scientific articles, designated as contributions from the Virginia Fisheries Laboratory, are published in existing journals. Bound Contribution series are available for distribution to libraries. Individual reprints are available on request. The Special Scientific Reports, an Educational Series, and a Biennial Report are also published.

In summary, Virginia's marine laboratory, the Virginia Fisheries Laboratory, is carrying out research and teaching activities in the tradition established early in the history of the Commonwealth by Thomas Jefferson and in the spirit of Matthew Fontaine Maury (Pathfinder of the Seas), Virginia's first great marine scientist.

IMPORTANT DEADLINES

Please note the following deadlines, all of which are to be met by the time of our Twenty-first Annual Meeting at Loyola University, New Orleans, Louisiana, April 21-23, 1960. Members can help facilitate plans for the meeting by sending in all requested material as far in advance of the deadlines as possible. Because the time available for preparation of the program and publication of abstracts is already at a minimum it will be necessary for the program committee and the editor to adhere strictly to the deadline set; no titles can be accepted thereafter.

February 12—Suggestions for nominations for ASB officers and executive committee members (Blank 1).

February 20—Titles and abstracts of papers to be presented at the New Orleans meeting (Blank 4).

March 1—Applications for Goethe Awards to graduate students (See Page 9).

March 1—Papers to be considered for the Association Research Prize (See Page 8).

April 1—Applications for Phipps and Bird Research Fellowship at Mountain Lake (See Page 9).

April 1—Nomination letters for the Meritorious Award for Teaching (See Page 8).

THE ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

(Founded 1937)

Purposes

The Association of Southeastern Biologists was organized " . . . to encourage research and instruction in the fields of the biological sciences; to foster a spirit of cooperation among the membership; to emphasize the relation of fundamental knowledge in biology to the solution of biological problems; to strive toward the preservation of biological resources; and to serve as a medium for professional contacts among the membership."

Eligibility for Membership

Any person is eligible for membership who is engaged in (a) biological research, (b) the teaching of biological subjects, (c) graduate study in the biological sciences, or (d) work in various fields of applied biology. Members, in general, shall be residents of the Southeast. Membership shall be granted any person recommended and approved as eligible by two active members in good standing. Such recommendations shall be submitted to the treasurer of ASB and the new member shall achieve active status on the payment of the dues for the current year. Annual dues are $2.00, which includes a subscription to the ASB BULLETIN.

Activities

1. Annual meetings at which the results of investigations are presented for discussion, and at which appropriate symposia may be conducted. 2. Quarterly publication of the ASB BULLETIN containing programs of annual meetings and abstracts of papers presented, news of science and scientists in the Southeast, a record of Association affairs, and articles of regional or timely interest. The BULLETIN promotes personal and professional contacts among the members of the Association. 3. The discussion of subjects of general interest to biologists of the Southeast and the formulation of policies and plans of action in relation to such subjects. 4. Encouragement of research through research prizes awarded for especially meritorious papers presented at the annual meetings. 5. Presentation of a Meritorious Award for outstanding contribution to biology, especially in service to young people through teaching. 6. Awarding annually a research fellowship at Mountain Lake Biological Station. 7. Representation on the Council of the AAAS. 8. Affiliation with the AIBS.

1. Deadline: February 12

SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

President-Elect_____ Vice-President_____

Executive Committee Members (2 for 3-year terms and 1 for one-year term)_____

_____

Mail to: DR. MARY ESTHER GAULDEN
Biology Division
Oak Ridge National Laboratory
P. O. Box Y
Oak Ridge, Tennessee

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2. STATEMENT OF ASB DUES FOR 1959

Your ASB dues of $2.00 for 1960 are now payable. This sum includes your subscription to the ASB BULLETIN for 1960. Please make your checks payable to the *Association of Southeastern Biologists*, and mail to the treasurer with this statement at the address given below. Please be sure to write your name and correct mailing address on this statement. The ASB constitution provides that members whose dues are in arrears two years will automatically be dropped from membership. The Executive Committee has ruled that members who are in arrears at the close of the annual meeting will not receive subsequent issues of the BULLETIN until dues are paid.

Name_____

Address_____

City_____ State_____

If retired, check here _____
If retiring within a year, check here _____

DR. ELSIE QUARTERMAN
Department of Biology
Vanderbilt University
Nashville 5, Tennessee

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3. APPLICATION FOR MEMBERSHIP ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

NAME (in full)_____ Date_____

DEGREES (institutions and dates)_____

_____

PRESENT POSITION: (1) Title_____ (2) Department_____

(3) Institution_____ (4) City, State_____

SPECIALTY (e.g., physiology)_____

SPECIFIC INTERESTS (e.g., respiration)_____

RECOMMENDED BY (1)_____ (2)_____

Fill out this blank, enclose check (or money order) for $2.00 as dues for one year and mail to:

DR. ELSIE QUARTERMAN, Treasurer ASB
Department of Biology
Vanderbilt University
Nashville 5, Tennessee

4. Deadline: February 20

CALL FOR PAPERS FOR THE NEW ORLEANS MEETING

This form and *two* typewritten copies of the abstract must reach the Chairman of the Program Committee, Father John H. Mullahy, Department of Biological Sciences, Loyola University, New Orleans 18, Louisiana, not later than Saturday, February 20, if the title is to appear on the program or the abstract included among those published in the April issue of the BULLETIN. Papers to be submitted for the Research Prize must be included in the program. Please type or print the following information. All papers are limited to 10 minutes, with three minutes for discussion.

1. Author(s): _____

2. Title of paper: _____

_____

3. Institution(s) represented: _____

4. Check organizations to which author(s) belong:

_____ Association of Southeastern Biologists.

_____ Southeastern Section, Botanical Society of America.

_____ Southern Appalachian Botanical Club.

_____ Society of General Physiologists, South Central and South Atlantic Regions.

5. Projection equipment needed: _____ 2x2 slide projector; _____ 3x4 slide projector; other equipment:

6. If your paper is being submitted for the Association Research Prize please check here: _____.

7. This form must be accompanied by *two double-spaced* typewritten copies of an abstract, not to exceed 200 words. Longer abstracts are subject to cutting by the editor without the approval of the author. Please use the following form in typing the heading of the abstract in order to avoid excessive editing:

Dimorphism of Embryonic Hooks of *Hymenolepis nana*
Arthur W. Jones, *University of Tennessee*

Start the text of the abstract here, on a separate line with paragraph indentation. In general the abstract should appear as a single paragraph, though two paragraphs are acceptable, if really needed.

8. *Reprints*: Reprints of individual abstracts are available at the rate of $2.25 for the first 100 and 75 cents for each additional 100, postpaid. In order to secure this price it is necessary to attach a check for the proper amount to this form and send it along with the form and the two copies of the abstract. Checks should be made payable to the Cary Printing Company. *Orders for abstracts will not be entered unless payment accompanies the order.*

Indicate here how many reprints of your abstract you want: _____.

Marquette Hall, Administration Building, Loyola University, New Orleans, Louisiana

ABOUT THE NEW ORLEANS MEETING

The twenty-first annual meeting of the Association of Southeastern Biologists will be held at Loyola University, New Orleans, April 21-23, 1960. Four organizations will meet with ASB: The Southeastern Section of the Botanical Society of America, Southern Appalachian Botanical Club, the Southeastern Regional Beta Beta Beta, and the Society of General Physiologists (South Central and South Atlantic Regions).

The meeting will begin on Thursday afternoon, April 21st, with a tour of the U. S. Southern Regional Research and Development Laboratory on Robert E. Lee Blvd. Arrangements are being made for an address by an outstanding biologist on Thursday evening followed by a Smoker. On Friday there will be several sessions of contributed papers and the annual business meeting. Presentation of awards will take place Friday evening. Two field trips are scheduled for Saturday morning.

Registration and all general ASB sessions will take place in the Loyola Field House. Sessions of contributed papers will be held in Marquette and Bobet Halls.

Members of the committee on local arrangements at Loyola are: Dr. Rosamond McMillan (L.S.U., N.O.), Dr. George H. Penn (Tulane), Dr. Arthur Welden (Tulane), and Miss E. L. Beard, Dr. Harry D. Brown, Dr. Robert C. Goss, Dr. Richard T. Jackson, Dr. Walter G. Moore, Father John H. Mullahy, Chairman (all of Loyola University).

Meals

Dining facilities will be available to all persons attending the meeting and their families at the Loyola University cafeteria on the campus, also at the nearby Tulane University Center. Since New Orleans is so noteworthy for its many world famous restaurants, it is felt that most of the members will avail themselves of this opportunity to visit them.

Housing Facilities

New Orleans has a large selection of hotels, motels and tourist courts, of which the following are but a few examples:

Hotels

Roosevelt—123 Baronne St. (first block off Canal St., in town); single $9.00 up, double $11.00 up.

Monteleone—214 Royal St. (in French Quarter section); single $5.00 up, double $10.00 up.

Sheraton-Charles (old St. Charles Hotel)—211 St. Charles Ave. (2nd block off Canal St.); single $6.50 - 9.00, double $9.50 - 12.00, twin $13.00 - 16.00.

Jung—1500 Canal St. (in town); single $8.00-10.00, double $12.00-15.00.

New Orleans—1300 Canal St. (in town); single $6.50-8.00, double $8.50-10.00, twin $12.00.

Motels

On Highway 61:

Fontainebleau—4000 Tulane Ave. (about 2 miles from University); single $9.50-14.50, double $13.50-18.50.

Hilton Inn—P. O. Box 338—Kenner (opposite Moisant Airport — about 10 miles from town); single $9.00-15.00, double $12.00-18.00.

Motel de Ville—3800 Tulane Ave. (about 2 miles from University); single $8.50-11.50, double $12.50-16.50.

Town & Country—1225 Airline Hwy. (about 3 miles from University); single $7.00, double or twin $12.00.

Town House—9419 Airline Hwy. (3 miles from town); single $7.00-8.00, double or twin $10.00-11.00.

On Highway 90:

Bellaire Motel—4100 Chef Menteur Hwy.; single $7.00, double $9.00-10.00, twin $9.50-11.00.

Cedar Park—5001 Chef Menteur Hwy.; single $7.50, double $7.50-8.50, twin $8.50.

Park Plaza—4460 Chef Menteur Hwy.; single $7.00-8.00, double $9.50, 2 double beds (4 people) $11.00-12.00.

Alamo Plaza—7300 Chef Menteur Hwy. (baby sitters); single $7.00, double $8.00, twin $10.00.

Le Baron — 4861 Chef Menteur Hwy.; single $7.00, double $9.00, twin $10.00.

Additional names of accommodations can be obtained from the Visitor's Bureau, 315 Camp Street, New Orleans.

Field Trips

Three field trips are scheduled for the Annual Meeting. Full information about them will be available at the Registration Desk.

Thursday, April 21

A tour of the U. S. Southern Regional Research and Development Laboratory on Robert E. Lee Blvd. is scheduled for Thursday afternoon. All persons interested in taking this trip should submit their intention before April 9th. Transportation for this trip will be by bus and/or private conveyance and will be determined by demand. Since the number of people that can be accommodated is limited, you are urged to make an early reservation, if you plan to take it. Reservations should be made with Dr. Harry D. Brown, Department of Biological Sciences, Loyola University.

Saturday, April 23

A field and collecting trip to the Gulf Coast Research Laboratory at Ocean Springs, Mississippi, will begin at 8:30 A.M. in front of the Loyola Field House. The laboratory is about 95 miles from New Orleans, and is reached by Highway 90, along the very beautiful Gulf Coast route. Dr. Gordon Gunter, Director of the Laboratory, will conduct a tour of the facilities of the laboratory and arrange for some collecting in the Mississippi Sound area aboard the laboratory research boat. It is felt that persons interested in this trip will probably wish to spend the night in the vicinity of Biloxi, Mississippi, and return thence to their respective homes. Since no more than 25 persons can be accommodated on the research boat, all persons interested in exploring the flora and fauna of the laboratory region should make their reservation at a very early date with Dr. Walter G. Moore, Department of Biological Sciences, Loyola University.

A Trip to a Sulphur Well

On Saturday, April 23rd, a field trip to a sulphur well in the Gulf is offered to the members of the Association by the Freeport Sulphur Company. This trip will also be limited to about 25 persons. It will consist of transportation by bus (leaving the Loyola Field House at 9 o'clock on Saturday, April 23) to Port Sulphur, Louisiana. A company boat will transport the party to the sulphur well in the Gulf, and provide a box lunch. The inspection of the well will require about 2 hours. The party will return to New Orleans by bus about 2 o'clock. Reservations for this trip should be made with Dr. Robert C. Goss, Department of Biological Sciences, Loyola University.

Sight-Seeing

Sight-Seeing Tours of New Orleans, and especially of the Vieux Carre, are available at almost all hours of the day and night for a reasonable fare.

The biology staffs of Dillard University, L.S.U.-N.O., Tulane University, Xavier University, and Loyola University will be on hand and happy to conduct all interested parties through their facilities. It is felt that members will not want to miss the Audubon Zoo in Audubon Park across St. Charles Avenue from Loyola, as well as the Green House facilities and Rose Gardens in City Park near the lake front.

General Information

1. Registration will be at a desk in the Loyola University Field House on Freret Street.
2. A fee of $1.00 will be charged for registration.
3. New Orleans is not dry.

Meritorious Award Nominations

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

"The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the departmental level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees."

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Edza Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)

In these times in which so much is heard about teaching, it would appear to be particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting materials to C. G. Goodchild, Emory University; Roberta Lovelace, University of South Carolina; or Frederick T. Wolf, Vanderbilt University.

Association Research Prize

The rules and regulations governing the

annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This applies to *all* names on the submitted paper. Applicants for membership are *not* eligible to submit papers for the Research Prize.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Judges will be eminent biologists outside the Southeast. They will set their own criteria, and may withhold the award if no paper is judged to have sufficient merit.

5. Papers must be submitted in *triplicate* and in their entirety not later than *March 1, 1960*, to P. M. Patterson, Hollins College, Va. One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Phipps and Bird Research Fellowship

A Research Fellowship of $150.00 for summer research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and, especially in the case of younger workers, by references and educational data. Applications should be sent to P. M. Patterson, Hollins College, Va., not later than *April 1, 1960*. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE
CHARLES E. JENNER
RALPH W. YERGER
P. M. PATTERSON, *Chairman*

Mary Glide Goethe Travel Awards

For the third year there will be funds available through the generosity of Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year in New Orleans, Louisiana, April 21-23. It is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from New Orleans.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student *needing financial assistance* in order to attend the 1960 meeting of the Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Give information on marital status and number of children.

2. Indicate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.

3. Give information as to whether or not a paper is being presented by the applicant.

4. In a paragraph, give a brief history of your education to date, of how many years you have been — and plan to be — in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details.

5. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.

6. Have your major professor or departmental head write a letter supporting your application.

7. Applications and supporting letters, *both in triplicate*, should be in the hands of W. D. Burbanck, Department of Biology, Emory University, Atlanta 22, Georgia, by March 1, 1960. Applicants will be notified of the decision of the Committee during March.

COMMITTEE
J. M. CARPENTER
R. B. SHORT
W. D. BURBANCK, *Chairman*

PROPOSED REVISION OF THE CONSTITUTION AND BY-LAWS OF THE ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

(Additions and modifications are set in CAPITAL AND SMALL CAPITAL letters for comparison with present Constitution — See ASB BULLETIN, Vol. 2, No. 2)

CONSTITUTION

ARTICLE I. *Name*

The organization shall be known as the ASSOCIATION OF SOUTHEASTERN BIOLOGISTS.

ARTICLE II. *Objectives*

THE OBJECTIVES OF THE ASSOCIATION SHALL BE TO ENCOURAGE IN THE BROADEST AND MOST LIBERAL MANNER THE ADVANCEMENT OF BIOLOGY AS A SCIENCE BY THE PROMOTION OF RESEARCH IN BIOLOGY; BY THE INCREASE AND DIFFUSION OF KNOWLEDGE OF BIOLOGY TO THE SOLUTION OF BIOLOGICAL PROBLEMS; BY THE PRESERVATION OF BIOLOGICAL RESOURCES; AND BY ITS MEETINGS, REPORTS, DISCUSSIONS AND PUBLICATIONS TO PROMOTE SCIENTIFIC INTERESTS AND INQUIRY, THEREBY ADDING TO THE HEALTH, HAPPINESS AND KNOWLEDGE OF ALL PEOPLES.

ARTICLE III. *Eligibility*

Section 1. Members, in general, shall be residents of the Southeastern States and shall be known as (A) Active Members and (B) Emeritus Members.

Section 2. Any person is eligible for active membership in the Association who is engaged in (A) biological research, (B) the teaching of biological subjects, (C) graduate study in the biological sciences, or (D) work in the various fields of applied biology.

Section 3. Any member may be elected as Emeritus Member who has been a member of the Association for ten (10) or more years and who has retired from professional duties. An Emeritus Member shall have the same rights and privileges as an Active Member.

Section 4. Any individual or organization contributing one hundred (100) dollars or more per annum to the support of the Association shall be known as a Patron. Patrons will receive the publications and notices of the Association and may attend the annual meetings but shall not have the right to vote.

ARTICLE IV. *Officers*

The officers of the Association shall be (A) President, (B) President-Elect, (C) Vice-President, (D) Secretary, and (E) Treasurer.

ARTICLE V. *Annual Meeting*

Section 1. The annual meeting of the Association shall BE HELD IN APRIL at such place as may be recommended by the Executive Committee and approved by the membership at an annual business meeting. THE DATE OF THE MEETING SHALL BE DETERMINED BY THE EXECUTIVE COMMITTEE.

Section 2. In case of an emergency, the Executive Committee may change the time and place of the annual meeting or may call a special meeting.

ARTICLE VI. *Quorum*

Fifty (50) members of the Association shall constitute a quorum for the transaction of business.

ARTICLE VII. *Disposition of Property*

IN THE EVENT OF THE DISSOLUTION OR TERMINATION OF THE ASSOCIATION, TITLE TO AND POSSESSION OF ALL THE PROPERTY OF THE ASSOCIATION SHALL PASS FORTHWITH TO THE AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES, WASHINGTON, D. C., IF THEN IN EXISTENCE AND QUALIFIED FOR EXEMPTION UNDER THE INTERNAL REVENUE CODE OF 1954 AS AMENDED, AND OTHERWISE TO THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, WASHINGTON, D. C.

ARTICLE VIII. *Incorporation*

THE EXECUTIVE COMMITTEE, WITH THE APPROVAL OF THE MEMBERSHIP IN A VOTE AT AN ANNUAL MEETING, MAY APPLY FOR INCORPORATION OF THE ASSOCIATION AS A NON-PROFIT SCIENTIFIC AND EDUCATIONAL ORGANIZATION WITHOUT CAPITAL STOCK UNDER THE LAWS OF ANY OF THE SOUTHEASTERN STATES WITHIN ITS AREA.

ARTICLE IX. *Amendments*

Section 1. This Constitution may be amended at any annual meeting by a three-fourths majority of those present, provided due notice of said amendment has been sent by the Secretary to each member at least thirty (30) days in advance of the meeting, and provided the amendment has been proposed by the Executive Committee or by a committee authorized by the Association at a previous annual meeting, provided that so long as the Association shall be or remain an organization exempt under Section 501 (c) (3) of the Internal Revenue Code of 1954, as amended, no amendment shall be made to Article II or Article VII of this Constitution without consent having been obtained from the Internal Revenue Service.

Section 2. Amendments to this Constitution shall become effective at the close of the annual meeting at which they were adopted.

BY-LAWS

ARTICLE I. *Membership*

Section 1. Membership shall be granted any person recommended and approved as being eligible by two active members in good standing.

Section 2. Such recommendations shall be submitted to the treasurer of the Association and the new member shall achieve active status in the Association with all the rights and privileges pertaining thereto when his dues for the current year have been received by the treasurer of the Association.

ARTICLE II. *Election of Officers*

Section 1. (A) Annually the nominating committee shall prepare a multiple slate of nominees for each office or vacancy to be filled. Members are privileged to recommend to the nominating committee persons for any or all offices.

(B) The slate of the nominating committee shall be presented to the membership on or before Thursday evening of the Annual Meeting, and the election shall be held at the following business session when nominations will be called for from the floor.

(C) The Secretary shall prepare ballots for distribution. These ballots shall be distributed and collected by three tellers appointed by the President. A majority vote will constitute election to office. Where more than one person is to be elected to a position (e.g., members of the Executive Committee) the two or more receiving the highest number of votes shall be declared elected.

(D) The results of the election shall be announced as soon as possible after the tellers have counted the ballots, and the successful candidates shall be presented to the membership. ALL BALLOTS SHALL BE DEPOSITED WITH THE SECRETARY WHO SHALL RETAIN THEM FOR ONE YEAR.

Section 2. (A) A President-Elect shall be elected annually and shall become President at the close of the next annual meeting following election.

(B) A Vice-President shall be elected annually. Neither the President nor the Vice-President shall be immediately eligible for re-election.

Section 3. (A) A Secretary and (B) A Treasurer shall be elected for a term of three (3) years each, and they shall be eligible for immediate re-election to additional terms. The Secretary and Treasurer shall not be elected to office in the same year except to fill an unexpired term.

Section 4. Should an office other than that of President and that of President-Elect become vacant during the year, the Executive Committee shall appoint a member to fill that office until the next election.

Section 5. Newly elected officers shall assume the duties of their offices at the close of the annual meeting in which they were elected.

ARTICLE III. *Duties of Officers*

Section 1. The PRESIDENT shall be the directing officer of the Association, shall perform the duties usual to that office, and shall appoint, with the advice of the Executive Committee, regular committees, special committees authorized by the Executive Committee, and a representative to the American Association for the Advancement of Science. Also, he shall appoint such other special committees as may be required.

Section 2. THE PRESIDENT-ELECT SHALL BE RESPONSIBLE FOR ORGANIZING THE PROGRAM FOR THE FIRST EVENING SESSION, AND SHALL BE RESPONSIBLE FOR PROMOTING MEMBERSHIP IN THE ASSOCIATION. IN THE EVENT OF THE RESIGNATION, DEATH OR INCAPACITY OF THE PRESIDENT-ELECT DURING HIS TERM OF OFFICE THE EXECUTIVE COMMITTEE SHALL DECLARE THE PERSON WHO RECEIVED THE NEXT HIGHEST NUMBER OF VOTES FOR THE OFFICE TO BE PRESIDENT-ELECT. IF THIS INDIVIDUAL IS UNABLE TO ACCEPT, THE EXECUTIVE COMMITTEE SHALL NOMINATE TWO MEMBERS FOR THE OFFICE, TO BE VOTED UPON BY THE MEMBERSHIP BY MAIL BALLOTS.

Section 3. THE VICE-PRESIDENT SHALL BE THE PUBLIC RELATIONS OFFICER OF THE ASSOCIATION. IN THE ABSENCE OF THE PRESIDENT FROM ANY MEETING THE VICE-PRESIDENT SHALL DISCHARGE THE DUTIES OF THAT OFFICE. IN THE EVENT OF THE DEATH OR RESIGNATION OF THE PRESIDENT, THE VICE-PRESIDENT SHALL BECOME PRESIDENT OF THE ASSOCIATION.

Section 4. The Secretary shall keep records of the meetings of the Association and of the Executive Committee, conduct the routine business of the Association pertaining to that office, maintain a roster of the membership, issue a call for suggestions for nominations stating the time during which these suggestions will be received and listing names and addresses of all members of the Nominating Committee, issue a call for papers for the program and work with the Program Committee in arranging the program, attend to the preparation and distribution of ballots at elections, report the activities of his office to the Association at the annual meeting, notify Emeritus Members of their election, and give proper recognition to Patron Members. THE SECRETARY OF THE ASSOCIATION SHALL BE EX-OFFICIO ASSOCIATE EDITOR OF THE *A. S. B. Bulletin* AND SHALL BE RESPONSIBLE FOR PROVIDING THE EDITOR WITH ALL OFFICIAL ANNOUNCEMENTS, DOCUMENTS, PROGRAMS AND ABSTRACTS OF PAPERS TO BE PUBLISHED IN THE *Bulletin.*

Section 5. The Treasurer shall receive and disburse all funds of the Association, keeping the necessary records of dues and funds expended. He shall at all times coordinate the efforts of his office with those of the offices of the Secretary AND OF THE EDITOR, and shall report annually all receipts and expenditures to the membership. He is authorized to reimburse the Secretary for expenses incurred in attending the annual meeting of the Association and interim meetings of the Executive Committee. The Executive Committee may by special action also authorize the Treasurer to reimburse other officers of the Association for all or a portion of expenses incurred in attending interim meetings of the Executive Committee, not to exceed one per year. THE TREASURER OF THE ASSOCIATION SHALL BE EX-OFFICIO BUSINESS MANAGER OF THE *A. S. B. Bulletin.*

ARTICLE IV. *Dues and Fees*

Section 1. The annual dues of the Association for Active Members shall be two dollars ($2.00), payable in advance. Emeritus Members shall be exempt from dues.

Section 2. The fiscal year of the Association shall be from March sixteenth to March fifteenth.

Section 3. Any member in arrears in the payment of dues for two (2) years as of the close of the fiscal year shall be dropped from the membership roster at the close of the annual meeting for that calendar year.

Section 4. Delinquent members who desire reinstatement to membership shall pay a reinstatement fee of two dollars ($2.00) in addition to the regular dues for the current fiscal year.

ARTICLE V. *The A.S.B. Bulletin*

Section 1. THE *A.S.B. Bulletin* SHALL BE THE OFFICIAL PUBLICATION OF THE ASSOCIATION, AND SHALL BE PUBLISHED QUARTERLY OR AT SUCH OTHER REGULAR INTERVALS AS MAY BE DETERMINED BY A VOTE OF THE MEMBERSHIP UPON RECOMMENDATION BY THE EXECUTIVE COMMITTEE.

Section 2. THE EDITOR OF THE *A.S.B. Bulletin* SHALL BE A MEMBER OF THE ASSOCIATION, RESPONSIBLE FOR THE EDITING AND PUBLICATION OF THE *Bulletin*, AND SHALL BE SELECTED AND APPOINTED BY THE EXECUTIVE COMMITTEE FOR A TERM OF THREE YEARS. THE EDITOR SHALL BE ELIGIBLE FOR REAPPOINTMENT FOR ANY NUMBER OF SUCCESSIVE THREE-YEAR TERMS. UPON THE RECOMMENDATION OF THE EDITOR, THE EXECUTIVE COMMITTEE MAY APPOINT A CIRCULATION MANAGER FOR THE *Bulletin*.

Section 3. THE *A.S.B. Bulletin* SHALL BE SUPPLIED TO ALL MEMBERS OF THE ASSOCIATION WITHOUT CHARGE BEYOND THE STATED ANNUAL DUES. ORGANIZATIONS MAY SUBSCRIBE TO THE *A.S.B. Bulletin* AT A RATE EQUAL TO THE ANNUAL DUES, BUT SUCH SUBSCRIPTIONS WILL NOT CARRY THE PRIVILEGES OF MEMBERSHIP IN THE ASSOCIATION. THE EXECUTIVE COMMITTEE, UPON THE RECOMMENDATION OF THE EDITOR, MAY ESTABLISH SPECIAL PRICES FOR BACK ISSUES OR VOLUMES OF THE *Bulletin*.

Section 4. ANY MAJOR CHANGE IN EDITORIAL POLICY PROPOSED BY THE EDITOR SHALL BE SUBJECT TO THE APPROVAL OF THE EDITORIAL BOARD.

ARTICLE VI. *Executive Committee*

Section 1. (A) The Executive Committee shall be in charge of the affairs of the Association between the Annual Meetings. (B) This Committee shall be composed of the officers of the Association, the immediate Past President, and six (6) members elected from the membership.

Section 2. The six members of the Executive Committee elected as such shall serve for a term of three (3) years, two members being elected each year. These members are eligible for re-election to the Executive Committee. SHOULD A VACANCY OCCUR AMONG THESE SIX MEMBERS, THE EXECUTIVE COMMITTEE SHALL APPOINT A MEMBER TO SERVE UNTIL THE NEXT ELECTION.

Section 3. The Editor of the *A.S.B. Bulletin* shall be an Ex-Officio Member of the Executive Committee with the power of discussion and privilege of proposing motions but shall not have the right to vote.

Section 4. THE EXECUTIVE COMMITTEE SHALL SERVE AS AN EX-OFFICIO EDITORIAL BOARD FOR THE *Bulletin* AND SHALL BE RESPONSIBLE FOR DETERMINING THE MAJOR EDITORIAL POLICIES OF THE *Bulletin* IN CONSULTATION WITH THE EDITOR.

Section 5. A majority of the Executive Committee shall constitute a quorum, provided all members have been notified of the proposed meeting.

ARTICLE VII. *Regular Committees*

Section 1. The following regular committees shall be appointed by the President upon the approval of the Executive Committee:

(A) Auditing Committee
(B) Nominating Committee
(C) Program Committee
(D) Resolutions Committee

Section 2. The duties of the regular committees shall be as follows:

(A) The Auditing Committee shall examine the records of the Treasurer prior to the annual business meeting of the Association and shall report the condition of the accounts to the membership at this meeting.

(B) The Nominating Committee shall, with due consideration of suggestions received from the membership, prepare a multiple slate of nominees for each office or vacancy to be filled.

(C) The Program Committee shall have the power to accept or to reject papers for the program, and shall work with the Secretary in arranging the program.

(D) The Resolutions Committee shall formulate and present to the Association such resolutions as may be considered worthy of action by the Association.

Section 3. THE EXECUTIVE COMMITTEE MAY FROM TIME TO TIME ESTABLISH SPECIAL *ad hoc* COMMITTEES AS NEEDED. THE MEMBERS OF ALL SUCH COMMITTEES SHALL BE APPOINTED BY THE PRESIDENT.

ARTICLE VIII. *Papers*

Section 1. All titles of papers submitted for the program shall be in the hands of the Secretary two (2) months before the date set for the annual meeting.

Section 2. Each title submitted shall be accompanied by two (2) copies of an abstract of not more than two hundred (200) words.

Section 3. Except by special action of the Program Committee the maximum time allowed for the presentation of a paper shall be ten (10) minutes. The presiding officer will enforce this rule.

Section 4. Papers presented before the Association at the annual meeting shall be read only by members or by persons introduced by members.

ARTICLE IX. *Amendments*

Section 1. These By-Laws may be amended at any annual meeting of the Association by a two-thirds majority vote of those present.

Section 2. Amendments to these By-Laws shall take effect at the close of the meeting at which they were adopted.

NEWS OF BIOLOGY IN THE SOUTHEAST

Receipt of news for this issue was sparse. The inclusion of the revised Constitution required more space than anticipated and the news available did not warrant elimination of one of the articles or expansion of the issue to 16 pages. News received will be included in the April issue.

The A.S.B. BULLETIN

Volume 7, Number 2 April, 1960

CONTENTS

The Official Quarterly Publication of
The Association of Southeastern Biologists

THE A. S. B. BULLETIN

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists and is published at Columbia, S. C., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to the Editor, U.S.P.H.S., P. O. Box 717, Columbia, S. C. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harold J. Humm, Department of Botany, Duke University, Durham, N. C. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tenn. Subscription rate for non-members of ASB: $2.00 per year. Printing and typography by the Cary Printing Co., Columbia, S. C.

GEOFFREY M. JEFFERY, EDITOR

HAROLD J. HUMM, ASSOCIATE EDITOR
ELSIE QUARTERMAN, BUSINESS MANAGER

ASSOCIATION AFFAIRS

Nominations for ASB Officers

The Nominating Committee, composed of Mary Esther Gaulden, Chairman, G. Robert Lunz, and Leland Shanor, has submitted the following slate of officers to be acted on by members at the New Orleans meeting:

President-Elect — Paul M. Patterson, Hollins College; Royal E. Shanks, University of Tennessee; and Harry E. Wheeler, Louisiana State University.

Vice-President — Ruth S. Breen, Florida State University; Walter S. Flory, Jr., University of Virginia; and Donald C. Scott, University of Georgia.

Executive Committee —

One to be elected for one-year term — John M. Carpenter, University of Kentucky; James H. Gregg, University of Florida; and Joseph C. O'Kelley, University of Alabama.

Two to be elected for three-year term — Robert R. Bryden, Union College; B. Theodore Cole, University of South Carolina; David J. Cotter, Alabama College; Charles E. Jenner, University of North Carolina; Jean Kerschner, Western Maryland College; and Paul A. Walker, Randolph Macon Women's College.

A call for nominations from the floor will be made at the business meeting.

The Annual Meeting

The forthcoming meeting at Loyola University in New Orleans will undoubtedly continue the trend of bigger and better meetings. The number of papers to be presented far exceeds any meeting in the past. The Program and Local Arrangements Committees have done an outstanding job.

Three distinguished guest speakers have been obtained for the Thursday and Friday evening General Sessions. On Thursday Drs. Arnold B. Grobman and Hiden T. Cox of A.I.B.S. will discuss two topics of much interest to biologists. On Friday Dr. F. C. Steward, Professor of Botany, Cornell University, will deliver an address with the intriguing title, "Carrots and Coconuts — Some Adventures in the Study of Growth".

Attention is called to the field trips to be offered during the meetings. Those intending to visit the U. S. Southern Regional Research and Development Laboratory should make their intentions known as early as possible, as suggested in the Meeting Notes. Of special note is the change in date of the trip to the Sulphur Well. This was originally announced for Saturday, April 23, but has been changed to Thursday, April 21, 9:00 A.M. - 4:00 P.M. (See Meeting Notes). Reservations for this trip should be made in advance.

Copies of the program will be available at the Meeting but those desiring to have abstracts should take along their own copy of the BULLETIN. Action on the revised Constitution and By-laws will be taken at the Business Meeting. It is not known at this time if copies of the revised Constitution will be available and those who wish to do so should bring along the copy printed in the January, 1960 issue (Vol. 7, No. 1).

A Message from the President

Horn Island, shall it remain a nature preserve? It has been called to my attention that there is a move underway to have Horn Island changed from a Nature Preserve to a Recreation Area. A Committee of A.S.B., consisting of Father P. M. Yancey, Gordon Gunter, Hurst H. Shoemaker, and Harold J. Humm, Chairman, as well as many other members of the Association, contributed a considerable amount of effort into having Horn Island set aside as a natural area (See ASB BULL., 4(3): 43 and 6(1): 30), and it is my feeling that we should, as individuals, do everything in our power to prevent its being ravaged and converted to a picnic park or something even less desirable. I hope that every member of ASB will write to his Congressman and Senator protesting any change in the present status of the Island.

From all reports which have reached me from Father Mullahy and Dr. Jeffery, the Meetings at Loyola promise to be among the best in the history of the Association. An interesting program of papers and addresses, and the thoughtful and careful planning of the Local Arrangements Committee can but add to the other appeals and charms of Loyola and New Orleans!

HORTON H. HOBBS, JR.

Program of the 21st Annual Meeting Association of Southeastern Biologists

Loyola University, New Orleans, Louisiana, April 21-23, 1960

A Joint Meeting with the Southeastern Section of the Botanical Society of America, Southern Appalachian Botanical Club, the South Central and South Atlantic Regions of the Society of General Physiologists, and the Southeastern Region of Beta Beta Beta National Honor Biological Society.

SESSION SCHEDULE

Thursday, April 21

9:00 a.m.-4 p.m. Field Trip to Sulphur Well in the Gulf. Bus leaves from Loyola Field House.

10:00 a.m. Meeting of the Executive Committee of the A.S.B. Student Lounge, Marquette Hall.

1:15 p.m. Tour of the U. S. Southern Regional Research & Development Laboratory on Robert E. Lee Boulevard.

2:00-8:15 p.m. Registration, Lobby, Loyola Field House.

8:20 p.m. General Session followed by Smoker, Loyola Field House.

Friday, April 22

8:00-12:00 noon. Registration, Lobby, Loyola Field House.

8:30-11:30 a.m. Showing of the A.I.B.S. Biological Sciences Film Series. Trophy Room, West End, Loyola Field House.

8:00 a.m. Commercial Exhibits, Loyola Field House.

8:30 a.m. Contributed Papers.
Animal Physiology, Auditorium, Marquette Hall.
Plant Physiology, Student Lounge, Marquette Hall.
Vertebrate Zoology, Room 207, Bobet Hall.
Parasitology, Room 212, Bobet Hall.
Cryptogamic Botany, Room 304, Bobet Hall.

11:30 a.m.-12:30 p.m. Business Meeting, Association of Southeastern Biologists, Main Auditorium, Loyola Field House.

1:15 p.m. Business Meeting, Southeastern Section, Botanical Society of America, Room 304, Bobet Hall.

2:00-5:00 p.m. Showing of the A.I.B.S. Biological Sciences Film Series. Trophy Room, West End, Loyola Field House.

2:00 p.m. Contributed Papers.
Animal Physiology, Auditorium, Marquette Hall.
Cytology and Genetics, Student Lounge, Marquette Hall.
Invertebrate Zoology, Room 207, Bobet Hall.
General Botany, Room 212, Bobet Hall.
Plant Ecology, Room 304, Bobet Hall.

5:45 p.m. Special Registration for Beta Beta Beta Members, Loyola University Cafeteria.

6:00 p.m. Dinner, Beta Beta Beta Society, Loyola University Cafeteria. Members will go through the cafeteria line.

7:00 p.m. Address to Beta Beta Beta Members, Marquette Auditorium.

8:30 p.m. General Session, Loyola Field House.

Saturday, April 23

8:30 a.m. Field Trip to the Gulf Coast Research Laboratory, Ocean Springs, Mississippi. Members will leave in private cars from the Loyola Field House.

8:30-12:00 noon. Student Papers, Beta Beta Beta Society. Eastern District, Room 212, Bobet Hall; Western District, Room 304, Bobet Hall.

12:00-1:00 p.m. Business Meeting, Beta Beta Beta Society; Eastern District, Room 212, Bobet Hall; Western District, Room 304, Bobet Hall.

GENERAL SESSION

THURSDAY, APRIL 21, 8:20 p.m.

Loyola Field House

Presiding: Horton H. Hobbs, Jr.

Address of Welcome: VERY REVEREND W. PATRICK DONNELLY, S. J., President of Loyola University.

Response: Horton H. Hobbs, University of Virginia, President of A.S.B.

Address: *The Biological Sciences Curriculum Study* — Dr. Arnold B. Grobman, Director, Biological Sciences Curriculum Study of the A.I.B.S., Boulder, Colorado.

Address: *The A.I.B.S. Biological Sciences Film Series* — Dr. Hiden T. Cox, Executive Director, American Institute of Biological Sciences.

Smoker following the Addresses.

ANIMAL PHYSIOLOGY SESSION I

FRIDAY, APRIL 22, 8:30 a.m.

Marquette Auditorium

Presiding: Douglas Humm, Univ. of North Carolina

8:30 Differentiation of Transplanted Pancreatic Rudiments. B. E. FRYE, Univ. of Virginia.

8:43 The Action of Thyroxine on the Mitochondria of the Liver of the Albino Rat. SAMUEL R. TIPTON, Univ. of Tennessee.

8:56 The Preservation of Experimental Neoplasms by a Frozen-Tissue Bank at —78° C. J. RICHARD THOMSON and DANIEL R. FARNELL, Southern Research Inst., Birmingham.

9:09 Shape Changes and Hemolysis of Frog Erythrocytes Following Treatment with Various Hemolysins. S. P. MARONEY, JR., Univ. of Virginia.

9:22 Differentiation of Chromatophorotropins and Retinal Pigment Light-adapting Hormone from the Eyestalk of the Dwarf Crayfish, *Cambarellus shufeldti*. MILTON FINGERMAN and WILLIAM C. MOBBERLY, JR., Newcomb Coll. of Tulane Univ.

9:35 *Intermission.*

9:45 A Study of the Sickling Phenomenon. ANNA L. CHERRIE, Loyola Univ.

9:58 Electromigration Properties of Mammalian Hemoglobins as Taxonomic Criteria. CHARLES W. FOREMAN, Pfeiffer Coll.

10:11 Differentiation of the Toads, *Bufo valliceps*, *Bufo fowleri*, and their Natural Hybrid by Electrophoresis of Blood Proteins. HERBERT C. DESSAUER, WADE FOX, and E. PETER VOLPE, L.S.U. School of Medicine and Newcomb Coll., Tulane Univ.

10:24 The Respiratory Properties of Chiton Hemocyanins. JAMES R. REDMOND, Univ. of Florida.

PLANT PHYSIOLOGY SESSION

FRIDAY, APRIL 22, 8:30 a.m.

Student Lounge, Marquette Hall

Presiding: Victor A. Greulach, Univ. of North Carolina

8:30 A New Method of Investigating the Daily Course of Oxygen Tension of an Aquatic Population. WILLIAM T. LAMMERS, Davidson Coll.

8:43 A Comparison of the Water Content of Insect Galls with that of Contiguous Tissues and Normal Organs of the Same Host Plant. EDWIN G. BECK, Univ. of Georgia.

8:56 Surface Antigen Dynamics in the Slime Mold, *Dictyostelium discoideum*. JAMES H. GREGG, Univ. of Florida.

9:09 The Use of Tetrazolium Chloride on Barley Meristems. PATRICIA A. SARVELLA, Mississippi State Univ.

9:22 The Effects of Selected Antibiotics on Pure Cultures of Algae. EDWARD O. HUNTER, JR. and ILDA McVEIGH, Vanderbilt Univ.

9:35 *Intermission.*

9:45 Effects of IAA and 2, 4, 6 — T on Timothy Root Growth. ROBERT T. BRUMFIELD, Longwood College and Oak Ridge Nat. Lab.

9:58 The Separation of Chloroplast Pigments by Countercurrent Distribution. FREDERICK T. WOLF and JOHN G. CONIGLIO, Vanderbilt Univ.

10:11 Responses of Selected Granite Outcrop Communities to Chronic Low-level Gamma Irradiation. J. FRANKLIN McCORMICK, Emory Univ.

10:24 A Growth Response by Two Sedges Inhabiting a Radiation Field. GAYTHER L. PLUMMER, Univ. of Georgia.

10:37 The Isolation of the Amino Acid, Canavanine, by Ion Exchange Methods. GORDON E. HUNT and JOHN F. THOMPSON, Univ. of Tennessee.

10:50 Effects of Ionizing Radiation on Tree Growth. JOHN T. McGINNIS, Emory Univ.

VERTEBRATE ZOOLOGY SESSION

FRIDAY, APRIL 22, 9:09 a.m.

Room 207, Bobet Hall

Presiding: Donald C. Scott, Univ. of Georgia

9:09 Aspects of Melanism in *Gambusia affinis* (Baird and Girard). JAMES D. REGAN, Florida State Univ.

9:22 *Etheostoma okaloosae* (Fowler), a Percid Fish Endemic in Northwest Florida. RALPH W. YERGER, Florida State Univ.

9:35 Growth and Development of the Golden Mouse, *Ochrotomys nuttalli*. JAMES N. LAYNE, Univ. of Florida.

9:48 Induction of Limb Regeneration in Postmetamorphic Frogs by Xenoplastic Adrenal Transplants. MERLE MIZELL, Tulane Univ.

10:00 *Intermission.*

10:10 Live-trap Induced Stress in *Sigmodon hispidus*. FRANK B. GOLLEY, Univ. of Georgia.

10:23 Influence of Nerves in Lizard Regeneration. SIDNEY B. SIMPSON, JR., Tulane Univ.

10:36 The Stimuli for the Start of the Reproductive Season in Juncos. JAMES T. TANNER, Univ. of Tennessee.

10:49 Taxonomic Status of the Florida Pine Vole, *Pitymys parvulus*. ANDREW A. ARATA, Univ. of Florida.

PARASITOLOGY SESSION

FRIDAY, APRIL 22, 8:30 a.m.

Room 212, Bobet Hall

Presiding: Horton H. Hobbs, Jr., Univ. of Virginia

8:30 The Genus *Entocythere*, an Ostracod Epizooic on Crayfishes. EDWARD A. CRAWFORD, JR., Erskine Coll.

8:43 Swift Tapeworms; the Genus *Notopentorchis* Burt in Ceylonese and American Trochilids. ARTHUR W. JONES, Univ. of Tennessee.

8:56 The Comparative Efficacy of Bephenium Hydroxynaphthoate and Tetrachloroethylene against Hookworm and other Parasites of Man. MARTIN D. YOUNG and GEOFFREY M. JEFFERY, U.S.P.H.S., Columbia, S. C.

9:09 Cortisone and Resistance to Infection with *Hymenolepsis nana*. CLARENCE J. WEINMANN, Univ. of Florida.

9:22 The Comparative Anthelmintic Effects of Dithiazanine and Tetrachloroethylene Individually and in Combination. GEOFFREY M. JEFFERY and MARTIN D. YOUNG, U.S.P.H.S., Columbia, S. C.

9:35 A Preliminary Report on the Helminth Parasites of Nutria in Louisiana. BERT B. BABERO and J. WARREN LEE, Southern Univ.

9:48 A New Species of *Macravestibulum* (Trematoda: Pronocephalidae) from the Florida Terrapin. RAYMOND T. DAMIAN, Florida State Univ.

10:00 *Intermission.*

10:10 Activity Suppression in the Golden Hamster (*Cricetus auratus*) Caused by *Trichinella spiralis* Infection. CHAUNCEY G. GOODCHILD and DIRK FRANKENBERG, Emory Univ.

10:23 Ovoviviparity in the monogenetic trematode *Polystomoidella oblonga*. LARRY C. OGLESBY, Florida State Univ.

10:36 Further Observations on the Structure of the Cyst of *Neoechinorhynchus cylindratus*. BURTON J. BOGITSH, Georgia Southern Coll.

10:49 Some Digenetic Trematodes from Birds from the Northwest Gulf Coast of Florida. AUSTIN J. MacINNIS, Florida State Univ.

11:02 Marine Trematode Cercariae from the Apalachee Bay Area. RHODES B. HOLLIMAN, Florida State Univ.

11:15 Observations on the Life Cycle of *Parorchis acanthus* Nicoll. PAUL D. LEWIS, JR., Florida State Univ.

11:28 Some Effects of Radiation on the Growth Rate of *Hymenolepis microstoma*. H. H. KUHLMAN, Univ. of Tennessee.

CRYPTOGAMIC BOTANY SESSION

FRIDAY, APRIL 22, 8:30 a.m.

Room 304, Bobet Hall

Presiding: Harold J. Humm, Duke Univ.

8:30 Aceto-carmine Staining of Nuclear Bodies in *Oscillatoria*. D. E. NORBY, Virginia Polytechnic Inst.

8:43 Factors Affecting Zoosporogenesis in Five Chlorococcacean Algae. KENNETH F. HANCOCK, Univ. of Alabama.

8:56 A Preliminary Host Range Study of the Chytrid, *Pringsheimiella*. J. THOMAS MULLINS, Univ. of Florida.

9:09 Current Effects and Growth of Freshwater Algae. L. A. WHITFORD, North Carolina State Coll.

9:22 An Axenic Culture of *Puccinia malvacearum*. VICTOR M. CUTTER, JR., Woman's Coll. of the Univ. of North Carolina.

9:35 *Intermission.*

9:45 The Effects of the Alkaloid Drug Colchicine upon the Alga, *chlorella pyrenoidosa*. ALAN D. REX, Virginia Polytechnic Inst.

9:58 Changes in Development of *Protosiphon botryoides* (Kütz) Klebs in Culture upon Replacement of Calcium with Strontium. J. C. O'KELLEY, W. R. HERNDON, and R. E. DANIEL, Univ. of Alabama.

10:11 Strontium Replacement for Calcium in the Growth of Four Volvocalean Algae. H. W. NICHOLS, W. R. HERNDON, and J. C. O'KELLEY, Univ. of Alabama.

10:24 Occurrence of *Beggiatoa* Species Relative to Pollution. JAMES B. LACKEY, Univ. of Florida.

10:37 What is *Riccia fluitans* L.? RUTH SCHORNHERST BREEN, Florida State Univ.

10:50 Sporophyte Production in Antarctic Mosses. ELMER G. WORTHLEY, Harvard Univ.

ANIMAL PHYSIOLOGY SESSION II

FRIDAY, APRIL 22, 2:00 p.m.

Marquette Auditorium

Presiding: Samuel R. Tipton, Univ. of Tennessee

2:00 Ascorbic Acid Metabolism and the Adrenal Glands. DON W. STUBBS and KENNETH OTTIS, Auburn Univ.

2:13 Narcosis, Hypothermia, and Resistance to Asphyxia in Newborn Guinea Pigs. JAMES A. MILLER, JR. and FAITH S. MILLER, Emory Univ.

2:26 Mechanism of Nitrogen Narcosis. D. F. SEARS, Tulane Univ.

2:39 Patterns of Oxidative Enzyme Formation in the Bruchid (Coleoptera) Embryo during Early Development. ALFRED BRAUER, Univ. of Kentucky.

2:52 Studies on the Balance between Lactic Acid Formation and Pyruvic Acid Oxidation in Normal Platyfish Pigment Cells and Platyfish — Swordtail Hybrid Tumors. DOUGLAS G. and JANE H. HUMM, Univ. of North Carolina.

3:05 *Intermission.*

3:15 Interrelation between Triiodothyronine and Adrenaline in Regulation of Oxygen Consumption. KENNETH OTTIS, Auburn Univ.

3:28 Reanimation of Anesthetized Mice from Body Temperatures below 1°C. FAITH S. MILLER and JAMES A. MILLER, JR., Emory Univ. and Nat. Inst. for Med. Res. (London).

3:40 Olfactory Nerve Degeneration. IRVING R. MARTINEZ, JR. and RICHARD T. JACKSON, Loyola Univ. and L.S.U. of New Orleans.

3:53 The Neurophysiological Effect of 3 cm. Microwave Radiation. R. D. McAFEE, Tulane Univ. and V. A. Hospital.

4:06 Measurement of the Effect of Sympathetic Stimulation on Nasal Blood Shunt. RICHARD T. JACKSON and HUNTER C. LEAKE, III, Loyola Univ. and L.S.U. Medical School.

4:19 Preliminary Studies of the Winter Fauna of a Small Artificial Lake at an Altitude of 2400 Feet. ELLINOR H. BEHRE, EMESE SOOS, Y. E. STYLES, ANN BEDDINGFIELD, BARBARA RIDDLE and PIROSKA SOOS, Louisiana State Univ.

4:32 Factors Influencing Contractions of Transplanted Ovarian Follicles. BARRY A. MAXWELL and H. J. LIPNER, Florida State Univ.

CYTOLOGY AND GENETICS SESSION

FRIDAY, APRIL 22, 2:00 p.m.

Student Lounge, Marquette Hall

Presiding: Mary Esther Gaulden, Oak Ridge National Laboratory

2:00 Cytological Studies in the Genus *Fissideus*. NARINDER CHOPRA, Univ. of Tennessee.

2:13 Effect of AET and MEA on X-ray Induced Genetic Damage in *Neurospora crassa*. EDGAR BARNETT, C. W. EDINGTON, and A. GIB DeBUSK, Florida State Univ.

2:26 Postirradiative Effects on Chromosomal Aberrations. A. V. BEATTY and JEANNE W. BEATTY, Emory Univ.

2:39 The Induction of Position Effect Lethals in *Drosophila* by X-rays. E. W. EDINGTON and J. D. REGAN, Florida State Univ.

2:52 Studies on the Role of Wild Yeasts in Fluctuating Populations of Drosophila. JOHN M. CARPENTER, Univ. of Kentucky.

3:05 Radiobiology of *Tetrahymena pyriformis*. CAROLYN WELLS, Oak Ridge Nat. Lab.

3:15 Relationships between Sparing and Inhibition in a Tryptophan-deficient Mutant of *Neurospora crassa*. H. E. BROCKMAN and A. GIB DeBUSK, Florida State Univ.

3:30 *Intermission.*

3:40 Genetic Analysis of Variant Pigmentary Patterns in the Leopard Frog, *Rana pipiens*. E. PETER VOLPE, Newcomb Coll. of Tulane Univ.

3:53 Colchicine Induction of Polyploidy in *Rhodobryum roseum* (Weis.) Limpr. and *Bryum nitens* Hedw. NARINDER CHOPRA, Univ. of Tennessee.

4:06 The Stage of the Female Germ Cell at Fertilization in Relation to Natural Selection. J. GORDON CARLSON, Univ. of Tennessee.

4:19 The Influence of Postirradiative ATP Treatment on Chromosome Aberration Yield. A. V. BEATTY and ELIZABETH DENNIS, Emory Univ.

4:32 Chromosome Breakage Frequency Induced by 3r of X-rays in Grasshopper Neuroblasts. CATHERINE C. HYDE and MARY ESTHER GAULDEN, Oak Ridge Nat. Lab.

4:45 Behavior of the Spindle Body in Neuroblasts of the Grasshopper, *Chortophaga viridifasciata* (De Geer). KEN-YA KAWAMURA, Univ. of Tennessee.

4:58 Nucleolar Activity in the Megasporocyte of *Lilium*. FRANKLIN F. FLINT, Randolph-Macon Woman's Coll.

INVERTEBRATE ZOOLOGY SESSION

FRIDAY, APRIL 22, 2:00 p.m.

Room 207, Bobet Hall

Presiding: Walter G. Moore, Loyola Univ.

2:00 The Fresh-water Shrimps of Jamaica, W. I. C. W. HART, JR., Acad. of Natural Sciences of Philadelphia.

2:13 Growth and Mortality of the Northern Hard Clam in Florida Waters. R. W. MENZEL, Oceanographic Inst., Florida State Univ.

2:26 Some Aspects of the Ecology of Two Psammolittoral Nematode Populations. CHARLES E. KING, Florida State Univ.

2:39 Protozoa from the New Orleans Area. STUART S. BAMFORTH, Newcomb Coll. of Tulane Univ.

2:52 Sub-lethal Effects of Co-60 Gamma Radiation on *Entosiphon sulcatum.* CARRIE F. BENNETT, Univ. of Florida.

3:05 *Intermission.*

3:15 Some Little Known Protozoa from Rock-pools of the Bald Knob, Salt Pond Mountain, Virginia. EUGENE C. BOVEE, Univ. of Florida.

3:28 A Critique of Gause's Experiments on the Destruction of One Species by Another. W. D. BURBANCK and JAMES D. EISEN, Emory Univ.

3:41 Gastotricha of the New Orleans Area. ROBIN C. KRIVANEK and JEROME O. KRIVANEK, Newcomb Coll. of Tulane Univ.

3:54 New Genera of Branchiobdellidae. PERRY C. HOLT, Virginia Polytechnic Inst.

4:07 Studies on the Role of Photoperiod on the Termination of Larval Diapause in Various Dipterous Insects. JAMES E. JENNER, Univ. of North Carolina.

4:20 The Vertical Diel Migrations of a Cyclopoid in a Mississippi Lake. ROBERT A. WOODMANSEE and BILLY J. GRANTHAM, Mississippi Southern Coll. and Mississippi Game and Fish Comm.

GENERAL BOTANY SESSION

FRIDAY, APRIL 22, 2:00 p.m.

Room 212, Bobet Hall

Presiding: Arthur Welden, Tulane Univ.

2:00 A New Technique for Dissecting the Endosperm and Embryo from Seed of *Ilex opaca* Ait. J. M. HERR, JR., Univ. of South Carolina.

2:13 The Problem of Morphological Variation in *Phacelia Purshii* (Hydrophyllaceae). M. D. BAKER, Vanderbilt Univ.

2:26 Additions to the Virginia Flora and Gray's Manual. A. B. MASSEY, Virginia Polytechnic Inst.

2:39 The Wood Anatomy of *Delopyrum, Dentoceras, Polygonella,* and *Thysanella* (Polygonaceae). JAMES H. HORTON, Univ. of North Carolina.

2:52 Geographical Affinities of the Southern Appalachian High Mountain Flora. GEORGE S. RAMSEUR, The Univ. of the South.

3:05 *Intermission.*

3:15 The Chromosomes of *Iris verna.* R. B. CHANNELL, Vanderbilt Univ.

3:28 Chromosome numbers in *Eryngium* Species of the Southern United States. C. RITCHIE BELL, Univ. of North Carolina.

3:41 The Nature of the Species, *Pachysandra procumbens* (Buxaceae). HERBERT C. ROBBINS, Vanderbilt Univ.

3:54 Typifying Species. ROLAND M. HARPER, Geological Survey of Alabama.

4:07 Some Preliminary Studies Contributing to a Cyto-taxonomic Investigation of the Genus, *Schoenolirion* (Liliaceae). HARRY L. SHERMAN, Vanderbilt Univ.

4:20 Foliar Origin and Development of *Tropaeolum majus* L. JEAN L. SMITH, Florida State Univ.

PLANT ECOLOGY SESSION

FRIDAY, APRIL 22, 2:00 p.m.

Room 304, Bobet Hall

Presiding: Elsie Quarterman, Vanderbilt Univ.

2:00 Autecological Studies on *Leavenworthia stylosa* (Cruciferae). RHONA ZAGER, Vanderbilt Univ.

2:13 Effects of Radiation on the Ecology of *Pinus taeda.* ROBERT A. PEDIGO, Emory Univ.

2:26 A Preliminary Report on Some Aspects of the Autecology of *Helenium amarum* (Raf.) H. Rock. DONALD CAPLENOR, LUCILLE PILLOW, WILLIAM RUSHING, and DAVID WEAVER, Millsaps Coll.

2:39 Changes in Dominance in Old Field Succession under Gamma Radiation. CHARLES P. DANIEL, Emory Univ.

2:52 Age and Development of Coastal Marshes in Southwestern Louisiana. CHARLES L. CHAMBERLAIN, Randolph-Macon Woman's Coll.

3:05 *Intermission.*

3:15 Is Sea-oats sterile? FLETCHER D. HARVEY, III and HARRIS OLIVER YATES, Vanderbilt Univ.

3:28 Floristic Changes on White Oak Lake Bed, 1956-1959. H. R. DeSELM and R. E. SHANKS, Univ. of Tennessee.

3:41 Studies on the Distribution and Life History of Two Species of Lesquerella (Cruciferae). ELSIE QUARTERMAN, Vanderbilt Univ.

3:54 A Preliminary Study on the Relationship between the Vegetation of a Mesic Hammock Community and a Sandhill Community. CARL D. MONK, Univ. of Florida.

4:07 The Origin of Relict and Disjunctive Species in Florida. C. W. JAMES, Univ. of Georgia.

4:20 An Evaluation of Three Hybrid-containing Oak Populations on the North Carolina Coast. C. JOHN BURK, Univ. of North Carolina.

GENERAL SESSION

FRIDAY, APRIL 22, 8:30 p.m.

Loyola Field House

Presiding: Horton H. Hobbs, Jr.

Presentation of Awards: Mt. Lake Biological Station Fellowship offered by Phipps and Bird, Inc.; Research Award offered by Carolina Biological Supply Company; Meritorious Teaching Award offered by Will Corporation of Georgia.

Address: "Carrots and Coconuts — Some Adventures in the Study of Growth", DR. F. C. STEWARD, Professor of Botany, Cornell University.

Items of Interest: New Orleans Meeting

Program
Beta Beta Beta Society

GENERAL SESSION

FRIDAY, APRIL 22

5:45 p.m. Special Registration for Beta Beta Beta Members, Loyola University Cafeteria.

6:00 p.m. Dinner, Loyola University Cafeteria. Members will go through the cafeteria line.

7:00 p.m. Address, Marquette Auditorium "Biology in Russia", Dr. Fred R. Cagle, Tulane University.

EASTERN DISTRICT SESSION

SATURDAY, APRIL 23
Room 212, Bobet Hall

8:30 a.m. to 12:00 noon. Contributed Papers.

12:00 noon to 1:00 p.m. Business Meeting.

WESTERN DISTRICT SESSION

SATURDAY, APRIL 23
Room 304, Bobet Hall

8:30 a.m. to 12:00 noon. Contributed Papers.

12:00 noon to 1:00 p.m. Business Meeting.

Meeting Notes

Lodging and Meals

A partial list of hotels and motels was published in the January issue of the BULLETIN. More complete lists are available from the Visitor's Bureau, 315 Camp Street, New Orleans. The Loyola University Cafeteria will be open to all persons attending the meeting. The newly opened Tulane University Center has excellent dining facilities and is just a few steps from the Loyola Field House. Since New Orleans is famous for its many world renowned restaurants, it is felt that most of those attending the meeting will avail themselves of this opportunity to visit them.

Registration

Registration will take place in the Lobby of the Loyola Field House on Freret Street on April 21 from 2:00 to 8:15 P.M. and on April 22 from 8:00 to 12:00 noon. A fee of $1.00 will be charged for registration; undergraduate members of Beta Beta Beta will not be charged the registration fee, but they are urged to register.

Directory

A directory of persons attending the meeting will be located in the Lobby of the Loyola Field House.

Placement Service

A do-it-yourself type of placement service will be located in the Lobby of the Field House. Space will be provided for posting of available positions and personnel.

Commercial Exhibits

These exhibits will be located on the main floor of the Field House.

A.I.B.S. Theatre

Recently completed films of the A.I.B.S. series will be shown in the Trophy Room, West End, Loyola Field House on Friday, April 22, from 8:30 to 11:30 A.M. and from 2:00 to 5:00 P.M. A program of the films to be shown will be posted about the campus.

Parking

The host institution is apologetic for the parking problem on its campus. However, in an effort to provide ASB members with the best available facilities, a placard will be provided each person requesting it at the registration desk. This placard, when displayed inside the car, will permit parking in the quadrangle in the front of the University on St. Charles Avenue.

Field Trips

Three field trips are scheduled for the 21st Annual Meeting. *Preregistration for each trip is imperative.*

Trip #1

Visit to an operating Sulphur Well in the Gulf is offered to members by the Freeport Sulphur Company. It has been found more convenient to offer this trip on Thursday, April 21, rather than on Saturday, April 23, as previously announced in the January issue of the BULLETIN. A bus will leave the Freret St. entrance of the Loyola Field House on April 21, at 9:00 A.M. and return at 4:00 P.M. the same day. A box lunch will be provided by the Freeport Sulphur Company. Reservations must be made with Dr.

Robert C. Goss, Department of Biological Sciences, Loyola University, before April 9th.

Trip #2

A tour of the U. S. Southern Regional Research and Development Laboratory on Robert E. Lee Blvd. is scheduled for Thursday afternoon, April 21, at 1:15 P.M. Registration should be made with Dr. Harry D. Brown, Department of Biological Sciences, Loyola University, before April 9th.

Trip #3

On Saturday, April 23, a field and collecting trip to the Gulf Coast Research Laboratory at Ocean Springs, Mississippi, will begin at 8:30 A.M. in front of the Loyola Field House. Dr. Gordon Gunter, Director of the Laboratory has arranged for collecting to be done in Mississippi Sound aboard the laboratory research boat. This part of the trip is limited to twenty persons; first to register will be accommodated. Dr. Gunter also offers free lodgings for twenty people on the night of April 23. Travel will be on a share-the-expenses basis. Interested persons should register with Dr. Walter G. Moore, Department of Biological Sciences, Loyola University, no later than April 16th.

Local Arrangements Committee

Dr. George H. Penn (Tulane), Dr. Arthur Welden (Tulane) and Miss E. L. Beard, Dr. Harry D. Brown, Dr. Robert C. Goss, Dr. Richard T. Jackson, Dr. Walter G. Moore, and Father John H. Mullahy, Chairman (all of Loyola University).

The Host Institution

Loyola University is a Catholic Institution conducted by members of the Society of Jesus (the Jesuits). The French Jesuits who founded it in 1849 in downtown New Orleans patterned its administration and curriculum along the lines of the Colleges they still maintain in France. In 1904 the high school divisions and college divisions were separated and moved to different parts of the city; the high school division became the present Jesuit High School on Carrollton Avenue and the College division became Loyola University on its present site in 1912. Besides the College of Arts and Sciences with small graduate divisions in Education and Biology, Loyola maintains schools of Business Administration, Music, Dentistry, Pharmacy, and Law. Its present enrollment is 3000.

Biological Sciences at the Host Institution

Loyola has a single department of biological sciences with a staff of eight members. It is housed in Bobet Hall on the St. Charles Avenue campus. The chairman of the department, Father John H. Mullahy (Vanderbilt) is engaged in an algal survey of the Chandaleur Islands, but freshwater Rhodophyceae are his main interest. Dr. Harry D. Brown (Columbia) is doing physiological work on secretion and secretory structures in plants. Plant pathology and the physiology of microorganisms is the interest of Dr. Robert C. Goss (Purdue), whereas Dr. Richard T. Jackson (Florida State) was recently awarded a N.I.H. grant to study the electrophysiology of the special senses. Dr. John G. Arnold (N.Y.U.) is interested in the parasites of the freshwater fishes of Louisiana. Dr. Walter G. Moore (Minnesota) has published extensively on the limnology of Louisiana lakes as well as on the sponges and anostraca of the South. Mr. Timothy L. Duggan (Loyola) is studying effects of salivary secretion on dental placques, and Miss Elizabeth L. Beard (T.C.U.) has just recently reported on her study of serum proteolytic activity.

Five years ago the department initiated a graduate program which is limited to the Master's degree.

The Participating Societies

Officers of some of the Societies participating in the meetings at New Orleans are as follows:

Association of Southeastern Biologists

President—Dr. Horton H. Hobbs, Jr., University of Virginia

Retiring President—Dr. Mary Esther Gaulden, ORNL

President-Elect—Dr. Victor A. Greulach, University of North Carolina

Vice-President—Dr. Royal E. Shanks, University of Tennessee

Secretary—Dr. Harold J. Humm, Duke University

Treasurer—Dr. Elsie Quarterman, Vanderbilt University

(Continued on Page 41)

Abstracts of Papers Presented at the 21st Annual Meeting of the Association of Southeastern Biologists

All except one of the 112 papers submitted for presentation at the Twenty-first Annual Meeting of the Association are abstracted here. Reprints of abstracts marked with an asterisk are available from the authors.

Taxonomic Status of the Florida Pine Vole, *Pitymys parvulus*

ANDREW A. ARATA, *University of Florida*

Audubon and Bachman in 1851 reported the pine vole from Florida, assigning it to *Arvicola pinetorum*. This name was subsequently changed to *Pitymys pinetorum*. The animal was not again reported from the state until 1916 when A. H. Howell described 4 specimens from Lynn (near Ocala), Marion Co., as a distinct species, *P. parvulus*. Acquisition of more material from Florida, Georgia, Alabama, Mississippi and Louisiana make a reappraisal possible. The descriptive characters (size and color) are found to overlap considerably with *P. pinetorum* to the north and west. Variation is apparent in all characters tested: size, color, molar patterns, etc. The amount of variation existing between, and within, populations is described. Clines running from the west and north, converging in peninsular Florida are evident. Molar patterns of *P. pinetorum* from the Pleistocene of peninsular Florida are described, and found to be more similar to populations living at present further north than to the modern peninsular populations. Extant populations from north Florida are more similar to populations from Georgia than to modern peninsular forms. A revaluation of the taxonomic status of this vole is made upon the evidence presented.

A Preliminary Report on the Helminth Parasites of Nutria in Louisiana*

BERT B. BABERO and J. WARREN LEE, *Southern University* and *A. & M. College, Baton Rouge, Louisiana*

A study on helminth parasitism of feral nutria or coypu in Louisiana is in progress. To date, approximately twenty-nine of these hosts have been examined. Although several helminth species have been recovered, generally, in each instance infections have been light. Morphological studies of the parasites recovered have not been completed. Tentative identifications of helminths and the number of hosts infected are as follows: NEMATODA — *Dipetalonema* sp. (12), *Heligmosomum* sp. (15), *Longistriata* sp. (15), and *Trichuris* sp. (13); TREMATODA — unknown monogenetic fluke, (1), unknown metacercaria (7), and unknown digenetic fluke (3); CESTODA — *Hymenolepis* sp. (1); ACANTHOCEPHALA — unknown species (3). The present report apparently is the first published record of an Acnathophala from nutria.

Trichurids and members of the subfamily Heligmosominae have been observed to be more prevalent in Louisiana nutria than any other helminth. Considerable variation in the spicular sheath of *Trichuris* has been observed.

Although certain of the helminths genera recovered are known to produce apthological conditions in other hosts groups, such pathogenicites have not been observed in animals necropsied during this study.

The Problem of Morphological Variation in *Phacelia Purshii* (Hydrophyllaceae)

M. D. BAKER, *Vanderbilt University*

This paper presents the problem of, and preliminary results concerning, the source of variation in *Phacelia Purshii* Buckl. in middle Tennessee. This species is allied to *P. fimbriata* Michx., and now includes *P. Boykinii* (A. Gray) Small and *P. Bicknellii* Small. The relationships of these taxa are treated. Particular attention is given to the problem in *P. Purshii* of small-flowered plants, pollen and anther sterility, etc., as understood through preliminary experimentation.

Protozoa from the New Orleans Area*

STUART S. BAMFORTH, *Newcomb College* of *Tulane University*

Mild climate and the alluvial soil of the Mississippi Delta provide a variety of hard water mesosaprobic and polysaprobic environments in the swamps, ponds, and ditches of the 50 mile area surrounding New Orleans. *Trachelomonas volvocina, T. hispida,* several species of *Euglena* and *Phacus, Cryptomonas erosa* and *C. compressa* are dominant flagellates. *Chlamydomonas* and colonial phytomonads are sparsely represented, although they may predominate in particular habitats. *Synura uvella* is prominent in the cooler portions of the year but other chrysomonads are relatively rare. *Actinophrys sol,* several small Heliozoan genera, *Arcella vulgaris,* and *Difflugia* appear more numerous than Amoebidae. *Coleps* is the most abundant ciliate genus. *Loxodes, Monochilium, Lembadion, Urocentrum turbo, Halteria grandinella, Strobilidium gyrans, Euplotes eurystomus* and a variety of Oxytrichidae are common. The distribution of many other ciliates depends upon the particular ecological characteristics of individual bodies of water.

Effect of AET and MEA on X Ray Induced Genetic Damage in *Neurospora crassa**

EDGAR BARNETT, C. W. EDINGTON, and A. GIB DEBUSK, *Florida State University*

In view of the number of investigations, past and present, concerned with the chemical protection of organisms against radiation death, surprisingly few studies have been reported which deal with the effectiveness of such compounds against radiation induced genetic changes. Experiments have been conducted in our laboratory with two such compounds, B-mercaptoethylamine (MEA) and S, 2 aminoethylisothiuronium (AET), to determine whether they protect against X ray induced genetic back mutation in *Neurospora crassa*. Our methods for deter-

mining rates of reversion are similar to those of Giles (1951) in which revertants from nutritional auxotrophy to prototrophy are detected by colony formation on basal unsupplemented agar medium plates and survival by colony formation on nutritionally complete agar medium plates. The results of our experiments show that AET when present at the time of irradiation, increases the level of back mutation produced by a standard dose of radiation at the ad-3 locus of Neurospora. MEA, on the other hand, shows a protective action against X ray mutagenicity.

Postirradiative Effects on Chromosomal Aberrations

A. V. Beatty and Jeanne W. Beatty,
Emory University

Investigations dealing with chromosomal aberrations in *Tradescantia* microspores have revealed that a total dose of 400r of X radiation, in combination with various environmental factors during or after irradiation, yielded in five percent oxygen an average low of 0.48 and a high of 0.88 aberrations per cell, while in helium a low of 0.14 and a high of 0.66 was found. In those experimental procedures in which a total dose of 400r yielded less than the highest yield of aberrations, a yield up to but not greater than this high could be obtained by modifying the experimental setup so as to influence the rejoining of broken chromosome ends. This idea of constancy in the number of recoverable breaks and the role which available energy plays in radiation recovery, form the basic premises upon which the present work was carried out. Irradiation was performed in both oxygen and oxygen-free atmospheres. In the oxygen-free experiments some of the material was pretreated in chemicals which presumably contributed in some way in supplying additional energy for repair. Postirradiative treatments for mass doses as well as in the fractionation experiments were given in either helium or air. Any treatment which supposedly increased the supply of energy in the cell, decreased the aberration yield, while a decrease in available energy increased the aberration yield.

The Influence of Postirradiative ATP Treatment on Chromosome Aberration Yield

A. V. Beatty and Elizabeth Dennis,
Emory University

In all experiments the *Tradescantia* inflorescences were exposed to 400r of X radiation in an oxygen-free atmosphere at 30° C. The molecular concentration of ATP used was 2×10^{-3}. The controls with no ATP treatment yielded 0.24 aberrations per cell. With pretreatment periods from 1-9 hours, the aberration yield was approximately 0.14 per cell. Postirradiative treatment for 1½ hours gave 0.17 aberrations per cell indicating biological activity. The use of tagged ATP to indicate absorption of the chemical showed radioactivity in the microspores after two hours of treatment. Biological activity was thus indicated in the microspores before radioactivity was measurable.

A Comparison of the Water Content of Insect Galls with that of Contiguous Tissues and Normal Organs of the Same Host Plant

Edwin G. Beck, *University of Georgia*

Seven leaf galls and one stem gall were examined in this study. The water content of each of the leaf galls was compared with that of the contiguous tissues of the leaf on which it occurred as well as with that of normal leaves from the host plant. The water content of the galls produced by different species of insects varied considerably in water content, but, in all of the cases studied, it was higher than that of the contiguous tissues or the normal leaves of the host plant. In all but one of the host plants, the leaf tissues adjacent to the gall contained more water than did the uninfected leaves from the same plant. A similar study was made of the *Solidago* stem gall caused by the larva of *Gnorimoschema gallaesolidaginis* in which the water content of the galls was compared with that of the stem segments above and below them. It was found that the galls had a greater water content than the stems.

Studies of the Winter Fauna of a Small Artificial Lake, Altitude 2400 Feet, Under Natural and Artificial Conditions: Temperature Changes*

E. H. Behre, Emese Soos, M. E. Styles, Ann Beddingfield, Barbara Riddle, and Piroska Soos,
Louisiana State University

Several species of trichopteran larvae, two of crayfish, one of frog tadpole, and one of salamander were studied; and incidental observations were made on other winter forms. Included were experiments on the effect of indoor temperatures on these species. Outdoor temperatures ranged from freezing (low) to 50 Fahrenheit; indoor temperatures, between 65 and 70.

Indoor temperatures speed up all processes studied. Trichopteran larvae build more rapidly, both initially and after damage or destruction of nests. Tadpoles not usually altering visibly here in the early or midwinter show measurable changes in body proportions, tail length (shortening) and leg length (increase). Tadpoles, salamanders, even crayfish, become very restless when kept indoors. The vertebrates feed vigorously indoors, hardly at all outdoors. Induced wounds heal, and operated appendages regenerate much more rapidly indoors than in outdoor temperatures. How much of this last effect is directly correlated with the amount of food consumed is still to be determined.

Chromosome Numbers in *Eryngium* Species of the Southern United States

C. Ritchie Bell, *University of North Carolina*

Among the species of the umbelliferous genus *Eryngium* which are native to the southern United States, diploid and aneuploid plants are found to represent equal numbers of species while plants of only one species are found to be polyploid. Similar aneuploid series are found in different phylogenetic lines and thus must have had independent origins.

Sub-lethal Effects of Co-60 Gamma Radiation on *Entosiphon sulcatum*

CARRIE F. BENNETT, *University of Florida*

The saprozoic colorless flagellate, *Entosiphon sulcatum*, was exposed to various dosages of gamma radiation using a Co-60 irradiating source. After observing no detectable morphological sub-lethal effects, division rates were studied. Seventy-two lines of irradiated isolates were examined daily for a duration of 50 generations and no striking drop in the division rate occurred. It seems that either the organisms are killed or they are not affected. Culture methods, graphs and charts on data for the experiments are available information contained in the paper.

Further Observations on the Structure of the Cyst of *Neoechinorhynchus cylindratus*

BURTON J. BOGITSH, *Georgia Southern College*

Cysts of juvenile forms of the acanthocephalan *N. cylindratus* were subjected to various histochemical and histological techniques. The evidence accumulated indicates that the cyst wall is made up of two portions, an inner connective tissue layer and an outer cellular layer. The outer, cellular layer is chemically different from the inner layer as well as from the surrounding cells of the host's liver.

Some Little-known Protozoa from Rock-pools of the Bald Knob, on Salt Pond Mountain, Virginia

EUGENE C. BOVEE, *University of Florida*

From water samples collected from rainwater pools on barren granitic rock at the Bald Knob, at the summit of Salt Pond Mountain, Giles County, Virginia, over 30 species of protozoan organisms were identified to genus or to species. The collections were made August 20, 1959, water temperature in the pools being 71° F. Amongst those identified were the green flagellates *Chloromeson* sp., *Olithodiscus luteus, Gonyostomum latum, Chlamydomonas* sp., *Haematococcus pluvialis, Stephanosphaera pluvialis, Mallomonas* sp., *Cryptomonas obvoidea*, and *Cryptomonas erosa*; the colorless flagellates *Astasia* sp., *Bodo minimus, Bodo variabilis, Bodo ovatus, Phyllomitus amylophagus*, and *Tetramitus decissus;* holotrichous ciliates *Spathidium muscicola, Enchelys pupa, Tetrahymena* sp., and *Colpoda* sp.; spirotrichous ciliates *Metopus* sp., and *Pleurotricha* sp.; suctorian *Podophyra* sp.; shelled amebas *Lesquereusia* sp., *Heleopora rosea, Crytodifflugia* sp., and *Gromia* sp.; and naked amebas *Hartmannella* sp., *Mayorella* sp., *Acanthamoeba hyalina, Thecamoeba striata*, and *Mastigamoeba* sp. Special attention will be directed to the green algae *Haematococcus pluvialis* and *Stephanosphaera pluvialis;* and to the ciliate, *Pleurotricha* sp.; because the two algae are found only in rock-pools at high altitudes or cold latitudes, and the ciliate is perhaps a new species, and is perhaps found only in such pools.

Patterns of Oxidative Enzyme Formation in the Bruchid (Coleoptera) Embryo During Early Development*

ALFRED BRAUER, *University of Kentucky*

In previous studies physiological patterns of development in early stages of the bruchid embryo have been studied through their differential susceptibility and recovery after treatment with such agents as KCN., phynylalanine, tyrosine, and Ultraviolet irradiation. The susceptibility patterns for the first three are very similar in that treatment during hours 1 to 7, results in reduplication (twinning), or at least in partial duplicity of the primary axis. In hours 7 to 12, treatment produced great elongation of embryos but no duplicity. Treatment at 12 to 16 hours again has its particular pattern. Ultraviolet irradiation in measured doses is likewise differentially effective in modifying development but for this the patterns differ somewhat from those of the solutions.

The modifications are analyzed in terms of appearance and distribution of the oxydative enzymes glutathione and cytochrome oxydase which are set forth in this study. The conclusion is drawn that the enumerated effects are due directly, and/or indirectly, by incapacitation of the oxydative mechanism. Ultraviolet has the double possibility of acting through this mechanism or by its direct effect on the chromosomes, notably DNA.

What is *Riccia fluitans* L.?

RUTH SCHORNHERST BREEN,
Florida State University

Finding what is usually known as *Riccia fluitans* with sporophytes on both free floating and stranded thalli has raised the question as to the identity of this liverwort. K. Müller (1940) stated that *R. fluitans* is always sterile, while stranded fertile plants represent a distinct species, *R. canaliculata* Hoffman. In October of 1959 abundant fertile material of the following was found in Wakulla County, Florida: (1) floating, (2) submerged and attached to the soil under some six inches of water, and (3) attached to moist soil. Observations have been made of the plants at this station at frequent intervals since its discovery. There seems to be no reason to doubt that all these forms, growing in an area about 200' x 25', are the same organism, merely showing response to a fluctuating water situation. Certain morphological differences are noted between the Florida material and previously published figures and descriptions.

Relationships Between Sparing and Inhibition in a Tryptophan-Deficient Mutant of *Neurospora crassa**

H. E. BROCKMAN and A. GIB DEBUSK,
Florida State University

Certain naturally occurring amino acids inhibit utilization of the required amino acid competitively in a tyrosine-deficient (DeBusk and Wagner, 1953) and in a phenylalanine-deficient (Brockman, DeBusk, and Wagner, 1959) mutant of *Neurospora crassa*. Similar inhibition studies have been extended to a third mutant, FS-108, which requires either indole or tryptophan for growth. Fourteen natural amino acids were found to inhibit competitively the utilization of tryptophan for growth in FS-108, but growth of the mutant was stimulated by the inhibitory amino acids when they were present in concentrations below those needed for inhibition. Added amino acids neither inhibited nor spared growth of the mutant in the presence of indole. Results of growth assays and tryptophan uptake studies support the conclusion that amino acids elicit both the sparing and the inhibition response by interfering with tryptophan uptake into the cell.

Effects of IAA and 2, 4, 6-T on Timothy Root Growth

ROBERT T. BRUMFIELD, *Longwood College* and *Oak Ridge National Laboratory*[1]

When the primary roots of timothy (*Phleum pratense*) seedlings germinated in moist air are immersed in water, a colorless, transparent, gelatinous substance swells out from the root cap and the distal portion of the meristem. RNase dissolves the substance and the process is inhibited by the presence of IAA and stimulated by 2, 4, 6-trichlorophenoxyacetic acid (2, 4, 6-T). IAA inhibits growth but does not alter the geotropic response or the growth effects of UV. Geotropism and growth effects of UV are inhibited by 2, 4, 6-T which also stimulates growth. The absorbance of water extracts of root tips bearing the gelatinous substance is high at 210 mμ, low at 240 mμ, with a "bulge" at 260 mμ. Extracts in 10^{-4} M IAA exhibit a sharp peak at *ca.* 227 mμ indicating the formation of a new complex. Extracts in 10^{-4} M 2,4,6-T show a new peak at *ca.* 224 mμ. When roots treated with IAA are exposed to UV, the absorbance of water extracts at 227 mμ varies with the UV dose. With 2, 4, 6-T, which inhibits the growth effects of UV, the absorbance at 224 mμ is not affected by UV. The peak at 227 mμ is higher in successive extracts in IAA while the peak at 244 mμ is lower in successive extracts in 2, 4, 6-T. Thus it appears that the two compounds form complexes with different components of the mixture.

[1]Work supported by the National Science Foundation and The Atomic Energy Commission.

A Critique of Gause's Experiments on the Destruction of One Species by Another*

W. D. BURBANCK and JAMES D. EISEN, *Emory University*

In Gause's *Didinium-Paramecium* experiments which attempted to produce predator-prey oscillations in laboratory cultures, the didinia died regularly after 3-4 days regardless of how many paramecia were present. This atypical death of the didinia necessitated "immigrations" of *Didinium* to complete the cyclic predator-prey oscillations. It is our intention to explain the death rather than the cyclic phenomenon and typical encystment of *Didinium.*

In our experiments, sterile *D. nasutum* were fed starved *P. aurelia* and paramecia which had been grown on monofloral cultures of five different bacterial species and a mixed culture of wild bacteria. After several generations, produced in 3-4 days, all didinia except those on wild-bacteria-fed paramecia yielded aberrant forms and died. It is suggested that the statistically different fission rates and subsequent death of didinia were due to nutritional deficiencies in the monoflorally-fed paramecia. A *Didinium* requirement, perhaps dipeptidase, may be lacking or insufficient in the monoflorally-fed or starved paramecia, but present in paramecia grown on a mixed bacterial culture. The inadequacy of paramecia fed on a monofloral culture of *Bacillus pyocyaneus* or *B. subtilis* as used by Gause may have accounted for the death of *Didinium* rather than cyclic oscillations of *Didinium-Paramecium* populations and eventual encystment of the didinia.

An Evaluation of Three Hybrid-containing Oak Populations on the North Carolina Coast*

CARL JOHN BURK, *University of North Carolina*

Three populations containing both hybrids and typical specimens of *Quercus phellos* L., *Q. nigra* L., and *Q. laurifolia* Michx. were found on barrier islands at Nagshead, Buxton, and on Bogue Barrier, North Carolina. These populations appeared to occupy a definite successional niche, replacing the salt-spray resistant dominants of the maritime forest, *Quercus virginiana* and *Juniperus*, outside the immediate influence of salt spray, as precursors of an open-canopied, rather mesic "coastal forest" in which they, in association with *Pinus taeda, Quercus falcata, Liquidambar,* and several species of *Carya,* formed a major part of the canopy.

A comparison of specimens taken from the hybrid-containing populations, by the use of Anderson's hybrid index, with specimens of *Q. phellos* and *Q. nigra* taken from the North Carolina piedmont, revealed that the entire range of variation found in the coastal populations, including specimens referable to *Q. laurifolia,* was no greater than that which could be expected from a cross between *Q. phellos* and *Q. nigra,* allowing for segregation and backcrossing with either parent.

A Preliminary Report on some Aspects of the Autecology of *Helenium amarum* (Raf.) H. Rock*

DONALD CAPLENOR, LUCILLE PILLOW, WILLIAM RUSHING and DAVID WEAVER, *Millsaps College*

A program of autecological research dealing with the species *Helenium amarum* (Raf.) H. Rock was initiated by the senior author in the summer of 1959 and has continued through the school year, 1959-1960, under the impetus of the NSF Undergraduate Research Participation Program. Specific phases of the research have been concerned with gross light requirements, requirements for seed germination, and photoperiodic responses.

The species has been found to have a relatively high gross light requirement, especially in seedling stages, but outdoor experiments carried on during the winter of 1959-1960 indicate that the general protection afforded by shading devices may more than offset the effect of shading itself. Germination experiments have shown that the seeds require a short exposure (30 min. or less) to a temperature slightly below 70 degrees F. for germination to occur, and that, after such induction germination is inhibited by a constant temperature of 85 degrees F. or higher. *H. amarum* is a long-day plant, growing throughout the winter in rosette form, and being induced to produce a vertical stem when length of day reaches 13 hours (depending somewhat upon maturity of the plant). Rate of growth of the rosette is also dependent upon length of day. Under present conditions of research, potassium salt of gibberelic acid will substitute for long light period in inducing the production of the vertical shoot.

The Stage of the Female Germ Cell at Fertilization in Relation to Natural Selection*

J. GORDON CARLSON, *The University of Tennessee*

In nearly all animals, if those about which we have information constitute a random sample, fertilization involves a female germ cell that has not

completed meiosis and that usually lacks the capacity to complete meiosis until fertilization has occurred. The particular meiotic stage that the female germ cell attains before it is fertilizable, and beyond which it will not normally proceed until fertilized, differs from species to species but appears to be constant for a given species. If it is assumed that this is a species characteristic that has become established, not by chance, but through natural selection, how might it have survival value? Among the possibilities are: (1) decrease in the time between the completion of meiosis in the female and the beginning of cleavage, (2) decrease in the length of time the eggs need to be retained in the body of the female, (3) simultaneous development and hatching of all the eggs laid at one time by a single female, and (4) protection of the ovum or the secondary oocyte and ovum from the cell lethal effects of recessive lethal genes.

Studies on the Role of Wild Yeasts in Fluctuating Populations of *Drosophila*

JOHN M. CARPENTER, *University of Kentucky*

Drosophila species are commonly known to be yeast feeders. Studies to investigate the feeding habits of the naturally occurring *Drosophila* species, *affinis*, *putrida*, and *robusta* indicate that they feed on 26 yeast species in 10 genera, as indicated by weekly analyses of crop contents. However, 7 yeast species represented 87% of the crop isolates. All yeast species were found consistently throughout the collecting period (May through October), although two, *Pichia fermentans* and *P. membranfaciens*, appeared to show a seasonal preference in growth. Preliminary studies indicate a possible seasonal correlation of certain of these *Drosophila* species with certain yeast species.

Age and Development of Coastal Marshes in Southwestern Louisiana*

JAMES L. CHAMBERLAIN,
Randolph-Macon Woman's College

A series of ridges paralleling the coastline provided an opportunity to interpret development of adjacent marshlands. The marsh area inland of the present beach shows distinct zonation of vegetation whereas marshes further inland do not exhibit such an arrangement. Carbon-14 dating of shell material from the ridges (cheniers) was used to indicate the interval of time during which various marshes developed. The oldest marsh began formation about 2800 years ago; the youngest marsh began formation only 1175 years ago. A vegetational sequence in relation to events in chenier formation is discussed.

The Chromosomes of *Iris verna*

R. B. CHANNELL, *Vanderbilt University*

Iris verna L. consists of two morphologic-taxonomic varieties: Var. *verna* occurs on the Atlantic and Gulf Coastal Plain, being represented to some extent also in adjacent provinces; var. *Smalliana* Fernald occurs in the uplands of the Appalachian system. Comparisons were made of mitotic chromosome number and morphology as a possible source of evidence for the evolutionary relationship and derivation of these two taxa.

A Study of the Sickling Phenomenon*

ANNA L. CHERRIE, *Loyola University*

Sickle Cell Anemia (SCA) and Sickle Cell Thalassemia (trait) are diseases associated with the pressure of abnormal hemoglobins and are thought to be the consequence of the inheritance of a genetic trait. No relationship linking the presence of S-hemoglobin with a particular blood group or Rh factor has been shown in the literature; nor is it believed that the sex has a prominent bearing on its presence. The incidence is high in younger years and the survival rate is low, above the age of fifteen years.

Hematological and electrophoretical studies are presented on one hundred and thiry-four blood samples on Negro students of a southern college population. The relationship of age, sex, blood group and Rh factor to the S-hemoglobin incidence is discussed.

Hemoglobin-S appears to be related in incidence to blood group AB and perhaps in lesser degree to blood group O. No such affinity is shown to blood group A or B.

Colchicine Induction of Polyploidy in *Rhodobryum roseum* (Weis.) Limpr. and *Bryum nitens* Hedw.

NARINDER CHOPRA, *University of Tennessee*

The spores and gametophores of *Rhodobryum roseum* (Weis.) Limpr. and *Bryum nitens* Hedw. were treated with colchicine solution: .0001 ppm, .001 ppm, .01 ppm, 1 ppm, 10 ppm, 50 ppm for 8 hours before sowing on sterilized tap water, ½ normal strength of knops solution, neutral agar, sucrose agar. The spores treated with a colchicine solution, a concentration of 50 ppm, did not germinate and the gametophores also did not show any sign of regeneration in any of the culture media. The other colchicine solutions of less concentration did not inhibit spore germination or gametophore regeneration. Two and a half months were required from spore germination to gametophore formation, but only a month was required for the completion of regeneration process. Concentrations of .01, 1 ppm, 10 ppm of colchicine solution induced polyploidy in both *Rhodobryum roseum* and *Bryum nitens* as 20 chromosomes were counted in aceto-carmine apex squashes of the gametophores, while the lower concentrations of .0001 ppm, .001 ppm of colchicine solution did not have any effect as 10 chromosomes were counted in aceto-carmine apex squashes of the gametophore in both *Rhodobryum roseum* and *Bryum nitens* and the same number, n=10 was reported earlier in both *Rhodobryum roseum* (Chopra 1957) and *Bryum nitens* (Pande and Chopra 1959).

Cytological Studies in Genus *Fissidens*

NARINDER CHOPRA, *University of Tennessee*

Fissidens is a large moss genus composed of nearly 700 species of which only ten species have been cytologically investigated. The cytology of seven other species of *Fissidens* are here reported: *F. grandifrons* Brid. (n=16), *F. minutulus* Sull. (n=5), *F. obtusifolius* Wils. (n=6), *F. osmundioides* Hedw. (n=16), *F. polypodioides* Hedw. (n=16), *F. subbasilaris* Hedw. (n=8) and *F. taxifolius* Hedw. (n=12).

The Genus *Entocythere*, an Ostracod Epizooic on Crayfishes

EDWARD A. CRAWFORD, JR., *Erskine College*

Insofar as is known the entire life cycle of these organisms is spent on the body of the host. This apparently is an obligate association. In no instance has there been demonstrated any degree of "host specificity". This genus appears to be limited in its distribution to the continent of North America and neighboring islands. So meager is the knowledge of their biology, that not even the feeding habits or the range of a single species has been determined. During the course of a study of this genus in Richland County, South Carolina, five new species were encountered and described. Only one of the species was found in all types of habitats investigated, the remaining four showing more precise ecological preference. A brief summary of the morphology of these new species is presented along with a resume of the known natural history of the group.

An Axenic Culture of *Puccinia malvacearum**

VICTOR M. CUTTER, JR.,
The Woman's College, University of North Carolina

During experiments on the growth of *Puccinia malvacearum* in tissue cultures of *Althea rosea* a fungus was isolated which, in general appearance and behavior, resembled strains of *Gymnosporangium* and *Uromyces* previously isolated in axenic culture. After several transfers on synthetic media in the absence of host cells this fungus proved capable of infecting tissue cultures of *Althea* and forming rust sori containing viable teliospores indistinguishable from those of *P. malvacearum*. On Gautheret's medium the isolated fungus formed very slow growing, pale tan, rugose colonies with uninucleate mycelial cells. Unlike other strains of plant rusts isolated by this technique which always developed directly from intercellular mycelium in the host tissue this fungus was obtained from a colony which formed on the culture medium at some distance from the infected host tissue mass and showed no direct mycelial connection with the host cells. Evidence is presented to show that this culture probably resulted from the direct germination of a basidiospore of the rust. This strain was maintained for four months in axenic culture on synthetic media after which transfers failed to grow. Further attempts to obtain axenic cultures of *P. malvacearum* by the direct germination of basidiospores have been unsuccessful to date.

A New Species of *Macravestibulum* (Trematoda: Pronocephalidae) from the Florida Terrapin

RAYMOND T. DAMIAN, *Florida State University*

Two specimens of a pronocephalid fluke were recovered from the small intestine of a turtle, *Pseudemys floridana* (Le Conte), taken from the St. Mark's River in Northern Florida. These trematodes appear to represent a new species in the genus *Macravestibulum* Mackin, 1930. This genus is unique in its possession of a large, posterior, bifurcated, eversible vestibular cavity connecting the excretory bladder proper with the exterior. The present species is similar to *M. kepneri* Jones, Mounts, and Wolcott, 1945 and *M. obtusicaudum* Mackin, 1930 in having accessory vesicles and ducts in the cirrus pouch. It differs from *M. obtusicaudum* chiefly in details in the structure of the cirrus pouch and in the possession of a well-defined pore connecting the excretory bladder and the vestibular cavity. It is distinguished from *M. kepneri* by the presence of a well-developed Laurer's canal, body shape, and details in the structure of the cirrus pouch. It differs from *M. eversum* Hsu, 1937 mainly in body shape, size, possession of accessory ducts in the cirrus pouch, and lack of a heavily muscularized metraterm.

Changes in Dominance in Old Field Succession under Gamma Radiation*

CHARLES P. DANIEL, *Emory University*

Old field succession communities of the first and second year after abandonment, were transplanted to wooden boxes 18 feet long and 3 feet wide. Each box with respective community was placed with one end 4 feet from a Co^{60} gamma radiation source. Chronic radiation was maintained during the spring and early summer during the period of growth and maturity. A gradient of radiation of from 5,000 r to 130,000 r was given as a total dose. Relative biomass was used to determine dominancy. In first year succession the dominants were *Oenothera lasciniata, Erigeron canadensis, Digitaria sanguinalis,* and *Ambrosia artemisiifolia.* All dominants were adversely affected by radiation. In proximity to the source *Digitaria* dominated, while *Erigeron* showed a definite decline. *Ambrosia* showed marked damage close to the source, and where damage was severe, died in late summer during the recovery period. *Oenothera,* while growing well in all areas of radiation, had reduced flower production with increased radiation. In the second year of succession, *Aster pilosa* dominated in the entire gradient of radiation, but showed fasciation and stunting with no flowers close to source.

Floristic Changes on White Oak Lake Bed 1956-1959

H. R. DESELM and R. E. SHANKS,
University of Tennessee

Collection of plant taxa on White Oak Lake Bed began in 1956 following its emergence after lake drainage and has continued in each growing season since. Each year the cumulative flora increases in number although the annual totals in 1958 and 1959 are the same. Percentage increases in numbers of woody taxa, shrubs, and climbers are evident while the herb percentage decreases. Non-indigenous taxa are increasing in numbers at a rate proportional to the logarithm of the total cumulative flora. The proportion of taxa whose propogules are animal disseminated are apparently increasing with time.

Differentiation of the Toads *Bufo valliceps, Bufo fowleri* and Their Natural Hybrid by Electrophoresis of Blood Proteins[1]*

HERBERT C. DESSAUER, WADE FOX,
Louisiana State University School of Medicine,
and E. PETER VOLPE, *Newcomb College,*
Tulane University

Paper electrophoresis of plasma revealed that the two species of *Bufo* and their naturally occurring hybrid could be differentiated by patterns of their

fast moving protein fractions (i. e. migrated faster than human B-globulins). These included two major fractions in both species. In *valliceps* these fractions were resolved less clearly and the lead fraction migrated slower than that of *fowleri*. The second fraction was of high concentration in both species but was broader in *valliceps*. The pattern of the hybrid appeared to be a poorly resolved composite of the parent patterns. By use of starch gel electrophoresis a clearer differentiation between the species was obtained. The lead fraction of *fowleri* again migrated faster than that of *valliceps*. The hybrid lead fraction overlapped the positions of that of the two parental species. Protein present in the fraction which migrated second on paper resolved into three narrow bands on starch gel. In *valliceps* all three bands were pronounced, in *fowleri* only the middle of these three bands was pronounced, and the hybrid pattern was variable. The hemoglobin of *valliceps* migrated faster on paper than that of *fowleri*. Hemoglobin of the hybrid appeared to be a mixture of hemoglobins of the parents.

[1]Supported in part by the National Science Foundation.

The Induction of Position Effect Lethals in *Drosophila* by X Rays*

C. W. Edington and J. D. Regan,
Florida State University

Position effects have been shown to be associated with chromosome aberrations in which one break of the aberration is in heterochromatin. In some cases, the expression of position effects can be suppressed by the addition of extra heterochromatin to the chromosome complement. In other position effects the expression may be enhanced by addition of extra heterochromatin. It has been known for some time that some recessive lethals may have their lethal expression suppressed by addition of an extra Y chromosome; however, no effort was ever made to measure the frequency with which such genetic changes were induced by radiation. Using a modified Muller-5 technique (Lindsley and Edington, 1957) it has been possible to recover sex-linked recessive lethals normally detected in lethal experiments and in addition to recover exceptional lethals (lethals that behave as position effects) that by the usual techniques have been discarded as non-lethals. Evidence to be presented will, for the first time, provide information concerning the frequency of total sex-linked recessive lethals induced by different doses of X rays. It will also be shown that the exceptional lethals recovered in these experiments behave as position effect lethals.

Differentiation of Chromatophorotropins and Retinal Pigment Light-adapting Hormone from the Eyestalk of the Dwarf Crayfish, *Cambarellus shufeldti**

Milton Fingerman and William C. Mobberly, Jr.,
Newcomb College of Tulane University

The eyestalks of *Cambarellus* contain chromatophorotropins for dispersing and concentrating red pigment as well as a hormone that causes light-adaptation of the distal retinal pigment. One of these chromatophorotropins and the light-adapting hormone could presumably be the same substance. The object of this investigation was to learn if these substances could be differentiated. Filter paper electrophoresis revealed that at pH 7.5-7.8 the pigment-dispersing hormone and the light-adapting substance were electropositive whereas the pigment-concentrating hormone was electronegative and, therefore, must be different from the retinal pigment activator. In this pH range the pigment dispersing hormone and the light-adapting substance were electrophoretically indistinguishable. However, when electrophoresis was performed at pH 9.0 the charge on some of the molecules of red pigment-dispersing hormone reversed with the result that some of this substance was found on the anodal portion of the filter paper strip. However, no significant quantity of light-adapting material had become electronegative. The only conclusion one can arrive at, therefore, is that the light-adapting hormone is not the same as either of the chromatophorotropins in the eyestalk.

This investigation was supported by Grant No. B-838 from the National Institutes of Health.

Nucleolar Activity in the Megasporocyte of *Lilium**

Franklin F. Flint,
Randolph-Macon Woman's College

In the megasporocyte there are initiated several small nucleoli which soon coalesce into a single large one. From this large nucleolus extrusions emerge which are of two kinds, an homogeneous substance and a small globular body. It seems probable that it is only after coalescence of all nucleolar elements within a cell that the extrusions are produced. The small globule stains well with safranin during extrusion but within the nucleoplasm it gradually disappears. Therefore it is presently not known whether only one body is formed or whether several are formed at various intervals of time. Concurrently with this extrusion or soon thereafter the nucleolus shows an invagination on one side. This invagination seems likely to be only the result of the extrusion of a certain amount of the contents of the nucleolus, leaving it in a more or less collapsed condition. It probably has no specific function unless it in some way is a factor in the extrusion process. The function of the extruded globule(s) cannot be stated with any certainty although it is released from the nucleolus just as the chromosomes are becoming distinct for Meiosis I, hence this timing may be a factor in determining its role.

Electromigration Properties of Mammalian Hemoglobins as Taxonomic Criteria*

Charles Foreman, *Pfeiffer College*

Results are presented of electrophoretic analyses of the hemoglobins of 161 individuals representing 21 species of mammals chosen carefully so that distantly related species might be compared with closely related ones. The following conclusions are demonstrated and discussed. 1. Individuals of the same species may, with very few exceptions, exhibit characteristic hemoglobin ionograms that do not vary appreciably even though these individuals are taken from collecting stations separated by hundreds of miles. 2. Closely related species usually show striking similarities of hemoglobin electrophoretic patterns, while distantly related species may or may not show such similarities. 3. Since it is shown that member species of a single genus may often be readily distinguished by definite, though slight, differences between the electromigration properties of

their hemoglobins, it is proposed that hemoglobin ionograms may sometimes serve as useful taxonomic criteria with which to identify species that are morphologically very similar. 4. Somewhat rarely certain individuals may show hemoglobin ionograms that are markedly atypical for their species. 5. By comparing the hemoglobin ionograms of nine of the above species with the oxygen dissociation curves that the author had previously established, it was concluded that no correlation exists between hemoglobin electromigration properties and oxygen affinity.

Differentiation of Transplanted Pancreatic Rudiments*

B. E. Frye, *University of Virginia*

The dorsal and the (single) ventral pancreatic rudiments of young larvae of *Ambystoma punctatum* have been transplanted independently to heterotopic sites in host larvae of the same species. The rudiments are dissected from the larvae (Harrison's stages 41 - 43) into Urodele operating solution, freed of adherring tissue and transplanted onto the posterior level of the yolk mass (intracoelomically) by means of a Spemann-type mouth pipette. The stage of transplantation precedes differentiation of the pancreatic cells into recognizable histological components. In this series of experiments hosts were of the same stage as the donors. Under these conditions the dorsal rudiments usually differentiate into recognizable pancreatic tissue containing ducts (which often open into the colon), centroacinar cells, acini and islets of Langerhans. The better cases are histologically indistinguishable from the normal host dorsal pancreas. Grafts of the ventral rudiment likewise differentiate into recognizable pancreatic tissue, but islet tissue is never present. The grafts have only slight — probably insignificant — effects upon the growth and size of the host pancreas.

Live-trap Induced Stress in *Sigmodon Hispidus*

Frank B. Golley, *University of Georgia*

Ecologists commonly use live-traps to determine mammal population density, assuming that trapping does not alter the behavior or physiology of the captive animal. The hypothesis tested here is that live-trapping induces stress in the captive cotton rat. The activity of the adrenal cortex is a measure of stress conditions. Weight of the fresh adrenal gland, width of the *zona fasciculata*, and intensity of staining in adrenal sections stained with Sudan III were used to indicate adrenal activity. It was found that (1) the weight of adrenals from live-trapped *Sigmodon* were higher than those from non-live-trapped *Sigmodon*. (2) The width of the *zona fasciculata* was greater in adrenals of trapped animals. And (3), adrenal sections stained with Sudan III were darker, indicating more steroid hormone, in trapped rats. The combined evidence supports the hypothesis that live-trapping induces stress in the cotton rat.

Activity Suppression in the Golden Hamster (*Cricetus auratus*) caused by *Trichinella spiralis* Infection

Chauncey G. Goodchild and Dirk Frankenberg, *Emory University*

Trichinella spiralis is a nematode parasite which encysts in the muscles of the infected host. It appears that such encystment must result in the impairment of muscle action. The object of this experiment was to test the effect of varying doses of *Trichinella spiralis* infection on the work capacity of golden hamsters (*Cricetus auratus*). To this end a device was designed in which the activity of the animals could be measured, by an hourly recording of the number of revolutions made by an exercise wheel. This device had the advantage of allowing the animals to exercise only as much as they desired. A total of 14 hamsters were run for 3 periods of 24 hours each on two machines. This served both to train the animals and to compile control data. The group was then halved according to the machine upon which each had run. Six animals were selected randomly, 3 from each half; five of these were infected with *T. spiralis* juveniles *per os*, in doses ranging from 75 to 600 per animal; the sixth served as a control.

Preliminary experiments showed that a significant decrease in activity occurred. Further experiments, now in progress, should elucidate the nature of this decrease.

Surface Antigen Dynamics in the Slime Mold, *Dictyostelium discoideum*

James H. Gregg, *University of Florida*

Methods are described whereby antigenic material of the slime mold, *D. discoideum*, effective in antibody production is prepared. Such antisera produced in response to migrating pseudoplasmodia, mature spores and mature spore surface antigens effected maximal agglutination of amoebae. Such antisera effected only minimal agglutination of spores. Absorption of the various types of antisera with amoebae and spores revealed the presence of a surface antigen(s) on the spores which could not be detected on amoebae from early aggregates or migrating pseudoplasmodia. It has been observed that spore cells have poor adhesion to each other as compared to the adhesion between the amoebae composing a migrating pseudoplasmodia. It has been suggested, therefore, that a relationship exists between the adhesive properties of the amoebae and the spores and their agglutinating properties in the presence of antisera.

Some Factors Affecting Zoosporogenesis in Five Chlorococcacean Algae

Kenneth F. Hancock, *University of Alabama*

The production of motile cells by *Neochloris gelatinosa* Herndon, *N. terrestris* Herndon, *Chlorococcum echinozygotum* Starr, *C. hypnosporum* Starr, and *Bracteococcus minor* (Chodat) Petrova has been studied in culture. The lower pH limits for zoosporogenesis were between 3.4 and 3.8 in all cases; the upper limits were above 8.9. Upon transfer from stationary cultures, zoospores were produced in distilled water and in NaCl solutions with osmotic concentrations up to between 1/40 and 1/10 molar. Actively growing cultures 20 to 40 days old gave zoospore percentages equal to those of older stationary cultures. Cultures grown in liquid media gave percentages comparable to those grown on agar slants. Cells from stationary liquid cultures transferred to their centrifugate diluted with distilled water in a graded series yielded a sharply graded series of zoospore percentages in *C. hypnosporum* and *N. terrestris* and a less sharply graded series in the others. A high percentage of zoospores was obtained from cultures grown in media having various equivalent nitrogen sources except in those having

the ammonium ion, but reduction of the concentration of the ammonium ion to ½ the basal medium gave comparable numbers of motile cells. Large numbers of zoospores were obtained from cultures having macromineral deficiencies.

Typifying Species*

ROLAND M. HARPER, *University of Alabama*

Many species of plants (and animals) are so variable, or their original descriptions so indefinite, that it is hard to decide just what is a typical specimen. Some old descriptions are broad enough to cover two or more species as now understood, and when different parts of the aggregate were split off and given new names, it was formerly customary to retain the old name for whatever was left, though that in some cases might be something quite different from the conception of the original describer.

In recent years this problem has often been met by designating a particular specimen, such as the one first collected, as type, and comparing all the others with it. But that was not entirely satisfactory, for often the type specimen is unknown or no longer in existence. And even when readily accessible, it may lack some parts later found to be essential for distinguishing it from closely related forms, such as roots, lower leaves, or fruit.

Occasionally a good type specimen is wrongly labeled, or its locality is not specified, so that the author may attribute it to a locality where the species is unknown, which could be confusing.

The Fresh-water Shrimps of Jamaica, W. I.*

C. W. HART, JR., *The Academy of Natural Sciences of Philadelphia*

Fresh-water shrimps of the families Atyidae and Palaemonidae were collected extensively in Jamaica during April, 1959, and January, 1960. This paper summarizes the work-in-progress on their taxonomy and distribution. The study was supported in part by the American Philosophical Society (grant no. 2623 from the Penrose Fund) and was carried out in cooperation with the Institute of Jamaica, Kingston.

Is Sea-oats Sterile?

FLETCHER D. HARVEY, III and HARRIS OLIVER YATES, *Vanderbilt University*

Uniola paniculata L. is regarded as a sterile species, although it is known ecologically as a pioneer on coarse sand dunes of the South Atlantic and Gulf Coasts. This paper consists of a report of the results obtained in preliminary investigations designed to clarify this matter.

A New Technique for Dissecting the Endosperm and Embryo from Seeds of *Ilex opaca* Ait.

J. M. HERR, JR., *University of South Carolina*

The preparation of serial sections from whole seeds has proved somewhat inadequate for the study of embryogeny in *Ilex opaca* Ait. Stone cells in the apex of the integument surrounded only by parenchyma are easily displaced during sectioning and result in ruinous furrowing of the endosperm and developing embryo. Furthermore, the required longitudinal sections of the embryo cannot be produced at a practical frequency from any specific section plane of the seed. Both difficulties, which obviously interfere with the observations, can be eliminated by removing the endosperm from the seed. Seeds are first treated for approximately forty minutes in basic alcohol (70% ethyl alcohol/2% NaOH) and then are transferred to 70% ethyl alcohol (neutral) for dissection. In seeds so treated, the integument including the lignified area is readily separated from the endosperm. Preparation of the endosperm for longitudinal sections is easily achieved and with practical frequency produces the required longitudinal sections of the embryo.

Whole mounts of young embryos have been prepared by a new technique, *viz.*, the dissection of prestained endosperms embedded in petroleum jelly. The petroleum jelly holds the endosperm in place during dissection and then serves as a semipermanent mounting medium.

Marine Trematode Cercariae from the Apalachee Bay Area*

RHODES B. HOLLIMAN, *Florida State University*

This investigation constitutes the first major effort to study the cercariae of the Gulf of Mexico. The mollusks examined were collected along the coast of Apalachee Bay from St. Marks Lighthouse to St. Teresa, Florida. A total of 69 collections was made from September 1956 to September 1959. A total of 16,577 individual mollusks were examined, encompassing 29 species: 10 species of pelecypods and 19 species of gastropods. From this total, 2622 individuals, or 15.2%, were found infected with trematode larvae. Thirty-one species of cercariae were discovered, of which 28 were studied in detail. Of these, 23 species are new to science. The following families were represented and contained the number of species indicated: 1 cyathocotylid, 1 avian schistosome, 2 aporocotylids, 4 fork-tailed gymnophallids (Fellodistomatidae), 1 tailless gymnophallid, 1 bucephalid, 6 echinostomes, 1 monostome microphallid xiphidiocercaria, 1 plagiorchioid distome xiphidiocercaria, 1 microcercous monorchid, 1 cotylocercous monorchid, 2 cotylocercous opecoelids or allocreadids, 1 leptocercous allocreadid, 3 heterophyids, 1 magnacercous opisthorchioid, and 1 cystophorous hemiurid.

New Genera of Branchiobdellidae

PERRY C. HOLT, *Virginia Polytechnic Institute*

Two newly established genera of branchiobdellids are briefly discussed and diagnostic characters illustrated. Problems of affinities among the genera of the branchiobdellids are posed and the significance of possible solutions of these problems discussed. In this connection, the knowledge, presently being gathered, of geographical distribution of the worms is shown to be of importance.

The Wood Anatomy of *Delopyrum, Dentoceras, Polygonella,* and *Thysanella* (Polygonaceae)

JAMES H. HORTON, *University of North Carolina*

In connection with a monograph of these four genera, a study of their wood anatomy has been undertaken. Plants of these genera share the anatomical peculiarity of branches which appear to be internodal in origin. They are annual or perennial,

suffrutescent or woody, herbs or shrubs. Even the suffrutescent herbs produce considerable amounts of secondary wood. The fourteen species are centered in Florida, but one, *Delopyrum articulatum* (L.) Small occurs as far north as southern Canada; another, *Polygonella americana* (Fisch. and Mey.) Small, ranges west to Texas; and a third, *Polygonella parksii* Cory, is endemic to Texas. In this comparative study, emphasis has been placed on length, length/diameter ratio, and end wall angle of the vessel elements. Structural relationships of stem tissues have also been investigated. Although the vessel elements of all these plants have simple alternate pits and simple perforations, there is considerable variation in the length, width, and end wall angles of vessel elements, even those from a single specimen. Because of this variability, it appears that these anatomical characteristics cannot be brought to bear on the problem of combining or separating these taxonomically confusing species, but they may be suggestive of phylogenetic trends within the group.

Studies on the Balance between Lactic Acid Formation and Pyruvic Acid Oxidation in Normal Platyfish Pigment Cells and Platyfish-Swordtail Hybrid Tumors

DOUGLAS G. HUMM and JANE H. HUMM,
University of North Carolina

One of the basic differences between normal and atypical cells is the capacity of the latter to produce lactic acid in the presence of air. This capacity for aerobic glycolysis, absent in most normal adult tissues is indicative of a fundamental difference in the tumor cells in the glycolytic mechanism. Three possible explanations for the observed difference between tumor and normal cells exist.

1. A quantitative change in the amount of one or more of the glycolytic enzymes.
2. A qualitative change in the activity constants of one or more of the glycolytic enzymes.
3. A factor (such as inorganic phosphate) in the oxidation of pyruvate, nonlimiting in normal cells, becomes limiting in tumor cells.

The experiments reported here are a preliminary series designed to estimate the relative values of the equilibria constants concerned with the conversion of pyruvate to lactate on the one hand and pyruvate to acetyl CO_a on the other in normal and atypical cells obtained from platyfish and tumor bearing swordtail-platyfish hybrids.

The Isolation of the Amino Acid, Canavanine, by Ion Exchange Methods*

GORDON E. HUNT, *The University of Tennessee*
and JOHN F. THOMPSON, *U.S.D.A.*

Thirty years ago Kitagawa discovered canavanine and described a method for its isolation. Since then ion-exchange resins have simplified amino acid preparation; they were used to prepare canavanine in the following manner. 350 g. of Jackbean meal was extracted by shaking for six hours in five times its volume of 75% ethanol. The mixture was allowed to settle and the supernatant decanted. The extraction was repeated two additional times, the supernates pooled, and reduced to 30 ml. volume of syrup. This was neutralized with HCl and placed on a batch prepared column of Dowex-50 (4% X), 200-400 mesh in the ammonium form. The column was 40 by 600 mm. and contained 200 ml. of resin. It was then washed by three times the column volume with distilled water which left only the basic amino acids on the resin. Remaining traces of histidine and other neutrals were removed with a wash of one column volume of N/100 ammonium hydroxide. Three column volumns of N/10 ammonium hydroxide quantitatively removed the canavanine and a quantity of yellow pigment from the resin. The pigment was removed with activated charcoal, a few ml. 0.1 N HCl added, and the decolorized eluate evaporated, first in a Roto-Vac, then *in vacuo* in a desiccator, until white crystals of canavanine chloride precipitated out. These were filtered and washed with cold absolute alcohol. The yield was 0.6%, low compared with literature citations. The low yield may have been due to poor original seed quality.

The Effects of Selected Antibiotics on Pure Cultures of Algae*

EDWARD O. HUNTER, JR. and ILDA MCVEIGH,
Vanderbilt University

A determination was made of the inhibitory effects of actidione, nystatin, amphotericin-A, sulfocidin, and anisomycin, antibiotics, active primarily against fungi, on pure cultures of members of the Myxophyceae, the Chlorophyceae, the Bacillariophyceae, the Xanthophyceae, and the Euglenophyceae. Similar investigations were made of the effects of polymyxin-B sulfate and bacitracin, antibiotics inhibitory to certain bacteria, on the pure cultures of algae. Concentrations of 1.0, 2.0, 20.0, 50.0, 100.0, and 200.0 p.p.m. of each antibiotic were used. Anisomycin, actidione, and nystatin at concentrations up to 200 p.p.m. had little or no detectable effect on the Myxophyceae but were toxic to members of the Chlorophyceae, and the Bacillariophyceae. Thus, these three antibiotics are of potential value as inhibitors of the green algae and diatom contaminants of the Myxophyceae. Of the antibiotics tested, amphotericin-A and sulfocidin were the least toxic to the algae. Hence, these agents may be of value in eliminating fungal contaminants of cultures of algae. Polymyxin-B sulfate and bacitracin were found to be too toxic to the algae to be used as aids in eradicating bacterial contaminants of cultures of algae. Microscopic examination of the algae indicated that various morphological changes accompanied exposure to each of the antibiotics. The principal changes were lysis of vegetative and reproductive cells and bleaching of chloroplasts.

Chromosome Breakage Frequency Induced by 3 r of X Rays in Grasshopper Neuroblasts

CATHERINE C. HYDE and MARY ESTHER GAULDEN,
Biology Division, Oak Ridge National Laboratory

The effects of low doses of radiation can be readily detected in the rapidly and continuously dividing neuroblasts of the grasshopper embryo. The mitotic rate of these cells is temporarily reduced 75% by 3 r and 25% by 1 r of X rays. Chromosome fragments are found in 2% of the neuroblasts after exposure to 3 r of X rays; this represents breakage of 0.1% of the total number of chromosomes treated (males have 23 and females 24 chromosomes in neuroblasts). Chromosome fragments have never been observed in unirradiated neuroblasts. Experiments are now in progress to determine the frequency of chromosome fragments induced by 1 r of X rays.

Measurement of Effect of Synthetic Stimulation on Nasal Blood Shunt*

RICHARD T. JACKSON, *Loyola University* and HUNTER C. LEAKE, III, *Louisiana State University*

If one arouses the sympathetic nervous system of an animal, considerable increases in olfactory acuity can be measured. The increase in acuity coincides with a visible shunting of blood from the ethmoturbinates to large nasal arteries such as the anterior ethmoidal. Measurements were made of the rate and extent of this nasal blood shunt resultant upon electrical stimulation of the cervical sympathetic nerve. A photoelectric cell mounted in the eyepiece of a microscope was the measuring device. The rate of bleaching of the tissue depended upon the strength of stimulation. All strengths of stimulation above threshold evoked a measurable bleaching within 5 seconds. With mild intensities (10 volts, 60 cps) the maximum bleaching was observed in 70-80 seconds. With moderate intensity (30 volts) the peak effect was reached within 50 seconds. The shortest maximum bleaching time was reached within 30-40 seconds. Other workers have shown that olfactory acuity can be affected by mental depression and by the estrous cycle. The authors feel that the increased acuity is probably caused by the impingement of the odorous stimulus upon a relatively untouched receptor field. The reflex is rapid enough to be of some value to the animal in natural situations.

The Origin of Relict and Disjunctive Species in Florida

C. W. JAMES, *University of Georgia*

The presence of relict and disjunctive species in Florida has attracted the attention of botanists since the writings of Croom, Chapman, and Cowles. The typically northern species represented as disjuncts in Florida have generally been assumed to have migrated there during the Pleistocene in response to a lowering of the temperatures and to have since remained in those habitats most nearly providing the conditions of more northerly latitudes. Evidence indicates, however, that a pre-Pleistocene origin for these disjuncts is also possible. The relict species have been postulated to have survived on and since dispersed from an "Orange Island" refugium of Oligocene time. There is no justification for the supposition of such a refugium nor that the origin of such relicts dates prior to late Miocene. There is considerable geological evidence for the existence of land areas in Florida during the Pleistocene. It is suggested that these areas (some of which were insular) have been a major factor in the survival and account of the present day relicts and disjuncts and that they may have also functioned in providing or increasing the effectiveness of isolating mechanisms and as centers of post Pleistocene dispersal of species or segments of species.

The Comparative Anthelmintic Effects of Dithiazanine and Tetrachloroethylene Individually and in Combination

GEOFFREY M. JEFFERY and MARTIN D. YOUNG, *U. S. Public Health Service*

Dithiazanine iodide and tetrachloroethylene were given to five groups of mental patients both alone and combined in varying amounts to determine possible efficacy against hookworm, *Trichuris trichiura* and other helminths of man. Dithiazanine alone, 200 mg. t.i.d. for five days, reduced the *T. trichiura* by 85 per cent with 22 of 43 infections eliminated, but had no effect on the hookworm. Tetrachloroethylene, 1 cc. per day for five days, had no effect on *T. trichiura* and reduced hookworm by only 19 per cent. Combining the two regimens produced no improvement in the effect on *T. trichiura*, but moderately improved the anti-hookworm effect (34 per cent reduction). Comparable combined doses for only one and three days resulted in a proportional decrease in effect against *T. trichiura*, but the effect against hookworm appeared not to decrease greatly. In another test, using the five day regimen of dithiazanine in the treatment of 89 patients, 66 of the *T. trichiura* infections were eliminated. In this group 10 of 35 cases of hookworm were cured. Dithiazanine seems to be an effective drug against *T. trichiura* under conditions prevailing at a mental hospital. Addition of tetrachloroethylene to the regimen does not at present seem justified.

Studies on the Role of Photoperiod on the Termination of Larval Diapause in Various Dipterous Insects*

CHARLES E. JENNER, *University of North Carolina*

Special study has been given to the photoperiodic control of larval diapause in the pitcher-plant midge, *Metriocnemus knabi* (Paris and Jenner, 1959). Further research has given attention to determining the following: (1) the threshold light intensity for this response; this was found to be below .000025 f. c. (2) the critical high temperature range for inhibition of the response; 27.5° C. permitted the response but 30° C. prevented it. (3) The critical short-photoperiod range separating inhibitory short-photoperiods from those even shorter (specifically continuous darkness) which are inductive; photoperiods of 5 and 15 minutes per day were equivalent in effect to total darkness but a 3-hour photoperiod simulated a non-inductive photoperiod of 11 hours; results on a 1-hour photoperiod were intermediate.

Larval diapause in the exceedingly large 4th. stage larva of *Megarhinus septentrionalis* has also been shown to be controlled by daylength. The critical range for the response lies between 12 and 13 hours; 6 to 9 consecutive inductive cycles are required for pupation; food was shown not to be critical; the threshold light intensity for the response also seems to be exceedingly low. Other experiments have demonstrated photoperiodism in the pitcher-plant mosquito *Wyeomyia smithii*, *Aedes triseriatus*, and in a species of the family Ceratopogonidae.

Swift Tapeworms: the Genus *Notopentorchis* Burt in Ceylonese and American Trochilids*

ARTHUR W. JONES, *University of Tennessee*

Specimens of a tapeworm, probably representing a new species of *Notopentorchis*, were recovered from one of three immature chimney swifts in Knoxville, Tennessee. This genus, originally erected for certain tapeworms of the edible-nest swiftlet, *Collocalia unicolor*, in Ceylon, has apparently not been reported heretofore in North America. The hypothesis of cestode speciation by host-determined isolation receives additional support from this occurrence.

Behavior of the Spindle Body in Neuroblasts of the Grasshopper, *Chortophaga viridifasciata* (De Geer)*

KEN-YA KAWAMURA, *University of Tennessee*

From measurements of the drawings of neuroblasts fixed in picro-formal-acetic solution and stained with mercuric bromphenol blue, the following results were obtained:

The length of spindle body continues to elongate throughout mitosis. After early anaphase the speed of elongation is approximately twice as much as before. This suggests that spindle elongation as well as shortening of chromosomal fibers is responsible for the anaphase movement of chromosomes.

The spindle volume also increases continuously into late anaphase. After which attachment of the furrow region of the cell surface to the middle part of the spindle body is followed by a remarkable decrease in spindle volume.

The shift of the whole spindle body toward the side of the neuroblast where the ganglion cell will eventually form occurs gradually after metaphase.

Some Aspects of the Ecology of Two Psammolittoral Nematode Populations

CHARLES E. KING, *Florida State University*

In order to investigate different psammolittoral nematode populations, two intertidal stations were selected facing the Gulf of Mexico in the Alligator Peninsula, Florida, area. The selected localities differed in average grain size of the sand, amount of wave action and degree of beach slope. From each locality, five qualitative and quantitative collections of nematodes, representing the entire range of tidal variation, were made. Hydrographic and physiographic data were taken with each collection.

At the station most exposed to wave action, it was found that the predator species were most abundant; however, deposit feeders formed a much higher proportion of the population than might be expected in an area with considerable wave action. The second station, which was largely sheltered from wave action and current, showed an increase in the percentage of deposit feeders in both numbers of species and individuals. A test for the MacArthur distribution of individuals and species was made through employment of the quantitative results.

Gastrotricha of the New Orleans Area

ROBIN C. KRIVANEK and JEROME O. KRIVANEK, *Newcomb College, Tulane University*

For several years random collecting of freshwater gastrotrichs has been undertaken by the authors in the vicinity of New Orleans, Louisiana. Certain general conclusions have been reached concerning the seasonal fluctuations and environmental requirements of this group. Although a few species of the genera *Chaetonotus* and *Lepidodermella* are obtainable during the winter months, most gastrotrichs are restricted to the warmer months of the year. In this region, the high summer temperatures appear to encourage the occurrence of several of the less common genera, not only in numbers of individuals but also in variety of species. The annual population composition will be discussed and unpublished data on new and previously-described species of *Polymerurus, Neogossea, Kijanebalola, Dasydytes,* and *Stylochaeta* will be presented.

Some Effects of Radiation on the Growth Rate of *Hymenolepis microstoma**

H. H. KUHLMAN, *University of Tennessee*

In September of 1959 the tapeworm *Hymenolepis microstoma* Dujardin was recovered from *Mus musculus* near Chattanooga, Tennessee. An infection of the cestode has been established, and is being maintained in white laboratory mice. The effects of radiation are being studied. Cysticercoids have been exposed to gamma radiation ranging from 2000 r to 50,000 r and the results are at present being tabulated. It has been found that exposure to radiation of 25,000 r and over has lethal effects on the cysticercoids of the tapeworm while lower radiation doses cause definite variation in growth rate as well as numerous morphological variations.

This work was supported in part by the U. S. Atomic Energy Commission under Contract AT(40-1)1749.

Occurrence of *Beggiatoa* Species Relative to Pollution

JAMES B. LACKEY, *University of Florida*

There are six listed species of the sulfur bacterium *Beggiatoa*. Two are marine, four cosmopolitan. Numbers and distribution have been investigated in many places to determine whether or not any of the six species might be used to indicate pollution or organic contamination of natural waters. The conclusion reached is that any source of hydrogen sulfide favors occurrence and growth, but that a toxic level of H_2S is soon reached. Disappearance of H_2S by oxygenation is sharply limiting. No use of any one of these species as a pollution indicator is possible despite the fact that H_2S is usually a product of organic contamination. Other conditions of occurrence are noted.

A New Method of Investigating the Daily Course of Oxygen Tension of an Aquatic Population

WM. T. LAMMERS, *Davidson College*

A means has been devised of making continuous in vivo and in vitro measurements of the oxygen tension of an aquatic population. This is done with a silver-oxide/platinum electrode connected to a recording polarograph. During the past summer this instrument was used in a laboratory study of the photosynthesis + respiration/respiration ratio of an aquatic population, chiefly *Leptodictyum*, sp., taken from the South Holston River.

A series of experiments was conducted at 10°, 15°, and 20°C with the light intensity varied from 0 to 910 foot-candles in 30 minute steps during an experiment. Respiratory rates were determined in the dark.

A P+R/R ratio, independent of population size but dependent upon the overall efficiency of the population, was calculated for each light intensity used at 10°, 15°, and 20°C.

Growth and Development of the Golden Mouse, *Ochrotomys nuttalli*

JAMES N. LAYNE, *University of Florida*

Breeding of the golden mouse in Florida apparently extends over at least an 8-month period, and mean litter size based on ten records is 2.8. The

newborn young has well developed vibrissae and scattered hairs on the dorsum. The juvenile pelage is nearly fully developed by 2 weeks of age, and the post-juvenile molt may begin about the 4th week. The pinnae of the ears normally unfold on the 1st or 2nd day, the incisors erupt between the 4th and 6th day, and the eyes open about the 11th or 12th day. The young are apparently weaned at about 3 weeks of age. Growth in weight and several linear measurements exhibits a marked leveling off at or before 5 weeks of age. Compared to seven species of the related genus *Peromyscus* for which data on growth and development are available, the golden mouse appears to be precocious in both physical and behavioral development. It is suggested that this relatively accelerated post-natal development plus certain specific behavioral patterns observed may be correlated with the semiarboreal habits of the species.

Observations on the Life Cycle of *Parorchis acanthus* Nicoll*

PAUL D. LEWIS, JR., *Florida State University*

Cercariae very closely resembling *Cercaria purpurae* Lebour, 1914, were collected from marine snails (*Cerithidea scalariformis* Say) from Shell Point, Wakulla County, Florida. These cercariae encysted on glass containers and the resulting metacercariae were fed to young chicks. The experimental hosts were autopsied at intervals of 7, 13, and 29 days after feeding. Young and adult flukes of the species *Parorchis acanthus* Nicoll, 1907 were recovered from the cloaca of the experimental hosts. Although the adult agrees in morphology with earlier descriptions, the cercaria differs from the typical *Parorchis acanthus* cercaria as described by Rees (1937, Proc. Zool. Soc. London, Ser. B., part 1, pp. 65-73) in that the excretory stem does not extend into the tail and the primary excretory tubes contain concretions throughout only part of their lengths.

This is the first report of the cercaria of *Parorchis acanthus* from snails of the genus *Cerithidea*, and the first account of the use of chicks as experimental hosts for studies on these flukes. The use of the chick as an experimental host for *Parorchis acanthus* may prove to be of use in elucidating taxonomic relationships in the genus *Parorchis*.

The Neurophysiological Effect of 3 cm Microwave Radiation*

R. D. MCAFEE, *Veterans Administration Hospital and Tulane University, New Orleans, Louisiana*

Neurological effects from microwave radiation (radar) have been reported and it has been indicated that these effects arise from some electromagnetic coupling between neurons and microwaves rather than from microwave heating. This report demonstrates, however, that the neurophysiological effect of 3 cm microwave radiation is caused by preferential heating of nerve branches lying within the tela subcutania. The preferential heating results from the penetrating characteristic of microwaves, the dielectric constant of neural tissue, and the limited ability of those neural fibers to lose heat because of their poor vascularization. Of particular interest is the observation that when irradiated nerves reach 45°C, and rarely before, a nociceptive response is elicited in decerebrated or anesthetized cats which includes withdrawal movements, elevation of blood pressure, and respiratory changes. Motor fiber stimulation does not occur and it is thought that only the C and delta fibers are affected by radar as a result of their specific thermal sensitivity.

Responses of Selected Granite Outcrop Communities to Chronic Low-Level Gamma Irradiation*

J. FRANKLIN MCCORMICK, *Emory University*

An investigation of selected granite outcrop communities was made in order to determine their composition, organization, and the reciprocal relationships between the communities and their environment. This study served as a base-line for the interpretation of the effects of chronic low-level gamma radiation upon individual species and community structure. Low-level chronic gamma irradiation of natural plant communities induced changes in community organization by selective elimination of a particular species and the subsequent positive selective pressure toward more radio-resistant species. Each of the several criteria by which species variation was measured illustrated increased variation upon accumulation of higher total doses of chronic gamma radiation regardless of dose rate. Response of plant species to irradiation normally followed a definite predictable pattern of growth inhibition. However, doses of radiation near or below 10,000 r often induced unusual and unpredictable effects. Among these unusual effects were the acceleration of the life cycle, variation of the flowering period, and sporadic irregularities in growth processes.

The granite outcrops represent an environment of abnormally high background radiation in which a particular species was found to be an accumulator of radioactivity. A similarity was found between the responses of a plant to ionizing radiation and the responses that the plant makes to particular plant growth substances. This similarity suggests a selective inactivation of specific plant growth substances resulting in the inhibited and abnormal growth which is typical of irradiated plants.

Effects of Ionizing Radiation on Tree Growth*

JOHN T. MCGINNIS, *Emory University*

Studies on *Quercus alba* L., *Carya tomentosa* Nutt., and *Pinus Taeda* L. are presented and illustrated in which daily radial growth is measured by means of continuously recording "Fritts" dendrographs. The experimental trees were selected in such positions as to receive a gradient in radiation emitted from the partially-shielded reactor at the Air Force Plant at Dawsonville, Georgia. The increase in radial size of trees is related to the radiation dose received and compared with tree growth in the control area. The deciduous trees show very marked physiological response to radiation in cambial activity but they appear outwardly as if radiation had no effect. However, near the reactor, leaf fall was initiated approximately 30 days before that of the trees in the control areas. The irradiated pine trees very early showed much morphological damage to needles but continued to enlarge radially although at a much reduced rate as compared to the control pines in a non-radiation area. It is suggested that the pine may occupy a much reduced place in forest stands which are subjected to chronic low-level radiation.

Some Digenetic Trematodes from Birds from the Northwest Gulf Coast of Florida

AUSTIN J. MACINNIS, *Florida State University*

Six species of digenetic trematodes have been recovered from the examination of 13 birds in the order Charadriiformes collected during the summer and fall of 1958 at Alligator Harbor, Franklin County, Florida. The parasites have been identified as: *Pachytrema sanguineus* (Linton 1928) Purvis, family Pachytrematidae, from the gall bladder of *Thalasseus maximus; Galactosomum spinetum* Braun, family Heterophyidae, from the coelom of *Gelochelidon nilotica; Gynaecotyla riggini* Dery, family Microphallidae, from the liver of *Catoptrophus semipalmatus; Renicola glandoloba* Witenberg, family Renicolidae, from the kidney tubules of *Larus atricilla* and *Sterna hirundo; Cyclocoelum obscurum* Leidy, family Cyclocoelidae, from the air sacs of *C. semipalmatus; Cardiocephalus medioconiger* Dubois and Perez Viguerez, family Strigeidae, from the small intestine of *Sterna forsteri, L. atricilla,* and *T. maximus. P. sanguineus* and *C. medioconiger* are redescribed. This report constitutes new host records for *P. sanguineus, G. spinetum, G. riggini,* and *C. medioconiger.* A new locality is reported for *P. sanguineus, C. medioconiger, R. glandoloba, C. obscurum* and *G. spinetum.* Six of the 13 birds examined were infected with *Renicola,* a genus of parasites which may cause pathology of the kidney (Wright, 1954), however all of the birds examined appeared normal prior to collection. The taxonomy and morphology of these parasites will be discussed.

Shape Changes and Hemolysis of Frog Erythrocytes Following Treatment with Various Hemolysins*

S. P. MARONEY, JR., *University of Virginia*

Frog erythrocytes suspended in Ringers Solution were treated with ultraviolet radiation, *n*-butyl alcohol and saponin. Individual cells were followed in camera-lucida drawings to hemolysis. With all treatments, cells were essentially spherical at hemolysis, although the shape changes leading to this condition differed from one hemolysin to the next. The critical volumes following ultraviolet and butal alcohol were 1.87 and 1.55 respectively, while cells treated with saponin hemolysed without volume increase.

Olfactory Nerve Degeneration*

IRVING R. MARTINEZ, JR.,
Louisiana State University—New Orleans
and RICHARD T. JACKSON, *Loyola University*

It has been reported by Le Gros Clark that if one olfactory bulb is removed 50% of the receptors on the affected side degenerate. In view of Gasser's electron microscope studies of the olfactory nerve fibers, which concluded a one-to-one relationship between olfactory receptors and axons until their delivery into the glia of the olfactory bulb, the above results seemed incongruous. Due to their one-to-one relationship, and absence of synapses, it appeared that none or all of the receptors should degenerate.

In order to determine if there was any interrelationship between receptors and bulbs of the opposite side, Le Gros Clark's experiments were reduplicated by this investigator and in addition bilateral ablations of the bulbs were performed. Approximately 50% of the receptors remained in both cases. No regeneration was observed even after one month. Similar results were obtained by Abercrombie using the abdominal vagus nerve.

The present author's work supports the notion that no interrelation exists between receptors and bulbs of opposite sides.

Preliminary experimentation with colchicine was undertaken by this investigator to note any degenerative effect and possible cell turnover in the olfactory epithelium.

Additions to the Virginia Flora and Gray's Manual

A. B. MASSEY, *Virginia Polytechnic Institute*

Work on the flora of Virginia has lead to the discovery of 6 species new to the State and not included in Gray's Manual 8th Ed. *Bunias erucago,* L., Prince Edward County; *Calepina irregularis,* (Asso.) Thell. Caroline and Prince Edward Counties, (Blake, S. F. 1957. Rhodora 59:278-280); *Aegilops cylindrica,* Host., Page, Clark, Nelson and Campbell Counties; *Acanthospermum hispidum,* DC., Northampton County; *Cynosurus echinatus,* L., Goochland County; *Alternanthera philoxeroides,* Griseb. City of Hampton, Princess Anne and Isle of Wight Counties. (Massey, A. B. 1957. Rhodora 59:239.)

Factors Influencing Contractions of Transplanted Ovarian Follicles*

BARRY A. MAXWELL and H. J. LIPNER,
Florida State University

Ovarian tissue autotransplanted to the eye of the rabbit very quickly becomes vascularized. The follicles composing the implant grow, become distended with fluid, and remain intact in the eye for months. Microscopic examination of the follicles reveals no observable activity, however, the administration of urine obtained from pregnant women is followed in from 8 minutes to 3 hours by changes in the form of individual follicles. The follicles change from spheres to oblate spheroids. The frequency of form change ranges from 1 to 5 minutes. These changes in form, which we interpret as being due to contractions of the smooth muscle fibers of the theca externa, are also induced 9 - 10 hours after cervical stimulation.

Epinephrine, acetylcholine and posterior pituitary extract were ineffective in inducing follicular contractions.

Growth and Mortality of Northern Hard Clam in Florida Waters*

R. W. MENZEL, *Florida State University*

Since March 1958, when several thousand small laboratory-reared hard clams (*Mercenaria mercenaria*) were secured from the U. S. Fish and Wildlife Laboratory at Milford, Connecticut, observations have been made on their growth and mortality under a variety of conditions on the northwestern Gulf Coast of Florida. Growth has been excellent, some of the clams reaching commercial size in eighteen months. Growth was best during the fall and spring months, was less during the winter, and almost ceased during the summer, especially the second year when the clams were larger. Mortality was very low when the clams were protected from preda-

tors (mainly blue, stone and mud crabs and the lightening whelk) but reached 100% in a very short time without protection. Limited observations have been made comparing the seasonal growth of the native clam (*M. campechiensis*) with the northern clam.

Reanimation of Anesthetized Mice from Body Temperatures Below 1°C*[1]

FAITH S. MILLER and JAMES A. MILLER, JR.,
Emory University, and *National Institute for Medical Research, London*

Mice can be successfully reanimated from colonic temperatures near zero by rewarming and artificial respiration. The method of cooling and the respiratory gas mixture influence the percentage of recoveries. After cooling to below 1°C with the closed vessel technique, employing slowly developing hypoxia and hypercapnia in addition to cold, 100% of mice were resuscitated by ventilation with air. However, only 36% recovered postural reflexes and all had weak or paralyzed hind legs when lightly anesthetized with a variety of agents and cooled rapidly in ice. Because tests had demonstrated the superiority of 95% O_2 + 5% CO_2 over air this was used for resuscitation of a second series. Nearly 100% recovered and remained alive and incidence of hind limb damage was low. Electrocardiograms as well as recovery rates were recorded. Anesthesia by inhalation of ether, chloroform, or nitrous-oxide-oxygen was more easily controlled than by intraperitoneal injections of pentothal or avertin. Chloroformed animals survived cooling well but died of toxic effects within two days, as also did uncooled chloroformed controls. None of the rapidly cooled anesthetized groups recovered as well as the closed vessel controls.

[1]Aided by grants from N.I.H.

Narcosis, Hypothermia and Resistance to Asphyxia in Newborn Guinea Pigs*[1]

JAMES A. MILLER, JR. and FAITH S. MILLER,
Emory University

Hypothermia postpones death from asphyxia and permits complete, spontaneous recovery from lethal exposures in newborn guinea pigs, rabbits, puppies and humans (Miller, Chapt. VIII in "*Influence of Temperature on Biological Systems.*" Am. Physiol. Soc. 1957; Westin, Miller, Nyberg, Wedenberg, Surgery 45: 868, 1959.) Contrariwise, narcosis induced by hypoxia-hypercapnia protects against deleterious secondary effects of hypothermia (Miller and Miller, Am. J. Physiol. 196: 1218, 1959.) Newborn guinea pigs sedated with sodium pentobarbital lived longer than littermate controls at all temperatures tested but the increase was greatest at the lowest temperature. At 40°C it was 117%, at 15.5°C it was 201%. When sedated animals were removed from the gas at the last gasp of the control the majority at 42°C and 38°C and all at 19°C and 15°C recovered. Likewise, the majority at 19°C and 14°C recovered from 2X the lethal exposure for normothermic controls. Animals sedated before cooling lived no longer than animals sedated after, showing that struggling and shivering had no influence on their resistance when subsequently asphyxiated. EKG records gave no indication of improved heart action in sedated animals. Since O_2 uptake studies showed a 17% depression in requirements at 40°C and a 49.7% reduction at 21°C it is suggested that the benefits of sedation are due largely, if not entirely, to the depression in metabolic requirements. Since many babies are apneic at birth because of oversedation the experiments provide further argument for the use of hypothermia in the treatment of asphyxia.

[1]Aided by grants from N.I.H. and Assn. for Aid of Crippled Children.

Induction of Limb Regeneration in Post-metamorphic Frogs by Xenoplastic Adrenal Transplants*

MERLE MIZELL, *Tulane University*

The role of nerves in amphibian limb regeneration is well substantiated. The role of the endocrines is first being appreciated (Schotté and coworkers). Adrenal tissue from the newt, *Triturus* (*Diemictylus*) *viridescens*, was transplanted to recently metamorphosed *Rana pipiens*. A few days after transplantation the forelimb of the frog was amputated below the wrist. Control limbs exhibited the usual lack of regeneration and resulted in limb stumps with typical connective tissue callus formation. The adrenal transplant series exhibited various degrees of regenerative responses. The epidermis migrated over the cut surface and was markedly thickened. Moreover, the dermis did not accompany the epidermis and therefore the epidermis was in contact with the underlying mound of accumulating mesenchymal cells. A significant amount of *de*differentiation occurred and several cases of histologically verified blastema formation were obtained. Regenerates that were allowed to develop further underwent a great deal of *re*differentiation after blastema formation. These regenerates were capable of reforming digits; although most of these regenerates were heteromorphic, they represent a regenerative capacity which is not normally found in post-metamorphic frogs.

A Preliminary Study on the Relationships Between the Vegetation of a Mesic Hammock Community and a Sandhill Community

CARL D. MONK, *University of Florida*

The presence of periodic fires normally prohibit the invasion of hammock species into sandhill communities. The sandhill community involved in this study has been free of fire for 5 years and as a result the hammock community is beginning to encroach onto the sandhill community through the transition zone. It appears that the differential response of the species involved to fire, soil moisture, and light control the invasion of hammock species into sandhill communities.

A Preliminary Host Range Study of the Chytrid *Pringsheimiella**

J. THOMAS MULLINS, *University of Florida*

Couch (1939) described *Pringsheimiella* as an obligate endobiotic parasite on the Saprolegniaceae. However the only host indicated for it was *Achlya flagellata*. To determine whether or not *Pringsheimiella* is limited to *A. flagellata* a preliminary host range study within the Saprolegniaceae has been

carried out. It has been possible to parasitize isolates E2, E16, E28, J1, 141, 181, 182, and 290 of *A. flagellata;* isolates E4 and E22 of *A. americana;* isolate E15 of *A. conspicua;* and *Thraustotheca clavata.* Successful infection has not been obtained with isolates D1 and G1 of *A. flagellata; A. caroliniana; A. glomerata; Saprolegnia diclina; Dictyuchus* sp.; and *Isoachlya unispora.* It appears that *Pringsheimiella* can distinguish between certain isolates of *A. flagellata.* The reaction to parasitism by *Pringsheimiella* does not seem to add any additional evidence to show a more definite relationship among members of Coker's Prolifera group. From the reaction of *Thraustotheca* it would seem to be closer to *Achlya* than either *Saprolegnia* or *Dictyuchus.*

Strontium Replacement for Calcium in the Growth of Four Volvocalean Algae*

H. W. Nichols, W. R. Herndon and J. C. O'Kelley, *University of Alabama*

Stephanosphaera pluvialis, Haematococcus droebakensis, Gonium sociale, and *Pandorina morum* were grown in culture media in which ionic equivalents of strontium were substituted for calcium in a graded series and compared with sodium substituted controls. Growth of cultures was measured turbidimetrically and each culture was studied microscopically to determine effects of the substitution upon the morphology of the organisms. The results of these experiments may be summarized as follows: (1) Strontium substituted, but only in part, for calcium in the growth of *Stephanosphaera, Gonium,* and *Haematococcus* whereas, under the same conditions, sodium did not substitute. (2) Growth of *Pandorina* was sustained when the calcium of the basal medium was replaced entirely by strontium although it was markedly reduced; in sodium substituted controls there was no measurable growth. (3) In each of the organisms a loss of motility was evident at one or more levels of calcium concentration when strontium was substituted for calcium in the basal medium. (4) Numerous morphological peculiarities were found among the cells and colonies of the cultures in which strontium had been substituted for calcium in the culture medium. Among these, an apparent loss, or an extreme reduction in extent of the gelatinous sheath was observed in *Pandorina.*

Permission to use the facilities for culture of algae provided by the University of Alabama Research Committee for Project Number 333 is gratefully acknowledged.

Aceto-carmine Staining of Nuclear Bodies in *Oscillatoria*

D. E. Norby, *Virginia Polytechnic Institute*

The nuclear material of *Oscillatoria* and other Cyanophyceae stains readily after overnight fixation in Johansen's *Volvox* fixative. For permanent preparations, G. B. Wilson's Venetian turpentine technique has proven satisfactory. This provides a simple method for classroom demonstrations and for investigations of the division cycle.

Ovoviviparity in the Monogenetic Trematode *Polystomoidella oblonga**

Larry C. Oglesby, *Florida State University*

Thirty adult specimens of *Polystomoidella oblonga* (Trematoda: Monogenea) were recovered from the urinary bladder of the stink turtle *Sternotherus odoratus.* Seventeen carried, *in utero,* immature individuals in various stages of development from gyrodactyloid larvae to juveniles with opisthaptors and digestive systems characteristic of adults as well as rather well developed reproductive organs. An empty egg shell was also present within each parental uterus. Non-ciliated gyrodactyloid larvae hatch and develop to an advanced stage *in utero,* and are released as fully formed, though sexually immature, adults. Ovoviviparity, which apparently has not been recorded before in the Monogenea, makes possible the completion of the life cycle of *Polystomoidella oblonga* within the bladder of the turtle, with no obligate free-living stage.

This work was done during the tenure of a National Science Foundation Cooperative Fellowship.

Changes in Development of *Protosiphon botryoides* (Kütz) Klebs in Culture Upon Replacement of Calcium with Strontium*

J. C. O'Kelley, W. R. Herndon and R. E. Daniel, *University of Alabama*

Protosiphon has a calcium requirement of more than trace magnitude; growth occurs when strontium, but neither barium nor any one of 5 monovalent nor of 4 other divalent cations, is substituted for calcium. The replacement of calcium by strontium gives rise to only slightly decreased amounts of growth, but is responsible for significant morphological changes in liquid cultures. Sacs form in strontium, but do not develop in length to as great an extent as do those formed in calcium cultures of equivalent age. Cells in general are larger and fewer in number in strontium, however, and cultures have a higher proportion of vacuolated cells than cultures in calcium. Wet and dry weight determinations reveal, as expected from direct microscopic observation, that the water content of the alga grown in strontium is higher than that of the alga in calcium. In strontium, cells possess relatively dark green chloroplasts in comparison to those in calcium. The most striking change, however, is the loss of zoospore production when calcium is replaced by strontium; aplanospores are produced instead.

Permission to use the facilities for culture of algae provided by the University of Alabama Research Committee for Project Number 333 is gratefully acknowledged.

Interrelation Between Triiodothyronine and Adrenaline in Regulation of Oxygen Consumption*[1]

Kenneth Ottis, *Auburn University*

A total of 80 sixty-day-old white rats of the Holtzman strain were used in this investigation. After acclimatization in air-conditioned quarters, 60 were thyroidectomized and placed on one per cent calcium gluconate drinking fluid for the two-week convalescent period. The operated animals were then grouped and treated daily as follows: Group I received no T_3, Group II received 5 *ug.* of T_3, and Group III received 10 *ug.* of T_3. Group IV was composed of the twenty unoperated, control animals.

After fifteen days of treatment, oxygen consumption rates were determined by a standard accepted technique. Determinations were run at regularly stated intervals as follows: A pre-adrenaline control determination, at twenty minutes post-adrena-

line, at seventy minutes post-adrenaline, followed by determinations at hourly intervals thereafter for three hours.

Results: The untreated-thyroidectomized group showed no increase in oxygen consumption post adrenaline. In ascending order, the intact-control group, the 5 *ug.* group and the 10 *ug.* group showed increased response to adrenaline in that order.

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[1]Project S.R. 13-003, Agricultural Experiment Station, Auburn University, Auburn, Alabama.

Effects of Radiation on the Ecology of *Pinus taeda**

ROBERT A. PEDIGO, *Emory University*

A study on the effects of ionizing radiation on *Pinus taeda* was begun in June of 1959 as part of Emory University's radiation research program at the Lockheed Aircraft Corporation reactor site near Dawsonville, Georgia. Obvious morphological effects have occurred after exposure to approximately 10,000 rem of combined gamma and neutron radiation while doses of about 25,000 rem apparently cause death. Morphological effects in the reactor radiation field are being mapped at three month intervals. Early results with experimental seedlings grown in a known soil and under semicontrolled environmental conditions indicate that physiology is disrupted and that irradiated plants develop more slowly. Survival of seedlings exposed to Co^{60} gamma radiation during the cotyledon stage of development has been better than that for seedlings one to several years old exposed to mixed gamma and neutron radiation from the reactor. However, radiation from the reactor is equilibrated to Co^{60} radiation by using an RBE of 10 for neutrons. Since a broad spectrum of neutrons is present in the reactor field, this may be an inherent error in calculating dosages for pine. Finally, differential effects on *Pinus taeda* and its usual ecological associates when exposed to chronic radiation suggest that the role of pine in secondary succession may be changed.

A Growth Response by Two Sedges Inhabiting a Radiation Field*

GAYTHER L. PLUMMER, *University of Georgia*

Carex Frankii and *C. vulpinoidea* are associated on White Oak Lake bed on the reservation at the Oak Ridge National Laboratory. They occur on sites having gamma radiation fields of 40, 20, 10, and 0 mr/hr. The lengths of the pistillate flowering structures were measured and the data were treated statistically for the purpose of using these features as indicators of a growth response to site quality and to radiation.

Lengths varied with dose rate but these appear to be independent of the radiation and more closely associated with other soil factors. Each sedge responds differently under similar moisture conditions, fertility, and soil reaction.

Observations suggest that these pioneers may not show obvious biological disturbances before they are replaced by succeeding species.

Studies on the Distribution and Life History of Two Species of *Lesquerella* (Cruciferae)

ELSIE QUARTERMAN, *Vanderbilt University*

Lesquerella Lescurii (A. Gray) S. Wats. and *L. densipila* Rollins, both endemic to the Central Basin of Tennessee, are apparently young species that originated allopatrically and have remained so until the recent past (Rollins 1957). *Lesquerella densipila* has migrated into the margin of the range of *L. Lescurii*, and there is evidence that *L. Lescurii* may be migrating out of the Basin. In an effort to clarify this situation, careful records are being kept of the location of *L. Lescurii* populations at the margin of the species' range. Special attention has been given, in the life history studies, to conditions necessary for seed dispersal and germination. The relationship of these factors to possible migration is reported.

Geographical Affinities of the Southern Appalachian High Mountain Flora*

GEORGE S. RAMSEUR, *The University of the South*

In the southern Appalachians there are ten isolated mountain areas which extend to elevations above 5500 feet. A catalog of vascular plants was compiled from collections made throughout the region in 1956 and 1957. By using manuals, floras, and other taxonomic literature the range of each species was established and plotted. The flora is represented by the following geographical range patterns: 1. Southern Appalachian species, 2. Appalachian species, 3. Northern species which extend southward only along the mountains, 4. Northern species near their southern limit, 5. Southern species near their northern limit, 6. Species wide-spread through eastern North America, and 7. Introduced species. The climax community of the region is the spruce-fir (*Picea rubens* Sarg.— *Abies fraseri* (Pursh) Poir.) forest, but most of it has been destroyed by logging and fire. The disturbed areas are now dominated by fire cherry (*Prunus pensylvanica* L.f.). A small percentage of the total area is occupied by several anomalous communities including: grass bald, heath bald, shrub bald, and beech forest. Most of the dominant species of the major communities belong to the group of plants with Northern ranges extending southward only along the mountains.

The Respiratory Properties of Chiton Hemocyanins*

JAMES R. REDMOND, *University of Florida*

At the present the only published information concerning the blood respiratory pigments of chitons consists of a measurement of the sedimentation rate of the blood protein of *Tonicella* (Svedberg and Pedersen, 1940) and an oxygen dissociation curve for the hemocyanin of *Cryptochiton stelleri* (Manwell, 1958). The present studies, carried out at the Zoology Department of the University College of the West Indies, Jamaica, and the Univ. of Washington Friday Harbor Laboratories, confirm hemocyanin as the blood respiratory pigment of chitons, describe certain of the characteristics of this material from four species of chitons, and comment on its function. Oxygen dissociation curves showed these pigments to have relatively high half saturation pressures. The effect of pH on the dissociation curve varied with the species, examples of both normal and inverse Bohr effects being found. Observations on the magnitude of the Bohr effect, the oxygen capacities of the bloods, and the habitats of the animals indicate that the Bohr effect is probably not of significance in gas exchange. It is further suggested that the principal role of the hemocyanins of most animals is not that of increas-

ing the oxygen capacity of the blood, but rather is a means of maintaining a high oxygen diffusion gradient across the gills.

Supported by research grant RG-5080 from the National Institutes of Health, U.S.P.H.S.

Aspects of Melanism in *Gambusia affinis* (Baird and Girard)*

JAMES D. REGAN, *Florida State University*

Melanistic individuals occasionally occur in collections of the top-minnow, *Gambusia affinis* (Baird and Girard). This condition is apparently confined to males of the species. Normally-pigmented *Gambusia* have scale melanophores in the epidermis and stellate micromelanophores in the dermis. In addition to these, melanistic *Gambusia* have dermal macromelanophores which are approximately twice the size of the micromelanophores and which have a different morphology. The degree of melanism varies greatly; specimens having only six macromelanophores, and others almost totally black have been collected. Collections totaling 3002 fish from three localities in southern Florida contained significantly different percentages of melanistic individuals among the mature males. In an area where approximately 7% of the mature males were melanistic, 153 females were collected and treated with 17-methyl testosterone for 12 days. 139 showed some degree of anal fin differentiation, indicating action of the hormone, but none showed any pigmentary changes. Two matings of melanistic males with normal females produced six F_1 males which were reared to sexual maturity. All were normally-pigmented. These results do not necessarily nullify a genetic hypothesis of holandric inheritance for melanism as ecological conditions, particularly temperature, may possibly affect expression of the melanistic phenotype.

The Effects of the Alkaloid Drug Colchicine upon the Alga, *Chlorella pyrenoidosa*

ALAN REX, *Virginia Polytechnic Institute*

Randomly growing cells of the green alga, *Chlorella pyrenoidosa* were grown in liquid modified Meyer's media containing colchicine in concentrations of 2.0%, 1.0%, 0.5%, 0.1% and 0.0%. It was found that colchicine in concentrations greater than 0.1% exhibited increasing degrees of inhibition to the normal logarithmic growth function of randomly growing *C. pyrenoidosa*. In the cultures treated with 2.0% colchicine nearly all the cells observed were as large as mature mother cells in the non-colchicine treated controls. Many of the cells observed in the 2.0% group had no crosswall formation. Division figures similar to the colchicine-metaphase types, demonstrated in other organisms, were observed. Current investigations using synchronized cells of *C. pyrenoidosa* are designed to determine the time of action of colchicine in respect to nuclear division, and to determine its effect on various metabolic systems.

The Nature of the Species, *Pachysandra procumbens* (Buxaceae)

HERBERT C. ROBBINS, *Vanderbilt University*

As one phase of the revisional study of the genus *Pachysandra*, a detailed study has been made of the single American species, *Pachysandra procumbens* Michx. Information concerning the distribution, biology, cytology and reproductive behavior of this species is presented.

The Use of Tetrazolium Chloride on Barley Meristems*

PATRICIA SARVELLA, *Mississippi State University* and *Washington State University*

Tetrazolium chloride is a vital stain and is reduced by living tissues to a red color. It has been used on dissected barley primordia to determine whether the apical and axillary buds were alive after irradiation. In the presence of living tissue the buds which stained red were assumed to be alive whereas the white buds were assumed dead. The seedlings were grown for 16 days under continuous fluorescent lights. Hoagland's nutrient solution was added to the water to insure continuous growth. All leaves were removed from the axillary buds and apical meristems. The meristems were then put into the stain at 40°C and remained for a minimum of 15 minutes. The most effective stain was a 0.1% solution of tri-phenyl tetrazolium chloride. The buds were then observed under a dissecting microscope and scored for coloration.

Mechanism of Nitrogen Narcosis*

D. F. SEARS, *Tulane University*

Nitrogen narcosis has been demonstrated in man, in animals and in spinal preparations of animals. The synapse seems to be the sensitive site. Synaptic transmission represents movement of electrolytes or other water-soluble materials across a water continuous junction. G. H. A. Clowes showed chemically inactive narcotics would reverse emulsions of oil dispersed in water to make the oil phase continuous. A similarity exists between emulsions and synapses; both contain lipid-water interfaces. It is the action of the narcotic at such interfaces which reverses emulsions. This same action may produce a decrease in water content of synaptic membranes and decrease movement of ions and water soluble materials necessary for synaptic transmission. We measured resistance to flow of an electrical current through emulsions subjected to high pressure of nitrogen, argon, and helium. Resistance increases as the oil phase of the emulsion becomes continuous. Resistance to electric current increased due to pressures of nitrogen and argon, but not helium. Narcosis results from pressures of nitrogen and argon, but not helium. The striking parallel suggests that it is this interfacial activity of nitrogen which causes narcosis.

Some Preliminary Studies Contributing to the Cyto-Taxonomic Investigation of the Genus *Schoenolirion* (Liliaceae)

HARRY L. SHERMAN, *Vanderbilt University*

The genus *Schoenolirion* (*Oxytria*) consists of five taxonomic species of local occurrence. Three of the species are represented on the Atlantic and Gulf Coastal Plain, one of which also occurs in adjacent provinces. The other two species are endemic to northern California and southern Oregon, where they occur in bogs. Preliminary work includes a study of the mitotic chromosome morphology of *S. croceum* (Michx.) Gray, utilizing 8-Hydroxyquinoline treatment of root-tips.

Influence of Nerves in Lizard Regeneration*

S. B. Simpson, Jr., *Tulane University*

The spinal cord of the brown skink, *Lygosoma laterale*, was deviated from the tail into the rear limb. This was done on the assumption that the nerve fibers of the spinal cord would augment the normal nerve supply of the limb, and by doing so, induce the limb to regenerate. In those cases where the deviated cord retained its integrity and actually increased the nerve complement of the limb, a limited regenerative response occurred. These results give added support to the importance of nerves in regeneration.

The influence of the spinal cord on tail regeneration was also studied. It was found that if the spinal cord was removed from the terminal portion of an amputated tail, no regeneration occurred. Also, if the spinal cord was deflected and positioned beneath a dorsal wound, heteromorphic tails regenerated from the dorsal surface of the tail.

Foliar Origin and Development of *Tropaeolum Majus* L. var. Golden Gleam

Jean L. Smith, *Florida State University*

An anatomic comparison of embryonic juvenile leaves is made with mature adult leaves of *Tropaeolum majus* L. var. Golden Gleam. Origin of the leaves within the shoot apex is considered as well as the ontogeny of the leaf primordia. Stipules, which occur only with the juvenile leaves, are included in this foliar analysis.

Ascorbic Acid Metabolism and the Adrenal Glands*

Don W. Stubbs and Kenneth Ottis, *Auburn University*

The effects of thiamine deficiency on the ascorbic acid content of the adrenals, livers, and kidneys of rats were studied. The rats were separated into two groups. The experimental group was fed, ad libitum, a diet deficient in vitamins B_1 and C. The controls were pair-fed on a complete diet. The experimental animals and their controls were periodically sacrificed and comparisons of the ascorbic acid contents of their adrenals, livers, and kidneys made. The livers and kidneys of the experimental rats showed a great initial decrease in ascorbic acid while that of the adrenals was only moderate. A close correspondence between the changes in renal and hepatic ascorbic acid was found.

It was concluded that both the adrenals and the kidneys depend upon the ability of the liver to synthesize and supply ascorbic acid. The adrenals appear to be superior to the kidneys in their ability to accumulate the vitamin. While thiamine appears to exert some influence on the ability of the liver to synthesize and supply ascorbic acid, the vitamin does not seem to play an essential role in this respect.

The Stimuli for the Start of the Reproductive Season in Juncos

James T. Tanner, *University of Tennessee*

Juncos (*Junco hyemalis*) nesting in the Great Smoky Mountains begin reproduction later at the higher and colder elevations compared with the lower elevations. Over fifty first-egg dates from nests at different elevations were obtained and these data were used to determine the sensitivity of the egg-laying process to environmental temperature. Several hypotheses have been proposed for the mechanism of this sensitivity. One of these is that higher temperatures stimulate singing and courtship by the male Junco, and that these activities are the direct stimuli which determine the first-egg date. A test of this hypothesis was made; the results did not support the hypothesis.

The Preservation of Experimental Neoplasms by a Frozen-Tissue Bank at −78° C

J. Richard Thomson and Daniel R. Farnell, *Southern Research Institute, Birmingham, Alabama*

Certain risks are inevitable when employing serially-transplanted experimental neoplasms in screening compounds for anticancer activity. These risks include infections by viruses or bacteria, cross-contamination by other cell strains, genetic drift, stromal tissue invasion, and accidental loss by faulty or careless scheduling. For a long-term screening program to be effective, the work done at any specified time should be comparable to similar work performed several years earlier. A frozen-tumor bank which, in effect, "stops time" for these particular cells can be used to considerable advantage in this type of research. A possible disadvantage might be an artificial selection of cold-resistant cells.

Using a method developed by Hauschka, et al., (Cancer Research 19 p. 643, 1959), we have frozen some thirty-five neoplasms of mice, rats, and hamsters. Selected tumor fragments were frozen in sealed glass ampules with 9-10% glycerol at a rate of 0.5-1.0° C/min. At intervals, samples were rapidly thawed to 37° C and transplanted to the proper host animal. Data will be presented to show the spectrum of tumors and leukemias employed, length of time in the frozen state, and viability results. The biological implication and significance will be discussed.

The Action of Thyroxine on Mitochondria of the Liver of the Albino Rat

Samuel R. Tipton, *University of Tennessee*

The enzymes, succinic dehydrogenase, glutamic dehydrogenase, and cytochrome oxidase, which are localized in the mitochondria, showed a greater activity in the mitochondrial fraction isolated from the liver of thyroidectomized rats that were treated with thyroid powder, or thyroxine, than that from untreated animals. The increase was significant on the basis of mg. dry weight, per mg. nitrogen, or per million mitochondria. Mitochondria isolated from regenerating liver within 48 hours after partial hepatectomy, were more sensitive to thyroxine than were those from the livers of control animals. Other changes indicating a change in properties of the mitochondria during regeneration are presented. (Supported in part by NSF Grant No. 8969.)

Genetic Analysis of Variant Pigmentary Patterns in the Leopard Frog, *Rana pipiens**

E. Peter Volpe, *Newcomb College of Tulane University*

Two pattern variants, kandiyohi and burnsi, are simple dominants to the common leopard frog, *Rana pipiens*, but lack dominance with respect to each other. Hitherto, the double dominant frog, designated "mottled burnsi", had been recovered only from laboratory cultures; it apparently had eluded naturalists in the past. The query as to whether the kandiyohi and burnsi genes arose as mutations at the same locus or at different loci would be answered by appropriate matings utilizing the "mottled burnsi" frog. The recent uncovering of two "mottled burnsi" adult frogs in nature and subsequent test-crossings to wild-type, recessive *pipiens* frogs revealed that the mutant genes do not constitute a multiple allelic series. The kandiyohi and burnsi genes are located at different loci, but independent assortment of the mutant loci has not been unequivocably demonstrated. Widely separated loci on the same chromosome (hypothetical linkage of 46%) would simulate independent assortment.

Cortisone and Resistance to Infection with *Hymenolepis nana**

Clarence J. Weinmann, *University of Florida*

Cortisone acetate, administered daily for one week in 0.5 - 1.0 mgm. dosages, depressed the natural resistance of mice to *H. nana* as measured by percentage development of 92-94 hour cysticercoids following egg infection. Daily hormone treatment for two and three weeks before infection resulted in a degree of recovery of natural resistance to this parasite.

Cortisone treatment for a week prior to an immunizing egg infection did not appear to influence the development of acquired resistance to challenge egg infections administered six days after immunization since parasites failed to complete larval development in immunized mice, whether or not treated with hormone. When cortisone was administered during the period of active immunization (i.e., first six days of infection), the degree of acquired resistance to reinfection on the last day of treatment was reduced although a heightened resistance was still evident. With an interval of eight days between an immunizing egg infection and the initiation of cortisone administration (daily for one week), the majority of hormone-treated mice suffered massive reinfection when challenged on the last day of treatment. Reinfection is believed to have been abetted by auto-infection.

Radiobiology of *Tetrahymena pyriformis*

Carolyn Wells, *Biology Division, Oak Ridge National Laboratory*

It is well known that the sensitivity of organisms to the lethal action of ionizing radiation varies from species to species. Some intraspecific strain differences in radiosensitivity have been reported. The following experiments have shown that such radiosensitivity differences also occur among strains of the holotrich, *Tetrahymena pyriformis*. Several micronucleate strains of this ciliate were X-irradiated with doses ranging from 48 to 380 kr, at a rate of 9.5 ± 0.4 kr/minute. Immediately after treatment, numerous single-cell isolations were made from irradiated and control populations into small petri dishes containing axenic medium. Survival was measured as the ability of such isolates to establish self-perpetuating clones.

It was found by this technique that, in some strains, more animals die than in other strains after a given X-ray dose. These strain-specific radiosensitivities are not correlative with either the ploidy of the micronucleus or the total DNA content of the strains. Radiation-induced micronuclear abnormalities were examined cytologically. Irradiated micronuclei, instead of being typically compact, were often enlarged spheres of intertwined strands. Micronuclear disorganization was frequently so severe that amicronucleate sister fission products occurred. However, amicronucleate clones were rarely found among the surviving fraction of at least some strains.

Current Effects and Growth of Freshwater Algae

L. A. Whitford, *North Carolina State College*

(No abstract submitted)

The Separation of Chloroplast Pigments by Countercurrent Distribution*

Frederick T. Wolf and John G. Coniglio, *Vanderbilt University*

Separations of chloroplast pigments are customarily made by partition between immiscible solvents, by paper chromatography, or by column chromatography. Lancaster *et al.* (J. Amer. Oil Chemists Soc. *27*: 386, 1950) effected a partial separation of a test mixture of chlorophyll *a*, chlorophyll *b*, and carotene with a 25-tube countercurrent distribution apparatus. In the present work, the chloroplast pigments from spinach were separated in a 100-tube machine, using 90 per cent aqueous ethanol and petroleum ether as the solvent system. After 100 transfers, upper layer was collected in a fraction collector, and the separations were continued to 310-425 transfers. In the petroleum ether layer were found two peaks corresponding to carotenes and chlorophyll *b*: in the ethanolic layer three peaks were separated, corresponding to chlorophyll *a* and two different xanthophyll components.

The Vertical Diel Migrations of a Cyclopoid in a Mississippi Lake

Robert A. Woodmansee, *Mississippi Southern College* and
Billy J. Grantham, *Mississippi Game and Fish Commission*

The vertical movements of *Mesocyclops edax* are described for a twenty-four hour period. A marked nocturnal increase in planktonic numbers is recorded for this species with the extent of the nocturnal increase varying with the sex and with the presence or absence of ovisacs. Two hypotheses have appeared in the literature to explain nocturnal increases in planktonic numbers: (1) that the animals see and evade the net or trap during the day and (2) that the animals are either benthic or hypoplanktonic during the day. Evidence is herein presented in support of the second hypothesis, which appears to be the more widely accepted one. An assumption of the second hypothesis requires a modification of the quartile curve method of illustrating diel vertical migrations.

Sporophyte Production in Antarctic Mosses

ELMER G. WORTHLEY, *Harvard University*

The extent of sporophyte production among various species of antarctic mosses will be discussed and the relative sporophyte production in mosses of certain temperate or warmer climates will be compared.

Reasons for the evolution of mosses with modified (or elimination of the) sporophyte stage seem to include: 1. Effect of terrific winds. 2. Sandblasting effect of snow at low temperatures. 3. Destructive effects of pebbles, rock fragments and particles hurled about during storms.

The occurrence of these unfavorable conditions has served to aid in the direction of the disappearance of the sporophyte stage in the antarctic mosses.

Etheostoma okaloosae (Fowler), A Percid Fish Endemic in Northwest Florida*

RALPH W. YERGER, *Florida State University*

In 1941, Henry W. Fowler described a new darter, *Villora okaloosae*, from a single specimen collected near Niceville, Florida. Bailey, Winn, and Smith (1954, Proc. Acad. Nat. Sci. Phila., 106:109-164) subsequently placed this name in the synonomy of *Etheostoma swaini* (Jordan). Recent studies of seven series of 140 specimens establish the validity of *Etheostoma okaloosae*. It was correctly assigned to the subgenus *Villora*, which is characterized by an arched lateral line, and the replacement of the genital papilla in the female by a marginal ring of matted villi. In recent years *Villora* has been included as one of many subgenera in the expanded genus *Etheostoma*.

Etheostoma okaloosae is differentiated from *E. edwini* (Hubbs and Cannon), the only other member of the subgenus, by scale counts, markings, and coloration, most noticeably the absence of red spots over the body. It is restricted to several clear, sandy, moderately swift streams which empty into a bayou at the western end of Choctawhatchee Bay. The origin of this species probably dates from the late Pleistocene, at a period when sea level was lower than at present, and all of the streams presently inhabited by *E. okaloosae* were conjoined. Rising sea level during the recent interglacial stage has now divided the population in several isolated small streams.

(Research supported by National Science Foundation Grant G6260, and by the Research Council of the Florida State University.)

The Comparative Efficacy of Bephenium Hydroxynaphthoate and Tetrachloroethylene Against Hookworm and Other Parasites of Man

MARTIN D. YOUNG and GEOFFREY M. JEFFERY, *U. S. Public Health Service*

The hydroxynaphthoate salt of bephenium, one of a series of new quaternary ammonium compounds, was tested against worm infections in 168 mental patients. Tetrachloroethylene was tried 41 times for comparison. Bephenium was more effective than tetrachloroethylene against hookworm infections. Single doses of 5.0 grams of base daily for 3 to 5 consecutive days reduced heavy hookworm infections by 95 per cent or more, with about 55 per cent of the infections cured. Five gram doses for 1 or 2 days greatly reduced the hookworm burden but the cure rate was low. The drug was highly effective against *Ascaris lumbricoides*, curing 12 of 13 infections and reducing the overall egg count by over 99 per cent. Bephenium was also moderately effective against *Trichuris trichiura* infections. Dosages totaling 15 or more grams resulted in a substantial reduction in worm burden and produced some cures. Side effects, principally vomiting, occurred in about 7 per cent of the patients, but in only one patient was it necessary to discontinue treatment. When tetrachloroethylene was given in 3 or 4 cc. single doses hookworm burdens were reduced by 49 to 58 per cent; there was no significant reduction in 37 *T. trichiura* infections treated.

Autecological Studies on *Leavenworthia stylosa* (Cruciferae)

RHONA D. ZAGER, *Vanderbilt University*

Leavenworthia stylosa A. Gray, a winter annual in the family Cruciferae, is restricted to the cedar glade areas in the Central Basin of Tennessee. Certain aspects of the causes of its narrow endemism may now be reported. Field observations on the degree of restriction to specific habitats, analyses of certain habitat factors, and general life history studies have been carried out. Particular attention has been given to conditions required for germination, tolerance of mineral deficiencies, tolerance of moisture extremes, and competition in field and experimental situations.

THE PARTICIPATING SOCIETIES

(Continued from Page 20)

Southeastern Section, Botanical Society of America

President—Dr. Ruth S. Breen, Florida State University

Secretary—Dr. Joseph C. O'Kelley, University of Alabama

Activities Committee—Dr. Ernest S. Ford, University of Florida

Dr. Robert Godfrey, Florida State University

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President—Dr. Donovan S. Correll, Texas Research Foundation

Vice-President—Dr. Erdman West, University of Florida

Secretary—Elizabeth Ann Bartholomew, West Virginia University

Treasurer—Roy B. Clarkson, West Virginia University

The participation in the Annual Meeting by the Society of General Physiologists is most welcome.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

Dr. Roland H. Alden, chief of the Division of Anatomy at the University of Tennessee Medical Units in Memphis since 1949, has been named to the newly created position of associate dean of the graduate school for medical sciences. Dr. Alden will begin his new duties January 1, retaining his position as chief of the division of anatomy. Dr. Alden will be taking over a portion of the duties performed by **Dr. T. P. Nash, Jr.,** dean of the School of Biological Sciences. Dr. Nash will continue in his position as dean of the School of Biological Sciences.

The following personnel changes are from the Biology Division, Oak Ridge National Laboratory:

Dr. Franco Celada, a United States Public Health Service Fellow, joined the Radiation Immunology Group in October. Dr. Celada received the M.D. degree from the University of Milan, Italy, in 1956, and since that time has served in the Italian Army. **Dr. Valerio C. Monesi,** also a United States Public Health Service Fellow, has joined the Mammalian Genetics and Development Section. Dr. Monesi received the M.D. degree from the University of Pavia, Italy, and comes to the Division from the National Division for Nuclear Researches, Frascati, Italy. **Charlotte R. Lea** is spending this year with the Enzymology Group as a Research Associate. Miss Lea expects to receive the Ph.D. in Biochemistry from Emory University in December. **Dr. Gustavo Cudkowicz,** under a grant from the International Cooperation Administration, has joined the Pathology and Physiology Section for a period of one year. Dr. Cudkowicz received his M.D. from the Medical School of the State University of Milan, Italy, in 1952, and comes to the Division from the National Cancer Institute and the Institute of Pharmacological Research in Milan. **Dr. Donald F. Parsons** has joined the Pathology and Physiology Section. Dr. Parsons received the Ph.D. in Physical Chemistry from Imperial College, London, England, and the M.D. from St. Bartholomew's Medical College, London. He comes to the Division from Duke University. **Dr. Otto Vos,** a Public Health Service Fellow, who has been associated with the Mammalian Recovery Section for the past year has left the Biology Division. Dr. Vos has returned to the Medical Biological Laboratory, Rijswijk, The Netherlands. **Dr. Johan Harrie Stuy** has completed a year of research in the Radiation Protection - Living Cells Section and left the Division to go to Yale University, New Haven, Connecticut. Dr. Stuy will be affiliated with the Biophysics Department at Yale. **Dr. Udo H. Ehling,** a Public Health Service Fellow, has joined the Pathology and Physiology Section. Dr. Ehling received the Ph.D. in Zoology from the Free University of Berlin, Germany, and for the past four years has been associated with the Max Planck Institut fur Vergleichende Erbbiologie und Erbpathologie, Berlin-Dahlem, Germany. **Dr. Menachem B. Lion,** who received the Ph.D. in Organic Chemistry from the Hebrew University, Jerusalem, Israel, in June, 1959, will be associated with the Mammalian Recovery Group for the coming year.

Dr. Wm. C. Sloan, Instructor in Biology, leaves Vanderbilt University in January to accept a 12-month research Post-Doctoral Fellowship from the National Institutes of Health. He will be located at the University of California, Berkeley, where he will carry out an investigation of the end-products of nitrogen metabolism in terrestrial invertebrates.

Dr. J. J. Friauf represented Vanderbilt University at the Darwin Centennial Celebration in Chicago, November 24-27.

Dr. Zane B. Carothers, formerly Instructor in the Department of Botany at the University of Kentucky, has resigned to accept an Assistant Professorship at the University of Illinois. **Mr. John C. Warden,** formerly a graduate student at the University of Chicago, has been appointed Instructor in Botany.

Drs. Herbert P. Riley and **Dale M. Smith** of the Department of Botany of the University of Kentucky, attended and presented papers at the IX International Botanical Congress in Montreal in August, 1959.

Mr. T. R. Bryant has received a National Science Cooperative Fellowship and is carrying out his work in the Department of Botany of the University of Kentucky.

Birmingham Southern College has two new Associate Professors in the Department of Biology. **Dr. William R. Montgomery,** a parasitologist with a Ph.D. degree from the University of Nebraska, came from Morningside College, Sioux City, Iowa; **Dr. Alvin A. Peters,** who holds a Doctor of Science degree from Munich, is a bacteriologist and comes from Texas A. and M. College.

At Howard College the Department of Biology has added **Miss Lynn Raulerson** as Instructor in Biology. Miss Raulerson comes to the College on the completion of her Master's degree at Emory University in Atlanta. Her field is in Vertebrate Ecology.

Dr. Herbert A. McCullough, Head of the Department of Biology at Howard College, has recently been appointed Coordinator of the North Central Alabama Regional Science Fair. He was also recently elected Chairman of the Alabama Council of Conservation.

Dr. G. M. Jeffery, Public Health Service, Columbia, S. C., received the Bailey K. Ashford Award at the annual meeting of the American Society of Tropical Medicine and Hygiene in Indianapolis on October 30. The award is provided bi-annually by the Eli Lilly Company and is for research in tropical diseases.

Dr. Paul C. Beaver, Professor of Tropical Diseases and Hygiene at the Tulane University School of Medicine, has been named Editor of the American Journal of Tropical Medicine and Hygiene. Dr. Beaver succeeds **Dr. Martin D. Young,** who has been acting as Editor pro tem.

Dr. Hans Gaffron, University of Chicago, has been appointed as Research Professor of Plant Physiology and Biochemistry at Florida State University. **Dr. Norman I. Bishop,** also of the University of Chicago, joins the faculty as assistant professor of Botany and research associate with Dr. Gaffron in their work on photosynthesis.

Dr. Sidney Fox of the Oceanographic Institute of Florida State University spoke on "How Did Life Begin?" in the General Symposium of AAAS on Moving Frontiers of Science at Chicago on December 26. Dr. Fox was also invited to speak

on "Self-Organizing Phenomena and the First Life" at the symposium on Synthesis of Organization sponsored by the Society for General Systems Research to be held during the same week.

Dr. Sidney Fox was an invited speaker in September at the AIBS symposium on Embryology and Evolution, and at the International Oceanographic Congress in New York.

Dr. A. M. Winchester, head of the Department of Biology at Stetson University, has been asked to serve on an NSF panel for the evaluation of research proposals.

Dr. Henry Stevenson, Department of Biological Sciences, Florida State University, has been granted a Faculty Summer Research Appointment to continue his studies on bird migration problems.

Dr. Fred S. Orcutt, acting head of the Biology Department at Virginia Polytechnic Institute, was appointed head of the department effective January 1, 1960.

The following items were received from the Department of Botany, University of Florida: **Dr. Alan Conger** recently spent a week in Puerto Rico taking part in a symposium on the comparative effects of various kinds of radiation; **Dr. R. D. Powell** has been elected secretary of the Southern Section of the American Society of Plant Pathologists; **Dr. W. M. Dugger, Jr.,** has accepted a position as Research Physiologist at the Riverside Experiment Station of the University of California; **Mr. Ted Holmsen** has been awarded the $5,000.00 General Biological Supply House scholarship for 1960-61. He recently was awarded one of the two prizes given to graduate students for presenting a Meritorious Paper before the American Society of Plant Physiologists at Birmingham, Alabama.

An addition to the staff of the Department of Biology, University of Alabama, is **Assistant Professor William C. Guest,** cytogeneticist, from the University of Texas.

Dr. C. Ritchie Bell, University of North Carolina, is the Secretary of the American Society of Plant Taxonomists for 1960.

Institutions and Organizations

A Symposium on Eastern Equine Encephalomyelitis was held at the **University of Maryland** in College Park on November 18, 1959. This meeting was under the auspices of the Departments of Entomology and Veterinary Science of the College of Agriculture and the Department of Medicine of the School of Medicine. Discussions dealt with infection in vertebrates, laboratory diagnosis, epidemiology, experimental studies and prophylaxis and control. More than 200 biologists attended.

The National Science Foundation has recently approved support of a proposal of the **American Institute of Biological Sciences** for a program of Foreign Visiting Lecturers in Biology. This proposal was suggested by the success of the AIBS program of visiting biologists to liberal arts colleges and smaller universities established over three years ago. This program has recently been extended to secondary schools, and now will be enlarged to include foreign lecturers. The operation of this new program will follow essentially that of the college program but will begin on a somewhat smaller scale until experience necessary for future successful full scale operation is acquired. The AIBS will schedule speakers and will handle all travel arrangements. A small panel of speakers will be initially selected from suggestions of the various societies representing the biological sciences; these selections will be made by the AIBS Committee on Education and Professional Recruitment, which meets in Chicago on December 29, 1959. Details of the program and inquiries concerning the availability of the lecturers can be obtained from Dr. Robert S. Leisner, Director of Educational Activities, AIBS, 2000 P Street, N.W., Washington 6, D. C.

The Department of Botany, **University of Florida,** is now authorized to conduct programs of study leading to the Ph.D. degree. The Department has been awarded four graduate fellowships by the Department of Health, Education and Welfare which are to be made available to doctoral candidates.

The Florida Academy of Sciences held their Annual Meeting at Florida Southern College, Feb. 18-20.

Florida Southern College has completed work on their Planetarium and will soon open it for public visitation.

The Department of Botany of the **University of Tennessee** announces that the Tenth Annual Spring Wildflower Pilgrimage will be held in the Great Smoky Mountains at Gatlinburg, Tennessee, April 28-30. Wildflower and fern hikes, bird walks, and motorcades led by competent botanists and naturalists, and illustrated lectures are available to the public. Those wishing further information should write to Dept. W. P., P. O. Box 208, Gatlinburg.

On February 1-3 the **Southern Section of the American Society of Plant Physiologists** met with the **Association of Southern Agricultural Workers** at Birmingham, Alabama. Two symposia were held: "Physiological Genetics" and "The Chemical Control of Plant Growth". Newly elected officers are: Chairman — **Dr. Robert E. Burns,** U.S.D.A.; Vice-Chairman — **Dr. Howard E. Joham,** Texas Experiment Station; Secretary-Treasurer — **Dr. Robert D. Powell,** University of Florida; Executive Committee — **Dr. Howard Teas,** University of Florida; **Dr. Aubrey Naylor,** Duke University; **Dr. Wayne C. Hall,** Texas Experiment Station.

A School of Applied Biology has been established at **Georgia Institute of Technology,** Atlanta. **Dr. Robert S. Ingols,** who has headed the Biology Department for the past several years has been named director of the new school. Beginning with the 1960 fall quarter the School will offer work toward a degree of Bachelor of Science in Applied Biology.

The **A.I.B.S.** has announced the establishment of the Biology News Bureau as a new activity to serve biologists and professional organizations in the biological sciences. This Bureau has the assignment of smoothing the flow of information between the biological professions and the public and has offices at AIBS headquarters, 2000 P St., N.W., Washington 6, D. C.

Grants in Aid

Dr. A. E. Harrises of Mississippi Southern College has received a grant of $3,710 from the **National Institutes of Health** to study the freshwater Tetraonchinae (Monogenea) of southern Mississippi.

Dr. Herbert P. Riley, Head of the Department of Botany of the University of Kentucky, has received a two-year grant of $13,600 from the **National Science Foundation** to study species of South

African plants by the method of paper chromatography.

Dr. R. B. Channell has been awarded a grant of $18,000 from the **National Science Foundation** for a taxonomic revision of the Eurhynchospora portion of the genus **Rhynchospora** (Cyperaceae). This project will cover a three-year period.

Drs. R. J. and **Ruth Neff** recently received a research grant of $50,000 from the **National Institutes of Health** for a three-year study of nuclear functions and growth synchrony in amoeba.

Dr. J. Orvin Mundt of the University of Tennessee Bacteriology Department has been awarded a $5,500 **National Science Foundation** grant to continue studies on streptococci. Recent studies by Dr. Mundt have shown that the Group D streptococci do not necessarily indicate the pollution of food, and future studies will deal with the distribution of these organisms under natural conditions.

Dr. R. Winston Menzel of the Oceanographic Institute, Florida State University, has received a three-year grant from the **Public Health Service** for a total of $19,952.00 to work on the control of **Dermocystidium** disease in oysters.

The **Florida State University** has been awarded a grant by the **National Science Foundation** and the **Atomic Energy Commission** for a Summer Institute in Radiation Biology for the summer of 1960. Participants will be selected from among the high school and junior and senior college teachers in the Southeast. Two four-week courses will be given—one in Radiation Science and the other in Radiation Biology. Students will be expected to take both courses, which will be conducted by the Department of Biological Sciences. A brochure will be distributed throughout the southeast soon. Additional information may be obtained from the Director, Dr. Charles Edington, Department of Biological Sciences, Florida State University.

Dr. Burton J. Bogitsh, Associate Professor of Biology at Georgia Southern College, has received a grant of $2,945 from the **National Institutes of Health** for studies on the nature of an acanthocephalan cyst in fishes.

Florida State University has been granted an award of 3 million dollars over a period of 5-7 years by the **Atomic Energy Commission.** This award will support a program in the development of biophysics sponsored jointly by the Departments of Biological Sciences and Chemistry.

Dr. B. T. Cole, Louisiana State University, has received a grant of $2,300 from the **National Institutes of Health** for continuing work on the characteristics of impulse formation in the aortic depressor nerve of rabbits.

Dr. Yoneo Sagawa, Department of Botany, University of Florida, recently received a grant from the **American Orchid Society** for the investigation of basic problems in the Orchidaceae. In connection with this project, **Dr. Dorothy Niimoto** has joined the Department as a post-doctoral fellow. In this same Department, **Dr. Carl Monk** has received a grant from the **National Science Foundation** for a study of radial tree growth.

The Department of Biological Sciences of **Florida State University** has received a grant of $40,000 from the **National Science Foundation** for the purchase of an electron microscope. This instrument will be housed in the Conradi (Biology) Building in space already prepared and should be in operation by the fall of 1960.

The **National Science Foundation** has granted $8,530 to the **Louisiana State University** to enable 40 high school students to attend the Gulf Coast Research Laboratory at Ocean Springs, Mississippi. High school teachers in Mississippi, Louisiana, Alabama, and Arkansas whose students might be interested should contact **Dr. Harry J. Bennett,** Zoology Department, L. S. U., Baton Rouge.

The **National Science Foundation** has granted the **University of North Carolina** a three-week summer Botany Conference for College Teachers of General Botany and General Biology. The Conference will be held in Chapel Hill, August 1-19. A brochure of information about the Conference and application forms may be secured from the Director, **Dr. Victor A. Greulach,** Box 1268, Chapel Hill, N. C.

National Science Foundation grants to staff members of the Biology Department, **University of Florida** include: $29,000 for a 3-year continuation of studies on the green turtle by **Dr. Archie F. Carr;** $9,000 to **Dr. R. M. DeWitt** to study metabolism of clams during drought and starvation; and $12,000 for a 2-year period to **Dr. John D. Kilby** to study the genetics of melanism in gambusid fish. From the **National Institutes of Health, Dr. G. W. Hunter, III,** received a grant of $23,000 to continue his work on schistosomiasis.

State of the BULLETIN

Members will note a new high in number of pages for a single issue of the BULLETIN in the April issue. This, of course, is due to the enthusiastic response to the call for papers for the Annual Meeting and the resulting larger requirements for space for abstracts and program.

The Editor would like to call to the attention of members a ruling of the Executive Committee which eliminates from the BULLETIN mailing list all members delinquent in dues at the close of the Annual Meeting each year. This ruling has resulted in a considerable saving to the Association and has avoided, for the present at least, another increase in the number of copies printed.

One of the thorniest problems of the Secretary and the Editor is in keeping up with the changes of address of members. The 10 to 20 copies which are returned each mailing not only produce a tripling of mailing costs, but also a doubling of the time consumed in all other mailing procedures. It would be of considerable help if individuals who move would promptly notify the Secretary of the new address. It would also be of help if institutions or departments, noting receipt of BULLETINS by departed personnel, would note the new address on the envelope prior to its return.

The Editor is, as ever, most grateful to the State Correspondents for their efforts in securing news for the BULLETIN. Many of these correspondents have served for extended periods, and, while it is the hope of the Editor that all will continue, it is quite understandable that some may wish to retire from this somewhat arduous and thankless task. The Editor would certainly welcome volunteers to fill these positions, or nominations by members of others who might be willing to serve. The Editor is always receptive to suggestions as to other methods of securing news which would work as well or better than that which we now have — especially a method which would be less of a chore to a small number of individuals.

The A.S.B. BULLETIN

Volume 7, Number 3 July, 1960

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The Official Quarterly Publication of
The Association of Southeastern Biologists

THE A.S.B. BULLETIN

The A.S.B. BULLETIN is the official quarterly publication of the Association of Southeastern Biologists and is published at Columbia, S. C., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to the Editor, U.S.P.H.S., P. O. Box 717, Columbia, S. C. Changes of address should be sent promptly to the Secretary of the A.S.B., Dr. Harold J. Humm, Department of Botany, Duke University, Durham, N. C. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tenn. Subscription rate for non-members of A.S.B.: $2.00 per year. Printing and typography by the Cary Printing Co., Columbia, S. C.

GEOFFREY M. JEFFERY
EDITOR

HAROLD J. HUMM, ASSOCIATE EDITOR
ELSIE QUARTERMAN, BUSINESS MANAGER

ASSOCIATION AFFAIRS

President's Message

I enjoyed seeing so many A.S.B. members at the New Orleans meeting. Those of you who were not able to attend missed an unusually good meeting in an unusually interesting and pleasant environment. I hope that many of you who did not get to New Orleans will be able to join the many who did at our next meeting at the University of Kentucky in Lexington, April 20-22, 1961. We are anticipating another excellent meeting in pleasant surroundings. I want to take this opportunity to thank Father Mullahy and his Committee once more for the very good job they did in making arrangements for the meeting at Loyola.

As I take over the presidency of A.S.B. I hope that I shall be able to do as good a job as our presidents have done in the past, and I am pleased with the excellent group of officers and Executive Committee members who will be working with me during the year. We will be happy to have any suggestions any of you may have for the continued improvement of the Association and you can be sure that we shall give all suggestions serious consideration. In addition to submitting any suggestions or ideas you may have, you can help by sending news items and articles to the BULLETIN, by keeping the Secretary informed promptly of any address change, and by submitting nominations for new members, emeritus members and the Meritorious Teaching Award.

At present we are faced with three main problems: Securing tax exempt status as a non-profit scientific and educational organization; incorporating as a non-profit organization; and selecting a new editor for the A.S.B. Bulletin. The Executive Committee was very reluctant to accept Geoffrey M. Jeffery's resignation as editor since he has been doing such a fine job but felt it could not do otherwise since Dr. Jeffery will be on leave of absence outside the region. A new editor will be appointed by the Executive Committee within the next month or so and I hope that any of you who would be interested in the editorship will not hesitate to send your application to me. Or, if you know of another member who would make a good editor please write me about him.

Our efforts to secure tax exempt status are continuing and since we have adopted our new constitution we anticipate favorable action on our next application to the Internal Revenue Bureau. Professor M. S. Breckenridge of the University of North Carolina School of Law, a specialist in corporation and tax law, has agreed to assist the Association both in its efforts to secure tax exempt status and in incorporating. It appears that the process of incorporating will not involve any undue difficulty or expense.

I think we can look forward with confidence to the continued growth and improvement of our Association and trust that it will keep on meriting the compliment that has been paid by many members: that A.S.B. is a favorite among the various organizations in which they hold membership.

Victor A. Greulach

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New Officers

Officers newly elected at the recent annual meeting are as follows:

President-Elect: Dr. Royal E. Shanks, University of Tennessee.

Vice-President: Dr. Walter S. Flory, Jr., University of Virginia.

Executive Committee: (3-year terms) Dr. B. Theodore Cole, University of South Carolina; Dr. Charles E. Jenner, University of North Carolina; (1-year term, to fill the unexpired term of Treasurer Elsie Quarterman) Dr. James H. Gregg, University of Florida.

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New Constitution

Members should note that the revision of the Constitution and By-Laws of the Association as published in the January, 1960 issue of the BULLETIN was approved by the members at the Annual Meeting and became effective at the close of the regular meeting.

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Amendment to the By-Laws

In a special session called after the adjournment of the regular

(Continued on Page 56)

Biological Research at Southern Research Institute

J. Richard Thomson

Mr. Thomson received his BS (1948) and MS (1949) degrees from Emory University. He served in the U. S. Navy at the Naval Medical Research Institute (1945-46), has been employed by the Communicable Disease Center (1949), University of Chattanooga, as Instructor in Biology (1950), the Oak Ridge National Laboratory (1951) and, since 1952, has held a position as Research Biologist in the Chemotherapy Division of Southern Research Institute, Birmingham, Alabama. His particular area of interest lies in the investigation of drug-resistant neoplasms, antimetabolite studies on tumor-bearing animals held on synthetic diets deficient in normal metabolites, and in combination chemotherapy of experimental cancer. He has been author or co-author of twenty-six publications in the field of cancer biology, and is a member of Sigma Xi, A.S.B., and the American Society of Professional Biologists.

Organization and Operating Policies

Southern Research Institute was established in 1941 as a means of providing research services for use by industry, government, foundations, and individuals. Shortages of material, equipment, and scientific personnel during World War II delayed actual operations until 1945. From its inception the Institute has operated as an independent, nonprofit corporation, governed by a board of trustees. Its financial needs are met by a capital fund derived from contributions from industry and individuals who are interested in furthering the ideals and objectives of the Institute as well as from operating revenues charged to sponsors for research services rendered. The capital fund is used only for acquiring real estate, buildings, and permanent equipment, whereas the operational costs are met from the project charges paid by the sponsors.

The operating policies provided for by its standard research contract place the Institute in a position which is virtually identical to a technical division of the sponsor's company. The contract provides that all information, discoveries, and patents resulting from the research become the exclusive property of the sponsor. Any degree of confidence desired by the sponsor is maintained at all times, and no publication or disclosure regarding the work is released without the sponsor's permission. Each sponsor is kept fully informed of the progress of the research at regular intervals, and the Institute encourages active participation, visits, and discussions by the sponsor's personnel.

Although Southern Research Institute was established with the interests of the Southern region uppermost in the founders' minds, the Institute has accepted research projects from all sponsors without regard to their location. Much of the research has indeed been sponsored by Southern industry; however, many of the largest and most significant projects have been sponsored by national concerns, the Federal Government, and other agencies outside the South.

The many research projects can be grouped into those having to do with applied chemistry and physics, engineering, metallurgy, and those of a biological and biochemical nature. Briefly listed, some of the more interesting projects concern the radiation preservation of foods, low-temperature carbonization of coal, atomization of liquids, utilization of industrial wastes, demineralization of water, disinfectants, protective coating for teeth, analytical services, mechanical design, electronic instrument development, high temperature evaluation of metals, and research in textiles, wood, and paper.

Biochemistry

The work of the Biochemistry Division is devoted almost entirely to the cancer problem. The nature of this work entails fundamental cellular biochemistry as a tool for investigating exploitable differences between normal and neoplastic cells. Once such differences can be demonstrated, a more rational approach to successful cancer chemotherapy will be made possible. The prime interest in such a program is to discover biochemical events, either anabolic or catabolic,

which are vital to the cancer cell, but unimportant to the normal cell. Antimetabolites, which may inhibit or retard such biochemical processes, then, may be used to block or to completely inactivate such a system, the net result being that the cancer cells are killed and the normal cells remain unharmed. Successful application of this phenomenon has been shown by the action of sulfanilamide and its various analogs which inhibit certain bacterial growth by blocking the utilization of p-aminobenzoic acid (PABA), an essential vitamin for these bacteria while, at the same time, not affecting the hosts' cells since they do not require PABA as a substrate to build folic acid.

For the past several years an intensive effort has been directed to the role of purines in the biosynthesis of nucleic acids. Since the nucleic acids occupy such a prominent position in the mitotic process, it is generally believed that the purine and pyrimidine antimetabolites should be particularly promising agents to use as growth inhibitors. It now appears that cancer cells have many specific deficiencies. Among these are enzymes that degrade certain purine derivatives, and enzymes which are involved in the metabolism of pyrimidine derivatives, carbohydrates, and amino acids. Although these differences have been found, no means have as yet been devised to exploit them to the detriment of the cancer cell.

Synthesis of Antimetabolites

The Organic Division is principally concerned with the synthesis of new agents to be screened for inhibition of transplantable neoplasms. This research group proceeds in its syntheses along rational lines suggested by the Biochemistry and Chemotherapy Divisions. Thus, there are integrated efforts of the three divisions, the chemotherapy of cancer being the common goal. When an effective antimetabolite is found, the Organic Division synthesizes the same basic molecule with various substitutions which are submitted for further tests to determine if a more inhibitory molecule will be produced by the molecular change. Through several years of research in this field it has been ascertained that certain radicals tend to negate the anticancer activity of selected basic compounds, and other radicals sometimes render the basic compound more active.

Chemotherapy

The Chemotherapy Division is primarily concerned with the empirical screening of new agents for anticancer and antiviral activity. More than 12,000 new synthetic drugs and antibiotic preparations are evaluated by this group yearly, and approximately 10,000 mice, hamsters, and rats are used in the overall program each week. Three mouse neoplasms are used in this primary screen: a sarcoma, an adenocarcinoma, and a leukemia representing each of the major classifications of neoplastic growth. The disease known to the general public as "cancer" is actually not a specific designation but a collective term given to include any group of cells manifesting abnormal or ungoverned growth. Since there are more than 300 cell types, each having different functions (and *a priori* different metabolic requirements), it is unreasonable to believe that any "panacea" or cure-all will be found. It is much more logical to expect that certain agents especially inhibit particular cell types but do not inhibit others. This, indeed, has been proved to be true in experimental chemotherapeutic attempts; hence we find the "spectrum of tumors" in any broad tumor-screening program.

When a compound has demonstrated anticancer activity in the "primary" screen, additional tests are made by the "secondary" screening group to determine its effectiveness on a much larger spectrum of tumors, e.g., 20 hamster tumors, 2 rat tumors, and several lines of drug-resistant mouse neoplasms. Certain of these active agents, whose chemical structure or mode of action would suggest that they might be additionally inhibitory to cancer cells if used in combination with known metabolic antagonists, are tested in a combination chemotherapy experiment. Those which show a potentiating or synergistic activity are studied in more detail by the Biochemistry Division. Other agents, the molecular structure of which suggests activity in antagonizing normal nutritional substances are tested in tumor-bearing animals which are held on a synthetic diet deficient in the corresponding nutritional component.

Some drugs are interesting in that they inhibit cell growth through mechanisms not readily defined *in vivo*; in such cases, tissue culture techniques are utilized to evaluate this inhibitory action *in vitro* in a chemically-defined media. Some of the more complicated enzyme systems are studied in tissue cell cultures, for example, in bacterial cultures where chromatographic and radioautographic techniques are employed.

The Chemotherapy Division of Southern Research Institute also maintains an exten-

sive virus chemotherapy program in which tissue cultures are infected by viruses; large numbers of new synthetic agents and antibiotics are then screened for activity against these viruses. There are several reasons to believe that the same agents that inhibit neoplastic growth may also inhibit virus multiplication. A popular, current theory holds that cells that are in a more rapid metabolic state require greater amounts of nucleic acids (and their precursors) than do normal, resting cells. Since virus particles also require large amounts of nucleic acids and their precursors, it is reasonable to assume that substances that block nucleic-acid formation or the use of nucleic acid may show similar activity in the chemotherapy of cancer and viral diseases. With such objectives in mind, several of the major pharmaceutical manufacturers have sponsored virus chemotherapy and hormone research projects at the Institute.

The biological laboratories of the Institute use a large portion of the total Institute employees, who currently number approximately 325; some sixty of these hold advanced degrees. To maintain its broad cancer research program, Southern Research Institute employs approximately 55 biologists, 40 chemists and biochemists, and 25 animal keepers. Among these are 13 PhD's, 2 DVM's, and 10 MS degrees. With few exceptions, all technical personnel have bachelor's degrees in either biology or chemistry and, for the most part, have received their education in the Southeast. Several of the Southeastern colleges and universities are very well represented, viz., Auburn University, Birmingham-Southern College, Alabama College, University of Alabama, Emory University, University of North Carolina, Vanderbilt University, Florida State University, and Howard College.

The funds to support the cancer screening programs are obtained by grants from such agencies as the American Cancer Society and various foundations, and through research contracts with the Federal Government's Cancer Chemotherapy National Service Center. The Institute does well over a million dollars' worth of cancer research each year. Smaller contracts with industrial, chemical, and pharmaceutical companies are performed in such general areas as preclinical pharmacology, special toxicities, endocrine preparation assays, and nutritional studies. All such activities are conducted on a research basis; no routine assays or analytical determinations are done.

Southern Research Institute is a rapidly-growing research center, and there is every reason to believe that this growth will continue in the future. Its aim to provide the Southeastern region with varied research services and to provide research opportunities for our biologists, chemists, physicists, and engineers has already been realized.

PROCEEDINGS OF THE NEW ORLEANS MEETING

Loyola University of New Orleans, Louisiana, was host at the twenty-first annual meeting of the Association of Southeastern Biologists, April 21 to 23, 1960. Meeting jointly with the A.S.B. were the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the South Central and South Atlantic Regions of the Society of General Physiologists, and the Southeastern Region of Beta Beta Beta National Honor Biological Society.

A number of interesting field trips were scheduled for April 21 and April 23. On Friday, April 22, the ten Scientific Sessions had a full schedule which included 112 contributed papers, something of a record for an annual meeting of the Association. The General Sessions on Thursday and Friday evenings were highlighted by the speakers, Dr. Arnold Grobman, Dr. Hiden T. Cox, and Dr. F. C. Steward.

The following account of the Executive Committee Meetings and of the General Sessions is submitted by the Secretary, Dr. Harold J. Humm:

April 21, 1960. Meeting of the Executive Committee

The Executive Committee of the Association of Southeastern Biologists met in regular session at 10 a.m., April 21, 1960, in the student lounge of Marquette Hall, Loyola University, New Orleans, Louisiana. The following officers and committee members were present: President Horton H. Hobbs, Retiring President Mary Esther Gaulden, President-Elect Victor A. Greulach, Vice-President Royal E. Shanks, Secretary Harold J. Humm, Treasurer Elsie Quarterman, Editor Geoffrey M. Jeffery, William D. Burbanck, Joseph C. O'Kelley, Donald C. Scott, Robert B. Short, and Harry E. Wheeler.

Father J. H. Mullahy, S. J., Chairman of the Committee on Local Arrangements, reported on the work of his committee.

President Hobbs reported that progress toward settlement of the income tax matter seemed very favorable.

At the request of President Hobbs, Mary Esther Gaulden agreed to represent the Association of Southeastern Biologists at the inauguration of the new President of the University of Tennessee in May, 1960.

The Secretary proposed a resolution urging the continuation of the present status of Horn Island as a wildlife reservation, in view of an announcement that efforts would be made by the government of the State of Mississippi to convert it to a recreational area. A motion was made and seconded that the resolution be presented to the membership for adoption. The motion carried.

The question of the time of receipt of dues from new members and the year for which they would apply was brought up. Donald Scott moved that a by-law be prepared for inclusion in Section 2, Article IV of the constitution which would establish the fiscal year as corresponding to the calendar year, instead of a fiscal year from March 16 to March 15 as heretofore. The motion was seconded and passed. It was pointed out that with this change the Treasurer's report at each annual meeting would be an interim rather than an end-of-the-year report.

The annual report of the Treasurer was presented and approved by motion.

Editor G. M. Jeffery reported that the 32-page April issue of the BULLETIN was the largest yet and contained 111 abstracts. Nine hundred copies were printed at a cost of $357 and 664 were mailed. He pointed out a need for a backlog of lead articles for the BULLETIN and requested that members of the association be urged to prepare and submit them for future use. He also discussed the problem faced by the editor just before the April issue of proofreading the many abstracts submitted and of the necessity of editing or altering a considerable portion of them because the authors had not conformed to the rules for submitting abstracts published in the January BULLETIN. He expressed the opinion that it may be necessary in the future to reject all abstracts that fail to conform to the rules in order to reduce the editorial task of the annual April number.

Editor Jeffery announced that he was obliged to resign this position following completion of the October, 1960, issue of the BULLETIN for two reasons: He would be away during the academic year of 1960-61; the U. S. Public Health Service has adopted a policy severely restricting editorial activities of its employees.

Several possible candidates for editor were mentioned in the discussion that followed. Victor A. Greulach moved and Mary Esther Gaulden seconded that the association sponsor the membership of the editor in the Conference of Biological Editors.

Harry E. Wheeler moved and Victor A. Greulach seconded a unanimously-approved rising vote of thanks for the excellent work done by G. M. Jeffery as Editor of the BULLETIN.

W. D. Burbanck, Chairman, Mary Glide Goethe Travel Awards Committee, reported that a total of $353 was awarded graduate students for travel expenses in attending the New Orleans meeting.

Invitations received for a 1961 meeting place were presented by Donald C. Scott, Chairman of the Meeting Place Committee, and discussed at length. Mary Esther Gaulden suggested that serious consideration be given to holding the 1962 meeting at the University of Georgia as this would be the twenty-fifth anniversary meeting of the Association, the first of which was held at the University of Georgia as a result of the efforts of George H. Boyd.

Reports of the Nominating and Auditing Committees were received and approved.

Mary Esther Gaulden moved and Robert B. Short seconded that the Association become incorporated. The motion passed and President-Elect Greulach indicated that he would take action in this direction during the summer of 1960.

Donald C. Scott moved and W. D. Burbanck seconded the motion that the following qualified members be elected to the category of Emeritus Membership: George H. Boyd, Roland Harper, L. R. Hesler, A. B. Massey, and A. D. Shaftsbury.

The meeting was adjourned at 11:45 a.m.

April 22, 1960. Morning General Session

President Horton H. Hobbs called the general session business meeting to order at 11 a.m. Friday, April 22, 1960, in the Field House auditorium of Loyola University.

Election of new officers was the first order of business, with the following positions to be filled: president-elect, vice-president, two regular members of the Executive Committee for three-year terms, and one member to fill the unexpired term of Elsie Quarterman. Terms of office of the Secre-

tary and Treasurer did not expire this year.

The slate of the Nominating Committee was officially presented and nominations from the floor were called for for each vacancy. William D. Burbanck was nominated for the position of vice-president as the only nomination from the floor. Ballots were distributed and were later submitted to the committee of tellers appointed by President Hobbs: W. G. Erwin (chairman), Julian Darlington, and C. W. Hart, Jr.

Reports of the Treasurer and Auditing Committee were heard and both were accepted. The Secretary gave a resumé of the proceedings of the Executive Committee meeting held the previous morning and announced a total of 117 new members since the Knoxville meetings a year previous.

Donald C. Scott, Chairman of the Committee on Meeting Places, listed the invitations received for holding the 1961 meeting. John W. Carpenter added to the cordiality of the invitation from the University of Kentucky. A motion was made, seconded, and passed that the 1961 meeting be held at the University of Kentucky in Lexington. The dates will be April 20-22.

The proposed revisions of the Constitution as published in the January, 1960, issue of the BULLETIN were considered. A motion and second were made that they be approved, and the motion passed.

The Secretary read the following resolution concerning Horn Island:

"Be it resolved that the membership of the Association of Southeastern Biologists go on record as being strongly opposed to the proposed conversion of Horn Island, Mississippi Sound, from its present status as a wildlife reservation under the U. S. Fish and Wildlife Service to a recreational area under the jurisdiction of the State of Mississippi.

"The Association of Southeastern Biologists, through a Committee on Horn Island, was instrumental in the establishment of Horn Island as a wildlife reservation only two years ago. Because of the limited number of natural areas of the type of Horn Island, we feel that it is to the best interests of the people of Mississippi as well as to the people of all other southeastern states that Horn Island remain a wildlife reservation in perpetuity."

A motion was made, seconded, and passed that this resolution be adopted.

The meeting was adjourned at noon.

April 22, 1960. Evening General Session

President Horton H. Hobbs called to order the evening business meeting at 8:30 p.m. on Friday, April 22, 1960, in the Field House auditorium of Loyola University.

Results of the election were announced as follows:

President-Elect: Royal E. Shanks.

Vice-President: Walter S. Flory.

Executive Committee, three-year terms: B. Theodore Cole and Charles E. Jenner; to fill the unexpired term of Elsie Quarterman, James H. Gregg.

Dr. O. C. Bradbury of Wake Forest College received the Meritorious Award for Teaching and the honorarium of $100, made available by the Will Corporation of Atlanta, Georgia. Frederick T. Wolf, Chairman of the Meritorious Award for Teaching Committee, made the presentation. The other committee members were C. G. Goodchild and Roberta Lovelace.

The Association Research Prize, made possible by the Carolina Biological Supply Company, was awarded to Drs. A. V. and Jeanne W. Beatty of Emory University for their paper, "Postirradiative Effects on Chromosomal Aberrations". The prize consists of an honorarium of $100.00.

The $150 Research Fellowship at the Mountain Lake Biological Station, presented annually by the Phipps and Bird Company of Richmond, Virginia, was presented to Miss Jean Elizabeth Pugh, Assistant Professor of Biology, Norfolk Division of the College of William and Mary.

The meeting was adjourned at 9:00 p.m.

April 22, 1960. Special Business Session of the Association

Immediately following adjournment of the business meeting dealing with matters of the current meeting, a meeting was called to order to conduct some business pertaining to the 1961 meeting. Past-President Horton H. Hobbs explained that the newly-adopted revision of the Constitution could not take effect until after adjournment of the meeting at which this revision was approved.

President Victor A. Greulach presided.

A motion was made and seconded that Article IV, Section 2 of the by-laws of the Constitution be amended to read that the fiscal year of the Association shall coincide with the calendar year. The motion passed.

Past-President Hobbs expressed the opinion that the Association should become incorporated. A motion was made and seconded authorizing the President and Secretary to start incorporation procedures immediately.

The meeting was adjourned at 9:15 p.m.

ANNUAL AWARDS

The Meritorious Award for Teaching

The Committee chose as the 1960 recipient of the A.S.B. Meritorious Award for Teaching Dr. Ora C. Bradbury of Wake Forest College. This coveted award consists of a certificate and an honorarium of one hundred dollars provided through the generosity of the Will Corporation of Georgia.

Dr. Ora C. Bradbury

For 35 years Wake Forest College students have been exposed to the sometimes relentless, sometimes wryly humorous, presence of Biologist Ora C. Bradbury. Dr. Bradbury favors his students with the same intensity he applies to a problem of science. Hard, they say, but carefully and objectively fair; a man with a passion for imparting knowledge to young people and with it a desire that they learn that knowledge is a tool to understanding.

Dr. Bradbury is a native of Kansas and received the Bachelor of Science degree at Ottawa University. He received the Master's and Ph.D. degrees at the University of Nebraska. He taught zoology at Baylor University from 1917 until 1923 and at the University of Denver from 1923 until 1925. He has been at Wake Forest since 1925. He is married and has two sons, Max G. of Clinton, Ohio, and Kenneth R. of Raleigh, N. C.

Dr. Bradbury has written various laboratory manuals and has done research on termites. He is a former president of the North Carolina Academy of Science and a member of the American Institute of Biological Sciences, the Association of Southeastern Biologists, the American Society of Parasitologists and the American Association for the Advancement of Science.

His fellow faculty members know him as a dedicated man anxious that each person be given a chance to express his opinions. His students know him as a man who respects excellence.

The Association Research Prize

The Association Research Prize, made possible through the generosity of the Carolina Biological Supply Company, is awarded annually to the member or members presenting an especially meritorious paper at the annual meeting, and consists of a $100.00 honorarium. This year the prize was awarded to Drs. A. V. and Jeanne W. Beatty of Emory University for their paper, "Post-irradiative Effects on Chromosomal Aberrations". The abstract of the winning paper is reprinted below:

POSTIRRADIATIVE EFFECTS ON CHROMOSOMAL ABERRATIONS

A. V. BEATTY and JEANNE W. BEATTY
Emory University

Investigations dealing with chromosomal aberrations in Tradescantia microspores have revealed that a total dose of 400r of X radiation, in combination with various environmental factors during or after irradiation, yielded in five percent oxygen an average low of 0.48 and a high of 0.88 aberrations per cell, while in helium a low of 0.14 and a high of 0.66 was found. In those experimental procedures in which a total dose of 400r yielded less than the highest yield of aberrations, a yield up to but not greater than this high could be obtained by modifying the experimental setup so as to influence the rejoining of broken chromosome ends. This idea of constancy in the number of recoverable breaks and the role which available energy plays in radiation recovery, form the basic premises upon which the present

work was carried out. Irradiation was performed in both oxygen and oxygen-free atmospheres. In the oxygen-free experiments some of the material was pretreated in chemicals which presumably contributed in some way in supplying additional energy for repair. Postirradiative treatments for mass doses as well as in the fractionation experiments were given in either helium or air. Any treatment which supposedly increased the supply of energy in the cell, decreased the aberration yield while a decrease in available energy increased the aberration yield.

Research Fellowship

The Research Fellowship, made possible by the generosity of the Phipps and Bird Company, was awarded to Miss Jean Elizabeth Pugh, Assistant Professor of Biology, Norfolk Division of the College of William and Mary. This fellowship consists of an honorarium of $150.00 for use in summer research at the Mountain Lake Biological Station of the University of Virginia. The recipient is selected from applicants on the basis of planned work, references, education and other supporting data submitted. Miss Pugh is a graduate of Madison College and the University of Virginia and is working toward the Ph.D. degree at the latter. This summer she will be engaged in a study of the morphology and histology of the alimentary tract of the fiddler crab.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

Dr. C. S. Shoup, Chief, Biology Branch, AEC, Oak Ridge, visited the Puerto Rico Nuclear Center of AEC on February 17th, and spoke to the radiobiology class of the University of Puerto Rico, Mayaguez. The Puerto Rico Nuclear Center is the newly-established nuclear science training center of the AEC for Latin America.

Dr. Claude L. Yarbro, instructor of biochemistry and nutrition at the University of North Carolina School of Medicine since 1955, has joined the Oak Ridge Operations of AEC. Dr. Yarbro is assigned to the Biology Branch, Research & Development Division, and a part of his duties will be that of staff coordinator for education and training programs administered from Oak Ridge.

Dr. James D. Eisen of Emory University has recently received a postdoctoral fellowship from the National Cancer Institute of the NIH for two years of research at the University of Uppsala, Sweden.

The University of Georgia Marine Institute, located on Sapelo Island, Georgia, announces the appointment of **Dr. George H. Lauff** as Director of the Institute, effective April, 1960. Dr. Lauff, who is secretary-treasurer of the American Society of Limnology and Oceanography, comes to the Institute from the University of Michigan where he has been associated with the Great Lakes Research Institute and the Department of Zoology. **Dr. Lawrence R. Pomeroy,** who has served as Acting Director at Sapelo for the past year will remain with the Institute and the University of Georgia to devote full time to research and teaching.

Dr. Jane Belcher, Sweet Briar College, is studying the embryology of *Xenapus* at University College, Ihadan, Nigeria.

Dr. Ruskin S. Freer, Chairman, Division of Science and Mathematics, Lynchburg College, was recently awarded an honorary Doctor of Science Degree by Culver-Stockton College in Missouri.

Dr. Miriam F. Bennett will be on sabbatical leave from Sweet Briar College during 1960-61 to study biological rhythmicity at the Max-Plank Institute fur Verhalten-physiologie at Tubingen, Germany. **Miss Rose Mary Johnson,** University of Virginia, will replace Miss Bennett during the session.

Dr. Dietrich Bodenstein, formerly with the Gerontology Branch of the National Institute of Health, assumed the Chairmanship of the Department of Biology at the University of Virginia in February 1960. His primary interests are invertebrate endocrinology and developmental physiology of vertebrates and invertebrates.

Dr. James L. Riopel, a recent graduate of Harvard University will join the staff of the University of Virginia Biology Department in September 1960. His major field of interest is plant anatomy and morphologenesis.

Dr. James N. Dent who has spent the past academic year at the Gaddy Marine Laboratory, St. Andrews, Scotland, will resume his duties at the University of Virginia in the fall of 1960.

Dr. B. Theodore Cole has accepted an appointment as Associate Professor of Biology, Department of Biology, University of South Carolina effective September, 1960. Dr. Cole is presently on a one year appointment as Research Participant, Cell Physiology Section, Biology Division, Oak Ridge National Laboratory.

Dr. L. R. Hesler, Dean Emeritus of the College of Liberal Arts of the University of Tennessee, is the author of a new book, MUSHROOMS OF THE GREAT SMOKIES, which is being published by the University of Tennessee Press. The book, which will be of interest to the layman as well as the biologist, deals with the interesting species of mushrooms in the Great Smoky Mountains and contains approximately 200 black and white illustrations. The book will be available in July, 1960.

Dr. James A. Miller, Professor of Anatomy at Emory University, has accepted the Chairmanship of the Department of Anatomy of Tulane University. He and **Dr. Faith S. Miller,** a research team which has been studying the use of hypothermia for the treatment of asphyxia neonatorum, will move their laboratory to New Orleans this summer.

Dr. S. Leonard Doerpinghaus, Assistant Professor of Biology at Agnes Scott College, will attend the National Science Foundation Institute in Desert Biology, June 27 to Aug. 6, at Arizona State University.

Several Florida State University faculty and students attended the Federated Societies of Experimental Biologists meetings in Chicago in April. Among the participants were **Mr. Edgar Barnett** and

Drs. Gib DeBusk, Lloyd Beidler, Harry Lipner, and **Dexter Easton.**

Dr. A. Gib DeBusk of the Department of Biological Sciences at Florida State University was an invited lecturer at the School of Aviation Medicine in May. He spoke on the "Genetic Effects of Primary Cosmic Radiation". He also attended and presented a paper to the Aerospace Medical Meeting held in Miami in May.

Dr. Sidney Fox of the Oceanographic Institute at Florida State University and **Dr. Gib DeBusk,** Florida State University, participated in a conference on "Biological Experiments in the Space Environment" sponsored by the National Aeronautics and Space Administration in Washington on June 20, 1960. This conference will establish the overall objectives of space biology.

Dr. Margaret Y. Menzel, Research Geneticist with the USDA, will be a visiting assistant professor in the Department of Biological Sciences, Florida State University this summer. Dr. Menzel will teach genetics.

Dr. A. W. Ziegler, Department of Biological Sciences, Florida State University, was invited to participate in the AIBS Film Series Review, June 20-30 in Santa Barbara and Pasadena, California. The conference was being sponsored by the State Department of Education of California.

Dr. Norman I. Bishop of the Department of Biological Sciences, Florida State University, gave a paper entitled "A Phylloquinone in the Electron Transport System of Photosynthesis" at a Ciba Foundation Symposium in London, England. The subject of the symposium was "Quinones in Electron Transport".

Dr. William Gueston Carter, Jr., instructor of biology, Washington and Lee University, received the Doctor of Philosophy degree in June from Duke University.

Mr. James E. Perham, Biology Department, Randolph-Macon Woman's College will work this summer on problems in the genetics and biochemistry of molds in the Department of Biological Sciences, Florida State University.

Dr. Paul A. Walker will be on sabbatical leave next semester from Randolph-Macon Woman's College to work with Dr. George W. Beadle, recent Nobel Prize winner in Genetics. Dr. Walker plans to conduct investigations in the field of mold genetics. He will leave early in August for the California Institute of Technology, spending a short time at the Biology Division, Oak Ridge Institute of Nuclear Studies en route.

Dr. Michael D. Coe, Assistant Professor of Anthropology at the University of Tennessee, spent the winter quarter in Costa Rica on an archaeological expedition for the Institute of Andean Research, Inc., New York City.

Dr. Chauncey Goodchild, Chairman of the Biology Department, Emory University, has been awarded one of 12 Charles Howard Candler Professorships presented at Emory recently.

The following items were received from the Department of Biology, Wake Forest College: **Dr. Charles M. Allen** will attend a National Science Foundation Institute in Marine Biology of the University of Oregon at Coos Bay from June 20 through August 12; **Dr. John E. Davis, Jr.** will attend the National Science Foundation Summer Institute of Genetics at N. C. State College from June 14 through July 21; **Dr. Elton C. Cocke** attended a conference on the History of Science at the University of Tennessee in June, and later in the summer will attend a similar conference at Colorado State University; **Dr. David W. Johnson** is spending the three summer months working with the U. S. Public Health Service at Cape Thompson, Alaska, on "Project Chariot." Dr. Johnson's work will entail preliminary surveys of vertebrate populations and productivity prior to underwater atomic blasting to create harbors. Dr. Johnson's book, "Biosystematics of North American Crows" will be published next year by the University of Washington Press.

Louisiana State University announces the following additions to the staff in Zoology: **Dr. Willie Mathews Reams, Jr.,** experimental embryologist, a graduate of University of Richmond, Richmond, Virginia and The Johns Hopkins University, comes to L. S. U. from the Department of Anatomy at the Medical College of Virginia. Dr. Reams has a grant of $13,000 from the National Science Foundation for the study of developmental biology; **Dr. John A. Davison,** physiologist, a graduate of the University of Wisconsin and the University of Minnesota comes to L. S. U. from the Department of Biology at Florida State University. Dr. Davison has a grant of $3,-800 from the NIH for the study of red cell form; **Mr. Fred Cauthron,** Associate in Zoology, comes to L. S. U. from the Texas A & M Research Foundation at Grand Isle, Louisiana, and from Douglas Aircraft. Mr. Cauthron will be responsible for the care and maintenance of Departmental instruments and equipment.

Dr. Douglas Lancaster has joined the staff in biology at Northwestern State College, Natchitoches, Louisiana, where he will teach ornithology and mammalogy. Dr. Lancaster is a graduate of Virginia Polytechnic Institute and holds the Ph.D. degree from Louisiana State University.

Dr. Beryl C. Franklin has joined the staff of Northeastern State College at Monroe, Louisiana. Dr. Franklin had occupied a temporary appointment in Zoology at Louisiana State University for the 1959-1960 school year.

Dr. George C. Kent, Jr. has been named Chairman of the Department of Zoology at Louisiana State University.

Mr. Earle A. Cross, Research Associate in Entomology, University of Kansas, will join the staff of Northwestern State College of Louisiana in the fall, replacing **Dr. James E. Sublette** who has accepted a position in the Department of Biology at Texas Western University, El Paso, Texas. Mr. Cross will receive the Ph.D. degree from the University of Kansas at the end of the summer.

Dr. Margaret E. Gilbert (Department of Biology, Florida Southern College, Lakeland, Florida), **Dr. Ralph Bangham** (Head of the Department of Biology, Wooster College, Wooster, Ohio), and **Mr. Stuart Warter** (graduate student in Zoology, Louisiana State University, Baton Rouge) are visiting members of the summer staff of Northwestern State College of Louisiana.

Dr. Victor A. Greulach is now Chairman of the Botany Department at the University of North Carolina. **Dr. John Couch** will devote full time to teaching and research in the Department.

The following personnel changes are from the Biology Division, Oak Ridge National Laboratory:

Dr. Masashide Asano, under the sponsorship of the Japanese Atomic Energy Bureau, has joined the Pathology and Physiology Section. Dr. Asano received the M.D. degree from Shinshu University School of Medicine, Matsumoto, Japan, in 1952 and since 1956 has been with the National Institute of Health, Tokyo, Japan. **Dr. Gino Doria,** a citizen of Italy, has joined the Mammalian Recovery Section. Dr. Doria,

who is on leave from the University of Pavia, was associated with the Centre D'Etudes Nucleaires, Saclay, France, for one year and with the Institut du Radium in Paris from 1958 to November, 1959. **Dr. Juergen Hans Fraenz** has joined the Microbial Protection and Recovery Group. Dr. Fraenz received the Ph.D. degree from the University of Muenster, Germany, in 1958. He comes to the Biology Division from the Radiologisches Institut der Universitaet, Freiburg, Germany and his stay here is sponsored by the German Ministry of Atomic Energy. **Dr. Cezar Antonio Elias,** a Fulbright Fellow, has joined the Biophysics and Microbial Protection and Recovery Groups. Dr. Elias received the M.D. degree from the University of Brazil in 1952, and is now Associate Professor of Physics at the University of Brazil in Rio de Janeiro. **Elena R. Monesi** has joined the Mammalian Cytogenetics Group of the Mammalian Genetics and Development Section. Mrs. Monesi was formerly associated with the University of Pavia, Italy. **Blanca A. Ramos-Ceballos** of the Institute of Biology "Juan Noe", School of Medicine of the University of Chile, has joined the Radiation Immunology Group. Miss Ramos will be here for one month of special training under the sponsorship of the United States Atomic Energy Commission and the University of Chile. **Dr. Tran Phan,** who has been associated with the Mammalian Recovery Group for the past year, has returned to Saigon, Viet Nam. Dr. Phan is a Radiobiologist with the Vietnamese Office of Atomic Energy, and his stay here was sponsored by that agency.

Drs. Alexander Hollaender and **John S. Kirby-Smith** attended a conference on "Comparative Effects of Various Radiations" at the University of Puerto Rico, San Juan in February. The conference was organized by the Committee on Photobiology, Division of Biology and Agriculture, National Research Council, and supported by the National Science Foundation and the Atomic Energy Commission. Dr. Hollaender is Chairman of the Committee on Photobiology; and Dr. Kirby-Smith is Secretary of the Conference.

Institutions and Organizations

Randolph-Macon Woman's College will hold its third **Summer Institute for Secondary School Teachers of Science and Mathematics** from June 22 to August 2. Dr. Paul A. Walker will serve as Director and have charge of the course, Interdepartmental Science S501, Topics in Contemporary Science, taken by all institute participants. Dr. Franklin F. Flint, Associate Professor of Biology, will teach the course, Man and his Organic Environment, and Dr. James L. Chamberlain, Jr., Assistant Professor of Biology, will direct the laboratory work for this course.

Virginia's marine laboratory at Gloucester Point announces several vacancies for graduate assistants desiring to qualify for the M.A. degree in Marine Science in the **Department of Marine Science of the College of William and Mary.** Qualified candidates will take up residence at the Laboratory and will be eligible for monthly stipends of $200 for half-time work as research assistants to staff members. Quarters are available at nominal cost.

Ground has been broken for the new $1.25 million Life Sciences Building at **Wake Forest College.** The Biology Department will occupy approximately 70 per cent of the building which is to be shared with psychology. Occupancy is anticipated by fall of 1961.

Grants in Aid

Dr. Charles Edington, Department of Biological Sciences, Florida State University, has received a continuation of a grant from the **Atomic Energy Commission** for work on gene and chromosome changes in Drosophila due to radiation effects.

The photobiology project in the Department of Biological Sciences, Florida State University, has received a grant of $26,100 from the **National Science Foundation** for the purchase of instruments.

Dr. Ronald C. Rustad, Assistant Professor of Physiology at Florida State University has received an **Atomic Energy Commission** contract for $15,000 to investigate radiation-induced mitotic delay. The **Florida Division of the American Cancer Society** has awarded a $2,000 grant to support one aspect of this study. Dr. Rustad has also received a travel grant from the **National Academy of Sciences** to attend the International Congress for Cell Biology in Paris.

Dr. Mitchell A. Byrd, Associate Professor, College of William and Mary has recently received a three year grant of $13,397 from the **National Institutes of Health** to study the Ecology of Digenetic Trematodes of Marine Fishes of the Atlantic Coast.

Dr. William Murdy of the Biology Department at Emory University has received a **National Science Foundation** grant of $7,000 for two years for the study of the morphology, development and cytology of *Mays.*

Dr. Charles Ray of the Biology Department at Emory University has received a **National Science Foundation** grant of $15,000 for two years for the study of the cytogenetics of *Tetrahymena pyraformis* by means of fluorescent microscopy.

Dr. Amoz I. Chernoff of the University of Tennessee Memorial Research Center has received a grant of $23,725 from the **National Institutes of Health** to continue studies of abnormal hemoglobins and myoglobins. At present Dr. Chernoff is engaged in studies of muscle myoglobin on persons suffering from muscular dystrophy, as well as certain other types of hereditary diseases.

Dr. Stanfield Rogers, director of the University of Tennessee Memorial Research Center, has received a grant of $282,130 from the **Public Health Service** to further his studies of virus-induced tumors. Dr. Rogers will study the mechanism of action of the Shope papilloma virus.

Dr. A. C. Cole, Professor of Entomology at the University of Tennessee, has received a **National Science Foundation** grant of $3,700 for a continuation of revisionary studies of the ant genus *Pogonomyrmex.* Dr. Cole has been elected Chairman of the Teaching Section of the Entomological Society of America.

Dr. Sidney A. Cohn, Associate Professor of Anatomy at the University of Tennessee Medical Units in Memphis, has been awarded a $39,000 research grant by the Dental Section of the **United States Public Health Service.** The grant will support studies on the incidence and severity of disease of the supportive tissues of teeth which have lost contact and function due to the extraction of the corresponding teeth in the opposite jaw.

Dr. Roger T. Sherman, Assistant Professor of Surgery at the University of Tennessee College of Medicine at Memphis, has been awarded a $33,000 research grant by the Medical Research and Development Command of the **U. S. Army.** Dr. Sherman is investigating the response of the body to artificial internal organs constructed from plastic materials.

Dr. Ernest Daigneault, Instructor in Pharmacology at the University of Tennessee Medical Units in Memphis, is making a study of yttrium, a derivative of

strontium, under a $10,082 research grant from the **Atomic Energy Commission.** He is investigating methods of making the tissues of the body release the radioactive element so that it can be safely excreted without damage to the tissues.

Dr. Paul J. Osborne, Lynchburg College, has been awarded a grant-in-aid by the **American Physiological Society** for fifteen weeks study in cell membrane and ionic transfers, as affected by certain drugs. The work is to be done with Dr. D. R. H. Gourley, Pharmacology Department, Medical School, University of Virginia.

Dr. Harry L. Holloway, Jr., Roanoke College, has received a grant-in-aid of $1,252 from the **American Physiological Society** to study for eight weeks with Dr. G. W. Nace, Department of Zoology, University of Michigan.

Dr. B. E. Frye, University of Virginia, received a one-year grant in the amount of $5,647 from the **U. S. Public Health Service** and a grant for $3,400 from the **National Science Foundation** for studying the function of the embryonic islands of Langerhans.

Mr. E. W. Lautenschlager, University of Virginia, received a $1,575 summer research grant from the **American Cancer Society.**

Mr. L. R. Emmons, University of Virginia, received a research grant from the **American Cancer Society** in the amount of $3,000.

Dr. Thomas C. Cheng, who received his Ph.D. degree in biology from the University of Virginia last year, has received a four-year grant of $15,851 from the **National Institutes of Health** to continue his study on "Development and Enzyme Studies on Endoparasitic Trematodes." Dr. Cheng has also received a teaching grant of $9,403 from the **Atomic Energy Commission,** for the 1960-1961 session.

The **Louisiana Academy of Sciences** has been awarded a **National Science Foundation** grant of $27,000 for 1960-61 for a continuation of the Junior Academy of Sciences program. **Dr. Harry J. Bennett** is director of the project and Louisiana State University serves as the fiscal agent.

A grant-in-aid for $24,300 has been made to the **Highlands Biological Station** by the **National Science Foundation** to support a three year study of locomotor periodicity in plethodontid salamanders. The principal investigator is Dr. Robert E. Gordon, University of Notre Dame. Co-investigator is Thelma Howell, Executive Director of the Station.

Under a grant-in-aid from the **National Science Foundation,** the **Highlands Biological Station** has supported the research of the following during the summer: Dr. M. W. Dick, University of Michigan; Dr. R. M. Schuster, University of Massachusetts; Dr. and Mrs. Stanley B. Mulaik, University of Utah; Dr. James W. Hardin and Dr. J. T. Mullins, University of Florida; and Ronald Peterson, Columbia University.

Recipients of grants-in-aid in the **Research Participation Program for Teacher Training,** sponsored by the **National Science Foundation** at the Highlands Biological Station are: Mr. Curry T. Haynes and Mr. Melvin Conrad, Emory-at-Oxford; Mr. John A. Cheek, Lambuth College; Mr. J. D. Spooner, South Georgia College.

Drs. Reinhard Harkema and **Grover C. Miller,** Zoology Department, N. C. State College, have recently received a $38,000 grant from the **National Institutes of Health** for studies on "Helminth Parasites in Wild Mammals in the Southeastern States".

The **Genetics Department** at N. C. State College has received a $41,000 grant from the **National Science Foundation** for the purpose of sponsoring a "Summer Institute of Genetics for College Teachers". The program is June 14 - July 21, 1960.

The National Science Foundation will accept applications for fellowships under the **Senior Postdoctoral and Science Faculty Fellowship** programs through October 10, 1960. Fellowships will be awarded in the mathematical, physical, medical, biological, and engineering sciences. Information, forms, etcetera may be obtained from the Fellowships Section, Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D. C.

ASSOCIATION AFFAIRS

(Continued from Page 46)

annual meeting an amendment of one of the By-Laws of the Association was proposed and approved. The amendment concerns Article IV, Section 2, and now reads that the fiscal year of the Association shall coincide with the calendar year.

This amendment may clarify the question of applicable date of dues paid by the members. There appears to be a large number of members who are one year in arrears in dues. These members will be notified by an inclusion with this issue of the BULLETIN; according to action of the Executive Committee, members delinquent in dues at the close of the annual meeting will receive no further issues of the BULLETIN.

Treasurer's Report April 1, 1959-March 31, 1960

Receipts

Balance on hand April 1, 1959	$1,496.87
Dues and subscriptions collected	1,219.10
Interest on savings	23.80
Gifts: Will Corporation C. M. Goethe, Mary Glide Goethe Fund	350.00
Registration, Knoxville Meeting	343.00
Total receipts	$3,532.77

Expenditures

Bulletin (mailing costs, printing, AIBS service, etc.)	$1,099.88
Dues refunded	24.00
Honorarium, Karl Sax	125.00
Secretary's expenses	163.36
Treasurer's expenses	2.77
Knoxville meeting	115.70
Total expenditures	$1,530.71

Balance on hand

Savings account	$1,064.32	
Checking account	937.74	
	$2,002.06	
		$2,002.06

Elsie Quarterman, Treasurer

The A.S.B. BULLETIN

Volume 7, Number 4 October, 1960

CONTENTS

The Official Quarterly Publication of
The Association of Southeastern Biologists

THE A.S.B. BULLETIN

The A.S.B. BULLETIN is the official quarterly publication of the Association of Southeastern Biologists and is published at Columbia, S. C., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to the Editor, U.S.P.H.S., P. O. Box 717, Columbia, S. C. Changes of address should be sent promptly to the Secretary of the A.S.B., Dr. Harold J. Humm, Department of Botany, Duke University, Durham, N. C. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tenn. Subscription rate for non-members of A.S.B.: $2.00 per year. Printing and typography by the Cary Printing Co., Columbia, S. C.

GEOFFREY M. JEFFERY
EDITOR

HAROLD J. HUMM, ASSOCIATE EDITOR
ELSIE QUARTERMAN, BUSINESS MANAGER

ASSOCIATION AFFAIRS

President's Message

I am pleased to report that the Executive Committee has appointed Mr. C. W. Hart, Jr. to be editor of the A.S.B. BULLETIN for a three-year term. Mr. Hart, who is a member of A.S.B. and has done graduate work at the University of Virginia under Dr. Horton Hobbs, is particularly well qualified and equipped to serve as editor, since he is editor of the publications of the Academy of Natural Sciences of Philadelphia. We thus have the unusually happy situation of obtaining the services of a professional editor on a volunteer basis. You will be glad to know that he can get the BULLETIN printed in Philadelphia at a cost somewhat lower than the present one. While certain members of the Executive Committee raised the question as to whether the BULLETIN should be published outside the southeast, it was decided that the advantages of having Mr. Hart as editor far outweighed this factor.

On behalf of the Executive Committee, as well as myself, I wish to thank Dr. Geoffrey M. Jeffery for the excellent work he has done as editor of the BULLETIN during the past several years. This issue is Dr. Jeffery's last, Mr. Hart taking over with the first issue of Volume 8 in January.

Progress is being made in the incorporation of A.S.B. and it is likely that the procedure will have been completed by the time this is in print. As soon as incorporation is completed negotiations for tax exempt status as a non-profit scientific and educational organization will be resumed. The Executive Committee will hold an interim meeting in Chapel Hill some time in October and will for the first time be functioning as the board of directors of A.S.B., Incorporated.

Let me suggest once more that you cooperate with your state correspondent for the BULLETIN by providing him with all the news of biology you may have. Best wishes for a good year.

Victor A. Greulach

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The BULLETIN

With this issue the editor regretfully completes his tenure with the A.S.B. BULLETIN. I particularly regret that it did not seem feasible for me to complete the full term of office of three years, but one of the characteristics of federal government service is the possibility of transfer. While these transfers are frequently advantageous, as is the case with my current assignment, they may also necessitate cessation of activities which one might otherwise be pleased to continue. I am hopeful that the BULLETIN has not deteriorated during my term; maintaining the standards established by its first editor has not been an easy task. Certainly any success which the BULLETIN has enjoyed during my association with it could not have been achieved without the unfailing help and encouragement of the officers and executive committee of the Association. While all have been indispensable, I shall always be most grateful to our Secretary, Dr. Harold J. Humm, for the tremendous amount of work which he has expended on behalf of the BULLETIN. Without the faithful performance of his duties — and much of the time he was also working away from his usual position and home — the BULLETIN certainly could not have been possible. My thanks also go to the state correspondents, whose job I am sure is tedious and thankless, but nevertheless of extreme importance to the BULLETIN.

I wish also to express my gratitude to Mr. Charles Moore and Mr. William Cartledge of the Cary Printing Company for their extreme patience in dealing with an inexperienced and amateur editor. Certainly the BULLETIN could never have been technically acceptable or on time without their advice and efforts.

As our president has mentioned above, the Association is most fortunate in the qualifications of our new editor. I am certain that he will continue to benefit from the same fine cooperation of the officers, executive committee, state correspondents and membership that I have received during my term. While there are times when getting out the BULLETIN can seem a thankless, if not impossible, task, I can commend to our new editor the feeling of satisfaction when the issue is complete, and even more the feeling of pride when a member or two very kindly extends a word of encouragement.

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Concepts Regarding Fungi — Then and Now

FREDERICK A. WOLF

Dr. Wolf is Professor Emeritus of Botany at Duke University where he joined the faculty in 1927 and retired in 1954. A native of Nebraska, he received the A.B. and A.M. degrees from the University of Nebraska in 1907 and 1908, respectively, and the Ph.D. degree in 1911 from Cornell University. Prior to going to Duke, Dr. Wolf spent a number of years working in plant pathology at experiment stations at Alabama Polytechnic Institute and North Carolina State College. His botanical interests have been centered in the fields of mycology and plant pathology. Additionally he has become widely known for his researches involving tobacco, especially aromatic or oriental kinds.

One is seldom admonished to look backward or to be retrospective. I am asking your indulgence for a few minutes to look backward with me, knowing full well that to reminisce is generally regarded as one of the pleasures in which only the aged are supposed to indulge. However retrospection can serve as an excellent means of orienting one's self, and thus of charting his "where do we go from here?" I have traveled the mycological road for a distance of more than 50 years, during all of which time I have maintained a more or less lively interest in fungi. Moreover some of the beliefs and concepts early instilled into me in the classroom and laboratory relative to the nature of fungi have continued to be regarded as widely accepted credos, as witnessed by the fact that they are still being included in current botanical and mycological treatises and are generally accepted among mycologists. For my own part, however, I have found it increasingly difficult, with the passage of the years, to regard as factual certain of these widely accepted concepts. Instead I have come to regard them as obstacles that have impeded progress along the mycological road. The present purpose is to account in small measure for my skepticism by directing attention to a few of these obstacles, in the hope that the course of others through the mycologic field will be made more scenic and more fruitful, and, that the true nature of fungi eventually may come to be appreciated.

I was taught, that the fungi have almost certainly evolved from algal stock. This is said to have come about by a loss of chlorophyll, and, in consequence, members of this group of plants were compelled to feed either as saprophytes on decaying organic matter, or as parasites at the expense of other living plants or animals. Let it be appreciated that wide accord remains that such *was* their origin and such *is* their food habit. But on what evidence or on what basis are such beliefs founded? It appears to me that the answer is related basically to the teachings regarding biologic evolution and on the belief that the systems of classification that have been devised are natural, thus indicating phyletic relationships. Indeed the evolutionary concept has played a continuously dominant role in biological teaching. Morphologists and taxonomists have exerted Herculean efforts to show relationship of all living things. In doing so, when the tracing of ancestries became difficult for them, their imaginations created the hypothetical missing links. Relationships between species, genera, families, orders, and classes were and continue to be graphically portrayed by use of phyletic trees. Some of these trees are monstrosities, lopsided, storm-tossed, with branches broken away or sometimes left suspended in midair, in defiance of the laws of gravity. Structural resemblance, as proof of affinity long has been accepted as the *sine qua non* upon which to base relationship. Even Plato, who may have been wholly unacquainted with fungi, stated that a cautious man should ever be on guard against similarities because they are tricky things. I desire merely to point out that even though morphology admittedly is invaluable in tracing natural relationships, perhaps the time is overdue to de-emphasize morphology and to stress more vigorously the development of other areas of knowledge or disciplines for the purpose of bringing them to bear in attempts to learn more of the nature of fungi or other organisms.

To me it is, however, exceedingly difficult to conceive that the simple expedient of depriving an alga of its chlorophyll would

transform it into a fungus or start it on the pathway leading to its eventually becoming a fungus. The main reason resides in the chemosynthetic potentialities possessed by fungi, many of which potentialities are not known to be possessed by any alga. How can one explain that certain species of yeast, for example, assuming they are transformed algae, have acquired the ability to employ a substratum consisting of the essential mineral elements, a nitrate salt, and sucrose, and are able to elaborate therefrom, glycogen, fats, alcohol, essentially all the known amino acids, and all the B-complex vitamins and other accessory growth factors. Or how can the ergot fungus, *Claviceps purpurea*, growing in the ovarian tissues of certain grasses elaborate the alkaloid ergotine? And how can *Omphalia flavida*, pathogenic on the leaves of coffee, elaborate luciferin and the enzyme luciferase, and cause the leaf lesions, on a dark night, to glow like tiny candles? Or yet how does the fly agaric, *Amanita muscaria*, growing on humus on the forest floor, produce the toxin muscarin, or how does the green mold, *Penicillium chrysogenum*, using corn steep liquor as a substratum, synthesize the antibiotic penicillin? And finally how does the mushroom *Lactarius* synthesize rubber as cis-polyisoprene? There are those who maintain that these foregoing products and hundreds of other organic substances synthesized by fungi arise as waste products. Nothing could be farther from the truth and moreover no species of alga is known to be capable of elaborating any of the compounds just mentioned. It must be admitted that too little is known about the physiology of algae, but it is generally assumed that their physiologic activities are like those of seed plants. This may not prove to be entirely true. However, a beginning in algal physiology has been made by such investigators as Fogg, Haas, and Pringsheim in England, and Colin in France.

If it were asked how fungi acquired such abilities, why should this have taken place, and why should such compounds accumulate within the bodies of fungi or in their immediate environment, it can only be said that these matters remain essentially unknown. But certainly it is not in any sense a direct consequence of loss of chlorophyll by any algal ancestor. In the face of the plethora of facts established in recent years in regard to the synthesizing potential of fungi we are forced to concede that no evidence is at hand to indicate that the fungi were derived from algae or from any other group of living organisms. Any opinion regarding their origin remains purely speculative and conjectural, and proof of origin must be admitted to be entirely lacking.

So long as the food habits of fungi are discussed by use of the terms saprophyte and parasite all understanding of this feature remains impossible. It is conceded by all that one and the same species of fungus may be both parasitic and saprophytic. If these terms have real significance how is such a situation brought about? Also food habits and pathogenic potential are commonly confused, or are regarded as synonymous. A so-called saprophyte may cause disease and some parasites are non-pathogenic, in other words, pathogenic saprophytes and non-pathogenic parasites exist. Is an organism capable of change in its food habits or its pathogenic potential? The answer is that some species are exceedingly adaptable. What evidence can be marshalled to show that a given saprophyte uses only a given nonliving substrate as food and is totally incapable of elaborating substances and storing them as reserve food? By the same token, what evidence can be employed to establish that a given parasite uses as food only materials contained in living tissues, and is unable, of itself, to make and to store reserve food? If one reflects upon the evidence in hand on the food habits of fungi, he will readily discern that the terms saprophyte and parasite add nothing except confusion to our understanding of the food habits of fungi. Speed the day when these terms will be discarded!

Some mycologists place the fungi in a separate phylum, Mycophyta (fungus plants). Three of the groups within this phylum bear the names Phycomycetes (alga-like fungi), Ascomycetes (ascus-bearing fungi), and Basidomycetes (basidium-bearing fungi). The first of these groups derives its name in a way to indicate evolution from algae and the other two in a way to indicate their characteristic type of reproductive structures. If one were to concede that fungi, all of them, were derived from algae, then the name of the phylum should properly become Phycomycophyta. If one were to concede that the characteristic type of reproduction is basic in separating these fungi into the three above-named groups, then the so-called Phycomycetes would properly become the Sporangiomycetes, because all of them produce sporangia. But why be logical when it is easier to be a mycologist?

Members of several orders of the so-called Phycomycetes form reproductive units that are provided either with one or two organelles of locomotion enabling these elements to swim. Such elements are commonly termed zoospores to designate motile spores of fungi. If accuracy is sought, and it is a desideratum in science, then all motile spores could be better spoken of as planospores and all non-motile spores as aplanospores. The use of such designations is certainly long overdue.

Mycologists continue to place great emphasis upon whether a given fungus is homothallic or heterothallic, that is whether the thallus arising from the development of a single spore is capable of producing both sperms and eggs (or their equivalents) that may fuse to form zygotes, or whether two thalli arising from different spores are required for the formation of zygotes. Actually these two sexuality patterns belong to the same spectrum in the light of the fact that certain species of fungi are found to be both homothallic and heterothallic. When sexuality is properly interpreted it is apparent that all fungus cells, including vegetative cells, so-called asexual spores, and gametes contain both mating potentials, that is they contain femaleness and maleness. Such potentials are innate, omnipresent characteristics or features of the living protoplasm itself. They are never acquired *de novo*, are never lost, and are never separated completely. When viewed in this manner sexuality has not evolved in any different sense than that in which respiration or any other function has evolved.

Ecological terminology, as applied to fungi has a distinctly limited value and may, in fact, be quite misleading. We are accustomed to speak of soil fungi, fresh water fungi, marine fungi, coprophilous fungi, lignicolous fungi, dermatophilous fungi, etc. Just because fungi can be isolated from dung or from the ocean, for example, does not entitle one to classify them as coprophilous or marine, respectively. As a matter of fact one and the same species may be found in different habitats or may be capable of growing on a variety of substrata. Furthermore it seems very improbable that any so-called lignicolous fungus requires wood and wood alone as a source of food. It is admitted however, that certain pathogenic fungi are well-known to have a very restricted suscept range, and in any consideration of them, specific habitat becomes of enormous importance.

In consequence of the enactment of new laws regarding the naming of fungi their names are being changed. It becomes questionable that such activity adds to new knowledge. Instead it would appear that greater efforts devoted to studies of fungal development, physiology, and biochemistry would be a more profitable means of acquiring an understanding of the nature of fungi as related to other living organisms.

ASSOCIATION AFFAIRS

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Address of the New Editor

For the convenience of those who may wish to communicate with the new editor prior to the next issue of the BULLETIN the address is as follows:

C. W. Hart, Jr., Editor
Scientific Publications
The Academy of Natural Sciences
Nineteenth and the Parkway
Philadelphia 3, Pennsylvania.

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The 1960 Annual Meeting

The next issue of the BULLETIN (Volume 8, Number 1) will carry the usual announcements for the annual meeting of the Association. The 1961 meeting will be held at the University of Kentucky, Lexington, Kentucky, April 20-22. The members are reminded that the announcements generally contain deadlines for the submission of abstracts, nominations for officers and awards, etcetera, which usually follow the receipt of the January issue quite closely. The deadline for acceptance of papers for the program has not of course been set as yet, but past experience has shown that it is often too soon for many of those wishing to present papers. Because of the growing number of papers being submitted for presentation at our annual meeting, it will undoubtedly be necessary to adhere rather strictly to a deadline which is usually set at the latest date possible for insuring the printing of the abstracts prior to the meeting date. Members will perhaps wish to give thought to these papers before the announcements arrive; members are also urged to be considering nominations for the Meritorious Award for Teaching and applications for the Association Research Prize and the Research Fellowship at Mountain Lake. The Program Committee and the Committee on Local Arrangements will be listed in the January issue of the BULLETIN.

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New Emeritus Members

The following qualified members were elected to Emeritus Membership at the last annual meeting: Dr. George H. Boyd, University of Georgia; Dr. Roland M. Harper, University of Alabama; Dr. L. R. Hexler, University of Tennessee; Dr. A. B. Massey, Virginia Polytechnic Institute; Dr. A. D. Shaftesbury, Lenoir Rhyne College.

NEWS OF BIOLOGY IN THE SOUTHEAST

About People

Two new staff members have joined the Department of Biology at the University of Virginia: **Dr. James L. Riopel,** Assistant Professor of Biology, received his doctorate in June 1960 from Harvard University where his research was concerned with the morphology and development of banana roots under the direction of Professor Ralph H. Witmore. He will be teaching courses in plant anatomy and plant morphogenesis; **Dr. Allison L. Burnett,** also Assistant Professor of Biology, received his Ph.D. from Cornell University in 1959 and spent the academic year 1959-60 at the University of Brussels, Brussels, Belgium working on the general problem of growth and cell differentiation in Hydra as N.S.F. Postdoctoral Fellow. His basic teaching responsibility will be in general biology.

Professor James Norman Dent, University of Virginia, has returned from a year in Europe as a Guggenheim Fellow. He visited a number of laboratories but worked mostly at the Gatty Marine Laboratory, St. Andrews University, Scotland. He conducted studies in amphibian limb regeneration and thyroid physiology.

Mrs. Te-Hsiu Ma (nee Peggy Rayburn) has been appointed Laboratory Assistant in Biology at Emory and Henry College.

Appointments in the Biology Department at Madison College include the following: **Dr. James Ferry,** formerly Senior Life Science Editor for McGraw-Hill, Professor of Biology; **Mr. Elwood Fisher,** formerly of Ohio University, Assistant Professor of Biology; **Mr. Duvall Jones,** formerly of the University of Maryland, Instructor of Biology; and **Mr. Robert Graves,** Instructor of Biology.

Dr. J. Warren Lee, Professor and Chairman of the Department of Biology at Southern University in Louisiana, passed away suddenly on April 1, 1960, in Baton Rouge, Louisiana.

Dr. George H. Mickey of Louisiana State University has accepted a position as cytogeneticist at the New England Institute for Medical Research, at Ridgefield, Connecticut. His duties commenced in August, 1960.

Dr. John P. Woodring, entomologist, has joined the Zoology faculty at Louisiana State University. Dr. Woodring, a specialist in soil mites, is a graduate of Pennsylvania State University and the University of Minnesota. He succeeded **Dr. Howell V. Daly,** who has joined the faculty in entomology at the University of California.

Dr. James H. Horton has been appointed as an instructor in the Department of Botany, University of North Carolina for the 1960-61 school year. He replaces **Dr. John Haesloop** who has accepted a position as assistant professor at Pfeiffer College.

During the past summer **Miss Anne Davidson** and **Mr. Edward Bostick,** both of the University of Alabama, and **Mr. C. B. O'Neal** of Valdosta State College worked as National Science Foundation Undergraduate Research Assistants at the Department of Botany at the University of North Carolina. Miss Davidson worked in mycology under the direction of Dr. W. J. Koch; Mr. O'Neal worked in mycology under the direction of Dr. John N. Couch; and Mr. Bostick worked in cytology under the direction of Dr. C. R. Bell.

J. Allan Holman, who has completed work for his Ph.D. degree, has joined the staff of Howard College as associate professor of Biology. Dr. Holman is a herpetologist.

Jerry Hunter, a recent M.S. graduate of Texas A. & M., has joined the staff of the Biology Department at Howard College as an instructor.

Dr. Alexander Hollaender attended the Third International Congress on Photobiology in Copenhagen, Denmark, July 31-August 5. Dr. Hollaender is President of the International Committee on Photobiology, and he gave the opening plenary session lecture which was entitled "Finsen and Basic Research".

Dr. William J. Cliburn has joined the Biology Department at Mississippi Southern College after receiving his Ph.D. degree in herpetology from the University of Alabama.

Dr. C. Leland Rodgers, Professor of Biology, Furman University, attended the Institute of Desert Biology at Arizona State University, Tempe, Arizona during the past summer.

Dr. Joseph B. Harris has been named professor of biology and head of department at Coker College, Hartsville, S. C. Now with the Georgia Experimental Station as Plant Physiologist, Dr. Harris will assume his new duties in January. Prior to receiving his Ph.D. at Duke University in 1958, he was an instructor in biology and chemistry at Young Harris College in Georgia.

Dr. Walter N. Hess, formerly head of the Biology Department of Hamilton College, has accepted a position as Visiting Professor at Winthrop College. Dr. Hess has a $12,000 U. S. Public Health Service grant for a three year study of the salt glands of marine vertebrate animals.

Dr. Samuel R. Tipton, Department of Zoology and Entomology, University of Tennessee, attended a Workshop for Teachers of Undergraduate Physiology at Carleton College, Northfield, Minnesota, August 8-20. These workshops are sponsored by the American Physiological Society with funds principally from the National Science Foundation. Dr. Tipton attended the workshop as a discussion leader and in his capacity as a member of the Education Committee of the Society.

At the recent meeting of the American Society of Plant Taxonomists **Dr. C. Ritchie Bell** of the University of North Carolina was re-elected as Secretary for the year 1961. **Dr. A. E. Radford,** also of the University of North Carolina, was appointed as the Society's representative on the editorial board of the American Journal of Botany.

Dr. J. Gordon Carlson, head of the Department of Zoology and Entomology at the University of Tennessee, spent July 31 through August 5 in Copenhagen, Denmark, where he had been invited to present a paper at a symposium of the Third International Congress on Photobiology. The title of his paper was "Mitotic Effects of Monochromatic Ultraviolet Microbeam Irradiation of the Nucleolus". While abroad, Dr. Carlson visited laboratories in Paris, Heidelberg, Lund, Stockholm, and Edinburgh, and gave a seminar at the University of Heidelberg.

Dr. James N. Liles is a new member of the staff of the Department of Zoology and Entomology at the University of Tennessee. Dr. Liles received his Ph.D. in Entomology at Ohio State University and has taught at the University of South Carolina. For the

past two years he has been engaged in research on insect physiology at Ohio State with the aid of a grant from the National Institutes of Health.

Dr. J. Ives Townsend, Assistant Professor of Zoology at the University of Tennessee, has left to accept a position in the Department of Biology and Genetics at the Medical College of Virginia, Richmond.

Dr. Takashi Makinodan of the Biology Division, Oak Ridge National Laboratory, attended the Eighth International Congress of Hematology in Tokyo, Japan, September 4-10, and presented an invited paper on "An Immunological Approach to Study Radiation-Induced Blood Chimeras". While in Japan Dr. Makinodan will consult with scientists on problems related to radiation effects on hematopoietic tissues, genetic aspects of antibody formation, and other problems at Hiroshima University, National Institute of Genetics at Mishima, Shinshu University at Matsumoto-shi, the National Institute of Health in Tokyo, and the Biochemistry Laboratory of the National Institutes of Radiological Sciences in Chiba. On his return, Dr. Makinodan will confer with scientific investigators at the University of Hawaii in Honolulu. He returns to Oak Ridge October 4.

Dr. David M. Prescott, Biology Division, Oak Ridge National Laboratory, attended the Tenth Congress of the International Society for Cell Biology in Paris, France, September 4-9. Dr. Prescott also attended the first Symposium on Macromolecular Structure and Biological Function held at Wenner-Gren Institute in Stockholm, Sweden, September 12-16, presenting an invited paper entitled "Function of the Nucleus in the Synthesis of Ribonucleic Acid and Protein." The Stockholm symposium is jointly sponsored by the International Union of Biological Science and the International Union of Biochemistry.

Dr. Sheldon Wolff, Biology Division, Oak Ridge National Laboratory, attended the Third International Congress on Photobiology in Copenhagen, Denmark, July 31-August 5, and presented a paper "On the Apparent Synergistic Effect of Infra-red and X rays in the Production of Intergenic Mutations (Chromatid Aberrations)." Dr. Wolff also attended the International Atomic Energy Agency Symposium on the Effect of Ionizing Radiation on Seeds and Its Significance for Crop Improvement, in Karlsruhe, Germany, August 6-13, and presented an invited paper entitled "The Effect of Postirradiation Storage on Seedling Height." While abroad, Dr. Wolff visited several European laboratories.

Dr. Gerald E. Cosgrove, Biology Division, Oak Ridge National Laboratory, presented a series of lectures before the National Science Foundation — Atomic Energy Commission Summer Institute of Radiation Biology at Florida State University, Tallahassee, July 30-August 7.

Several staff members of the Biology Division, Oak Ridge National Laboratory, participated in the Summer Institute in Radiation Biology at Tulane University in New Orleans, during August. **Arthur C. Upton** lectured on the subjects: Effects on prenatal development in mammals; pathophysiology in mammals; and relative biological effectiveness. **David G. Doherty** lectured on chemical protection against ionizing radiation. **Lawton H. Smith** lectured on effects of radiation on cell morphology and viability, and also on protection against ionizing radiation other than chemical.

The Biology Division, Oak Ridge National Laboratory, announces the following new staff members: **Evelyn Clark** has joined the Mammalian Genetics and Development Section. Miss Clark received the A.B. degree in Zoology from Winthrop College and the M.S. degree in Zoology from Oberlin College; **James C. Copeland,** a graduate of the University of Illinois, is a new member of the Radiation Protection-Living Cells Group; **Thomas C. Detwiler,** a Ph.D. in animal nutrition from the University of Illinois, will be with the Pathology and Physiology Section as a Research Associate; **Paul E. Eide,** who received the B.S. degree in Biology from Florida State University, has joined the Cell Growth and Reproduction Group; **William T. Lipscomb** will be with the Cell Physiology Group, and is a B.S. graduate in Biology from the University of Florida; and **Bobbie J. Scandlyn,** a graduate of Tennessee Polytechnic Institute, has joined the Mammalian Cytogenetics Group of the Mammalian Genetics and Development Section.

Dr. Gordon D. Braithwaite, Research Associate at the Fort Johnson Marine Biological Laboratory in South Carolina, returned to England on September 21, 1960, after completing two years tenure at the Laboratory. Dr. Braithwaite came to the laboratory from the University of Liverpool.

Dr. Harry W. Freeman has resigned from the Biology Department of the University of South Carolina to accept the position of Professor of Biology at the College of Charleston, Charleston, S. C.

Dr. Sherwood M. Reichard has been appointed as assistant professor of physiology in the Department of Biological Sciences at Florida State University. Dr. Reichard has been an Advanced Research Fellow of the American Heart Association at Johns Hopkins University for the past 2 years. His main interests are in the fields of endocrine physiology and enzyme biochemistry.

Dr. A. M. Winchester, head of the biology department at Stetson University, attended the International Congress of Photobiology held at the Medical Institute in Copenhagen, Denmark during the early part of August. Also, while in Europe he spent several weeks at the Institute of Human Genetics at the University of Munich in Germany.

Dr. Herman E. Brockman, recently at Florida State University, has joined the Genetics Section of the Biology Division at the Oak Ridge National Laboratory.

Drs. Gib DeBusk, Adrian Poitras, Norman Bishop, Leland Shanor, George Keitt, Edgar Barnett, of the Department of Biological Sciences at Florida State University attended the AIBS meeting at Stillwater, Oklahoma. Dr. DeBusk also attended the International Symposium on Growth held at Purdue University in June.

Dr. Leland Shanor has been appointed to the editorial board of Mycologia for a 5 year term by the Mycological Society of America at its recent meeting in Stillwater.

The University of Georgia Marine Institute at Sapelo Island, Georgia, announces the appointment of three biologists and two geologists to its staff. **Dr. Kenneth L. Webb,** having recently held a postdoctoral fellowship in plant physiology at Ohio State University, joined the staff in October, 1960, as a Research Associate with the associated rank of Assistant Professor of Botany. **Mr. Claire L. Schelske,** who completed his doctoral work in limnology at the University of Michigan in October 1960, joined the Institute staff as a Research Associate. **Mr. Frederick C. Duerr** expects to complete his doctoral work in animal physiology at the University of Minnesota in February, 1961, and has accepted appointment as Research Associate and Instructor of

Zoology at that time. **Dr. John H. Hoyt,** Assistant Professor of Geology, received his degree from the University of Colorado, and joined the staff in March, 1960, and **Mr. Vernon J. Henry** who completed his work for the Ph.D. degree at the Texas A. & M. College in October, 1960, has joined the Institute staff as a Research Associate on a half-time basis. He is also an Instructor of Geology at the Athens campus. The latter two staff members are interested in aspects of marine sedimentation.

Institutions and Organizations

Dr. Raymond C. Jackson of the **Department of Botany, University of Kansas,** Lawrence, Kansas, is establishing a card file on all research problems in the field of plant taxonomy that are currently and actively underway in North America. All botanists involved in taxonomic work are earnestly requested to support this project, which is under the sponsorship of the American Society of Plant Taxonomists, by sending information on your current research and the research of your students. Such information should identify the taxon or taxa under investigation, the primary trend or emphasis of the project (morphological, ecological, cytological, etc.) and the name and address of the person or persons actually doing the research. If the project is being supported by N.S.F. or other funds this information might be included, as might any tentative schedule for completion of the project. The object of the file is to eliminate duplication of taxonomic effort and to foster cooperation between those who might be working on a common problem from different approaches. Please address information and inquiries to Dr. Jackson.

At **Emory and Henry College** two tracts of land on the campus, approximately 20 acres each, are to be developed as biological study areas. One, to be known as "The Woods", is an oak-hickory woods in which mammal studies will be done. The second is a low, marshy area traversed by a permanent stream and will be referred to as "The Swamp". Basins will be excavated and established as permanent ponds for life history and experimental studies in ichthyology and herpetology. These areas will also provide students with the opportunity for research in a number of other fields.

The **Department of Botany of the University of North Carolina** has set up a new and expanded offering of graduate courses in botany to be given during the two six-weeks terms of the Summer Session. The courses will be given in a three-year sequence and will include all the basic graduate courses offered by the Department. The summer program will be of particular interest to high school teachers applying for NSF Summer Fellowships, to college teachers of biology on NSF Science Faculty Fellowships for the summers, and to graduate students in biology at colleges and universities with limited graduate offerings in this field. The sequential course offerings will make possible the completion of required courses for an M.A. in Botany during three summers, and it should be possible to complete all requirements for the degree in four summers if work on the thesis is in progress during the intervening years. Further information concerning the course offerings, expenses, department facilities, etcetera, may be obtained from the Chairman, Department of Botany, University of North Carolina, Chapel Hill, North Carolina.

Grants in Aid

Assistant Professor **Samuel P. Maroney, Jr.,** of the University of Virginia has been awarded a grant of $2,300 by the **U. S. Public Health Service** for research on comparative aspects of ultra-violet induced hemolysis.

The Department of Health, Education and Welfare, upon recommendation of the National Advisory Council on Health Research Facilities has approved a **Public Health Service** grant of $475,000 to **Florida State University.** This grant, initiated by Dr. Leland Shanor of the Department of Biological Sciences will, with matching funds, be used for the construction of a building which will house portions of the new AEC Molecular Biophysics Institute and relieve space shortage in the present building occupied by the Department of Biological Sciences at Tallahassee.

A grant of $166,000 has been awarded to **Dr. A. Gib DeBusk** of the Department of Biological Sciences at Florida State University. This grant, from the **National Aeronautics and Space Administration** is in support of a program of research in space genetics.

The **Department of Botany,** University of North Carolina, has been awarded a grant of $306,000 from the **National Institutes of Health** for use in construction and equipping of health oriented research space in the new botany building at Chapel Hill. Construction is expected to start early in 1961.

Dr. C. Ritchie Bell, University of North Carolina, has been awarded a **National Science Foundation** grant in the amount of $12,300 for a three year project dealing with isolating mechanisms in the Umbelliferae.

Dr. Max H. Hommersand has been awarded a **National Science Foundation** grant in the amount of $24,300 for a two year project on cellular differentiation in *Chlamydomonas.*

Dr. A. E. Harrises of Mississippi Southern College has received a grant renewal from the **National Institutes of Health** to continue his work on the monogenetic trematodes of south Mississippi.

Dr. John Freeman of Winthrop College has been awarded a **National Science Foundation** research grant for a two year study of guppies.

Dr. G. Thomas Riggin, Jr., Assistant Professor of Biology, Furman University, received a grant from the **Southern Fellowships Fund** during the summer of 1960.

Dr. Frederic C. Chang, professor of chemistry and research associate in pathology and microbiology at the University of Tennessee Medical Units in Memphis, has been awarded a $28,951 grant by the **U. S. Public Health Service** for research on the synthesis of steroid hormones.

Dr. Clark E. Grosvenor, assistant professor of physiology at the University of Tennessee College of Medicine, has been awarded a $37,706 grant by the **U. S. Public Health Service.** The grant is to be used over a three-year period to support basic studies concerning hormonal factors responsible for mammary gland function during lactation.

Dr. Donald W. Dery, Department of Biology, College of Charleston, Charleston, S. C., recently received a research grant of $14,500 for three years from the **National Science Foundation** to study the life cycle of *Bucephalus cuculus,* a larval trematode.

The **College of Charleston** received a grant from the **National Science Foundation** to conduct an Undergraduate Research Participation Program at the Fort Johnson Marine Biological Laboratory. The program began on June 6, 1960, and will continue to May 31, 1961.

The ASB BULLETIN

Volume 8, Number 1 January, 1961

THE LABORATORY BUILDING—MOUNTAIN LAKE BIOLOGICAL STATION

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THE ASB BULLETIN

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C. Willard Hart, Jr.
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Harold J. Humm, Associate Editor
Elsie Quarterman, Business Manager

ASSOCIATION AFFAIRS

A Note from the President

On October 28 the Association of Southeastern Biologists was issued a North Carolina charter as a nonprofit scientific and educational corporation. At the meeting of the Executive Committee in Chapel Hill on October 29 formal action was taken transferring all members, officers, assets and the constitution and by-laws of ASB to the new Corporation, the Association of Southeastern Biologists, Inc. Just subsequent to the incorporation the State of North Carolina declared ASB, Inc. to be exempt from state taxes. We are now making a new application to the Bureau of Internal Revenue for federal tax-exempt status. In view of the revision of our constitution and by-laws made at New Orleans, our incorporation, and our tax-exempt status in North Carolina we anticipate favorable action on our new application to the federal government.

Since a corporation must have a resident agent who deals with the State in corporate matters, the Executive Committee has appointed Dr. William J. Koch, associate professor of botany at the University of North Carolina as agent for an indefinite term. The position carries no compensation, very little in the way of duties, and no authority regarding the internal affairs of ASB. The Executive Committee now constitutes the Board of Directors of the new corporation and will continue to function as in the past.

Professor M. S. Breckenridge of the School of Law at the University of North Carolina has been of very great help in accomplishing our incorporation and in securing our state tax-exempt status. I wish to thank him here for his valuable services. personally as well as in behalf of ASB and its Executive Committee, particularly since Prof. Breckenridge has refused any compensation for his work for us.

The Executive Committee considered a number of other matters at its Chapel Hill meeting, but I shall not discuss them here since our Secretary is reporting on the meeting elsewhere in this issue.

We are looking forward to another excellent meeting this April in Lexington. John Carpenter informs me that it is essential to make motel and hotel reservations as early as possible since our meeting comes at the time of the racing season in Lexington, and I am passing this advice on to you.

I want to remind you of a few of the things you can do as a member of ASB to help keep our organization operating efficiently and effectively: 1. Don't forget to pay your dues, 2. Be sure to give our Secretary any address change promptly, 3. Submit a paper for the Lexington meeting, 4. Don't hesitate to submit appropriate manuscripts to the ASB Bulletin, 5. Keep your state correspondent informed regarding news about yourself and your institution for publication in the Bulletin, 6. Nominate for membership your colleagues who want to become members or who should be members, 7. Respond to the calls for nominations for officers, recipients of awards, and emeritus members.

Victor A. Greulach

Executive Committee Meeting

An interim meeting of the Executive Committee of the Association of Southeastern Biologists was held on Octover 30, 1960, at the University of North Carolina. Those in attendance were President Victor A. Greulach, Past-President Horton H. Hobbs, President-Elect Royal E. Shanks, Vice-President Walter S. Flory, Secretary Harold J. Humm, Editor C. Willard Hart, Jr., Committeemen B. Theodore Cole, Charles E. Jenner, and Robert B. Short.

President Greulach announced the appointment of the new editor, C. Willard Hart, Jr., and of the following committees—**Auditing:** Fred Wolf, *Chairman*, Ilda McVeigh, and C. S. Chadwick; **Nominating:** Horton Hobbs, *Chairman*, J. G. Carlson, and George H. Boyd; **Resolutions:** Ruffin Jones, *Chairman*, Thelma Howell, and Edmund Berkeley; **Research Awards:** Ralph Yerger, *Chairman*, Charles Jenner, and Victor Cutter; **Meritorious Awards:** Roberta Lovelace, *Chairman*, C. C. Goodchild, and William J. Koch; **Goethe Awards:** John Carpenter, *Chairman*, Robert B. Short, and Joseph O'Kelley; **Meeting Places:** Donald Scott, *Chairman*, Paul Walker, and Walter Herndon; **Program:** John Carpenter, *Chairman*, Harold Humm, and C. W. Hart, Jr., **Local Arrangements:** John Carpenter, *Chairman*.

President-Elect Shanks reported that he had tentative plans for a Thursday night speaker for the Lexington meetings in the field of ecology, perhaps conservation oriented.

Secretary Harold J. Humm reported that efforts to keep the addresses of members up-to-date were

(*continued on next page*)

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rather disappointing as so many members change address without notification and it is sometimes necessary to write to the chairman of their former department to find out where they are.

Treasurer Elsie Quarterman sent a report for the period April 1 to September 28, 1960, together with a letter commenting on current problems. She pointed out that during April it was not possible to meet the bills received and that while dues will be coming in during January, the total receipts may not exceed the cost of the BULLETIN. She asked for suggestions for reducing expenses. Changing the fiscal year to coincide with the calendar year has deferred receipt of many dues payments for about six months.

Vice-President Flory moved that a sufficient amount be shifted from the savings account to the checking account to pay all outstanding bills. President-Elect Shanks seconded and the motion passed.

Dr. Jenner moved that we budget $150 per year for travel and honorarium for a visiting speaker, the fund to accumulate if not used. The motion passed.

There was a discussion concerning the possibility of increasing patron memberships and President Greulach appointed Dr. B. Theodore Cole as Chairman of a Patron Membership Committee.

Editor Hart reported that printing costs of the BULLETIN in Philadelphia (He is Editor of Scientific Publications for the Academy of Natural Sciences of Philadelphia) will be similar to the costs in Columbia, S. C., and perhaps less in some respects. He submitted a new cover page design and this was approved as a result of a motion by Past-President Hobbs, seconded by Flory, and passed without dissent.

Mr. M. S. Breckenridge of the University of North Carolina School of Law brought into the meeting the official document attesting to incorporation of the Association of Southeastern Biologists in the State of North Carolina, effective October 29, 1960. All incorporation procedures were handled by Mr. Breckenridge, and expedited so that this meeting of the Executive Committee might also be a meeting of the Board of Directors, as the twelve officers and members of the Executive Committee are designated as the Board of Directors. Greulach, Hobbs, and Humm were named as incorporators and Dr. William Koch agreed to serve as the initial registered agent for the corporation.

Mr. Breckenridge refused a fee for his services so that the only cost of incorporation was the state charge of $25 and a charge of less than $5 for recording. Past-President Hobbs moved that a letter of appreciation be written Mr. Breckenridge. The motion was seconded by Dr. Short and passed unanimously.

Dr. Douglas Humm, representing the Southeastern and South Central Sections of the Society of General Physiologists, joined the meeting to advise the Executive Committee of the interest of this group in meeting with ASB at Lexington and of arranging a symposium on invertebrate physiology. Dr. Cole moved that they be invited to meet with ASB and to present the symposium. The motion, seconded by Humm, was passed.

President Greulaeh reminded the committee that the term of Dr. Ray Noggle as AAAS representative expires on December 31, 1960, and that Dr. James H. Gregg, Department of Botany, University of Florida, has been appointed to succeed him. Dr. Greulach also read a letter from the Centennial Office of the American Association of Land Grant Colleges advising ASB of their centennial observance of next year. It was agreed that the letter be answered to the effect that we are interested in cooperating with them in this observance.

The author, Dr. Ivey F. Lewis, is an Emeritus Professor of Biology at the University of Virginia, a former Dean of the University, and a founder and former director of Mountain Lake Biological Station. Dr. Lewis's long career has also included work in the fields of red algae and in the development of plant galls.

BY IVEY F. LEWIS

Mountain Lake Biological Station

The need for a summer biological station had long been felt, and the reasons for the need were strongly stated in a notable address by William M. Wheeler before the American Society of Naturalists. The address was entitled, "The Dry Rot of Academic Biology." In the college training of the young biologists there are three factors that prevent him from seeing animals and plants as they actually are in a natural state. One is the fact that class instruction in the winter months comes at a time when living material is not readily available, so that most of the material used in the customary "general biology" courses must come in bottles or jars put up by one of the excellent biological supply houses. A second factor is the disappearance of natural habitats in the path of urbanization. A third factor is the social complexity of life at the usual summer school.

In the early 1920's a good deal of thought and discussion were given to the problem. Professor Bruce D. Reynolds and I inspected possible sites around the Chesapeake Bay and decided that another marine station, in spite of the wealth of animal and, to a lesser extent, plant life, did not fill the need as we saw it. The Marine Biological Laboratory at Woods Hole was supplemented by facilities along the coast from Maine to Florida. Furthermore, most of our advanced students were going into teaching, and the colleges and schools where they would serve were inland. This seemed a compelling reason why they should become familiar with the sort of things that they would encounter where they lived.

When the Virginia Academy of Science met at Blacksburg in 1925, Professor William Day Smith, who had taught at nearby Radford College Summer School, suggested that Mountain Lake would be a good location. Our colleagues at the Virginia Polytechnic Institute arranged a field trip to Mountain Lake, where under the leadership of Professor A. B. Massey we saw the natural advantages of the place. There was the interesting lake itself, the limitless unspoiled mixed deciduous forest, the mountain streams, dry rocky ridges, and deep valleys with great hemlocks, the open grassy areas, the bogs, and the nearby New River. In sum, nearly all types of habitats.

The mountains there form the divide between the Mississippi and Atlantic drainage areas, and the summer climate is always cool and has less rainfall than some other mountain areas. The presence of the hotel, roads whieh were passable and later very good, and the highway and the Norfolk and Western Railroad at the foot of the mountain were also favorable factors.

Meanwhile, the advantages of the Highlands Museum in North Carolina came to our attention. It was our intention to have a station which would serve the southeastern states, and in hopes of enlisting cooperative support from universities in this area, letters were written to all. The response was disappointing. Only one (Vanderbilt) showed any interest or possibility of support.

When the possibility of developing an inland biological station at Highlands was presented to the General Education Board, the success of the Marine Biological Laboratory was cited as a pattern of cooperative endeavour. I was told, however, that this success was not due to the cooperative feature, but to strong support from *one* institution and the generous endowment of *one* individual. The Board might therefore be interested in a station for which *one* institution was willing to assume responsibility.

It was then decided to make a trial run at Mountain Lake. The Mountain Lake Biological Station of the University of Virginia was established in 1930. Professor Bruce D. Reynolds served as Director, with Ivey F. Lewis as Associate Director. The Thompson Cottage at the Mountain Lake Hotel was fitted up as a temporary laboratory and served as such for the period 1930-1933.

Several decisions as to policy were made: (1) The courses given were to be at the graduate level, (2) The faculty was to be selected on a broad basis--one member from the University of Virginia, two from elsewhere in Virginia, two from Southern institutions, two from institutions outside the South (usually from Eastern or Midwestern universities), and, when possible, one top-flight man of national prestige, (3) A varied curriculum was to be arranged in such a way that in a three year period a graduate student would be able to get instruction in subjects not covered in usual college curricula, and (5) Emphasis was to be placed on subjects for which live material would be locally available; preserved material was to be used only when necessary.

On the whole the policy as outlined has proved its worth. Faculty and students have come from most of the states east of the Mississippi River; the resulting contacts and exchange of ideas serving to broaden the horizon of students and faculty alike.

An intensive course of five weeks length to which the student, under competent direction, gives his entire attention has resulted in better work than where the student, for a longer time, divides his interest among several subjects.

The disadvantages of rented and inadequate quarters became increasingly obvious and it was realized that a better physical plant was a necessity. Dean Charles G. Maphis initiated steps which led to placing the Station on a sound basis. Through a friend in West Virginia, he interested Mr. John B. Laing in the work of the Station, and the result was that Mr. Laing presented, on a long term and renewable lease, a well located tract of 83 acres one mile north of the lake on the old Salt Sulphur Turnpike. Dean Maphis then approached the General Education Board, which has done so much for education in the South. After inspection of the Station's program the Board, in December, 1933, appropriated $30,000 for buildings and an additional sum for scholarships.

At this time Ivey F. Lewis succeeded Dr. Reynolds as Director. In the planning of construction, the energy and skill of the latter made possible the erection of a laboratory, dining hall, four student dormitories, four small cottages, a service building, and a caretaker's cottage. Water was piped by gravity from a spring high up on the mountain side. A power line was constructed to connect the Station with the Appalachian Power Company's line to the hotel. Connection was also made with the Pembroke Telephone Company.

This seems a great deal to have been done with the available funds. It was possible because the spring of 1934 was at the depth of the great depression and the services of two competent builders were available along with an abundance of less skilled local labor. Hardwood and coniferous timber was immediately at hand. Though the time was short the buildings were ready for the opening in June. On July 4 dedicatory exercises were held, with the principal address by Dean Price of the Virginia Polytechnic Institute.

The increasing proportion of married students pointed up the need for more small cottages, and in 1936 an additional appropriation from the General Education Board made such construction possible.

At about the same time Mr. Laing enlarged his gift of land by 600 acres. A little over ten years later Mr. and Mrs. James W. Wiltshire of Lynchburg added 600 acres to the Station's holdings. Finally, Professor Horton H. Hobbs, Director, succeeded in 1959 in having 1500 acres in the Jefferson National Forest adjoining the Station property designated a Scenic Area, which will be kept in its natural state undisturbed by cutting of timber or other development.

In 1939 the General Education Board appropriated $55,000 for constructing and equipping a larger and more solid laboratory (see cover photograph). This handsome building of native stone has been in use since 1940. It contains the usual classrooms and laboratory facilities as well as a number of research rooms and offiees.

The objective of the Station has always been to combine a teaching with a research program. The presence, therefore, of serious students and experienced investigators living in a compact group far removed from distractions has proved to furnish a favorable atmosphere for the stimulation and growth of serious interest in fundamental biological problems.

About The Lexington Meeting

The twenty-second Annual Meeting of the Association of Southeastern Biologists will be held at the University of Kentucky, Lexington, Kentucky, April 20-22, 1961. Three organizations will meet with the ASB: The Southeastern Section of the Botanical Society of America, The Southern Appalachian Botanical Club, and the Society of General Physiologists (South Central and South Atlantic Regions).

The meeting will begin on Thursday afternoon, April 20, with registration in the lobby of Memorial Hall on the campus of the University of Kentucky. On Thursday night the Society of General Physiologists will sponsor a symposium entitled *Hormonal Control in Crustacea;* the panel will consist of Dr. Milton Fingerman of Tulane University, Dr. Deitrich Bodenstein of the University of Virginia, and Dr. Theodore Bulloch of the University of California. Several sessions of contributed papers and the annual business meeting will be held on Friday, and the presentation of awards will take place on Friday night. Three field trips are scheduled for Saturday.

Local Arrangements Committee

Members of the committee on local arrangements at the University of Kentucky are: Dr. Roger W. Barbour; Dr. Alfred Brauer; Dr. E. T. Browne; Dr. J. M. Carpenter, *chairman;* Prof. J. M. Edney; Dr. C. E. Henrickson; Dr. R. A. Kuehne; Dr. H. P. Riley; Dr. J. A. Wallwork, and Prof. J. C. Warden.

Meals

Dining facilities will be available at two University cafeterias. There are also several grills on campus and restaurants in the vicinity of the University.

Housing Facilities

Housing facilities will be somewhat difficult since the ASB meeting falls during the Keeneland racing season. However, the **Phoenix** and **Lafayette** hotels are holding 200 rooms for those attending the meetings. Both hotels are about 15 minutes walking distance from the University. The distance is approximately 1 mile. **Reservations must be made before April 1, 1961.**

Hotels

Lafayette, 100 rooms reserved, single $6.00-$7.00; double $8.50-$9.50; twin $9.50-$11.00. **Phoenix,** 100 rooms reserved, single $6.00-$10.00, predominately $8.00; double $8.50-$11.00; twin $11.00-$14.00.

Parking is free at the Phoenix; there is a charge at the Lafayette at present, but the possibility of free parking by April. Most people will probably find it most convenient to stay at these hotels.

Motels

First class motels within 10 minutes car distance from the University are:

Howard Johnson (Highway 27, South)
Single: $8.24
Twin: $12.36
Each additional person $1.00

Springs Motel (2020 Harrodsburg Road)
Single: $6.00
Double: $8.00
Twin: $10.00

Downtowner Motel (347 East Main)
Single: $7.00
Double: $10.00
Twin: $12.00

Campbell House (Harrodsburg Pike)
Single: $8.00
Double: $12.00

Town House Motel (1912 South Lime)
Single: $6.00
Double: $7.00
Twin: $8.00

It should be stressed that *reservations must be obtained early* since the meetings occur during the racing season and many racing fans obtain reservations 4 to 8 months in advance. *When writing for hotel reservations please mention the conference or use the blank supplied in this issue.*

Regarding Segregation: Negroes may stay at the Phoenix Hotel but the dining room is segregated. Other hotels and motels are segregated both as to rooms and dining. However, there is no segregation in dining facilities on campus, where members are invited to take most of their meals.

Field Trips

One all day and two morning field trips for Saturday are planned.

The all day trip will be an ecological and collecting tour through 150 miles of the area adjacent to Lexington. It will cover three of the physiographic regions of Kentucky including visits to Natural Bridge State Park and Red River Gorge.

The two morning trips will give a choice between a visit to the United States Public Health

IMPORTANT DEADLINES

Please note the following deadlines, all of which are to be met before our Twenty-second Annual Meeting at the University of Kentucky, Lexington, Kentucky, April 20-22, 1961. Members can help facilitate plans for the meeting by sending in all requested material as far in advance of the deadlines as possible. Because the time available for preparation of the program and publication of abstracts is already at a minimum it will be necessary for the program committee and the editor to adhere strictly to the deadline set; NO TITLES CAN BE ACCEPTED THEREAFTER.

February 11—Suggestions for nominations for ASB officers and executive committee members (Blank 1).

February 18—Titles and abstracts of papers to be presented at the Lexington, Kentucky, meeting (Blank 4).

March 1—Applications for Goethe Awards to graduate students (See Page 8).

March 1—Papers to be considered for the Association Research Prize (See Page 7).

April 1—Applications for Phipps and Bird Research Fellowship at Mountain Lake (See Page 8).

April 1—Nomination letters for the Meritorious Award for Teaching (See Page 7).

THE ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

(Founded 1937)

Purposes

The Association of Southeastern Biologists was organized ". . . to encourage in the broadest and most liberal manner the advancement of biology as a science by the promotion of research in biology; by the increase and diffusion of knowledge of biology; by emphasis of the relation of fundamental knowledge of biology to the solution of biological problems; by the preservation of biological resources; and by its meetings, reports, discussions and publications to promote scientific interests and inquiry, thereby adding to the health, happiness and knowledge of all peoples."

Eligibility for Membership

Any person is eligible for membership who is engaged in (a) biological research, (b) the teaching of biological subjects, (c) graduate study in the biological sciences, or (d) work in the various fields of applied biology. Members, in general, shall be residents of the Southeastern States. Any eligible person recommended by two or more members in good standing may become a member upon payment of the annual dues of two dollars and completion of this form. The annual dues include a subscription to the *ASB Bulletin*.

Activities

1. Annual meetings in April at which the results of investigations are presented for discussion, and at which appropriate symposia may be conducted.
2. Quarterly publication of the *ASB Bulletin* containing programs of annual meetings and abstracts of papers presented, news of science and scientists in the Southeast, a record of Association affairs and articles of regional or general timely interest.
3. The discussion of subjects of general interest to biologists of the Southeast and the formulation of policies and plans of action in relation to such subjects.
4. Encouragement of research through research prizes awarded for especially meritorious papers presented at the annual meetings.
5. Presentation of a Meritorious Award for an outstanding contribution to biology, especially in service to young people through teaching.
6. The annual award of a research fellowship at the Mountain Lake Biological Station.
7. Representation on the Council of the AAAS.
8. Affiliation with the AIBS, which entitles all members to receive the *AIBS Bulletin*.

1. SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

PRESIDENT-ELECT ..... VICE-PRESIDENT .....

SECRETARY .....

EXECUTIVE COMMITTEE MEMBERS (2 for 3-year terms) .....

.....

Deadline: February 11

Mail to: DR. HORTON H. HOBBS, JR.
Department of Biology
University of Virginia
Charlottesville, Va.

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2. STATEMENT OF ASB DUES FOR 1961

Your ASB dues of $2.00 for 1961 are now payable. This sum includes your subscription to the ASB BULLETIN for 1961. Please make your checks payable to the Association of Southeastern Biologists, and mail to the treasurer with this statement at the address given below. Please be sure to write your name and correct mailing address on this statement. The ASB constitution provides that members whose dues are in arrears two years will automatically be dropped from membership. The Executive Committee has ruled that members who are in arrears will not receive subsequent issues of the BULLETIN until dues are paid.

NAME .....

ADDRESS .....

CITY ..... STATE .....

If retired, check here .....
If retiring within a year, check here .....

DR. ELSIE QUARTERMAN
Department of Biology
Vanderbilt University
Nashville 5, Tennessee

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3. APPLICATION FOR MEMBERSHIP ASSOCIATION OF SOUTHEASTERN BIOLOGISTS

NAME (in full) ..... Date .....

DEGREES (institutions and dates) .....

.....

PRESENT POSITION: (1) Title ..... (2) Department .....

(3) Institution ..... (4) City, State .....

PREFERRED MAILING ADDRESS .....

SPECIALTY (e.g., physiology) .....

SPECIFIC INTEREST (e.g., respiration) .....

RECOMMENDED BY (1) ..... (2) .....

Fill out this blank, enclose check (or money order) for $2.00 as dues for one year, and mail to:

DR. ELSIE QUARTERMAN, Treasurer ASB, Dept. of Biology, Vanderbilt Univ., Nashville 5, Tenn.

4. Deadline: February 18 CALL FOR PAPERS FOR THE LEXINGTON MEETING

This form and two typewritten copies of the abstract must reach the Chairman of the Program Committee, Dr. John M. Carpenter, Department of Zoology, University of Kentucky, Lexington, Kentucky, not later than Saturday, February 18, if the title is to appear on the program or the abstract included among those published in the April issue of the BULLETIN. Papers to be submitted for the Research Prize must be included in the program. Please type or print the following information. All papers are limited to 10 minutes, with three minutes for discussion.

1. AUTHOR(S): .....

2. TITLE OF PAPER: .....

.....

2. INSTITUTION(S) REPRESENTED: .....

4. Cheek organizations to which author(s) belong:

..... Association of Southeastern Biologists.

..... Southeastern Section, Botanical Society of America.

..... Southern Appalachian Botanical Club.

..... Society of General Physiologists, South Central and South Atlantic Regions.

5. Projection equipment needed: ..... 2 x 2 slide projector; ..... 3 x 4 slide projector; other equipment: .....

6. If your paper is being submitted for the Association Research Prize, please check here: .....

7. This form must be accompanied by two double-spaced typewritten copies of an abstract, not to exceed 150 words. Longer abstracts are subject to cutting by the editor without the approval of the author. **Please use the following form in typing the heading in order to avoid excessive editing:**

Dimorphism of Embryonic Hooks of *Hymenolepis nana*
Arthur W. Jones, *University of Tennessee*

Start the text of the abstract here, on a separate line with paragraph indentation. In general the abstract should appear as a single paragraph, although two paragraphs are aeceptable if really needed.

8. *Reprints:* Reprints of individual abstracts are available at the rate of $3.00 for the first 200 and $1.00 for each additional 100, postpaid. It is necessary to attach a check for the proper amount to this form and send it along with the form and the two copies of the abstract. Checks should be made payable to the Association of Southeastern Biologists. **Orders for abstracts will not be entered unless payment accompanies the order.**

Indicate here how many reprints of your abstract you want: ..... .

HOUSING RESERVATION COUPON

(Fill in and mail to hotel or motel of your choice, see page 6)

Please reserve the following accommodations for the 22nd Annual Meeting of the Association of Southeastern Biologists, in Lexington 20-22 April 1961.

Single Room ....., Double-Bed Room ....., Twin-Bed Room ....., Rate ....., Number in Party ....., Date of Arrival ....., Departure Date .....
(Give approximate hour, A.M. or P.M.)

Name .....
Please Print

Address .....

Because of the racing season, please make reservations early! !

The Funkhouser Biological Sciences Building
University of Kentucky

The Funkhouser Biological Sciences Building houses the departments of Anatomy and Physiology, Botany, Microbiology, and Zoology. It also contains the biology library, the electron microscope, and the W. R. Allen Museum of Zoology. Most of the papers at the Lexington Meeting will be scheduled in this building.

Service Narcotics Hospital on the outskirts of Lexington or a visit to one of the local thoroughbred farms.

The U.S.P.H. Service Hospital in Lexington is unique as a free federal hospital for the treatment of drug addiction and for research in this field. It is the largest hospital of this type in the world and one of two in the United States.

The famous Blue Grass Region surrounding Lexington houses over 300 horse farms of which many are world famous. A trip to one of the famous breeding farms is scheduled.

General Information

1. Registration will be Thursday afternoon, April 20, in the lobby of Memorial Hall on the University campus and on Friday morning, April 21, in the lobby of the Funkhouser Biological Sciences Building.

2. A fee of $1.00 will be charged for registration.

3. Plans are being made to hold all paper sessions in the Funkhouser Biological Sciences Building.

4. Lexington is not dry.

5. Lexington is served by three airlines: *Delta* from Atlanta; *Eastern* from Louisville, and *Piedmont*, directly, from Charlotte, Charlottesville, Raleigh-Durham, Richmond, Roanoke, Tri-City, and Winston-Salem. The airport is 4½ miles west of town.

Two railroads also serve Lexington: The *Chesapeake and Ohio* and the *Southern*. The *Greyhound Bus Line* also services Lexington.

6. Inasmuch as the meeting occurs during the local racing season, a section has been reserved at the Keenland Race Course for those who may desire to attend.

7. Free campus parking for ASB members will be available at the Rose Street parking lot, which is quite convenient to meeting activities.

Points of interest around Lexington

1. Ashland, home of Henry Clay.

2. Hunt Morgan Home, home of Thomas Hunt Morgan, noted geneticist and Nobel Prize winner.

3. Home of Mary Todd, wife of Abraham Lincoln.

4. I. B. M. electric typewriter plant.

5. James E. Pepper Distillery.

6. Transylvania University, oldest institution of higher learning west of the Alleganies.

7. Statue of Man O' War, most famous thoroughbred in history.

8. Shrine Crippled Children's Hospital.

9. Tobacco warehouses.

Meritorious Award Nominations

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

"The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees."

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting materials to *Roberta Lovelace, Department of Zoology, University of South Carolina, Columbia, S. C.*

COMMITTEE
C. C. Goodchild
William J. Koch
Roberta Lovelace, *Chairman*

Association Research Prize

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This ap-

plies to all names on the submitted paper. Applicants for membership are not eligible to submit papers for the Research Prize.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Judges will be eminent biologists outside the Southeast. They will set their own criteria, and may withhold the award if no paper is judged to have sufficient merit.

5. Papers must be submitted *in triplicate* and in their entirety not later than March 1, 1961, to *Ralph Yerger, Department of Zoology, Florida State University, Tallahassee, Fla.* One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Phipps and Bird Research Fellowship

A Research Fellowship of $150.00 for summer research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and, especially in the case of younger workers, by references and educational data. Applications should be sent to *Ralph Yerger, Department of Zoology, Florida State University, Tallahassee, Fla.*, not later than April 1, 1961. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE

Charles Jenner
Victor Cutter
Ralph Yerger, *Chairman*

Mary Glide Goethe Travel Awards

For the fourth year there will be funds available through the generosity of Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year in Lexington, Kentucky, April 20-22. It is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from Lexington.

Staff members are requested to eall to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1961 meeting of the Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Indicate if application is being made for maintenanee or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.

2. Give information as to whether or not a paper is being presented by the applicant.

3. In a paragraph, give a brief history of your education to date, of how many years you have been—and plan to be—in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.

4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.

5. Have your major professor or departmental head write a letter supporting your application.

6. Applieations and supporting letters, both in triplicate, should be in the hands of *J. M. Carpenter, Department of Zoology, University of Kentucky, Lexington, Kentucky,* by March 1, 1961. Applicants will be notified of the decision of the Committee during March.

COMMITTEE

R. B. Short
Joseph O'Kelly
J. M. Carpenter, *Chairman*

News of Biology in the Southeast

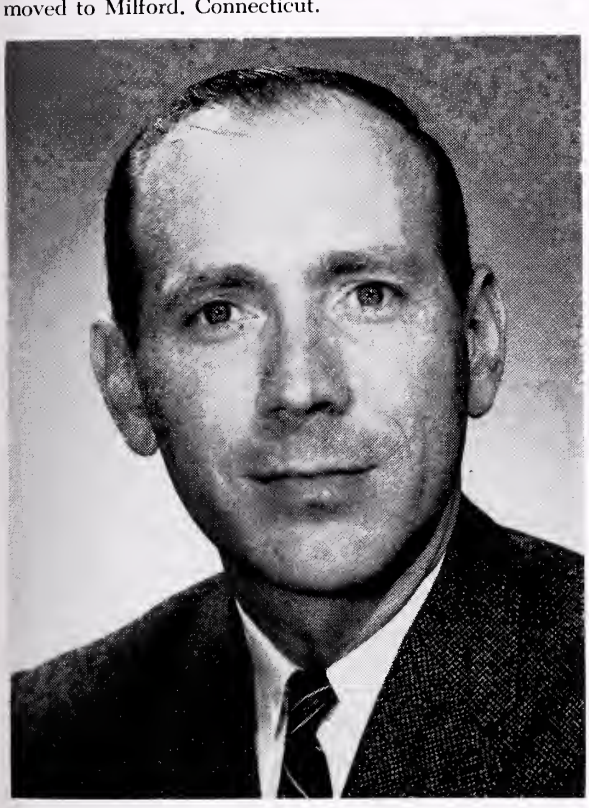
About People

Dr. William Burbanck, Professor of Biology at Emory University, spent the fall working on his research at Woods Hole, Massachusetts.

Dr. Lee Weeks, Professor of Biology at The Berry Schools, Mount Berry, Georgia, attended the NSF Institute of Genetics at North Carolina State College, June 14-July 21, 1960.

Dr. Kenneth Hancock, who received his Ph.D. in Botany from the University of Alabama in June, 1960, has joined the staff of the Biology Department of the Berry Schools, Mount Berry, Georgia.

Dr. Geoffrey M. Jeffery, former Editor of the ASB BULLETIN, was awarded the Bailey K. Ashford Award in Tropical Medicine in 1959. The work for which Dr. Jeffery was given the award involved no specific project, but a paper presented in response to the award was published last year in the *American Journal of Tropical Medicine and Hygiene.* When he received the award, Dr. Jeffery was associated with the U. S. Public Health Service Laboratory at Columbia, S. C. He has recently moved to Milford. Connecticut.



GEOFFREY M. JEFFERY

The Bailey K. Ashford Award in Tropical Medicine is sponsored by Eli Lilly and Company for presentation to young scientists who have distinguished themselves by their contributions to fundamental research and who have shown originality and independence of thought. The award is named in honor of Bailey K. Ashford (1873-1934), an officer in the Medical Corps of the U. S. Army who contributed to the advance of public health by his work on hookworm.

Dr. John Allen Boole, Jr., Chairman, Division of Science and Mathematics, Georgia Southern College, Statesboro, Ga., recently attended the NSF sponsored Conference for College Teachers of Genetics at Colorado State University.

Dr. Burton J. Bogitsh, Associate Professor of Biology, Georgia Southern College, Statesboro, Ga., has received $3,400 from the National Institutes of Health to continue his work on the histochemistry of parasitic cysts.

Dr. Wade T. Batson, Department of Biology, University of South Carolina, has received a grant of $3,000 from the South Carolina State Water Pollution Authority to study the algae in disposal lagoons.

Mr. Donald Dobbs of the Wofford College Biology Department is on a two-year leave to complete his Ph.D. He is working in parasitology at Emory University.

Dr. Harold Robinson recently joined the staff of the Wofford College Biology Department in a temporary capacity during the absence of Mr. Dobbs.

Dr. Hugo Ferchau of Wofford College has recently received a grant of $14,400 from the National Science Foundation to work on the mycorrhizae of pine. Dr. Ferehau will be joined by two European botanists in the summer of 1961.

Mr. Edward Tyson, a graduate student in the Department of Biological Sciences at Florida State University, and his co-author Mr. Dick Harlow, presented a paper at the 13th annual meeting of The Wildlife Society in Baltimore. The paper, "A Preliminary Report on the Effect of Mast Abundance on the Weight and Reproduction of Deer in Central Florida," has been judged first place. A certificate of award will be presented to the authors by the society.

Professor Clyde T. Reed, Head of the Department of Biology at the University of Tampa, retired from the position in September, 1960. Professor Reed will remain on the teaching staff. **Dr. Charles R. Walker, Jr.** has succeeded Professor Reed as head.

Mr. Elmer A. Youngman has resigned his position as assistant professor of Biology at the University of Tampa to become Curator of Mammals in the Canadian National Museum at Ottawa, Canada.

Dr. William Jennings has recently resigned from the U.S. Fish and Wildlife Service to accept employment with the Florida State Board of Health. Dr. Jennings will be working throughout Florida on wildlife diseases, particularly rabies.

Game management personnel of the Florida Game and Fresh Water Fish Commission have recently won five of the first six annual awards for "best publications" offered by the Southeastern Section of the Wildlife Society. Among these award winners were: **Richard F. Harlow,** for his publication "An Evaluation of White-tailed Deer Habitat in Florida"; **James A. Powell** as co-author with **J. L. Sincock,** for publication entitled "An Ecological Study of Waterfowl Areas in Central Florida"; and **C. M. Loveless,** for best paper entitled "Clipping Study Techniques in Marsh Ecology Investigations."

Miss **Charlotte Bebb,** formerly of the University of Alabama Medical Center in Birmingham, Alabama, will join the staff of the Department of Biological Sciences at Florida State University as Electron Microscopist in January, 1961.

Dr. A. Gib DeBusk of the Department of Biological Sciences at Florida State University has received a one year contract from the AEC, for studies on the molecular basis of "forward and back" mutation. Cultures of *Neurospora* from Dr. DeBusk's laboratory were exposed and recovered from a 1200 mile flight for 26 minutes into the lower Van Allen radiation belt. Dr. DeBusk also attended a meeting on "Biological and Medical Aspects of the Energies of Space" recently held at the School of Aviation Medicine in San Antonio, Texas.

F. P. Aldridge, Instructor of Biology at Florence State College, Florence, Ala., participated in the Summer Institute for College Teachers Research Participation program at Vanderbilt University in 1960. He assisted **Dr. R. B. Channell** in research on a taxonomic revision of the sedges.

Dr. A. L. Hershey, Professor of Biology at Florence State College, Florence, Ala., served as president of the Alabama Wildlife Federation during 1960.

Dr. F. S. Arant, head of the Zoology-Entomology Department of Auburn University School of Agriculture, was elected president of the Entomologieal Society of America at its rccent meeting in Atlantic City, N. J.

Dr. B. Wayne Arthur of Auburn University is one of the five scientists invited to represent the United States at an international symposium on radioisotopes and radiation in entomology held in Bombay, India, last December. The symposium was sponsored by the International Atomic Energy Commission.

Dr. James L. Riopel, Assistant Professor of Biology at the University of Virginia, has been named Direetor of Mountain Lake Biological Station of the University of Virginia.

Ella D. Morris, Assistant Professor of Biology, Spring Hill College, was elected national secretary of Lambda Tau Medical Technology Society at its Atlantic City N. J. meeting last June. Mrs. Morris was also elected the first honorary member of the Alabama Association of Medical Technologists at their October 1960 meeting in Birmingham, Ala.

Father Patriek H. Yaneey, chairman of the Department of Biology at Spring Hill Collegc, served on a panel of the National Science Foundation for screening proposals for undergraduate research. He has also been appointed to the Committee on Undergraduate Research of the AAAS.

Dr. A. Frederiek Hemphill, Assistant Professor of Biology at Spring Hill College, received his doctorate from the University of Alabama in June.

Dr. Hansell F. Cross is the new head of the Huntingdon College Biology Department. Dr. Cross comes from Northeast Louisiana State College where he was Associate Professor of Biology. He received the Ph.D. degree from the Universitv of Maryland, and is the recipient of a grant of $18.000 from the National Institutes of Health for work on the secretion of the chigger, *Trombicula splendens.*

Dr. Paul A. Walker of the Department of Biology, Randolph-Macon Women's College, Lynchburg, Virginia, has spent the first semester of the 1960-61 aeademic year on sabbatical leave at the Athenaeum of the University of California at Pasadena working with Drs. Beadle and Horowitz on a problem in *Neurospora* geneties. He will return to his home institution in mid-January of 1961.

Dr. Brooke B. Webber is a new member of the staff of the Department of Zoology and Entomology at the University of Tennessee. Dr. Webber received his Ph.D. at Yale and has come to U.T. from the Oak Ridge National Laboratory where he was a member of the Biology Division.

Dr. Matti Al-Aish, Dr. Sandra L. Bell, Dr. Alan S. Heilman, and **Dr. Edward Clebsch** have recently joined the staff of the Botany Department of the University of Tennessee.

Mr. Marvin Seott has been appointed research assistant to **Robert T. Brumfield** at Longwood College. Mr. Scott is a graduate of Hampden-Sydney College and is on leave of absence from the public schools of Lynchburg, Virginia.

Dr. L. R. Hesler, Emeritus Dean of the College of Liberal Arts and Professor of Botany, University of Tennessee, spent several weeks in September and October, 1960, visiting mycologists and mycological herbaria in Europe.

Dr. A. J. Sharp, head of the Botany Department of the University of Tennessee, taught Bryology and Liehenology at the University of Michigan Biological Station. In October he attended the First Botanical Congress in Mexico City, where he presented an invited paper on the migration of plants from eastern Asia to North America in the Tertiary Era.

Dr. Charles Norman and **Dr. Erwin Goldberg,** Department of Biology, West Virginia University, and **Dr. I. D. Porter,** Department of Dairy Husbandry, West Virginia University, have received three grants totaling $23.500 for two research projects. The National Institutes of Health contributed $18.549 and the National Association of Artificial Breeders, $1,800, for a continuation of a study of the physiology and biochemistry of mammalian germ cells. The National Institutes of Health also eontributed $4.870 for a second investigation on the elimination of vibrio fetus from frozen bovine semen.

Dr. R. L. Hoffman has joined the Biology Department of Radford College as associate professor. He was formerly research assoeiate with the U. S. National Museum, serving in Washington, D. C. and Europe.

Mr. D. H. Messersmith, assistant professor, has rejoined the Biology Department, Radford College, after a one-year leave of absence spent in candidacy for the Ph.D at V.P.I. Mr. Messersmith is studying the biology and distribution of *Culicoides* in Virginia and the relationship of *Culicoides* to infectious synovitis in poultry.

Dr. Carolyn Wells, formerly of Oak Ridge National Laboratory, has been appointed assistant professor of biology at Longwood College. Dr. Wells assumed her duties in September, 1960, giving courses in genetics, embryology, and physiology. Her research, supported by the Atomic Energy Commission, is in the field of radiation biology, using *Tetrahymena* as the test object.

Dr. and Mrs. Orland E. White returned to Charlottesville, Virginia, on October 12 from a twelve-week biological expedition involving more than 6,000 miles of travel in Tanganyika, Kenya, and Uganda, British East Africa. Most of the mountain masses and animal parks were visited and over 800 kodachromes were taken.

Dr. Miriam F. Bennett is on sabbatical leave from Sweet Briar College during the current session. She is studying biological rhythmicity at the Max-Plank Institute for Verhaltenphysiologie at Tübingen, Germany.

Dr. Jane Belcher has resumed her work at Sweet Briar College after a sabbatical leave during which she studied the embryology of *Xerapus* at University College, Ibadan, Nigeria.

Professor Miser Richmond has been made Acting Head of the Department of Biology at Tennessee Polytechnic Institute. He is replacing **Dr. G. B. Pennebaker,** who will devote full time to his duties as Director of the School of Arts and Sciences.

Dr. John Warren has been appointed Associate Professor of Biology at Tennessee Polytechnic Institute. He received his Ph.D. in Microbiology and Botany at Ohio State University in 1950 and was on the faculty at Duke University for six years. He has done extensive research on plant diseases in the tropics for the past four years.

Dr. William J. Koch, Department of Botany, University of North Carolina, attended the Phillips Electron Microscope School in New York last November.

Dr. Francis Byers, formerly Chairman of the Biological Sciences Department and Professor of Biology at the University of Florida, is now Chairman of the Division of Natural Sciences at Elmira College, Elmira, N. Y.

Institutions and Organizations

A summer institute for college teachers in the form of a course entitled *Survey in the Marine Sciences* will be held at the **Duke Marine Laboratory** during the second summer session of 1961, July 19 to August 23. The institute is sponsored by the National Science Foundation. Any college teacher interested in taking part in this institute should write *Dr. F. John Vernberg, Duke Marine Laboratory, Beaufort, N. C. or Dr. Harold J. Humm, Department of Botany, Duke University, Durham.*

Construction began on a new Science Building for **Troy State Teachers College,** Troy, Alabama, in October of this year. The new building will house facilities for biology, chemistry, physics, and science education. It is a three-story building of approximately 35,000 square feet of floor space. In addition to classrooms and laboratories, the building includes office space for twelve science department staff members, a small auditorium-classroom which will seat one hundred and twenty persons, exhibit areas, storage space and research, study, and reference rooms. Present plans call for completion of the building by August and installation of equipment by September, 1961. Upon completion of the building, the science department will increase its offerings, particularly in the field of physics and chemistry. The Alabama Academy of Science is scheduled to meet in the new building in the Spring of 1962.

As part of a continent-wide cooperative effort to acquire greater knowledge of the marine mammals of North American waters, four southeastern biologists are investigating and identifying whales, dolphins, porpoises, seals, and manatees which become stranded on coasts of southeastern states. The program, which was established recently, is being carried on by the *Committee on Marine Mammals of the American Society of Mammalogists.* The four participants from the southeast are: **Dr. Norman C. Negus,** Assistant Professor of Zoology at Tulane University, who is responsible for the coastal sector including all of the Gulf of Mexico except Florida; **Dr. James N. Layne,** Assistant Professor of Biology at the University of Florida, who is garnering records from the entire coast of Florida; **Dr. Frank B. Golley,** Assistant Professor of Zoology at the University of Georgia, who has the coastal sector from Georgia to Cape Hatteras; and **Mr. John L. Paradiso,** Systematic Zoologist, U. S. Fish and Wildlife Service, U. S. National Museum, who is responsible for the coastal area from Cape Hatteras through Maryland.

The Biology Department of Wofford College, along with the Chemistry and Physics Departments, has recently moved into a new science building. This building, to be dedicated on February 7, 1961, will be named the *Millikan Science Building* in honor of Mr. Roger Millikan, textile executive.

Georgia Southern College will hold its first *Summer Institute for High School Teachers of Science and Mathematics* from June 12 to July 20, 1961. **Dr. Burton J. Bogitsh** will serve as Director and have charge of the course in zoology. **Dr. John Allen Boole, Jr.,** Professor of Biology, will teach the course in botany.

The Department of Biological Sciences of Florida State University will hold a Summer Institute for teachers of high school and junior college biology during the summer of 1961. The institute, sponsored by the National Science Foundation, will be administered by Dr. Grace Madsen of the Department.

The Biology Department of the University of Alabama has signed a contract with the Alabama Department of Conservation to operate the Marine Laboratory at Cedar Point. The facilities will be used to conduct both basic and applied research in Marine Biology, and will also be used in the academic program of the Biology Department. **Mr. Jack Mallory,** is the resident biologist assigned to the laboratory. **Professor Everett L. Bishop** will conduct coursework in Marine biology during the summer of 1961.

Vanderbilt University has received a grant of $4 000.000 from the Ford Foundation and is beginning a public campaign for a total of $30.000 000 to be raised over the next three years. One of the projects for which funds are sought is a new science center to house several of the science departments of the university.

A Summer Institute in Radiation Biology for High School Teachers of the sciences will be held at Florida State University during the 1961 Summer Session. **Dr. Charles W. Edington** of the Department of Biological Sciences will be in charge of the program. The Institute is jointly sponsored by the Atomic Energy Commission and the National Science Foundation.

The Division of Physiology of the Department of Biological Sciences at **Florida State University** has received a Graduate Student Training Grant for $83,750 from the National Institutes of Health. **Dr. Harry J. Lipner** of the department will be in charge.

The Department of Botany of the University of North Carolina has received a grant of $5,200 from the Atomic Energy Commission to set up an isotope teaching laboratory. **Dr. Max H. Hommersand** will offer a course in Radioisotope Tracer Techniques this spring.

The American Society of Plant Taxonomy has announced the election of **Dr. A. J. Sharp**, University of Tennessee, as President and of **Dr. R. F. Thorne**, University of Iowa, to the Council.

Grants in Aid

The **Division of Biological and Medical Sciences of the National Science Foundation** announces that the next closing date for receipt of basic research proposals in the Life Sciences is January 15, 1961. Proposals received prior to that date will be reviewed at the spring meetings of the Foundation's advisory panels and disposition will be made approximately four months following the closing date. Proposals received after the January 15, 1961, closing date will be reviewed following the summer closing date of May 15, 1961. The next closing date for submission of proposals for specialized biological facilities is March 1, 1961.

The NSF has two programs for support of facilities, one for general graduate level university laboratories and the other for specialized biological facilities. The latter are defined as discrete research installations which are unique, one-of-a-kind, or at least less than ordinary in that they are not a usual part of a university department and may represent either new ventures or the more traditional establishments. Inquiries should be addressed to the *National Science Foundation, Washington 25, D. C.*

The Mountain Lake Biological Station has available, from the National Science Foundation, three types of awards for research and study at the Station: Post-Doctorates, for research; Pre-Doctorates, for supervised research; and Post-Graduates, for training in field or laboratory research techniques, thus permitting course work. Application blanks for these awards may be secured from the Director, Mountain Lake Biological Station, Department of Biology, University of Virginia, and must be submitted by April 1, 1961.

The National Science Foundation announces that March 1, 1961, is the next closing date for the receipt of proposals in the *Graduate Laboratory Development Program.* Proposals received after March 1 will be reviewed following the next closing date, September 1, 1961. This program requires at least 50% participation by the institution with funds derived from non-Federal sources. The purpose of the grants is to aid institutions of higher education in modernizing, renovating, or expanding graduate-level basic research laboratories used by staff members and graduate students. Only departments having an on-going graduate training program leading to the doctoral degree in science at the time of the proposal submission are eligible at present. Proposals and additional information should be addressed to *Office of Institutional Programs, National Science Foundation, Washington 25, D. C.*

The ASB BULLETIN

Volume 8, Number 2 April, 1961

MEMORIAL HALL—UNIVERSITY OF KENTUCKY

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN *Volume 8, Number 2—April 1961*

CONTENTS

COVER PHOTOGRAPH: *Memorial Hall, University of Kentucky. This building is the University Auditorium. It seats about 1100 persons, and is equipped with a pipe organ and a carillon. Registration on Thursday, April 20, will be held in the lobby. The photograph was supplied by the Public Relations Department of the University of Kentucky.*

THE ASB BULLETIN

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harold J. Humm, Department of Botany, Duke University, Durham, N. C. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tenn. Subscription rate for non-members of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

Application to mail at second-class postage rates is pending at Philadelphia, Pa.

C. WILLARD HART, JR.
EDITOR

HAROLD J. HUMM, Associate Editor
ELSIE QUARTERMAN, Business Manager

Program of the 22nd Annual Meeting of the Association of Southeastern Biologists

A Joint Meeting with the Southeastern Section of the Botanical Society of America, Southern Appalachian Botanical Club, the South Central and South Atlantic Regions of the Society of General Physiologists, the Southeastern Section of the Society of Ichthyologists and Herpetologists, and the Southeastern Region of Beta Beta Beta National Honorary Biological Society—held at the University of Kentucky, Lexington, Kentucky, April 20-22, 1961.

THURSDAY, APRIL 20

2:00 p.m.-7:45 p.m. REGISTRATION. Lobby of Memorial Hall.

8:00 p.m.-9:30 p.m. GENERAL SESSION. Auditorium, Memorial Hall. Victor A. Greulach, Presiding.

Address of Welcome: Frank G. Dickey, President, University of Kentucky.

Response: Victor A. Greulach, University of North Carolina, President of Association of Southeastern Biologists.

Symposium: *"Control Mechanisms in Invertebrates."* Sponsored by the Society of General Physiologists and the Association of Southeastern Biologists.

Introduction

Samuel R. Tipton, University of Tennessee

"Control of Pigmentary Effectors"

Milton Fingerman, Tulane University

"Some Recent Advances in Insect Endocrinology"

Dietrich Bodenstein, University of Virginia

"Invertebrate Contributions to the Analysis of Organized Systems of Neurons"

Theodore H. Bulloch, University of California at Los Angeles

The symposium will be followed by a *smoker at the new University of Kentucky Medical Center.* Tours of the Center will be available for those interested. Medical students and members of Alpha Epsilon Delta (premedical honor society) will serve as guides.

FRIDAY, APRIL 21

FRIDAY MORNING

8:00 a.m.-12:00 noon. REGISTRATION. Lobby of Funkhouser Biological Sciences Building.

8:00 a.m.-12:00 noon. EXHIBITS. Room 12, Funkhouser Biological Sciences Building.

8:30 a.m.-11:20 a.m. PAPER SESSIONS.

Animal Ecology.—Room B-3, Funkhouser Biological Seiences Building.

Animal Physiology and Development.—Room B-8, Funkhouser Biological Sciences Building.

Algology-Mycology.—Room 211, Funkhouser Biological Sciences Building.

Plant Physiology.—Room 319, Funkhouser Biological Sciences Building.

11:30 a.m.-12:30 p.m. BUSINESS MEETING. Association of Southeastern Biologists. Room 200, Funkhouser Biological Sciences Building.

FRIDAY AFTERNOON

1:00 p.m.-5:00 p.m. EXHIBITS. Room 12, Funkhouser Biological Sciences Building.

2:00 p.m.-4:30 p.m. PAPER SESSIONS.

General Ecology.—Room B-3, Funkhouser Biological Sciences Building.

Animal Physiology and Development.—Room 8, Funkhouser Biological Sciences Building.

Cytogenetics.—Room 211, Funkhouser Biological Sciences Building.

Systematic Botany.—Room 319, Funkhouser Biological Sciences Building.

FRIDAY EVENING

5:00 p.m.-6:30 p.m. OPEN HOUSE. Spindletop Mansion.

7:00 p.m.-8:00 p.m. BUFFET. Spindletop Mansion.

8:00 p.m. GENERAL SESSION. Spindletop Mansion.

Presiding: Dr. Victor A. Greulach, President, Association of Southeastern Biologists.

Address: "Functional Organization of Primitive Nervous Systems." Theodore H. Bulloch, UCLA.

Presentation of Awards:

Mt. Lake Biological Station Fellowship.
Sponsored by Phipps and Bird, Inc.

Association Research Prize.
Sponsored by Carolina Biological Supply Co.

Meritorious Teaching Award.
Sponsored by Will Corp. of Georgia.

SATURDAY, APRIL 22

SATURDAY MORNING

8:30 a.m. FIELD TRIPS.

Botanical Field Trip to Raven Run, 10 mi. southeast of Lexington on U. S. Highway 25.

Zoological Field Trip to Red River Gorge, 120 miles round trip.

8:00 a.m.-12:00 noon. BETA BETA BETA GENERAL MEETING AND PAPER SESSIONS.

8:00 a.m. *General Meeting*—Room 125, Funkhouser Biological Sciences Building.

Paper Sessions—Room 125 and Room 211, Funkhouser Biological Sciences Building, following the General Meeting.

9:00 a.m. GUIDED TOURS.

Tours will be available, for those interested, to the following points:

1. Thoroughbred Horse Farms.
2. U. S. Public Health Service Narcotics Hospital.

SCHEDULE OF PAPER SESSIONS

FRIDAY MORNING—APRIL 21, 8:30 A.M.

Animal Ecology

Room B-3 Funkhouser Biological Sciences Building

Presiding: John A. Wallwork, University of Kentucky

8:30 1. Kuehne, Robert A. (Univ. of Kentucky). Fish Distribution in a Small Stream System of Eastern Kentucky.

8:43 2. Freeman, John A. (Winthrop College). Observations of Temperature Adaptation of Goldfish and P-32 Distribution.

8:56 3. Lautenschlager, E. W. (Univ. of Virginia). Uptake of P-32 by the Snail, *Australorbis glabratus.*

9:09 4. Pierce, E. Lowe (Univ. of Florida). The Distribution, Growth and Reproduction of Lancelets in the Cedar Key Area.

9:22 5. Gordon, Robert E. (Univ. of Notre Dame and the Highlands Biol. Sta.). Comparative Studies of Locomotive Activity in Appalachian Salamanders.

9:35 6. Hamon, J. Hill (Jacksonville Univ.). Bird Remains from a Sioux Indian Midden.

9:48 7. Edney, J. M. (Univ. of Kentucky). The Life History of *Fasciola indica.*

10:01 8. Holliman, Rhodes B. and Robert B. Short (Florida State Univ.). Studies on a New Avian Schistome in the *Austrobilharzia.*

10:14 9. Harkima, Reinard and Grover C. Miller (North Carolina State Coll.). A New Strigoid Trematode, *Diplostomidae alariinae.*

10:27 10. Barr, Thomas C. (Tennessee Polytechnic Institute). The Fauna of Mammoth Cave.

10:40 11. Wallwork, John A. (Univ. of Kentucky). Oribatid Mites and the Soil Community.

10:53 12. Westfall, Minter J., Jr. and Richard P. Trogdon (Univ. of Florida and Judson College). The True *Consanguis* Selys (Odonata: Gomphidae).

11:06 13. McCrone, John D. (Univ. of Florida). A Study of the *Geolycosa*, Pike Complex in the Southeastern U. S.

Animal Physiology and Development

Room B-8 Funkhouser Biological Sciences Building

Presiding: Douglas G. Humm

8:30 14. Yarbrough, James D. and Joseph C. O'Kelley (Univ. of Alabama). Alkaline Earth Elements and Their Avoidance.

8:45 15. Young, Martin D. (Parasite Chemotherapy Laboratory, Columbia, South Carolina). Chloroquine Resistance in *Plasmodium falciparum.*

9:00 16. Cole, B. Theodore and N. G. Anderson (Biol. Div. Oak Ridge National Laboratory). Fatty Acids from Lipids of Rat Liver.

9:15 17. Goss, Robert C. (Loyola Univ.). The Use of Plants in Cancer Research.

9:30 18. Foreman, Charles W. (Pfeiffer College). Comparative Aspects of Tryptic Peptides of Several Mammalian Hemoglobins.

9:45 19. Parrish, Fred K. and Joanna W. Parrish (Emory Univ.). The Developmental Effects of Lithium Chloride Applied to Selected Surface Regions of the Eggs of *Nussarius vibex* and *N. obsoleta.*

10:00 20. Moore, Jack H., Richard Thomson, and Charles A. Kelly (Southern Reserve Institute). The Utilization of Transplantable Hamster Tumors as Experimental Tools.

10:15 21. Cardell, Robert R., Jr. (Henry Ford Hospital, Detroit, Michigan). Observations of Structures and Ultrastructures of the Pituitary Glands of the Salamander, *Triturus viridescens.*

10:30 22. Nagabushanam, R. and Milton Fingerman (Newcomb College and Tulane Univ. Marine Laboratory). Physiology of the Proximal Retinal Pigment of the Shrimp, *Crangon septemspinosus.*

10:45 23. Rawls, John M. (Univ. of Florida). A Partial Characterization of the Jellyfish Splitting Enzyme of Sand Dollar Spermatozoa.

11:00 24. Thomson, Richard (Southern Research Institute, Birmingham, Alabama). Isocaloric Synthetic Diets as Inhibitors of Experimental Neoplasms.

Algology-Mycology

Room 211 Funkhouser Biological Seiences Building

Presiding: Frederick T. Wolf, Vanderbilt University

8:30 25. Wolf, Frederick T. (Vanderbilt Univ.). Growth Inhibition of *Chlorella* Induced by 3-Amino-1,2,4-Triazole and Its Reversal by Purines.

9:00 26. Umphlett, Clyde J. and John Couch (Univ. of North Carolina). Germination of the Resting Sporangium of *Coelomyces.*

9:15 27. McDonald, James C. and John E. Peterson (Wake Forest). Fruiting Body Germination and Formation in the Genus *Archangium.*

9:30 28. Miller, Charles E. (Texas A & M). Aquatic Phycomycetes of Lake Texoma.

9:45 29. Koch, William J. (Univ. of North Carolina). Fungus Motile Cells.

10:00 30. Frederick, Lafayette (Southern Univ.). Studies of Leaf Fungi from Louisiana.

10:15 31. Mullins, Thomas (Univ. of Florida). The Chytrid *Pringsheimiella* Is *Dictyomorpha.*

10:30 32. Williams, Louis G. (R. A. Taft Engr. Center, Cincinnati, Ohio). Composition of the Phytoplankton Populations of Major Waterways.

10:45 33. Humm, Harold J. (Duke Univ.). The Marine Algae of Bimini, Bahamas.

11:00 34. Edwards, Jackie and Walter Herndon (Univ. of Alabama). A New Ulotrichacean Alga.

Plant Physiology

Room 319 Funkhouser Biological Sciences Building

Presiding: Carl E. Henrickson

8:30 35. Burk, Carl John (Univ. of North Carolina). Environmental Aeration in *Heterotheca subaxillaris.*

8:45 36. Queen, William H. and Joseph B. O'Kelley (Univ. of Alabama). Influence upon Root Development in Maize Seedlings of a Strontium Replacement for Calcium in the Nutrient Solution.

9:00 37. Brumfield, Robert T. and Marvin W. Scott (Longwood College). The Effect of Nucleic Acid Components on Root Growth and Geotropism.

9:15 38. Caplenor, Donald (Millsaps). Competition between *Helenium amarum* Raf., H. Rock and Certain Grasses at Various Levels of Mineral Nutrition.

9:30 39. Griffith, Mildred M. and Robert D. Powell (Univ. of Florida). The Time Course of Cell Enlargement and Leaf Growth as Affected by Kinetin and Red Light.

9:45 40. Plummer, Gayther L. (Univ. of Georgia). Aspects of the Physiological Tolerance of Some Clovers to Gamma Radiation of the Seeds.

10:00 41. Beck, Edwin G. (Univ. of Georgia). The Percentage Distribution of Mineral Elements in Certain Leaf Cells.

10:15 42. Won Kyum Kim and Victor A. Greulach (Univ. of North Carolina). Influence of Maleic Hydrazide on the Growth and Metabolism of *Chlorella.*

10:30 43. Lammers, William T. (Davidson College). Accumulation of Radioisotopes by *Justicia americana* L. in the Clinch River.

10:45 44. Coleman, Marion T. and Charles Ray (Emory Univ.). Studies of *Tetrahymena* Serotypes of Fluorescent Counterstaining.

11:00 45. Wells, Margaret M. and Charles Ray (Emory Univ.). Potentiation of X-ray by Near-infrared Pretreatment of *Tetrahymena.*

FRIDAY AFTERNOON—APRIL 21, 2:00 P.M.

General Ecology

Room B-3 Funkhouser Biological Sciences Building

Presiding: Alfred C. Brauer, University of Kentucky

2:00 46. Borror, Arthur C. (Florida State Univ.). Feeding Apparatus of the Ciliate *Cohnilembus vermihus* Muller.

2:15 47. Bovee, Eugene C. and David E. Wilson (Univ. of Florida). Polymorphism of a Marine Amoeba in Laboratory Culture.

2:30 48. King, Charles E. (Florida State Univ.). On MacArthur's Model of the Relative Abundance of Species.

2:45 49. Burbanck, W. D. (Emory Univ.). The Distribution and Ecology of *Cyathura polita.*

3:00 50. Clebsch, Edward E. C. and R. E. Shanks (Univ. of Tennessee). Weight and Volume Characteristics of Selected Species of Southern Trees.

3:15 51. Hart, C. W. and Horton H. Hobbs, Jr. (Univ. of Virginia). Observations on the Distribution and Relationships of the Troglobitic Entocytherid Ostracods of N. A.

3:30 52. Hunter, George W. III and Richard B. Crandall (Univ. of Florida). Experiments on Some Factors Affecting Resistance to Schistosome Infections in Mice.

3:45 53. Dvorak, James A., Arthur W. Jones and H. H. Kuhlman (Univ. of Tennessee). The Life History of *Hymenolepis microstomum.*

4:00 54. Huffman, Joan L. (Univ. of Tennessee). Studies on Hatchability and Infectivity Using the Cat Tapeworm, *Hydatigera taeniectoformis.*

4:15 55. DeSelm, H. R. and R. E. Shanks (Univ. of Tennessee). Organic Matter Accumulation During a Primary Succession.

Animal Physiology and Development

Room B-8 Funkhouser Biological Sciences Building

Presiding: Samuel R. Tipton, University of Tennessee

2:00 56. Reams, W. M. and T. C. Mayer (Louisiana State Univ.). Pipment Cell Behavior in the hind limb musculature of pet mice.

2:15 57. Smothers, James L. and S. R. Tipton (Univ. of Tennessee). Spontaneous and Thyroxin-Induced Swelling of Liver Mitochondria from Riboflavin Deficient Rats.

2:30 58. Pryor, Marilyn Zirk and Samuel R. Tipton (Univ. of Tennessee). The Influence of Certain Factors on the Respiratory Metabolism of Amphibia.

2:45 59. Hutchins, Carolyn R. (Univ. of Tennessee). Immunological Studies of *Hymenolepis microstoma* Dujardin.

3:00 60. Brannon, Marvin H. (Univ. of Tennessee). Survival of Heavily Irradiated Cestode Larvae.

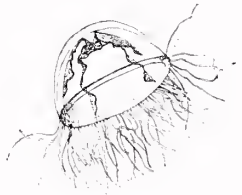
3:15 61. Johnston, David W. (Wake Forest College). Gonadal Reerudescence and Lipid Deposition in Response to Different Photoperiods in the Slate-colored Junco.

3:30 62. Bush, Frances M. (Univ. of Georgia). Seasonal Change in the Quantity of Fat and Glycogen in *Bufo fowleri.*

3:45 63. Newcomer, Richard J. (Univ. of Kentucky). Investigation into the Status of *Gyrinophilus lutescens* Raf.

4:00 64. Page, Sara Leak and C. J. Wust (Oak Ridge National Laboratory). Primary Immune Response of Mice to an Enzyme, Triose Phosphate Dehydrogenase.

4:15 65. Bamforth, Stuart S. (Newcomb College). A Simple Mechanical Model to Teach Energy Flow.



Cytogenetics

Room 211 Funkhouser Biologieal Sciences Building

Presiding: Herbert P. Riley, University of Kentucky

2:00 66. Lewis, Walter H. and Royce L. Oliver (Austin State College). Cytogeography and Phylogeny of the North American Verbenas.

2:15 67. Flory, W. S. and R. O. Flagg (Blandy Exp. Farm, Univ. of Virginia). The Chromosomes of *Zephyranthes albiella.*

2:30 68. Alamuddeen, M. Admen (Appalachian State College). Locus of Genes for Rust Resistance in Two Varieties of *Hordeum vulgare.*

2:45 69. Grogan, C. O. and Patricia Sarvella (Mississippi State Univ.). Morphological Differentiation Between Cytoplasmic Male-Sterile and Normal Strains of Maize.

3:00 70. Mukerjee, Debdas and H. P. Riley (Univ. of Kentucky). The Cytological Behavior of Supernumerary Chromosomes in Two Speeies of *Agapanthus.*

3:15 71. Singleton, W. Ralph, in collaboration with W. E. Castle (Univ. of California). Genetics of Coat Color in Horses.

3:30 72. Ray, Charles, Jr. and W. D. Fattig (Emory Univ.). A New Radiation Induced Oyster-Eye Mutant in *Marmoniella.*

3:45 73. Whiting, P. W. and Doris J. Bush (Univ. of Pennsylvania). The Problem of Sex Determination in *Marmoniella.*

4:00 74. Sagawa, Yoneo and D. H. Nimoto (Univ. of Florida). Ovule Development in *Dendrobium.*

Systematic Botany

Room 319 Funkhouser Biological Sciences Building

Presiding: Edward T. Browne, University of Kentucky

2:00 75. Browne, Edward T., Jr. (Univ. of Kentucky). A Preliminary Report on the Liliaceae of Kentucky.

2:15 76. Isbell, Charles J. and H. P. Riley (Univ. of Kentucky). Chromatographic Studies in the Coarctatae Section of the Genus *Haworthia.*

2:30 77. Hopkins, Jerome D. and H. P. Riley (Univ. of Kentucky). The Use of Paper Chromatography as an Aid in Studying Several South African Species of Aloinae.

2:45 78. Duncan, Wilbur H. (Univ. of Georgia). Studies of *Lyonia lucida* (Lam.) K. Koeh.

3:00 79. Sharp, Aaron J. (Univ. of Tennessee). The Asiatic Element in the Flora of Mexico.

3:15 80. James, Charles W. (Univ. of Georgia). Preliminary Studies of the Taxonomic Status of *Erigeron pusillus.*

3:30 81. Ramseur, George S. (Univ. of the South). A Hybrid Index for the Mid-Appalachian *Abies* (Fir of Balsam).

3:45 82. Horton, James H. (Univ. of North Carolina). Phylogenetic Relationships in the Genus *Polygonella.*

4:00 83. Hardin, James W. (North Carolina State). The Variation in *Aconitum uncinatum.*

4:15 84. Flagg, R. O. and W. S. Flory (Blandy Exp. Farm, Univ. of Virginia). Concepts of the Genus *Zephyranthes* and the Confounding of Herbert's *Hippeastriformes.*

Items of Interest: Lexington Meeting

Local Arrangements Committee

Members of the Committee of local arrangements at the University of Kentucky are Dr. Roger W. Barbour, Dr. Alfred C. Brauer, Dr. E. T. Browne, Dr. J. M. Carpenter, *Chairman*, Prof. J. M. Edney, Dr. C. E. Henrickson, Dr. R. A. Kuehne, Dr. H. P. Riley, Dr. J. A. Wallwork, and Prof. J. C. Warden.

Lodging

A partial list of hotels and motels was published in the January issue of the *Bulletin*. More complete lists are available from the Lexington Chamber of Commeree. *It has recently been learned that there are a few dormitory rooms available for men at $2.00 per night.* Any men wishing reservations should write Dr. J. M. Carpenter, Chairman Arrangements Committee, Department of Zoology, Univ. of Kentucky, by April 12.

Meals

Dining facilities are available at two University cafeterias. There are, in addition, several grills on campus, and several grills and restaurants in the immediate vicinity of the campus.

Parking Facilities

As on most College campuses, parking facilities are inadequate at the University of Kentucky. However the Rose Street Parking Lot, convenient to the meetings, is being made available to ASB members. Cars may not be needed by all members, since hotels are only 15 minutes walking distance from the university. Good bus service is also available.

Registration

Registration will bc held Thursday afternoon in the Lobby of Memorial Hall from 2:00 p.m. to 7:45 p.m. and on Friday from 8:00 a.m. to 12:00 noon in the Lobby of the Funkhouser Biological Sciences Building. A fee of $1.00 will be charged for registration. Undergraduate members of Beta Beta Beta will not be charged the fee but are expected to register.

Ichthyologists and Herpetologists; Beta Beta Beta

The Southeastern Seetion of the Society of Ichthyologists and the Southeastern Region of Beta Beta Beta, National Honorary Biological Society, whieh are meeting jointly with the Association of Southeastern Biologists, will print their own programs. Those persons desiring copies may obtain them at registration.

Directory, Placement Service, Commercial Exhibits

These facilities will all be located in Room 12 of the Funkhouser Biological Sciences Building. The Directory will contain the names of all persons attending the meeting. The Placement Service will be of the do-it-yourself type and space will be provided for posting of available positions and for consultation. A number of eommercial firms will have exhibits for your interest and information.

Field Trips

Two field trips are planned for Saturday, April 22. One is a short trip under the auspices of the Botany Department of the University, the other a longer trip under the auspices of the Zoology Department. Both field trip areas have been selected for their local ecological uniqueness. Information about these trips may be obtained at the time of registration, at which time you are urged to sign up for the trips, if interested.

Tours

Arrangements are being made for two tours. One will be to a well known horse farm, the other to the United States Public Health Service Narcotics Hospital. If you are interested in one of these tours, please indicate this at registration. Other tours to interesting Lexington points can be arranged personally.

Smoker

This year's S*moker* will be held Thursday night following the Symposium sponsored by the Society of General Physiologists and ASB. It will be held in the University's new Medical Center and will give ASB members an opportunity to visit with one another as well as meet the biologists at the Medical Center. Tours of the Medical Center will be arranged for those interested.

National Science Foundation Exhibits

The National Science Foundation has made available two educational exhibits for the meetings. The first is entitled, "*Lost, One Third of the World's Scientific Literature*," and is concerned with the problems of language barrier as it affects the availability of foreign science information to U. S. Scientists. The second, entitled, "*Progress in Information Processing*," is concerned in depicting the historical development of eleetronic eomputers. Members and guests are invited to view these exhibits which will be located in the lobby of the Funkhouser Biological Sciences Building.

Refreshments

Beta Beta Beta Honorary Biological Society will serve free coffee during the paper sessions on Friday. Arrangements are also being made for a free "Coke" stand for those who prefer a cold drink. These refreshments will be served in Room 12, Funkhouser Biological Sciences Building, which houses the Commercial Exhibits, Placement Service, and Directory.

Spindletop Mansion

The Friday evening meeting will be held at Spindletop Mansion on Spindletop Horse Farm. This mansion, valued at close to $1,000,000, was recently acquired by the University of Kentucky along with its many acres of valuable bluegrass land. The land is now being used by the College of Agriculture. The Spindletop Research Institute is also under construction on a portion of the land.

Open house will be held by the University for ASB members and guests at the Mansion from 5:00 p.m. to 6:30 p.m. preceding the buffet. The Mansion, with over 40 rooms, 8 elaborately designed baths and 6 half baths, contains over 300,000 cubic feet of room. There is an English Library, which formerly contained 7,000 volumes and bedrooms of the Louis XV and XVI period. An Elizabethan Room contains century old tapestries valued at $150,000; a French Room and a Music Room hold Arbusson rugs valued at $8,000 and $25,000 respectively. The Grand Hall contains a rug, matching the overhead elaborate ceiling decoration, which was woven in Scotland at a cost of $40,000. In the Music Room is a $50,000 organ on which rolls can be played automatically from 7 different stations in the Mansion. The basement floor is informal and contains, among other things, a Kentucky Tavern and a ballroom representing a Louisiana courtyard with stars overhead. Outside is a swimming pool with bathhouse, tennis courts, a lake, and an aviary. A carriage house contains over 30 carriages valued at $150,000 and dating back to 1820. These and many other interesting sights at Spindletop should appeal to ASB members.

Buffet

A buffet is being planned for the evening meal on Friday. This will be held at Spindletop Mansion following the open house. Cost of the buffet will be $2.50 per person and, since facilities at Spindletop are somewhat limited, no more than about 250 persons can be accommodated. For this reason you are urged to reserve your place at the time of registration. Wives of ASB members are welcome.

Keeneland Races

Since the ASB Meetings are being held during the local racing season at Keeneland Race Course, some members may be interested in attending the races on Saturday. Races start at 2:00 p.m. but, on Saturdays, it is advisable to arrive shortly after 12:00 noon. Lunch may be obtained at the track. General admission is $1.35.

The Host Institution

The University of Kentucky was established in 1865 under the name of Kentucky Agriculture and Mechanical College. The name was changed in 1908 to State University and again in 1916 to its present name, "University of Kentucky." The University of made up of ten colleges, all located on the Lexington campus: College of Agriculture and Home Economics, College of Arts & Sciences, College of Commerce, College of Dentistry, College of Education, College of Engineering, College of Law, College of Medicine, College of Nursing, and College of Pharmacy. There is also a well recognized Graduate School and an Extended Programs Division dealing with adult education courses and programs at five off-campus centers.

There are 74 major buildings on the 706 acre main campus at Lexington. Total fixed assets of the University, including land, buildings and equipment amount to approximately $78,000,000. The University's total staff includes approximately 2,000 persons. Of this number about 900 are on the teaching, research, and administrative staff. Students enrolled for credit currently on the main campus, at the five two-year centers, and in evening and extension classes for college credit total 10,157. The students are from all of Kentucky's 120 counties, 43 states, the District of Columbia, and 38 foreign countries and U. S. possessions. The University Libraries contain over 900,000 volumes and are as strong qualitatively as any collection in the southern states.

Biological Sciences at the University of Kentucky

The Biological Sciences are represented at the University by the departments of Botany, Microbiology, and Zoology in the College of Arts & Sciences and by the departments of Anatomy and Physiology in the College of Medicine. These departments contain a total of 30 members, all of whom are engaged in teaching and research and most of whom hold research grants either from the University of Kentucky Faculty Research Fund or from national research organizations. Work toward the Master's and the Ph.D. is offered by these departments in a number of areas represented by the special training of the faculties of these departments.

Abstracts of Papers Presented at the 22nd Annual Meeting of the Association of Southeastern Biologists

Investigations into the Status of *Gyrinophilus lutescens* (Rafinesque)

Richard J. Newcomer, *University of Kentucky*

The Kentucky cave salamander, *Gyrinophilus lutescens* (Rafinesque), has been a controversial species since its redescription by M. B. Mittleman in 1942. It was interpreted by him to be a presumably neotenic cave species found in the waters of Bat Cave, Carter Caves State Park, Olive Hill, Kentucky. It has been held by later authors that these larval salamanders are simply the larvae of the Kentucky spring salamander, *Gyrinophilus porphyriticus duryi* Weller, found in the springs and streams of eastern Kentucky, western West Virginia, and southern Ohio.

Extensive field work during the summer and autumn of 1960 and spring of 1961 shows that some of the original assumptions about the isolation of Bat Cave were erroneous. Experiments with thyroxin-induced metamorphosis and x-ray photographs of vertebrae add weight to the theory that *G. lutescens* is in reality the larva of *G. porphyriticus duryi*.

Feeding Apparatus of the ciliate *Cohnilembus verminus* (Müller)

Arthur C. Borror, *Florida State University*

Feeding in this hymenostome ciliate is accomplished by means of a complex arrangement of buccal ciliature which in the past has been considered a double undulating membrane. Photomicrographs of living individuals and individuals prepared according to the Chatton-Lwoff technic are presented, and the buccal membranelles of this species are shown to be arranged fundamentally in a tetrahymenal pattern. There is a short undulating membrane (M_1), and three elongate, highly modified buccal membranelles (M_2, M_3, M_4). The apparent "double undulating membrane" is composed of M_2 and M_3 on the right, and on the left by the secondarily modified anterior part of somatic meridian #1. The importance of this morphological detail in the systematics of hymenostome ciliates is discussed.

Studies in the Life History of *Hymenolepis microstoma* (DuJardin, 1845)

James A. Dvorak and Arthur W. Jones, *University of Tennessee*, and H. H. Kuhlman, *Southern Missionary College*

Cestodes were successfully reared from eggs in several species of grain bettles. Known numbers of cysticercoids were given to mice *via* stomach tube, and the mice were examined serially at intervals. For 24 hours after ingestion the worms moved freely about the upper 25% of the small intestine, but by 48 hours they became concentrated in the duodenum, and by 96 hours many had entered the bile duct (the normal habitat of the mature cestode of this species.). Worms in the bile duct were three to five times the length of the intestinal forms; the latter had increased very little above their initial length. Worms grew to their mature size in about two weeks after being acquired by the mice, and began shedding gravid segments. Adult worms lived in mice for 5 to 6 months. The entire cycle under optimum conditions may require no more than three weeks for completion. This study was supported in part by AEC Contract AT (40-1) 1749.

Survival of Heavily Irradiated Cestode Larvae

Marvin H. Brannon, *University of Tennessee*

Fully developed cysticercoids of *Hymenolepis microstoma* Dujardin in beetle hosts (*Tribolium* spp.) were subjected to gamma irradiation from a cobalt source at the rate of 500 roentgens per minute until total doses were 30,000 r and 200,000 r, respectively. *In vitro* survival of the excysted larvae after the lower dose equalled but did not exceed the survival of untreated larvae. *In vitro* survival of the more heavily irradiated larvae exceeded that of untreated and less heavily irradiated larvae exceeded that of untreated and less heavily irradiated larvae. Explanation of this unexpected result may be found in the relative low motility of the highly irradiated larvae; their survival may be a function of their slow utilization of stored nutrients. This study was supported in part by AEC Contract AT (40-1) 1749.

Studies on Hatchability and Infectivity Using the Cat Tapeworm, *Hydatigera taeniaeformis*

Joan L. Huffman, *University of Tennessee*

Eggs of *Hydatigera taeniaeformis* were tested *in vitro* for hatchability in an effort to predict *in vivo* results in laboratory animals. Hatching was accomplished in solutions containing cholesterol, trypsin, pancreatin, bile and sodium tauroglycholate. Twelve hatching solutions were used. Each differed from the others in either bile concentration, pancreatin concentration or hydrogen ion concentration. The hatching medium containing five per cent bile concentrations gave the largest percentage of hatched eggs. There were no apprciable effects of changes in pancreatin concentrations and hydrogen ion concentrations.

In vivo tests were made using the best hatching medium. The per cent eggs hatched were compared to the per cent infectivity in the rat. The correlation coefficient was 0.73 for the results obtained.

Although this was not a high correlation, it is thought that this method of determining infectivities should be further investigated.

This study was supported in part by AEC Contract AT (40-1) 1749.

Immunological Studies of *Hymenolepis microstoma* Dujardin

Carolyn P. Hutchins, *University of Tennessee*

Precipitin reaction and complement fixation tests demonstrate a positive response of mice to infestations with *Hymenolepis microstoma*, an inhabitant of the bile duct. Since this cestode, unlike *Hymenolepis nana*, a closely related form which has been studied immunologically, does not at any stage in its life cycle invade the tissues of its host, the immunological response observed seems to be unusual. It may be due to some host-parasite exchange such as might be expected when a parasite lives in very close contact with host tissue. This study was supported in part by AEC Contract AT (40-1) 1749.

The Life History of *Fasciola indica*. Trematoda: Fasciolidae

J. M. Edney, *University of Kentucky*

Fasciola indica adults were obtained from naturally infected water buffalo, *Bos bubalus* Lin. Eggs taken from these worms hatched in 15 days at room temperature. Miracidia thus obtained were used to infect laboratory reared snails, *Lymnaea rubiqinosa* (Michelin, 1831). Emergent cercariae encysted on debris and vegetation in the snail isolation dishes. These metacercariae were fed to guinea pigs and sheep.

Juvenile worms were found in hosts examined 60-90 days later. Sexually mature specimens were recovered four months after infection.

Oribatid Mites and the Soil Community

John A. Wallwork, *University of Kentucky*

Mites belonging to the Oribatei represent a very large numerical proportion of the mesofauna of many grassland and forest soils. Studies on the feeding habits indicate relationships between this group and other components of the soil community. Such studies reveal that the Oribatei are almost exclusively herbivorous, necrophagous, or coprophagous, and as such are important consumer organisms. Their significance lies in the fact that they accumulate, in their bodies, energy derived from the dead and decaying plant and animal material eaten. A large part of this energy would otherwise be dissipated by reducer organisms. The net effect of the consumers is to slow down the flow of energy through the community and also to distribute it more widely. The coprophagous habit is of especial importance, for by this feeding habit bound energy which passes out of the body in the faecal material may be acquired and accumulated in the bodies of the mites by repeated passage through the gut.

Fish Distribution in a Small Stream System of Eastern Kentucky

Robert A. Kuehne, *University of Kentucky*

Downstream increase in numbers of fish species in a river has been demonstrated repeatedly in stream studies. Buckhorn Creek, Breathitt and Knott counties, Kentucky, is a short, dendritic stream, which remarkably parallels the situation found in rivers. Twenty seven species were taken in 22 collections. Three species were characteristic of the extreme headwaters; nine to 17 species occurred in the middle region; and, 24 species were found in the lower reaches. The stream is 12 miles from source to mouth.

The Use of Paper Chromatography as a Taxonomic Aid in Studying Several South African Species and Varieties of the Aloineae

Jerome D. Hopkins and H. P. Riley,
University of Kentucky

Chromatographic patterns, or biochemical profiles, were obtained from a number of species of the tribe Aloineae (Liliaceae) to learn whether they might be of use in a taxonomic study. The species and varieties studied included those of several sections other than the Coarctatae section of *Haworthia*, several species of *Astroloba*, and the sole species of the monotypic genus *Poellnitzia*. Plants of several related genera were selected to obtain an estimate of the value of this method in distinguishing related genera, species of the same genus, and varieties of the same species. Pieces of leaves were smeared on to the filter paper and butanol, water, and acetic acid in a 4:5:1 proportion were used to develop the chromatogram. After they were dry, the chromatograms were examined under ultraviolet light and the spots were outlined with a pencil. The colors were noted, the R_f values were calculated, and the profiles of the various species were compared. Ninhydrin-positive patterns were also obtained and were compared with the patterns revealed by ultraviolet light. A series of other developers and many other different solvents were tried to determine the best method to use with these genera.

The Cytological Behavior of Supernumerary Chromosomes in Two Species of Agapanthus

Debdas Mukerjee and H. P. Riley,
University of Kentucky

Cytological studies of eight different species of *Agapanthus*, a genus of the Amaryllidaceae, showed that in addition to the normal sixteen and fifteen pairs of chromosomes found respectively in *Agapanthus orientalis* and *A.* sp. 148/55 there are two supernumerary chromosomes in each. In somatic metaphase plates these supernumeraries are stained more intensely than other chromosomes and in the early anaphase stage they are found separating earlier than the other chromosomes. The two supernumeraries of *A. orientalis* are quite prominent in the emerging radical but are not present in older root tips from seeds or in the root tips obtained from bulbs, but in *A.* sp. 148/55 they are present in old and young root tips from seeds and also in root tips from bulbs.

Weight and Volume Characteristics of Selected Species of Southeastern Trees

Edward E. C. Clebsch, *The University of Tennessee*

In studies of mineral cycling in forest ecosystems, it becomes necessary to measure or estimate the dry weight of the standing crop of forest trees. Reasonable estimating parameters for weight of leaves and weight of bark and wood in boles and branches are desirable. Measurements of volume, weight, length, diameter, and other characteristics in oak, hickory, spruce, fir, birch, and willow in Tennessee and North Carolina have been used to derive estimating equations through regression analysis. The diameter of a tree at breast height is the best single measurement for estimating the total weight of bark and wood in a tree.

Organic Matter Accumulation During a Primary Succession

H. R. DeSelm and R. E. Shanks,
The University of Tennessee

The winter of 1955, The White Oak Lake, a hold-up basin for low-level radioactive wastes on the Oak Ridge Reservation, was drained. Since that time two vegetation sampling programs have been pursued by the writers. One relates to mineral composition of the vegetation and radionuclide cycling; the other to composition and mass of the vegetation itself.

Annual amounts, relation of amounts to physical site factors, litter accumulation and decay in herbaceous communities are reported; as are increments of organic matter accumulation in a willow thicket.

A Preliminary Report on the Liliaceae of Kentucky

Edward T. Browne, Jr., *University of Kentucky*

Although much work has been done on the taxonomy of vascular plants of Kentucky, there are large areas of the state which are apparently botanically unknown. As a preliminary study to biosystematic researeh in the Liliaceae, a taxonomic monograph has been undertaken of this, the third largest monocotyledonous family in the state with a total of 50-52 spp., vars. and forms reported by McFarland (1942) and Braun (1943). Many counties do not have even one species reported. There are indications that at least 8 species in 8 different genera of this family have never been reported from the state although distribution records from adjacent states suggest their probable occurrence. It is quite apparent that much field work will be required before the presence and distribution of all the species of this family in Kentucky will be known.

Chromatographic Studies in the Coarctatae Seetion of the Genus Haworthia. A Chemo-Taxonomic Study

Charles J. Isbell and H. P. Riley, *University of Kentucky*

Five species of the genus Haworthia and seven varieties of *H. reinwardtii* have been studied taxonomically by the use of one-dimensional descending paper chromatography. The solvent system adopted was: 4 parts butanol, 5 parts distilled water, 1 part glacial acetic acid. After development, the chromatograms were studied under ultra-violet light. Each species and variety studied gave a constant and characteristic "biochemical profile" and was readily identified by its profile alone. The closer the taxonomic relationship, the more similar were the profiles and the more distant the taxonomic relationship the more dissimilar the profiles. It is suggested that the correlation of "biochemical profiles" with data from morphological studies and cytogenetics will make for a closer approach to phyletic classification.

Accumulation of Radioisotopes by *Justica americana* L. in the Clinch River

Wm. T. Lammers, *Davidson College*

Radioisotopes discharged into the Clinch River from White Oak Creek appear to have 2 principal fates. These are: (1) sorbed by clay particles or (2) sorbed by aquatic organisms whieh they contact. These two should be antagonistic to one another.

In an investigation of this hypothesis collections of *J. americana* were made at 30 sites between CRM 4.6 and 21.7. Gross gamma counts of dried ground aliquots were made and counts per minute plotted against river miles (CRM).

If the original curve were adjusted for scouring and sedimentation due to differences in velocity and for thermal overflows from tributary creeks, the curve took on a satisfactory sigmoid shape.

When account is taken of the increased sorption of radioisotopes by clay with time of contact, the pattern of radioisotope distribution in *J. americana* appears to fit the hypothesis that there is a progressively decreased plant accumulation downstream due to increased unavailability of radioisotopes as they are sorbed by the clay.

The Asiatic Element in the Flora of Mexico

A. J. Sharp, *University of Tennessee*

The rich and varied flora of Mexico shows affinities with those of many parts of the world, but the element least appreciated is that with plants in it which are related to Asiatic species. Probably many genera and species migrated from Asia to North America and became widely distributed before the Late Tertiary and their ranges were bisected or trisected in the Pleiocene and/or Pleistocene. It is difficult to explain on any other basis the present distribution of such taxa as *Mitrastemon, Ilex montana, Rozea bourgeana, Cladonia formosana,* and many others.

Influences of Maleic Hydrazide on the Growth and Metabolism of Chlorella

Won Kyun Kim and Victor A. Greulach, *University of North Carolina*

Though the few studies on the effects of maleic hydrazide (MH) on algae have provided little evidence that it has growth-inhibiting effects on algae similar to those on vascular plants, in this study MH markedly and significantly inhibited the growth of *Chlorella pyrenoidosa* at 5, 10 and 25 ppm, but not at 1 ppm. Growth inhibition as based on cell counts was most marked (36% of the controls) at pH 5.5. At pH 6.5 growth was 65% of the controls, at pH 7.5 it was 75%, while at pH 8.5 and above growth inhibition was minor. IAA counteracted MH growth inhibition on the basis of cell counts and dry weight, but not on the basis of optical density. GA did not influence MH growth inhibition, while kinetin counteracted MH inhibition partially but significantly. Respiration was not reduced by 10, 50 or 100 ppm MH, but 500 ppm reduced respiration to 52% that of the controls at pH 7.5 while the reduction with 1000 ppm was to 23%. At pH 5.5 and pH 9.5 500 ppm did not reduce respiration significantly. The amino acid and DNA content of Chlorella were both reduced significantly by 10 and 50 ppm MH. MH reduced the intake of P^{32} by Chlorella to 81% of the controls, the TCA soluble fraction to 87%, the ethanol soluble fraction to 72%, the RNA and polyphosphate fraction to 78%, and the DNA and residue fraction to 84%.

These and similar data on three other species of algae show that MH is a growth inhibitor for at least some algae as well as for higher plants, and suggest that MH may antagonize IAA and perhaps kinetin, but not GA. Growth inhibition by MH apparently is not brought about by a decrease in respiration, but protein and nucleic acid metabolism may be involved.

Aspects of the Physiological Tolerances of Some Species of *Trifolium* to Gamma Irradiation of the Seeds

Gayther L. Plummer, *University of Georgia*

Clovers have responded to irradiation in ways typical for such treatments. The embryos germinate following exposure dosages up to 280 Kr, but the shoots failed to develop. However, shoots grew following 175 Kr. In some instances growth was more vigerous. In other cases growth was inhibited with wide degrees of variability up to about 100 Kr. Generally, *T. subterranean, T. pratense,* and *T. nigrescens* appear to be quite tolerant to gamma irradiation. The lethal radiation absorbed dosages will be suggested.

The Percentage Distribution of Mineral Elements in Certain Leaf Galls, Their Contiguous Tissues and the Normal Leaves of Their Host Plants

Edwin G. Beck, *University of Georgia*

Leaf galls caused by *Contraria canadensis* on *Fraxinus*, those caused by *Contraria negundifolia* on Acer negundo and the galls caused by *Pachypsylla venusta* on the leaves of *Celtis* were analysed for the elements nitrogen, phosphorous, calcium, magnesium and iron. Contiguous leaf tissues about the galls and normal leaves of the host plants were also analysed for the same elements. In the cases studied the galls contained less nitrogen and more of the other nutrient elements than did the normal leaves. Galls which contained relatively large amounts of vascular tissue were lower in nitrogen than those which contained a large amount of parenchyma tissue.

The Time Course of Cell Enlargement and Leaf Growth as Affected by Kinetin and Red Light

Mildred M. Griffith and Robert D. Powell, *University of Florida*

Disks, cut from the leaves of etiolated seedlings of bean plants, were placed on filter paper saturated with a nutrient solution. Treatments involved additions of kinetin to the medium, exposure to red light and to far-red light. Disks were grown in the dark for varied periods of time. At the end of each experiment the disks were measured and prepared for histological study. The growth of disks and comparisons of cell size indicated the following conclusions. Both red light and kinetin stimulated the initial rate of growth. Kinetin was more effective than red light in increasing the rate of growth. Varying the length of time of exposure to red light did not change the growth rate, but with longer exposures the increased growth rate was maintained for a longer time. The first phase of disk growth appeared to be due to cell enlargement in the presence or absence of kinetin.

Competition Between *Helenium amarum* (Raf.) H. Rock and Certain Grasses at Various Levels of Mineral Nutrition

Donald Caplenor, *Millsaps College*

Experiments were performed during two separate summers to gather data concerning the relative capacity of *Helenium amarum* to compete with various grasses at different levels of inorganic nutrition. Plants of *Helenium amarum* (3/pot) were grown in washed quartz sand in 2-quart porcelain culture pots, and given fractional dilutions of Hoagland and Arnon's Solution #1 three times weekly to run-through. Replicates were prepared and maintained in the same manner, but were planted to excess with a lawn mixture and with Bermuda grass, respectively. Various growth criteria were used.

The grasses used were relatively better competitors than *H. amarum* at all concentrations of nutrient used, the degree of relative inhibition of *H. amarum* being directly proportional to the concentration of nutrient salts. When growth of *H. amarum* with competition was compared with its growth without competition in the various concentrations of nutrient solutions, it was found that *H. amarum* competed most successfully at a concentration of mineral nutrients equalling 1/10th Hoagland and Arnon's solution #1.

The Effect of Nucleic Acid Components on Root Growth and Geotropism

Robert T. Brumfield and Marvin W. Scott, *Longwood College*

Ribonuclease (50 mg/L) stimulates the growth of timothy roots and modifies the geotropic response in terms of curvature per unit of growth. The enzyme also digests an extracellular, gelatinous substance which covers the root cap and distal portion of the meristem. The components of the mixture have not been identified since such a minute quantity is present. The effects of purines, pyrimidines, and their compounds on growth and geotropism are being tested in concentrations of 2×10^{-3} m. The purines and pyrimidines stimulate; uracil giving the greatest effect. The nucleosides are also stimulatory but the nucleotides so far tested are inhibitory. The stimulations induced are accompanied by a greater geotropic curvature per unit of growth than in water treated controls. This is in contrast to 2,4,6-trichlorophenoxyacetic acid which stimulates growth but inhibits the curvature. It is pertinent that the latter compound stimulates the RNase digestion of the material covering the root.

Influence Upon Root Development in Maize Seedlings of a Strontium Replacement for Calcium in the Nutrient Solution

William H. Queen and Joseph C. O'Kelley, *University of Alabama*

Root development was observed in nutrient solutions prepared so that there was a stepwise replacement of calcium by sodium, calcium by strontium, and strontium by sodium. In calcium growth continued normally up to 21 days; in a sodium replacement most seedings died within 4 days; in strontium growth was normal for about 3 days after which a marked reduction was observed. Plants in strontium remained alive for the 21 day period. Roots in sodium turned brown and died soon; in strontium they showed decreased elongation after 3 days but branching was not inhibited; in calcium elongation continued throughout the 21 days. Cell length was much less in strontium than in calcium; development of side root primordia and differentiation of vascular elements occurred nearer the meristem in strontium; mitosis observed in both strontium and calcium treatments appeared normal. This research was supported by grant A-3680 from the National Institute of Arthritis and Metabolic Diseases.

Environmental Variation in *Heterotheca subaxillaris*

Carl John Burk, *University of North Carolina*

Variation in *Heterotheca subaxillaris* (Lam.) Britt. & Rusby was studied on Bogue Barrier, an island off the North Carolina coast. Low-growing prostrate forms referable to *H. subaxillaris* var. *procumbens* Wagenknecht were found in the dune-grass community. Taller, more erect plants referable to typical *H. subaxillaris* were found in the pine-oak-hickory forest. Established plants from the dunes and from the forest, when transplanted to alternating rows in an experimental plot at Chapel Hill, North Carolina, flowered at virtually identical heights. There were no morphological differences between the two sets of plants; therefore the variation observed on Bogue Barrier was interpreted as the response of a common genotype to differing environmental conditions.

A winter-blooming variant referable to *H. subaxillaris* var. *petiolaris* Benke was found at several sites. Transplants of typical *H. subaxillaris* developed the characteristic heavier pubescence of *H. subaxillaris* var. *petiolaris* but would not flower on short day in the greenhouse.

Polymorphism of a Marine Amoeba in Laboratory Culture

Eugene C. Bovee and David E. Wilson,

The marine helio-flagellate, *Dimorpha floridanis* Bovee 1960, when grown in the laboratory in liquid medium or on an agar medium, demonstrates not only the already known bi-flagellated swimming stage in an overlay of salt water, but will also adopt an amoeboid feeding stage when the small flagellates (probably *Ochromonas*) on which it feeds are abundant. Feeding movements are also amoeboid, whether feeding occurs in the heliozoan or the amoeboid phase. So far as the authors are aware no other organism is known with such a wide range of protoplasmic transmogrification.

The Use of Plants in Cancer Research

Robert C. Goss, *Loyola University*

A program of research has been initiated to perform exploratory experiments to determine if a correlation exists between animal carcinogenie chemicals and their action on germinating seeds or young growing seedlings. The prime interest is to discover biochemical events, either anabolic or catabolic, which are important to the normal germinating seed. Specific phases of the investigation have been concerned with establishing criteria for botanical carcinogenesis through laboratory and greenhouse studies.

Germination screening of approximately 50 different seed varieties indicates that rice reacts most favorable to the test procedures. Morphological differences have been noted under both laboratory and greenhouse conditions. The stem-root ratio has been used to theoretically study the translocation of native chemicals in the plant as affected by the chemical treatment. A formula to determine the chemical activity of the test material has been devised. Products of microbial degradation decreased or increased the elongation rate of rice varieties under greenhouse conditions.

This work was supported under a grant in Cancer Research from the American Cancer Society, Louisiana Division, Inc.

Experiments on Some Factors Affecting Resistance to *Schistosoma Mansoni* Infections in Mice

George W. Hunter, III and Richard B. Crandall,
University of Florida

Inconsistent results have been obtained by various workers when challenging with *Schistosoma mansoni* experimental animals which were "immunized" by the homologous parasite. Consequently a series of experiments were designed, with mice in which the principal variables were: (1) the number of "immunizing" exposures, (2) the time interval between "immunization" and challenge, and (3) the size of the challenge exposure. The results indicate that the number of "immunizing" exposures is not important nor is the size of the challenge dose. However, an interval of at least 60 days is necessary if evidence of resistance is to be found following challenge.

Observations on the Distribution and Relationships of the Troglobitic Entocytherid Ostracods of North America

C. W. Hart, Jr.,
Academy of Natural Sciences of Philadelphia
Horton H. Hobbs, Jr., *University of Virginia*

Troglobitic crayfishes are known to inhabit four distinct regions--*Procambarus* and *Troglocambarus* in the Florida peninsula, *Cambarus* in the Florida panhandle, *Orconectes* and *Cambarus* in the limestone region stretching from northern Alabama into Indiana, and *Cambarus* in the Ozark region. Associated with these crayfishes are entocytherid ostracods representing the Columbia Group in the Florida peninsula, the Runki and Humesi groups in the Alabama-Indiana region, and the Columbia Group in the Ozarks. No entocytherid ostracods are known to be associated with troglobitic crayfishes in the Florida panhandle.

Comparative Studies of Locomotive Activity in Appalachian Salamanders

Robert E. Gordon, *University of Notre Dame*
and *Highlands Biological Station*

The temporal pattern of locomotive activity in sympatric species, representing potential competitors in a given community, is compared. A brief explanation of the methods employed and some preliminary results are given for *Aneides aeneus* and *Plethodon jordani*.

(Research supported by National Science Foundation Grant 13327.)

A Simple Mechanical Model to Teach Energy Flow

Stuart S. Bamforth,
Newcomb College of Tulane University

H. T. Odum's analogue of an electrical computer to demonstrate energy flow for an ecosystem may be translated into a simple mechanical model for teaching purposes. Six pendulums are suspended from a beam, and labeled from left to right, plants, plant respiration, herbivores, carnivores, decomposers, and organic matter. Cross bars connect those pendulums where energy flows from one entity on the left to one on the right. For example, cross bars connect plants to plant respiration, herbivores, decomposers and organic matter; carnivores connect to decomposers and organic matter. The model can be adjusted to special situations; *e.g.*, for Lake Pontchartrain, additional organic matter and decomposer pendulums are placed between plant respiration and herbivores, to represent the energy source supplied by rivers draining into the lake. For heterotrophic waters, plants and plant respiration would be eliminated. Students can eonstruct ecological situations with the model to learn energy relationships.

On MacArthur's Model of the Relative Abundance of Species

Charles E. King, *Florida State University*

In an attempt to analyze species abundance from a biological view, Robert H. MacArthur has formulated a mathematical model which predicts the relative abundance of any species in a community with nonoverlapping and continuous niches. Discrepancies between predicated and observed abundances are negligible for tested birds and members of the gastropod genus *Conus* but not for soil arthropods. Data are presented in the current paper on tests of free-living marine nematodes and ciliates. Both of these groups display a poor fit.

In all cases of poor fit it is observed that (1) the members of the respective communities have different periods of reproduction resulting in asynchronous peak populations, (2) the life span is relatively short, and (3) reproduction occurs two or more times each year so that environmental conditions differ for every generation. It is suggested that these factors should be considered in application of the MacArthur model.

Seasonal Changes in the Quantity of Fat and Glycogen of *Bufo fowleri*

Francis M. Bush, *University of Georgia*

About 10 male and 10 female adult Fowler's toads were collected from the field each month from April to October, 1960, at Athens, Georgia. The total weight was ascertained, fat-bodies, livers, and ovaries were ablated and weighed. The fats were extracted (method of Bloor) and analyses of liver glycogen (method of Montgomery) were made.

The results showed that from spring to autumn, total dry weight increased (males, 23-28%, females, 24-28%) and water decreased (males, 77-72%, females 76-72%). The fat of the total body (mg fat/g fat-free dry wt), liver fat (mg fat/g fat-free liver wt) and carcass fat (mg fat/g fat-free carcass wt) increased on the average nearly two and one half fold in the male and slightly over four in the female. The fat of the fat-bodies (mg fat/100 g fat-free total wt) increased 23 fold in the male. The female had only a trace of fat in the fat-bodies in April, from May to October, a 54 fold increase occurred. Ovary fat (mg fat/g fat-free ovary wt) did not vary seasonally, but relative ovary fat (mg fat/100 g fat-free total wt) was twice as abundant in the spring. Apparently the fat of the fat-bodies shifts to maintain the ovary fat during the spawning period. In April, liver glycogen represented 2.2% dry fat-free liver weight in both sexes. At the peak of the breeding season, this declined to 1.5% males, 0.6% females. In July, it increased to a maximum, 3.2% males, 3.3% females, and then dropped off slightly in September, 3.1% males, 2.6% females. Increased daylength and ambient temperature, both associated with abundance of food in summer, appear to be two factors directly related to the seasonal changes.

Gonadal Recrudescence and Lipid Deposition in Response to Different Photoperiods in the Slate-colored Junco

David W. Johnson, *Wake Forest College*

Wintering Slate-colored Juncos were trapped and housed in outdoor cages at Winston-Salem, N. C. from February to May. One group was exposed to a daily photoperiod of 16 hours of daylight and 8 hours of darkness; another received 6 hours of light; and another was kept as a control, receiving natural light. Other birds were captured from the wild state periodically. Samples were taken from each group for gonad examination and lipid extraction. Most wild juncos migrated by the end of March when their gonads were undeveloped and average lipid content was 4% of body weight. Caged controls in April had large testes and 18% lipids. Deceased light birds had small gonads and 8% lipids. Males on increased light had large testes with sperm by April 8 and by May 4 had 17% lipids.

Bird Remains from a Sioux Indian Midden

J. Hill Hamon, *Jacksonville University*

Thirty-seven species of birds comprise the avifauna unearthed at a midden located at Mill Creek Indian Village, near Cherokee, Iowa. The presence of the rough-legged hawk, a winter resident, suggests that the site was occupied during the winter. Because of the absence of bones of young birds it is doubtful that Indians lived here in the middle of summer. Woodland birds comprised 31 percent of identified remains, raptorial and scavenging birds 28.4 percent, prairie dwellers 16.2 percent, marsh-dwellers 13.5 percent, and aquatic species 10.9 percent. Judging from the avifauna, the area surrounding the midden was probably mostly deciduous woodland with nearby prairie and marshes. The passenger pigeon is the only extinct bird found here.

The Influence of Certain Factors on the Respiratory Metabolism of Amphibia

Marilyn Zirk Pryor and Samuel R. Tipton, *University of Tennessee*

The influence of dietary factors and hormones of the thyroid and pituitary glands on the metabolism of larval and adult amphibia, primarily *Rana pipiens* and *R. catesbeiana*, is being studied to relate the whole body respiration to the respiration of slices of liver and to the oxidative enzymes of isolated liver mitochondria. The respiration of *R. pipiens* adults at 22° C averages 125 μl O_2/gm fresh weight/hr; liver slice Q_{O_2} and SDHase of the isolated liver mitochondria are 3.0 μl O_2/mg dry weight/hr and 52.7 μl O_2/mg N/hr, respectively. The scarcity of data on the respiratory metabolism of cold blooded forms, tissues and subcellular enzymatic systems and their response to various factors, makes such a study urgent.

Spontaneous and Thyroxin-induced Swelling of Liver Mitochondria from Riboflavin Deficient and Normal Rats

James L. Smothers and S. R. Tipton, *University of Tennessee*

Mitochondria isolated from livers of rats kept on riboflavin deficient diet for a period of 8-10 weeks exhibit a slower rate of spontaneous swelling in 0.3 M sucrose than do mitochondria from livers of pair fed controls. After 30 minutes observation, the decrease in optical density of mitochondria from riboflavin deficient rats was approximately one-third that of mitochondria from controls. The swelling of mitochondria from both groups occurred at a faster rate in the presence of 1×10^{-5} M to 1×10^{-7} M thyroxin. The change in rate of swelling at any thyroxin level (especially at the lower concentrations) was roughly the same in both. Changes in the osmotic behavior of isolated mitochondria are usually considered to reflect changes in the functional morphology of the mitochondrial membrane. On this basis, these data are interpreted as indicating that thyroxin and riboflavin deficiency differ in the fundamental nature of their action on the mitochondrial membrane.

Pigment Cell Behaviour in the Hind Limb Musculature of PET Mice [1]

Willie M. Reams, Jr. and Thomas C. Mayer,[2] *Louisiana State University*

Mice of the PET strain contain Pigmented Extracpidermal Tissues. Since the establishment of this strain in 1958, there has been an isolation of several substrains, each being distinguished by the specific location of melanocytes in the connective tissues. The present investigation is concerned only with the presence and differentiation of pigment cells in the hind limb musculature. In this respect, mice of the original PET strain are noted to possess melanocytes between the fibres of all

the muscles of the limb. However, melanocytes are limited primarily to the muscles of the posterior and lateral compartments and to the hip in the recently developed PET/LSU mice, and are even more restricted in present PET/MCV groups. The question arises regarding the factors involved which affect their appearance in the substrains. In the absence of reliable staining methods for early melanoblasts, their presence can be shown only by suitable grafting experiments into the coelom of host chick embryos. This method is being utilized to determine whether melanoblasts are unable to migrate into certain areas, or whether their differentiation is prevented by the chemical environment within the muscle. These studies of the pigmentary pattern and behaviour in the limb muscles entice speculation on the possible role of genetically influenced pathways for melanoblast migration and changes in the tissue milieu for differentiation.

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[2] Science Faculty Fellow of the National Science Foundation.

Preliminary Studies of Isocaloric Synthetic Diets as Inhibitors of Experimental Neoplasms

J. Richard Thompson,
Chemotherapy Seetion, Southern Researeh Institute

The evaluation of experimental cancer chemotherapy data is not a quick and easy task. Proper evaluation and interpretation of such data are dependent upon full cognizance of each of the parameters of the experiment, keeping always in mind the effects and possible interactions of each of the parameters. It is well known that in certain tumor systems simple caloric restriction will significantly inhibit tumor growth. In certain experiments, nonlethal drug toxicity and associated reduction of food intake (and host inanition) can easily be mistaken for specific and meaningful drug "activity." These "weight-loss false positives" are one of the many stumbling blocks encountered in a cancer chemotherapy program.

In an effort to elucidate this problem, experiments have been designed to determine the tumor-inhibiting effects of specific weight loss caused by caloric restriction in the animal diet. Similarly, tumor-bearing mice have been held on isocaloric-synthetic diets in an effort to determine the effects on tumor growth of protein-free, fat-free, and carbonhydrate-free diets. It is possible that the source of calories (protein, fat, or carbohydrate) or the percentage distribution thereof, may be of importance in establishing tumor inhibition.

Data will be presented showing composition of diets and their antitumor effects in mice bearing Sarcoma 180 and Adenocarcinoma 755.

A Partial Characterization of the Jelly-Splitting Enzyme of Sand Dollar Spermatozoa

John M. Rawls, *University of Florida*

Extracts of sperm from the sand dollar, *Mellita quinquiesperforata* contain a substance, distinct from antifertilizin, which causes dispersal of the gelatinous coat surrounding the eggs of this species. The substance under study is apparently an enzyme. It has optimum lytic activity at pH 8.0, at 25 to 30° C. From the optimum, activity decreases with increase in pH up to 9.6. At higher pH values irreversible inactivation occurs. At pH 6.0 partial inactivation occurs. There is a decrease in lytic activity after treatment for two minutes at various temperatures up to 45° C. at which temperature the enzyme is irreversibly inactivated. Kinctic studies indicate that a zero-order reaction is approached at saturation. Preliminary studies reveal that the jelly-splitting enzyme may be separated from antifertilizin by means of absorption of the extract with fertilizin.

This work was done during tenures of a National Science Foundation Science Faculty Fellowship and a fellowship from Southern Fellowships, Inc.

Physiology of the Proximal Retinal Pigment of the Shrimp *Crangon septemspinosus*

R. Nagabhushanam and Milton Fingerman,
Neweomb College of Tulane University, and
Marine Biologieal Laboratory, Woods Hole, Massaehusetts

To observe the position of the proximal pigment the eyestalks had to be sectioned. The shrimp were rapidly killed in boiling water. Both eyestalks were then removed and fixed. After having been dehydrated and embedded, the eyestalks were sectioned at 20 μ. With the aid of an ocular micrometer two measurements were made: (1) cornea to distal edge of proximal pigment and (2) cornea to basement membrane. Changes in the ratio of measurements 1 to measurement 2 indicated the direction and extent of pigment migration. A graded response to illumination between zero and 17 ft. c. was found. The proximal pigment of specimens in darkness lay completely below the basement membrane. At 22-24° C, maximal dark-adaptation occurred 45 minutes after transfer from light to darkness. Light-adaptation required 30 minutes. Eyestalk extract injected into animals maintained under an illumination of 2 ft. c. caused a statistically significant proximal migration, dark-adaptation, of the proximal pigment.

This investigation was supported in part by Grant No. B-838 from the National Institutes of Health.

Observations on the Structure and Ultrastructure of the Pituitary Gland of the Salamander (*Triturus Viridescens*)

Robert R. Cardell, Jr.,
Edsel B. Ford Institute for Medical Researeh,
Henry Ford Hospital

Pituitary glands of *Triturus virideseens* were exposed and fixed *in situ* with nine parts of Susa solution plus one part saturated aqueous solution of picric acid and studies were made with the light microscope. Other glands were exposed and fixed *in situ* with buffered 1% osmium tetraoxide (pH 7.4) and either dehydrated with ethyl alcohol and embedded in a 3:1 mixture of butyl to methyl methacrylate, or dehydrated with acetone and embedded in Vestopal W. In either case ultrathin sections were cut and studies were made with the electron microscope. The advantage of the technique utilizing acetone and vestopal are pointed out. Details of the vascular organization of the pituitary are presented which includes the ultrastructure of the sinusoids, perisinusoidal spaces and the relationship of the pituitary cells to the vascular system. The ultrastructure of the acidophilic and basophilic cells is discussed and this is correlated with light microscopy studies.

The Utilization of Transplantable Hamster Tumors as Experimental Tools for Evaluating Potential Anticancer Agents

Jack H. Moore, Charles A. Kelley, and
J. Richard Thompson,
Chemotherapy Seetion, Southern Research Institute

We have used eighteen hamster tumors isolated and established by Dr. Joseph Fortner of Sloan-Kettering Institute in a secondary screening program to evaluate the

effects of a group of selected anticancer agents. These tumors represent a wide variety of neoplasms with regard to site of origin and morphology. Most of these tumors metastasize to lymph nodes, liver, heart, lung, etc., following subcutaneous implant. Through the use of these, a double criterion of judging the effectiveness of new drugs is possible: 1) their inhibitory action on the primary tumor implant and, 2) their inhibitory action or retardation of metastatic spread of the tumor.

Slides which show normal tumor growth and sites of metastatic spread will be presented. Data will be presented which show the inhibition of some of these tumors by certain classes of drugs which are effective against animal neoplasms.

The Developmental Effects of Lithium Chloride Applied to Selected Surface Regions of the Eggs of *Nassarius vibex* and *N. obsoleta*

Fred K. Parrish, *Agnes Scott College*
Joanna W. Parrish, *Emory University*

In preliminary experiments to test for regional differences in plasma membrane permeability, an apparatus was constructed which allowed a selected region of a living cell to be bathed in one solution while the rest of the cell remained in an entirely different environment. Eggs of *Nassarius vibex* and *N. obsoleta* were irrigated at the animal and vegetal poles with a concentration of lithium chloride sufficient to produce cytolysis or severely anomalous development. It was found that when the whole egg and the animal pole were exposed to lithium, cytolysis and anomalous development resulted. When the vegetal poles of the eggs were exposed to the same concentrations of lithium, however, the resulting embryos were normal. Data from other sources indicate that the time and concentration of lithium used in these experiments were ample for an effective dosage of lithium to be established in the egg from either pole. These preliminary data can be interpreted, then, as showing that different concentrations of lithium are established throughout the egg depending upon the pole irrigated. The literature states that the establishment of these concentrations is not a function of the cytoplasm (endoplasm) or the yolk.

Comparative Aspects of Tryptic Peptides of Several Mammalian Hemoglobins

Charles W. Foreman, *Pfeiffer College*

Peptide patterns obtained by two dimensional paper chromatographic and electrophoretic analysis of hemoglobin tryptic hydrolysates will be presented and discussed for the following: two genetically different hemoglobins from the cotton rat (*Sigmodon hispidus*), and one hemoglobin each from the golden mouse (*Peromyscus nuttalli*), cotton mouse (*P. gossypinus*), bob cat (*Lynx rufus*), and opossum (*Didelphis virginiana*). The tryptic peptide chromatograms of hemoglobins from closely related species are much more similar than those of hemoglobins from distantly related species.

(This work was done in the Biology Division of the Oak Ridge National Laboratory under the provisions of S-Contract number 776.)

Studies of *Tetrahumena* Serotypes by Fluorescent Counterstaining

Marion T. Coleman [1] and Charles Ray, Jr., *Emory University*

Immunological reactions of S-I and S-II strains (mating types I and II) of *Tetrahymena pyriformis*, variety 1, have been investigated by the direct fluorescent antibody method of staining suspensions of methanol-fixed ciliates. Difficulties relating to nonspecific fluorescence were resolved by using rhodamine conjugates as counterstains with immunospccific flourescein-labeled antiglobulins. Normal serum fractions labeled with rhodamine B isothiocyanate served to limit fluorescein staining reactions to the homologous strains of Protozoa and to provide an effective color contrast in heterologous organisms. Mating reactions and serotype fluorescence of different strains of variety 1 were compared. Studies were made of populations of conjugating ciliates at intervals during a period of 18 hours after mating began. Evidence indicated that a significant number of co-conjugants had undergone a change in serotype expression between 10 and 12 hours following onset of conjugation.

This work was supported in part by grants from the National Science Foundation and from the National Institutes of Health.

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Fatty Acids from Lipids of Rat Liver Microsomes

B. T. Cole and N. G. Anderson,
Biology Division, Oak Ridge National Laboratory, and University of South Carolina

Gravimetric determination of total lipids extractable from lyopholized microsomes from brain, kidney, liver, and testis of rats showed them to be 20.8, 10.4, 14.6 and 17.5% respectively.

A 332.5-mg sample of lipid, extracted from rat liver microsomes with chloroform-methanol (2:1) at room temperature, was taken up in hexane, placed on a silicic acid column, and eluted in accordance with a scheme devised by E. C. Horning, modified by D. A. Turner *et al.* (personal communication). Eleven peaks were obtained, and by various quantitative tests on each peak fraction, total cholesterol, phosphorus, total nitrogen, glycerol, ester linkages, and total lipid were determined. Analysis showed the lipid to be 17.5% cholesterol, 7.75% triglyceride, 6.98 diglyceride, 5.43% monoglyceride, and 62.7% phospholipid. The phospholipid fraction was eluted as six separate peaks. Specific identification of the phospholipid classes has not been made.

Two-milliliter samples of each peak were taken to dryness under nitrogen and hydrolyzed. Constituent fattly acids were methylated by a procedure described by Turner *et al.* Qualitative fatty acid analysis was made by gas liquid chromatography. Suitable standards are being formulated for fatty acid identification and quantitative analysis. Gas chromatography revealed the presence of 9 different fatty acids esterified with cholesterol, 10 associated with triglycerides, 15 with diglycerides, and 10, 14, 22 and 22 fatty acids with phospholipid peaks 6 through 9, respectively. Phospholipid peak 10 was inadvertently destroyed, and peak 11 gave evidence of containing only 6 fatty acid moieties. Gas liquid chromatography of fatty acids from peak 5 (monoglyceride) gave a single, large peak with a retention time of 1.11 min, height of 55 mm, and width at half height of 12 mm. The peak was badly "tailed" and repetitive analysis altered neither the peak shape characteristics nor its retention time. Other analysis revealed this peak to contain 5.34% of the total lipid, 0.30 mg of cholesterol, 219 mg of phosphorus, no nitrogen, 3.088 mg of glycerol and 3.32 microequivalents of ester.

Chloroquine Resistance in *Plasmodium falciparum*

Martin D. Young, *Laboratory of Parasite Chemotherapy, Columbia, South Carolina*

A strain of *Plasmodium falciparum* originating in Colombia, South Ameriea, was induced in neurosyphilitic

patients. The response of this strain of malaria to normal or above-normal doses of chloroquine, hydroxychloroquine, and amodiaquine was very poor, the parasitemias either being slowly reduced or not reduced at all. The parasitemias, if cleared, usually relapsed shortly thereafter. Urines and blood plasma showed presence of the chloroquine. Normally susceptible strains of *P. falciparum* are usually eliminated within several days and seldom relapse after normal doses of drug. The Colombia strain continued to show a normal response to quinine and mepacrine. As the 4-aminoquinoline group represents the most important drugs for the treatment and suppression of clinical malaria, it is felt that this development of resistance to the drug is of importance. At present millions of people take these drugs in areas where malaria eradication programs are in progress.

Alkaline Earth Elements and the Avoidance Reaction in *Paramecium multimicronucleatum*

James D. Yarbrough and Joseph C. O'Kelley

In a solution containing calcium, *Paramecium* behavior was normal; only occasional directional changes were observed. In a medium wherein strontium replaced calcium, *Paramecium* exhibited almost continuous classical avoidanee reaction, initiated upon exposure to strontium and continuing apparently indefinitely. When barium replaced calcium, organisms showed disorientation, with a rotation of the anterior end around the posterior; evidence of toxicity by barium existed. Replacement by sodium produced a slow circular swimming pattern; organisms died within five minutes. Strontium, barium and sodium chlorides alone produced the same general reactions and other elements of the original mineral solution sensitized the organism. Two types of sterilized cultures of *Protosiphon botryoides* were supplied as nutrient media for *Paramecium;* one consisted of the alga grown in calcium, the other type contained the alga grown with a strontium replacement. Paramecia inoculated into the medium, along with bacteria; were alive in both culture media after thirty days. In strontium after this time period avoidance reactions were noted. This research was supported by a grant, no. A-3680. from the National Institute of Arthritis and Metabolic Diseases.

The Distribution, Growth and Reproduction of Lancelets in the Cedar Key Area

E. Lowe Pierce, *University of Florida*

One species of lancelet, *Branchiostoma caribaeum*, occurs in many locations along the Gulf coast of Florida. Periodic bottom samples were taken with a dredge in a variety of habitats in the Cedar Key area. Lancelets were screened from dredged materials. The preferred habitat was coarse sand and shell fragments in channels where tidal currents were swift. Sand mixed with mud yielded few specimens. Lancelets with developing gonads were found frequently during late winter and spring. Breeding appeared to extend over a period of several months. (Research supported by National Science Foundation Grant G-13252.)

A Study of the *Geolycosa pikei* Complex in the Southeastern United States

John D. McCrone, *University of Florida*

The *pikei* complex of the burrowing wolf spider genus *Geolycosa* consists of a group of closely related allopatric populations. These are confined to sandy beaches along the northern Atlantic seaboard and inland dune-like areas in South Carolina, Georgia, and Florida. A combined taxonomic, ecologic, and zoogeographic study resulted in the recognition of three species and two subspecies. Two of the species, *G. pikei* (Marx) and *G. patellonigra* Wallace, have been previously described and their status is confirmed. The new species and its two subspecies will be discussed. The range of *pikei* extends from Massachusetts south to northern Georgia, while *patellonigra* and the new species are confined to Florida. The extent of speciation in the southern part of the range is striking in view of the relatively uniform topography of the southeastern Coastal Plain. An attempt is made to explain this speciation by a consideration of the Pleistocene history of the area.

A portion of this work was done during the tenure of a fellowship from the Southern Fellowships Fund.

The True *Gomphus consanguis* Selys (Odonata: Gomphidae)

Minter J. Westfall, Jr., *University of Florida*
Richard P. Trogdon, *Judson College*

In 1879 Edmond de Selys-Longchamps described *Gomphus consanguis* from North Carolina. Leonora K. Gloyd in 1936 made an unsuccessful attempt to have the type located in connection with her description of *Gomphus rogersi*. In 1944 Elsie B. Klots placed *G. rogersi* as a synonym of *G. consanguis*. Needham and Westfall followed Klots' option in 1955 in the *Manual of the Dragonflies of North America*. One of us has now collected a series of more than 30 specimens, including one female, in Tennessee. The males fit perfectly Sely's description of *consanguis* and the female can be made known for the first time. This species is quite different from *G. rogersi* Gloyd and the specimens allow us to reinstate *rogersi* as a valid species. Further study of the two species, as shown by the adults and also the nymph of *rogersi* which has been reared, indieates they are to be included in the subgenus *Gomphurus*.

The Fauna of Mammoth Cave

Thomas C. Barr, *Tennessee Polytechnic Institute*

Mammoth Cave, in Edmonson and Barren Counties, Kentucky, together with genetically associated limestone caverns in Mammoth Cave National Park, is the most extensive known linear cave system in the world. Its rich cavernicolous fauna has been sporadically investigated by biologists since about 1840, and approximately 40 species have their type loealities within the region. The system is inhabited by 108 species (or more) of animals, of which 43 are troglobites (obligatory cavernicoles). The troglobites include turbellarians, gastropods, pseudoscorpions, opilionids, spiders, mites, millipedes, copepods, ostracods, amphipods, isopods, crayfishes, shrimps, collembolans, diplurans, bettles (Carabidae, Catopidae, Pselaphidae), and teleosts. The faunal affinities of the Mammoth Cave community indicate multiple invasions in the past from two probably subterranean avenues of dispersal: (1) from the north and southwest, along the margins of the Western Kentucky coal basin, and (2) from the upper Cumberland basin of Tennessee.

The Distribution and Ecology of *Cyathura polita* (Stimpson) in Tidal Marshes of Cape Cod, Massachusetts, and Its Vicinity

W. D. Burbanck, *Emory University*

The isopod *Cyathura polita* (Stimpson) was found in 40 of te 62 marshes studied in the Cape Cod area. Cyathurans occurred at a depth of from 5–8 cm. in a stable substrate with some sand present and covered by a mixture of salt and fresh water in motion and under tidal influence. Populations were relatively stable as to

location and density over a period of five years with a range in density of from 108/m² to 1080/m² with the exception of two much larger populations. No species of macroseopic animals were regularly associated with *C. polita,* but those most frequently recorded were *Scolecolepides, Heteromastus,* nereids, and gammarids. *C. polita* is essentially euryokous but appears to tolerate only slight reductions in dissolved oxygen, is chiefly a detritus feeder, and is eaten by winter flounder, sea-run trout, and black duek. After three years, a transplanted population of cyathurans is well established at Mill Creek, Sandwich, where none occurred naturally. Possible reasons for the nonoccurrence of *C. polita* in certain marshes are discussed and related to the problem of the prescrvation of natural estuarine habitats.

This work was supported by National Science Foundation Grant G-7138 and the McCandless Fund of Emory University.

A New Strigeoid Trematode (*Diplostomatidae: Alariinae*) from Florida Raccoons

Reinard Harkema and Grover C. Miller,
North Carolina State College

Examination of 19 raceoons from Glades County, Florida, in September, 1960, revealed the presence of an unknown strigeoid trematode. Five of the 19 raceoons had light to moderate infections of this parasite in the small intestine. These specimens are sufficiently different from any known form to constitute a new genus. They are characterized by an elongated bi-lobed holdfast organ which extends to or beyond the oral sucker. There is similarity to the genus *Pharyngostomoides* Harkema, 1942, in the parallel position of the testes and in general body form. The major features which separate this strigeoid trematode are the position and structure of the holdfast organ, the forward loeation of the testes, the large reeess in the genital atrium, and the much larger size.

Studies on the Life Cycle of a New Avian Schistosome in the Genus *Austrobilharzia*

Rhodes B. Holliman, *Jacksonville University*
Robert B. Short, *Florida State University*

An examination for larval trematodes has been made on 10,510 specimens of *Cerithidea scalariformis,* a marine gastropod from the salt marshes of Apalaehee Bay, Wakulla County, Florida. Of this number, 24 specimens were found infected with a new schistosome. Parakeets, pigeons and chicks were exposed to cercariae and adult worms were recovered from the livers and mesenteric veins of these laboratory animals. White mice, exposed to eercariae, failed to produce worms. Eggs, deposited in the tissues of the avian hosts, have also been studied. Examination of both sexes of adult worms revealed that they are a new species in the genus *Austrobilharzia.* The produetion of dermatitis in man by this cercaria has been demonstrated.

Potentiation of X-ray Damage by Near Infrared Pretreatment of *Tetrahymena*

Margaret M. Wells [1] and Charles Ray, Jr.,
Emory University

Exposures of *Tetrahymena pyriformis* to 4, 6, 8, 16, or 24 hours of near infrared preeeded exposures of 150 kr or 300 kr x-radiation (at 1 kr per minute). Log phase cultures of variety 1, mating type I were mixed with the irradiated mating type II cultures. Analysis of the effects of near infrared pretreatment involved the examination of anlagen stage in hematoxylin stained conjugants. The experimental cultures differed in the frequency of reeovered micro- and macronuclear combinations. Pretreatment with 6, 8, or 16 hours of near infrared resulted in a significant increase of abnormal nuelear conditions. Pretreatment of 150 kr x-rays with 6 hours of near infrared produeed the same number of recoverable abnormalities as produeed by twice the x-radiation does without infrared pretreatment.

This work was supported in part by grants from the National Institutes of Health, the Atomic Energy Commission, and the National Science Foundation.

[1] Present address: Science Department, Ball State Teachers College.

Uptake of P^{32} by the Snail, *Australorbis glabratus*

E. W. Lautenschlager, *University of Virginia*

Both uninfected control snails and snails infected with *Schistosoma mansoni* were exposed to $P^{32}(PO_4)$ in a concentration of 5 microcuries per milliliter of water for varying times ranging from less than 1 minute to 3 hours. For quantitative measurement of uptake snails were washed, the shell removed, the tissue dried on planchets, and radioactivity determined by direct count. To determine the loss of isotope, snails were exposed to the same concentration for a uniform time, returned to nonradioactive water for varying times, after which a direct count of radioactivity was made on dried tissue. To determine the localization of the isotope, other snails were fixed and sectioned for autoradiography. Quantitative uptake of thc isotope, loss of isotope, and localization by both infected and uninfected snails will be diseussed.

Preliminary Observations on Temperature Adaptation of Goldfish and P-32 Distribution

John A. Freeman, *Winthrop College*

Several changes involving an increase in activity during low temperature adaptation have been observed in goldfish. In view of the roles of phosphorus compounds in bioenergetic processes a study of its distribution in organisms adapted to different temperatures appears worthwhile. Goldfish adapted to 10° and 23° C have been injected with tracer doses of P-32 and the concentrations of the isotopes eompared in brain, muscle and visceral breis removed four hours after injection. Radiophosphorus was determined on trichloroacetate precipitates and on supernates. Activity in soluble fractions was significantly higher in brain and in visceral breis of cold-adapted fish as compared with warm-adapted fish. It was also significantly higher in precipitates from the eombined viscera of cold-adapted fish. Muscle showed no signifieant differences when cold- and warm-adapted fish were compared.

Concepts of the Genus *Zephyranthes* and the Confounding of Herbert's Hippeastriformes [1]

R. O. Flagg and W. S. Flory,
The Blandy Experimental Farm

Major changes in coneepts of the genus *Zephyranthes* Herb. (1821) have occurred four times. Synonymy of *Zephyranthes* binomials involves at least 17 other generic names, prominently: *Amaryllis* (*Hippeastrum*), *Rhodophiala, Habranthus, Atamosco, Cooperia, Pyrolirion* and *Haylockia,* i.e. Herbert's 1837 section Hippeastriformes except for *Sprekelia* and *Phycella.* The results of Pax's

1888 wide separation of certain of those taxa (following enlargements of *Zephyranthes* and *Hippeastrum* by Bentham and Hooker) have not been totally rectified. Consideration of morphological and distributional similarities, and cytological reports suggests that the genera *Amaryllis, Worsleya, Placea, Sprekelia, Rhodophiala, Habranthus, Zephyranthes, Cooperia, Pyrolirion* and *Haylockia* comprise a bifurcate phyletic branch in the Amarylloideae and should be united as a tribe, Amaryllleae-a-re-incarnation of Herbert's section Hippeastriformes. A phyletic key to generic synonymy of *Zephyranthes* binomials is presented and evolutionary trends within the proposed tribe are discussed.

[1] Work supported by N.S.F. Grant G-11080.

The Variation in *Aconitum uncinatum*

James W. Hardin, *North Carolina State College*

A preliminary study of *A. uncinatum* indicates that a thorough taxonomic revision of the eastern Aconitums is needed to answer all the questions that have arisen. The study of variation in pubescence and leaf shape already indicates (1) the necessity of revising the current descriptions and keys, (2) that Fernald's variety *acutidens* is probably not distinct, and (3) the doubtful distinctness of *A. novebaracense* at least as a separate species. The pattern of variation and the characteristics which have been used to distinguish these entities, are discussed.

Phylogenetic Relationships in the Genus *Polygonella* (Polygonaceae)

James H. Horton, *University of North Carolina*

Polygonella, as treated here, includes *Delopyrum* Small *Dentoceras* Small, and *Thysanella* Gray. These plants are low subherbaceous or suffrutescent annuals or perennials, most of which inhabit southeastern coastal or scrubland sands. Despite variations in chromosome number and other minor differences, the plants should be placed in a single genus, as evidenced by similarities in morphology and floral and foliar anatomy. Plants of two taxa constitute an evolutionary dead end, and are placed in a separate subgenus. Subherbaceous annuals of *Polygonella articulata* are judged to be the most primitive plants of the group on the basis of chromosome number, wood anatomy, floral morphology, and distribution. Two lines—subherbaceous and suffrutescent—seem to diverge from the common ancestor of the group, and lead, through plants producing hermaphroditic and pistillate flowers, to suffrutescent perennials (*P. polygama*) and subherbaceous annuals (*P. gracilis*) in which the apparently bisexual flowers are functionally staminate, the plants dioecious.

A Hybrid Index for the Mid-Appalachian *Abies* (Fir or Balsam)

George S. Ramseur, *The University of the South*

The mid-Appalachian *Abies* seems to be limited to seven small stands in West Virginia and northern Virginia. The variation, especially in cone bracts, of specimens from these stands has led various workers to refer to this *Abies* as either *A. fraseri* (Pursh) Poir., *A. balsamea* (L.) Mill., or a new intermediate species. These stands are generally well isolated from each other, and are certainly well separated from the modern ranges of *A. fraseri* and *A. balsamea.* There may have been overlapping during the Ice Ages.

Cone scales, bracts, and seeds of specimens from five mid-Appalaehian stands were compared with specimens of *A. balsamea* from Michigan and *A. fraseri* from the Smokies. Evaluation by the hybrid index method of Anderson shows the variations to fall within the limits which could be expected for hybrids with segregation and back crossing with the parental species.

Preliminary Studies of the Taxonomic Status of *Erigeron pusillus*

C. W. James, *University of Georgia*

Until 1947, *Erigeron pusillus* Nutt. had been consistently referred to specific rank. At that time and since, it has often been considered a var. of *Erigeron canadensis L.*—primary because of the presence of plants intermediate in form between the two. Observations on the distribution, frequency, and form of these plants in the Piedmont and Coastal Plain of Georgia, indicate that if hybridization does occur it is infrequent in the field and some isolating barrier is presumably operative. Plants intermediate in form, as well as typical plants of each species, were self-pollinated to determine if self-pollination effected a partial barrier to free hybridization. At the same time it was thought that observations on the phenotypes of the progeny might indicate the hybrid nature of the "intermediate" parents. The results of these studies and progress in others are discussed.

Studies of *Lyonia lucida* (Lam.) K. Koch (Ericaceae)

Wilbur H. Duncan, *University of Georgia*

This species, previously known only in the Coastal Plain from southeastern Virginia to southeastern Louisiana, was discovered in the Ridge and Valley, and Cumberland Provinces in northwest Georgia. Study of herbarium specimens sought evidence to show or deny that these colonies might be relic. Although plants from dry sandy habitats of Trail Ridge east of the Okefinokee Swamp show consistent differences in flower form from those growing in the wet habitats of the swamp, these differences appear not to be correlated with edaphic conditions when analyzed over a broad geographic area. Only sepal length seems to vary on a regional basis. The disjunct northwest Georgia colonies are not in any of the dozen characters studied significantly different from the Coastal Plain population. Flower measurement data from 116 widely distributed collections when analyzed independently of habitat show that the two flower form types of the Okefinokee region may be partly segregated genetically. Heterostyle is not involved.

Growth Inhibition of *Chlorella* Induced by 3-Amino-1,2,4-Triazole, and its Reversal by Purines

Frederick T. Wolf, *Vanderbilt University*

The growth of *Chlorella pyrenoidosa* is inhibited by amino triazole. In cultures in Bristol's solution, approximately 50 percent inhibition of growth is induced by amino triazole at a concentration of 0.5 mg. per 100 ml. This inhibition may be reversed by adenine, quanine, hypoxanthine, uric acid, or xanthine in concentrations approximately twice as great, but is not reversed by riboflavin. It is concluded that amino triazole functions as an inhibitor of purine synthesis. Since purines are constituents of the ribonucleic acid present in chloroplasts, the interference of amino triazole with chloroplast development may be explained on this basis.

A New Ulotriehacean Alga

Jackie Edwards and Walter Herndon,
University of Alabama

An apparently unique ulotriehacean alga has been isolated from grassland soil from Baldwin County, Alabama, and its morphology and life history studied in unialgal and baeteria-free eultures. The plant grows profusely in soil-water eultures and in both liquid and agar inorganie nutrient eultures. Its most striking eharacteristie is its tightly spiraled unbranched filamentous body which strongly resembles that of the cyanophyeean *Spirulina*. Further, as the filaments approaeh maturity, individual cells of the filaments undergo repeated divisions produeing *Sarcina*-like paekets along the spiraled filament. Cellular morphology is eharaeteristically ulotriehaeean. Asexual reproduetion is by quadriflagellate zoospores, aplanospores produeed within the paekets, and by fragmentation. Sexual reproduetion has not been observed. The characteristic elose spiraling and the regular produetion of *Sarcina*-like paekets are eonsidered to merit generic distinetion from *Ulothrix* to whieh it is considered to be most elosely related.

The Marine Algae of Bimini, Bahamas. I. *Cyanophyta*

Harold J. Humm, *Duke University*

Fifty eight speeies (25 genera) of bluegreen algae from marine habitats are listed from the Bahamas Arehipelago, all but 12 of whieh have been found around the Bimini Islands. Nine of these speeies are coeeoid bluegreens and 49 are filamentous species.

The known distribution in the western North Atlantie, habitat notes for the Bahamas reeords, and an extensive bibliography are given. As an aid to identification, a key to the genera, speeies keys, and descriptions are ineluded.

Composition of the Phytoplankton Populations of the Major Waterways of the United States

Louis G. Williams,
R. A. Taft Sanitary Engineering Center, Cincinnati, Ohio

A report of the oeeurrence and distribution of the most abundant plankters of the National Water Quality Network of some 70 stations located on the major waterways of the United States to show proportional abundance, seasonal variation, and population density and their effeets on water quality, and their eomposition as indieators of water quality, with speeial emphasis on diatoms.

The Chytrid *Pringsheimiella* is now *Dictyomorpha Gen. Nov.*

J. Thomas Mullins, *University of Florida*

The ehytrid, *Pringsheimiella*, originally described by Coueh (1939), is re-named *Dictyomorpha*, beeause of the previous use of the name *Pringsheimiella* for an alga. It seemed appropriate, in using *Dictyomorpha*, to emphasize the distinetive zoosporangial elusters whieh bear a strieking resemblanee to the dictyoid sporangia formed by *Dictyuchus*. *Dictyomorpha* is of great interest because Couch (1939) suggested that it exhibited the first known case of heterothallism in the Chytridiales, an order of the aquatie fungi.

Studies on Leaf Fungi from Louisiana

Lafayette Frederick, *Southern University*

Preliminary studies of fungi parasitic on leaves of Louisiana plants, exeluding eereals and grasses, have revealed the oeeurrence of genera and speeies hitherto unreported from the state. Those leaf fungi studied oeeur on host plants eollected mostly within the parish of East Baton Rouge. Genera and speeies of imperfect fungi are the predominant organisms assoeiated with the leaf spots in the collection studied. Noteworthy among the fungi determined are speeies belonging to the genera *Amerosporium*, *Discosia*, *Piggottia*, *Actinopelte*, *Robillarda*, *Pestalotia*, *Phyllosticta*, *Septoria*, and *Cercospora*. Most of the speeies thus far determined represent new host reeords for the state and in some instanees for the eountry. Morphologieal studies of the fungus tentatively plaeed in the genus *Robillarda* suggest that it may represent a new speeies. Furthermore, when this fungus is compared with speeimens representing other speeies in the genus, it beeomes apparent that a critieal review of the genus is needed. This aspect of the projeet is already underway.

Types of Fungus Motile Cells

William J. Koch, *University of North Carolina*

Long range studies of the strueture and aetion of the motile eell in eaeh of the four major developmental lines of the lower fungi are proposed. Within the posteriorly uniflagellate line, the chytrid type of motile eell is seen to be heterogeneous. The six major types of chytrid motile eell presently reeognized among the eighteen speeies studied are diagnosed on the basis of the internal parts present and their appearances and arrangement. The phylogenetic and practical taxonomie value of information about motile cell strueture and activity is diseussed.

Aquatic Phycomycetes of Lake Texoma

Charles E. Miller, *Texas A. & M.*[1]

Part of the summer of 1960 was spent at The University of Oklahoma Biologieal Station, Willis, Oklahoma, surveying the aquatie Phycomycetes of Lake Texoma. This initial investigation involved life-history, identification, and description of parasites and saprophytes of algae, other fungi, and pollen grains. Collections of lake water were "baited" with sweet gum (*Liquidambar styraciflua* L.) and pine (*Pinus taeda* L.) pollens. Observations were recorded photographieally and with the aid of a camera lueida. In *Spirogyra: Olpidium entophytum* (Braun) Rabenhorst, *Rhizophydium minutum* Atkinson, *R. sphaerocarpum* (Zopf) Fiseher, *Phlyctochytrium hallii* Coueh, *Myzocytium proliferum* Schenk; in *Closterium: Lagenidium rabenhorstii* Zopf; in *Aphanomyces: Olpidiopsis luxurians* Barrett; on sweet gum and/or pine pollen: *Olpidum pendulum* Zopf, *Phlyctidium megastomum* Sparrow, *Rhizophydium sphaerotheca* Zopf, *R. pollinis-pini* (Braun) Zopf, *Phlyctochytrium hallii* Couch, *P. sanchytrii* Köhler, *Rhizidiomyces hansonii* Karling, *Aphanomycopsis bacillariacearum* Scherffel, *Lagenidium pygmaeum* Zopf. In addition, apparently undeseribed species of *Phlyctidium*, *Phlyctochytrium*, and *Chytridium* were found.

[1] Supported by a National Seience Foundation Grant-in-aid administered by The University of Oklahoma Biologieal Station.

Fruiting Body Germination and Formation in the Genus *Archangium* (Myxobacterales)

James C. McDonald, *Wake Forest College*
John E. Peterson, *University of Missouri*

Archangium species possess fruiting bodies devoid of encasing membranes. Therefore, fruiting body germination does not require the bursting of a cyst membrane typical of some myxobacterial species. Upon germination in a hanging drop, single, shortened, cells within a fruiting body activate, elongate, and move to its surface. The rods assume a position perpendicular to the fruiting body surface which, as the number of upright rods increases, resembles a procupine back. Eventually, many cells swarm away from the fruiting body out into the medium.

Fruiting body formation in a hanging drop begins with the clustering of several vegetative rods; more nearby cells join the cluster, shorten, and finally form small, atypical aggregates. On agar media, a vegetative rod "psuedoplasmodium" appears to circle a common focal point. Additional waves of rods, streaming from different directions, surge onto those cells already within the focal point amassment. Subsequently, small, typical, mounded, fruiting bodies form.

Germination of the Resting Sporangium of *Coelomomyces*

Clyde J. Umphlett and John N. Couch,[1]
University of North Carolina

The process of formation and liberation of the zoospores produced by the resting sporangium of an undescribed variety of *Coelomomyces psorophorae* Couch, parasitic in mosquito larvae, is described. Zoospores have been cleaved by the time of the expulsion of the sporangial contents. Release of the zoospores is accomplished by the gradual extrusion of the zoospore mass through a germination slit in the sporangium wall. The mass of spores is covered during the extrusion process by two membranaceous structures, the outer of which is a portion of the inner layer of the sporangium wall, the inner of which is a cytoplasmic membrane. The outer layer of the covering separates from the sporangium, thus exposing the cytoplasmic membrane around the spore mass. The spores begin to move about in the extrusion, and soon are a seething mass. A rupture of the cytoplasmic membrane brings about the liberation of the zoospores which swim rapidly away.

[1] A grant from National Institutes of Health which supported this work is gratefully acknowledged.

Ovule Development in *Dendrobium phalaenopsis*

Yoneo Sagawa and D. H. Nimoto,
University of Florida

In *Dendrobium phalaenopsis*, pollination and pollen tube growth stimulate further development of the rudimentary placenta and subsequent formation of the ovules. During the first 35 to 40 days after pollination, the placenta grows rapidly, forming many branching projections. The ovules are formed at the tips of the ultimate branches where a few terminal cells differentiate into a nucellus consisting of a single column of several cells surrounded by a layer of epidermis. The topmost nucellar cell becomes the archesporial cell which functions directly as the megaspore-mother-cell. Meiosis occurs between 45 to 50 days after pollination and an 8-nucleate embryo sac is formed by three successive divisions of the chalazal megaspore. The embryo sac is completely organized and ready for fertilization in approximately 55 to 65 days after pollination. The first two divisions of the zygote are transverse, cutting off a suspensor initial, a middle cell and a terminal cell. A multicellular, undifferentiated embryo is formed by divisions of the middle and terminal cells. Experiments with the aseptic culture of ovules at various stages of development indicate that further growth and formation of seedlings will occur in ovules with zygotes but not in stages prior to fertilization.

The Problem of Sex Determination in *Mormoniella*

P. W. Whiting and Doris J. Bush,
University of Pennsylvania

Sex determination by complementary allelism has been suggested for all groups with haploid males. *Multiple* sex alleles are proven for *Habrobracon* and the honey bee, normally outbreeding. For species like *Melittobia* having much natural inbreeding, multiple alleles cannot apply without involving waste of many eggs. It is now suggested that in such species females are heterozygous for two sex alleles which may be similar or different in different populations. Reproductive economy may be effected by differential maturation which becomes stabilized after inbreeding but is unstabilized by outcrossing. Egg hatchability, very high in inbred lines of *Melittobia*, is radically reduced by outcrossing. *Mormoniella* is intermediate between *Melittobia* and *Habrobracon* respecting inbreeding in nature. The attempt is being made with highly inbred lines to locate the sex alleles in *Mormoniella* by linkage with mutant genes in different chromosomes.

A New Radiation-Induced Oyster-Eye Mutant in *Mormoniella*

Charles Ray, Jr., and W. D. Fattig,
Emory University

During experiments designed to induce mutations by radiation in a scarlet-152 eye-color stock of *Mormoniella vitiripennis* (Walker), a mutant with oyster-eye was recovered. The new mutant, which carried the st-152 gene, was crossed with the st-152 stock and with wild (brown) stock. The oyster x st-152 cross gave F_2 males in a ratio of 1 scarlet : 1 oyster. The oyster x wild (brown) cross gave F_2 males in a ratio of 2 brown : 1 scarlet : 1 oyster, indicating that the mutant was not allelic with the st-152 locus and, in fact, segregated independently of it. When both st-152 and oyster are present in hemizygous males, oyster is epistatic to scarlet. A stock of the oyster mutant free of the st-152 gene has been recovered and is being used to determine the action of oyster with other eye-color mutants in *Mormoniella*.

Genetics of Coat Color in Horses

W. Ralph Singleton, *Blandy Experimental Farm, University of Virginia, Boyce, Virginia—in collaboration with* W. E. Castle, *University of California*

The commonest color types of horses are those known as bay, black, brown, and chestnut. These are produced by various combinations of alleles of three basic color genes; A for color pattern, B for black pigment and E for the extended or restricted distribution of black pigment in the coat. There are four alleles of the A locus

A^L (wild), A (bay), a^t (brown), and a (black). Two alleles are present at the B locus, B (black pigment) and b the reddish color of chestnuts and sorrels. These are three alleles at the E locus, E^D (dominant black), E (sooty bay) and e (red bay with A and B). A dilution gene D is found in horses, another S in Shetland ponies. D/d produces Palominos, S/s silver dapple Shetland ponies. Interactions of these different alleles will be discussed with new information on lack of penetrance of the D allele.

Morphological Differences Between Cytoplasmic Male-Sterile and Normal Strains of Maize

C. O. Grogan and Patricia Sarvella,
Miss. State Univ. and U.S.D.A. cooperating

Comparisons were made at Mississippi State University to determine if morphological differences existed between normal and cytoplasmic male-sterile strains of maize. Differences were observed in the extrusion of the tassels above the terminal leaf sheath of normal and male-sterile counterparts of a single cross. The normal plants were found to extrude more than the steriles. Subsequent examination of the parental lines revealed a similar relationship but of less magnitude, indicating the condition was heritable. Examinations of the normal and sterile counterparts of other lines showed similar differences. Measurements of the culm revealed that the internodes of the steriles, beginning with the fourth to the sixth internode above the ear, were shorter than the normal versions. This reduction was especially noticeable in that part of the culm bearing the tassel. Limited information indicates that height differences between normal and sterile strains are associated with differences in the culm lengths above the ear.

Locus of Genes for Rust Resistance in Two Varieties of *Hordeum vulgare* by Means of Translocation Stocks

M. Adnan Alamuddeen,
Appalachian State Teachers College

Nine translocation stocks were crossed with Sudan and Reka. The F_1 plants from crosses of Sudan with all translocations and Reka with all translocations were tested for rust reaction and found to be resistant. Examination of the mature pollen showed that the F_1's were partially sterile. In the crosses involving the variety Sudan with translocation stocks having interchanges of chromosomes a with e and c with e, the F_2 data indicated complete linkage. The common chromosome e must carry the gene for resistance. This is substantiated by crosses involving translocations of a with other chromosomes and c with others which showed independent assortment. In the crosses involving the variety Reka with translocation stocks having interchanges of chromosomes b with f and e with f, the F_2 data indicate that in Reka the gene for resistance is linked with chromosome f. This is substantiated by crosses involving translocations of b with other chromosomes and e with others which showed independent assortment. The results obtained from the crosses studied and from the F_2 data agree with previous conclusions that the factors for resistance in Sudan and Reka are independent.

The Chromosomes of *Zephyranthes albiella* [1]

W. S. Flory and R. O. Flagg,
The Blandy Experimental Farm, University of Virginia

This species has 18 somatic chromosomes, the lowest number known for the genus. Chromosomes range from 6 to 14 microns in length, following colchicine pretreatment. Three pairs—the two longest, and the shortest have approximately median centromeres. The other 6 pairs would be classed as having sub-median constrictions; two of the shorter of these are near-median, while a third approaches the sub-terminal condition. A short near-median pair bears terminal satellites on the longer arms.

Most plants studied derive from Colombia, where the species is indigenous. One accession, also appearing to be Z. *albiella*, traces from Panama. There are taxonomic similarities between Z. *albiella* and Z. *rosea* ($2n = 24$). The latter species occurs in the West Indies and also in Central America. An undescribed accession from Panama, with characters somewhat intermediate between *albiella* and *rosea*, has 21 chromosomes and fails to set seed.

[1] Work supported by N.S.F. Grant G-11080.

Cytogeography and Phylogeny of the North American *Verbena*

Walter H. Lewis and Royce L. Oliver,
Stephen F. Austin State College

Chromosome numbers of twenty-six *Verbena* species in North America separable into two series are reported. The $x = 5$ series has no diploid representative, few tetraploids, and numerous widespread hexaploid species, while the $x = 7$ series has many pandemic diploid species, and few tetraploid and hexaploid taxa. When compared with the data available for the South American *Verbena*, these frequencies and distributions were found to be almost opposite. The origin of the two groups from a $x = 6$ prototype followed by ascending and descending aneuploidy is suggested. Migration via tropical land bridges is proposed to explain the occurence of both groups in the two continents.

Primary Immune Response of Mice to an Enzyme, Triose Phosphate Dehydrogenase

Sara L. Page, *Winthrop College*
C. J. Wust, *Biology Division,*
Oak Ridge National Laboratory

Triose phosphate dehydrogenase (TPD) was crystallized from rabbit muscle and injected into mice in an aqueous vehicle. In the animals that received an intramuscular or intravenous injection, no significant increase in weight was observed in the lungs, liver, spleen, and lymph nodes. Other mice that received the antigen intraperitoneally emulsified with Freund's Adjuvant showed a spleen weight increase up to 4-fold. No other tissue weight was increased significantly. The relative titer of antibody remained high through the 20th day. This correlation of spleen weight and appearance of antibody seems to indicate a prior production, storage, and release phenomenon.

News of Biology in the Southeast

About People

Dr. W. Preston Adams has accepted an appointment as Assistant Professor of Botany, DePauw University, Greencastle, Indiana, effective September 1961. Dr. Adams has been a Research Associate in botany at Florida State University since being graduated from Harvard University in 1959.

Dr. Harry Lipner of the department of Biological Sciences of Florida State University was elected Chairman of the Medical Section of the Florida Academy of Sciences for 1961.

Dr. Dexter Easton, Associate Professor of Physiology at Florida State University, presented a paper, "Interpretations of Electric Potentials Recorded at the End of a Nerve" at the February meeting of the Florida Academy of Sciences.

Dr. E. Ruffin Jones, Professor of Biology at the University of Florida, was named president-elect of the Academy Conference of the American Association for the Advancement of Scienee at the annual meetings of the group December 26-27, 1960, in New York City. The Academy Conference is composed of two delegates from and representing each of the state Academies of Science and their affiliated organizations, as well as the Canadian Academies of Science. It meets each year with the parent organization, the American Association for the Advancement of Science, providing speeches by invited speakers, panel discussions, and informal discussions, giving opportunity for the various academies to exchange ideas. The Academy Conference was organized in 1950. Dr. Jones, who is immediate past-president of the Florida Academy of Science, which he represents in the Academy Conference, will step up to the president's post next year, moving to the position of president-elect this year after two years of serving the Academy Conference as its secretary-treasurer.

Dr. A. Gib DeBusk of Florida State University left February 27, 1961, to attend the First Neurospora Conference at La Jolla, California. En route he visited the School of Aviation Medicine at Brooks Air Force Base, Texas, for consultation, and the Radiation Laboratory at Berkeley for a seminar.

Dr. Norman Giles, Head, Department of Botany at Yale, **Dr. Max Delbruck,** California Institute of Technology, **Dr. E. L. Powers,** Argonne National Laboratory, **Dr. William J. Clench,** Museum of Comparative Zoology at Harvard University, and **Dr. George W. Hunter,** Department of Microbiology of the Medical Center at the University of Florida, gave seminars recently at Florida State University in Tallahassee.

Dr. Orland E. White was appointed "Lecturer in Residence for Economic Botany" at the College of William and Mary during February and March, 1961.

Dr. A. C. Cole, Professor of Entomology at the University of Tennessee, has been awarded a two year National Science Foundation grant of $5,200 to continue investigations on the harvesting ant. Dr. Cole will spend part of summer in western United States and western Mexico making additional collections of these ants.

Dr. J. Gordon Carlson, head of the Department of Zoology and Entomology at the University of Tennessee, was one of the session chairman at a conference on "The Use of Animal Cell, Tissue, and Organ Cultures in Radiobiology," sponsored by the New York Academy of Sciences in February.

Dr. Melbourne R. Carriker, formerly of the University of North Carolina, is now employed by the U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries, as Supervisory Fishery Research Biologist, Chief, Oyster Mortality Program, with headquarters at the new Bureau Laboratory in Oxford, Maryland. He will continue his research on boring mechanisms in boring gastropods and other aspects of oyster drill biology—and in addition will supervise research on other predators, parasites, and disease organisms of oysters and other commercial bivalves. This research will be done in cooperation with the research groups at the University of Delaware, Rutgers University, the Maryland Department of Research and Education, and the Virginia Fisheries Laboratory, where similar research programs are under way.

Dr. George Moskovits has recently been added to the staff of the Virginia Fisheries Laboratory at Gloucester Point. He will assist Dr. John L. Wood in the microbiology-pathology division, and will conduct experiments to determine the bacterial flora in the digestive system of oysters.

1st Lt. Gordon Bradshaw has been made Assistant Professor of Biology and Chemistry at the Citadel.

Dr. J. T. Penney of the Department of Biology of the University of South Carolina has received a two year grant of $7,000 from the National Science Foundation for a taxonomic study of the subfamily meyeniinae.

Dr. Fontelle Thompson of the Department of Biology of the University of South Carolina has been awarded $4,928 for an institute for undergraduate research participation to be held in the summer of 1961.

Mr. Richard Mulford has joined the staff of the Virginia Fisheries Laboratory and is working in the microbiology-pathology division with **Dr. John L. Wood** and **Dr. George Moskovits.**

Dr. Morris L. Brehmer and **Mr. Dexter S. Haveen** of the Virginia Fisheries Laboratory have been awarded $20,000 by the Atomic Energy Commission to study the role of filter-feeding marine organisms in removing radioactive wastes from the water and depositing them as bottom sediments. In addition to his research, Dr. Brehmer is giving a course to graduate students and advanced undergraduates in radiobiology.

Dr. Leon Howell of High Point College and **Dr. Douglas Dean** of Abilene Christian College will be visiting Assistant Professors in the Biology Department, University of Alabama, during the summer of 1961.

Dr. Everett L. Bishop of the Biology Department, University of Alabama, will serve again as Instructor in Marine Biology at the Alabama Conservation Department Marine Laboratory at Cedar Point, Alabama, July 13 to August 13, 1961.

Mr. R. E. Smith and **Dr. Ralph L. Chermoek** will travel to the American Fruit Company Plantation near Limon, Costa Riea, during the summer of 1961. Mr. Smith will spend about 3 months studying the herpetology of the area and Dr. Chermock about 5 weeks collecting Lepidoptera and conducting ecological and zoogeographical studies.

Dr. Herbert Boschung, Biology Department, University of Alabama, will serve again as Instructor of the course in Marine Vertebrate Zoology and Ichthyology, and do research, at the Gulf Coast Research Laboratory, Ocean Springs, Mississippi, during the summer of 1961.

Dr. William Guest, Biology Department, University of Alabama, will be a research participant in mammalian cytogenetics at the Oak Ridge National Laboratories during the summer of 1961.

Dr. Walter Herndon, Biology Department, University of Alabama, will participate again as Instructor for the Marine Botany Course, and do research, at the Marine Biological Laboratories, Woods Hole, Massachusetts, during the summer of 1961.

Drs. Walter Herndon and **Charles O'Kelley,** Biology Department, University of Alabama, received a grant of $9,930 for 1961 from the National Institute of Arthritis and Metabolic Diseases for continuation of a study of the replacement of calcium by strontium in living organisms.

Dr. Howard M. Phillips, President of Alabama College, has recently been appointed a member of two National Science Foundation Panels and will serve as a special consultant for both Panels. The Panels to which he has been appointed include the Life Sciences Facilities Panel and the Panel on Special Projects in Science Education.

Dr. John N. Couch has accepted an assignment in India to serve this spring as a consultant with the Review Committee of the Indian University Grants Commission regarding the revising and modernizing of the curriculum in the field of Botany. Also, he will give seminars on various aspects of mycology at different universities. He will return to the United States in June, 1961.

Dr. C. C. Hall, Biology Department, Howard College, has recently been made Associate Professor.

Dr. Herbert P. Riley served in February on a National Academy of Sciences-National Research Council Screening Panel to screen applications for National Science Foundation Cooperative Fellowships.

Dr. Dale M. Smith, Associate Professor of Botany, University of Kentucky, resigned during the summer to accept a position at the University of Illinois.

Dr. Edward T. Browne, Jr., Assistant Professor of Botany at the University of Kentucky, has received a research grant from the University of Kentucky Faculty Research Fund to study the Liliaceae of Kentucky.

Dr. John M. Carpenter, Head of the Department of Zoology at the University of Kentucky, was in Washington, D.C. for several days in January to serve on an NSF Screening Panel considering NSF Summer Fellowships for Secondary School Teachers of Science and Mathematics.

Dr. Herbert P. Riley, Head of the Department of Botany, University of Kentucky, served last October on a National Science Foundation Screening Panel to screen undergraduate research participation program participants.

Dr. Roger W. Barbour of the Department of Zoology, University of Kentucky, recently received a research grant of $8,533 from the National Institutes of Health for the study of a traffic survey of *Microtus ochrogaster* runways.

Institutions and Organizations

The 1961 Florida State Science Fair will be held at Florida Southern College, Lakeland, Florida, April 6, 7, 8, 1961. A total of 310 exhibits are expected at this State Science Fair. A total of 30 Committees are working diligently to make this State Science Fair a success.

The Virginia Fisheries Laboratory at Gloucester Point is offering, in cooperation with the National Science Foundation, a research participation for college teachers program which will run for twelve weeks beginning about 12 June 1961. Both predoctoral and postdoctoral teachers are being considered, and each applicant should specify the field of research in which he will engage and specify the equipment and space needed. Applications will be accepted as long as research space is available.

The Virginia Fisheries Laboratory is offering, in cooperation with the National Science Foundation, an undergraduate research participation program supplying research experience to biology majors. Preference will be given to students interested in marine biology as a profession and who have had two or more years of college training. The program will be in operation for twelve weeks beginning 12 June 1961, and applications will be accepted until the full quota of participants has been selected.

The eleventh annual wildflower pilgrimage, sponsored by the Department of Botany of the University of Tennessee, will be held 27 through 29 April 1961 in cooperation with the Naturalists Service of the National Park Service in the Great Smoky Mountains National Park. This program will consist of hikes and automobile trips under the direction of trained botanists, ranger naturalists, and expert photographers. Illustrated evening lectures and morning bird trips are scheduled. Further information may be obtained from the Department of Botany of the University of Tennessee, the Great Smoky Mountains National Park Naturalists Service, the Gatlinburg Chamber of Commerce, or the Gatlinburg Garden Club—joint sponsors of the event.

The Third Summer Botany Conference at the University of North Carolina, supported by the National Science Foundation, will be held July 31 through August 18, 1961. Like the previous Botany Conferences, the 1961 Conference is designed for teachers of general botany and general biology in liberal arts colleges, teachers colleges and junior colleges from all parts of the country. Recent developments in plant physiology and cytology will be discussed in six one-week lecture series by leading botanists. The principal lecturers will be Dr. C. Ritchie Bell of the University of North Carolina, Dr. Lindsay S. Olive of Columbia University, Dr. Aubrey W. Naylor of Duke University, Dr. N. E. Tolbert of Michigan State University, and Dr. John M. Clark, Jr. of the University of Illinois. In addition, evening lectures will be given on recent developments in other areas of botany by Dr. John M. Couch and Dr. Max H. Hommersand of the University of North Carolina and Dr. W. C. Gregory of the North Carolina State College. Two field trips to areas of taxonomic and ecological interest will be conducted by Dr. A. E. Radford of the University of North Carolina. Stipends of $200 each, plus a travel allowance, will be awarded to 30 applicants by the selection committee. The stipend will be more than adequate to cover all essential expenses of attending the three-weeks Conference. Application blanks and a brochure deserib-ing the Conference may be obtained from the Director of the Conference, Dr. Victor A. Greulach, Box 1268, Chapel Hill, N. C. Completed applications must be received not later than May 10, 1961 to be assured of consideration.

The ASB BULLETIN

Volume 8, Number 3 July, 1961

THE INSTITUTE OF MARINE SCIENCE—UNIVERSITY OF MIAMI

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

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C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Elsie Quarterman, Business Manager

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ASSOCIATION AFFAIRS

A Message from the President

It is hard to believe that the Association of Southeastern Biologists is already in its 25th year. Not only have the eventful years passed rapidly for those of us who have been in the region all or most of this time, but the organization is still youthful in many respects.

It has certainly not accumulated much dead wood. How many of the other organizations to which you belong can boast an attendance of over half of the membership at the annual meetings, even when they are held at the periphery of the region? This may well be related to the fact that it is a working organization, not just a prestige organization, or a license to practise in the region, and very few join just to have their names on the roll.

The ASB is still the best visiting organization I know. The circle of friends it comprises is just about the right size for effective and stimulating informal communication. It complements the state academies by bringing together a larger group in each field of specialty, while still favoring cross-disciplinary contact, and has been particularly effective in bringing graduate students into contact with staff members from other institutions. It is neither so large, nor so far away from home, nor so formal, as to be formidable, or inaccessible, or unfriendly.

It has also held on to another of the fine characteristics of the academies. In contrast to the usual tendency at the national meetings, a commendably high proportion of our specialists have addressed themselves to a general audience, rather than primarily to the specially tuned ears of their fellows, to the mutual benefit of speaker and audience.

Of such an Association we may well be proud—now long established as an effective regional instrument of stimulating communication, both within and across disciplinary boundaries. It has been regional without being provincial, and broad without losing professional character. May it continue to fulfill its objectives as well in its second quarter century.

—Royal E. Shanks

The Executive Committee would appreciate receiving nominations for emeritus members of the ASB. These nominations should be made according to Article III, Section 3, of the Constitution and Bylaws, which states that . . . "Any member may be elected as Emeritus Member who has been a member of the Association for ten (10) or more years and who has retired from professional duties. An Emeritus Member shall have the same rights and privileges as an Active Member."

Nominations should be sent to *Dr. Harry Bennett, Dept. of Zoology, Louisiana State University, Baton Rouge, La.*

Second-Class Mailing

I am happy to report that the Post Office Department in Washington has seen fit to extend second-class mailing privileges to the ASB Bulletin. This will result in a tremendous saving in our mailing costs—reducing them from 3-4½¢ per copy to ⅛¢ per copy.

—C. W. Hart, Jr.

Dr. F. G. Walton Smith, the Director of the University of Miami's Institute of Marine Science since 1943, was born in England. Since coming to this country he has been associated with Princeton University, the U. S. Fisheries Laboratory at Beaufort, N. C., and the Hopkins Marine Station at Stanford. His interests lie in the fields of marine invertebrates and in the problems of commercial fisheries.

This is another in a series of articles on marine stations of the southeast scheduled to appear in the ASB Bulletin.

The Institute Of Marine Science

Of The University Of Miami

F. G. Walton Smith

Marine laboratories differ considerably in their objectives. Some are essentially *biological* rather than *marine* stations, although located so as to take advantage of the rich marine fauna and flora. Other stations are primarily *marine*, with the various scientific disciplines directed towards problems peculiar to the ocean. There are also stations which are concerned with the applieations of a number of sciences, especially biology, to the problems of the fisheries. These are usually, but not exclusively, under state or federal government auspices. Some of these varied types of stations are staffed to undertake institutional programs of directed research, others are organized mainly to provide facilities for independent visiting investigators.

The teaching of marine sciences is equally diverse. Some stations offer no formal training. Others offer courses directed primarily at broadening the education of students from inland colleges during summer vacations. A very small number of stations, which are essentially oceanographic departments of universities, offer complete year-round graduate curricula leading to professional degrees in oceanography—with opportunity for speeialization in the geophysieal, geochemical, biological, physical, or meteorological aspects.

The Institute of Marine Science was established in 1943 as The Marine Laboratory because none of the foregoing functions was being exercised in tropical waters, except at considerable distances from the mainland. Miami, although geographically in latitude 27°N, is faunistically within the West Indian region. It is thus the only station in the continental United States where the tropical marine enviroment is now being studied. A further advantage is that deep water and a major ocean current, part of the Gulf Stream system, are within a short distance of the Laboratory. Since no other tropical marine stations exist under similar favorable conditions, the Laboratory has developed a comprehensive program which includes the functions of an oceanographic institute, a fisheries laboratory, and a marine biological institute. In addition, as part of a University it is able to combine research with specialized graduate and undergraduate study throughout the year.

This combination of functions has been stimulating, both to teaching and research. Students are trained partially on an internship basis in an atmosphere of original investigation. Staff scientists are constantly exposed to the stimulation of ideas and techniques developed in cognate disciplines by visiting investigators. Equally well, the academic program is enriched by outstanding visiting investigators who contribute lectures to it.

The value of the unique location and this concentration of objectives is reflected in the growth of the staff from one or two to over 100 graduate scientists in a period of about 15 years.

The tropical conditions, unique among stations in the United States, make it possible to offer training in an aspect of biology which is a valuable part of the education of all botanists and zoologists. The climate also permits the study of chemical and physical oeeanography and submarine geology under favorable year-round conditions.

The terrific competition for food and space on the coral reefs and the enormous variety of species, of adaptations, feeding habits, and of methods of attack and defense, provide a living classroom and workshop for the study of funda-

mental branches of biology. Furthermore, the physiologist, behaviorist, ecologist, embryologist, or biochemist who uses marine animals and plants merely because of their convenience and not because of an interest in the ocean is immensely benefited by being able to work at a tropical station where the organisms are active for twelve months every year.

There are two buildings with seawater circulation—in addition to a three story air-conditioned main laboratory building, a workshop and storage building, and a radar meteorology antenna tower. These buildings have a total floor space of about 42,000 square feet.

An additional saltwater circulation building for experimental ecology and behavior of fishes and invertebrates will shortly be erected, with floor space of about 6000 square feet. In addition to indoor aquaria, large outdoor concrete tanks are provided. Seagoing vessels and shallow draft craft are docked at the Laboratory. The entire 5-acre tract is on an entrance to Biscayne Bay, within easy reach of the Gulf Stream and deep water.

Efficiency apartments for students and visiting investigators have been erected. Additional units are planned for the near future.

Apparatus and equipment is available for a wide range of investigation, and includes a mass spectrometer, X-ray and emission spectrometry, alpha and beta radiation laboratories, physiology, biochemistry, chemistry and submarine sound laboratories. The facilities of the Engineering School, Medical School and College of Arts and Sciences are also available. These include animal colony maintenance and electron microscopes. Immediately adjacent is a large aquarium which cooperates fully in experimental behavior and other studies. The library is first rate and the systematic biology laboratories maintain a reference museum of the flora and fauna of the area.

For administrative and academic purposes the staff is organized as three Divisions, comprising Fisheries, Physical Sciences, and Biological Sciences.

The research staff acts as the faculty of the Department of Marine Sciences of the University of Miami—which offers the Ph.D. in the various disciplines of marine science. A special summer High School program is provided and courses are offered to graduate and undergraduate summer school students.

The Marine Laboratory operates a number of research vessels. Mostly, these vessels work in local inshore and near-shore waters, but the largest vessel, *R/V GERDA*, regularly works in the Florida Straits and eastern Bahama Islands and in the Caribbean and the Gulf of Mexico.

A recent addition is the 35-foot twin hulled motor vessel *ARIUS* experimentally designed and equipped for research on shallow banks with a cruising range of 500 miles. Hydraulic winches and ample deck and laboratory space with good cruising range and excellent seagoing qualities are unusual accompaniments to a shoal draft to about 15 inches. This vessel conforms to coastguard regulations for transporting classes of twenty-five students.

The Institute publishes quarterly *The Bulletin of Marine Science of the Gulf and Caribbean*. Papers concerning physical, chemical, and biological oceanography in relation to the region extending in the western Atlantic from Brazil to the southern United States are considered for publication.

The Institute is a fishery research agency for the State of Florida, and publishes two sets of publications for the State Board of Conservation. The Educational Series is devoted to reports on subjects of wide public interest, and is distributed by the Board. It is available upon enquiry. Other publications are The Annual Proceedings of the Gulf and Caribbean Fisheries Institute and the Technical Series.

The Institute is headquarters for the International Oceanographic Foundation which publishes the illustrated popular science quarterly, Sea Frontiers. It also provides office and laboratory space for units of the U. S. Fish and Wildlife service.

The cover photograph of the Institute of Marine Science of the University of Miami was very kindly supplied by the Institute.—Ed.

Dr. Wolf, Emeritus Professor of Botany at Duke University, is no stranger to ASB Bulletin *readers. Only last fall his paper,* Concepts Regarding Fungi—Then and Now, *appeared in the* ASB Bulletin *(Vol. 7, No. 4). We now have the pleasure of presenting another paper by Dr. Wolf—on the somewhat controversial topic of sex reversal.*

Frederick A. Wolf

Sex Reversal In Plants?

Sex reversal in animals is a subject around which much discussion has been centered and about which much has been published by many investigators. This matter as understood by zoologists was brought into perspeetive recently by Witschi (1960). Certain botanists, in dealing with dioecious seed plants have spoken of the existence of sex reversal in such species. Their interpretations, however, have been largely disregarded or held to be without significance—or else sex reversal has been deemed to be of such rare occurrence as to be unworthy of serious consideration. This situation may be accounted for partly because morphologic sex characters or sex structures among plants that are comparable to secondary or accessory sex characters in animals are almost entirely wanting. It may also be due in part to the fact that complementary gametes or equivalent units of many species of lower organisms, as of slime molds, and of many species of algae and fungi are morphologically alike. It may be interjected that morphologic similarity of gametes among lower groups of animals, as among protozoa, is well known to exist. Since lack of morphologic differences between complementary gametes of lower organisms is of sueh wide occurrenee it may eventually come to be appreeiated that structural differences involving sex expression are really not fundamental in any organism for the reason that sex is functional, not structural, and therefore can be regarded as basically alike in all organisms. Nevertheless one must be realistic, since accord in this belief has not been reached, and he must not dismiss lightly the fact that morphologic sex characters or structures have remained the criteria among biologists generally for determination of what is regarded as fundamental in sex expression.

One reason for emphasis on structural sex may be that, from the beginning, the approach in the teaching of biology has been by way of morphology. As a consequence, special attention in accounting for sexual differences and patterns of behavior have been directed to the morphologic features of sex cells, sex nuclei, sex chromosomes, and sex-determining genes, either singly or in combination with autosomes or other cell structures or constituents. Using this approach, fertilization is generally defined in a way to include only the conventional pattern of sequential events, namely differentiation of haplophase gametes, the fusion of such gametes, including both cytogamy and caryogamy, with resultant doubling of the number of chromosomes, and finally the undoubling at meiosis. Such definition, however, appears to require modification in the light of events regarding fusion in bacteria and hyphal anastomoses among certain fungi, espeeially the Fungi Imperfecti. The fact that the morphologic features associated with fertilization are so strongly emphasized appears to preclude the possibility of appreciating that sex-behavior is basically a physiological or functional phenomenon in which structural features are not the causes but instead the effects, hence are secondary and accessory.

The present discussion is concerned primarily not with morphologic sex characters in plants but with functional activities of gametes or of their equivalent structures as bearing on an interpretation of "so-called" sex reversal. It will contain nothing that is really novel, but will be an attempt to reinterpret certain published data from the observations of others. A plethora of supportive data is available in the many publications dealing with fungi, algae, mosses, ferns, and seed plants that could be employed as corroborative evidence for lack of sex reversal in plants. To save time and space, only a few, selected from the many relevant ones, however, will be diseussed. These will deal with certain species of fungi and seed plants. In each example cited the faets will be stated, after which certain pertinent questions that could occur to anyone will be propounded. The answers may

be supplied immediately by the reader from his own point of view but the writer has elected to reserve his own answers and interpretations for the final general discussion. By so doing repetition will be avoided, basic similarities of sexuality among all plants will become apparent, and so-called sex reversal will appear in its true perspective.

Patterns of Sexual Behavior

Consideration will be given, in turn, to the behavior of one member of each of the orders of fungi, Chytridiales, Blastocladiales, Monoblepharidales, Saprolegniales, Peronosporales, and Mucorales and to three dioecious species of seed plants, *Mercurialis annua*, *Cannabis sativa*, and *Cucumis sativus*.

Among Chytridiales.—In *Synchytrium fulgens* from 12 to 20 planospores are formed within each sporangium. At an early stage each sporangial initial is uninucleate and, before the sporangial protoplast is cleaved, a sufficient number of nuclei is formed mitotically to provide a single nucleus for each planospore. Since all the nuclei arise from the parent nucleus or its proximate progeny one may assume that all the resultant planospores are potentially alike. But on emergence some behave as asexual elements and can develop directly into multinucleate thalli. Others fuse in pairs, hence somehow must have become "male" cells or else "female" cells. The sporangia therefore produce both asexual and sexual spores, as these terms are commonly employed. Since both kinds have the same origin how can one account for asexuality on the one hand, and sexuality on the other, or by what process did certain planospores become asexual whereas others became sexual? Could it be that all of them were sexual from the beginning? If all were not sexual from the beginning how was sexuality acquired?

Among Mucorales.—In 1904, Blakeslee (1920) established that the black mold, *Mucor mucedo*, is dioecious and designated one member of the pair required for production of zygospores as + and the other member as –. Each fused nucleus within the zygospore therefore contained the factors for + and –. But zygospores failed to form when he attempted to mate certain other isolates of *M. mucedo* with each of the two isolates of known mating potential. He therefore termed the strains which failed to mate with one or the other of known potentials as neutrals. But by cultivation of neutral strains at higher temperatures he found that certain of them could be mated either with the + strain or with the – strain. Did the neutral strain acquire sexuality and if so from what source or by what process? Moreover he established that all spores produced within the germ sporangium at germination of a given zygospore were of the same mating potential, i.e., all were either + or else all were –. How is it possible at meiosis to lose all of one mating potential and conserve all of the other? Surely it is naive to believe, as several investigators have maintained, that either all of the "male" nuclei degenerated during germination of certain zygospores or that all "female" nuclei degenerated in others.

Among Blastocladiales.—Emerson (1950) found that *Blastocladiella variabilis* is dioecious and that if its "female" gametes remain unmated some may develop to become thalli which bear only antheridia (male structures), and others only oogonia (female structures). One may inquire appropriately how femaleness became maleness in the first instance and how femaleness was retained in the second instance. Does lack of segregation of the "sex-determiners" at meiosis provide an adequate explanation for the behavior of Blastocladiella? Is sex a morphologic entity that can be partitioned at meiosis in this organism?

Among Monoblepharidales.—In *Monoblepharis polymorpha* the antheridium arises as a protrusion or branch from the oogonium. At an early stage of development the protoplasts of the two structures are not separated and the "male" and "female" nuclei must therefore be intermingled. Since the formation of the oogonium is well advanced before the antheridium begins to form as a protrusion from the oogonial wall should one assume that the "female" nuclei give rise mitotically to "male" nuclei which are to migrate into the antheridium? Eventually a septum is formed between the antheridium and oogonium. Before closure of the opening between the two sex structures is a signal given to the male nuclei to scurry into the antheridium? Such assumptions are patently absurd yet the fact remains that the antheridia arise from the oogonia in this species, and the cells liberated from the antheridium are motile sperms.

Among Saprolegniales.—Studies of the water mold, *Sapromyces elongatus*, led Bishop (1940) to conclude that this fungus consists of the following strains: (1) pure males (2) pure females, (3) neutrals, (4) sterile hermaphrodites, (5) females that can be mated with females, (6) males that can be mated with males. By what process did the females become males in the fifth category and the males become females in the sixth category? How can one explain the incidence of neutrals in the third category if sex is divisible? What difference in nuclear behavior, sex chromosome behavior, or in controls by sex-determining genes can be postulated to account for the production of spores of six strain categories within any single sporangium?

Among Peronosporales.—The investigation of Galindo and Gallegly (1960) that deal with *Phytophthora infestans* emphasize the influence exerted by nutrition on expression of sexual reactivity. They found that "when one of two isolates of opposite compatibility type and equal sexual strength are purposely starved, the starved isolate acted as a pure male. When the second isolate was starved, the first acted as a pure female. In a few cases studied the starved isolate always supplied the antheridia whereas the vigorously growing isolate penetrated the antheridium and formed the oogonium." How could change in nutritional level occasion reversal of sex if sex depends upon the complement of sex chromosomes, of gene determiners of sex, or of any other morphologie feature? Again, if sex is divided at meiosis or at any subsequent mitotic division, how can one explain sex reversal in this fungus?

Among Seed Plants.—The phenomenon of so-called "sex-reversal" has long been known to occur within seed plants but to date it remains without adequate explanation. These matters may be brought into focus by citation of results of three representative studies, one by Yampolsky (1919), one by Schaffner (1920), and a recent one by Galun and Atsmon (1960).

Yampolsky (1919) found that *Mercurialis annua* is both monoecious and dioecious. He noted among the flowers of female plants the existence of all intergradations from pure female to those with numerous male flowers. Moreover some male plants bore female flowers from which seed were matured. These observations led him to conclude that sex is not fixed in this species. If sex is determined by Mendelian factors and if *M. annua* has sex nuclei and sex chromosomes, how can one explain that this species is monoecious, dioecious, and of mixed sexual expression? At what stage or with what proeess did some plants become pure males, others pure females, and in others maleness and femaleness were not separated? Were any plants actually pure as to maleness or femaleness?

Schaffner (1920) observed that when seed of hemp, *Cannabis sativa,* are sown in the open, in spring, the ratio of pure carpellate to pure staminate plants that develop will be 1:1. If however, the seed were sown in the greenhouse, in winter, approximately 80% of the carpellate plants bore stamens and an equal proportion of the staminate plants bore carpels, the remaining 20% in each instance being pure carpellate or else pure staminate individuals. He also noted that when the apical inflorescences of carpellate plants were removed lateral axillary inflorescences developed having both carpels and stamens. Conversely when staminate plants were decapitated the lateral inflorescences which developed were composed of both staminate and carpellate flowers. These results compelled him to conclude that each staminate and each carpellate individual contains all the factors or potentials of both sexes. Moreover sex reversal (so-called) in hemp must take place in response to interaction of both external and internal factors. What more logical conclusion could be drawn, as was done by Schaffner, than that the Mendelian hypothesis of sex is not only wholly untenable but is extremely absurd. Surely change of environment from being grown in the open to being grown in the greenhouse did not eliminate the complement of chromosomes or genes as sex determiners, or inhibit their ability to function. Likewise the sex-chromosomes and gene sex-determining factors did not reside only in the inflorescences, making possible their eradication by decapitation. Rather it would appear that the potential for differentiation of expression of both maleness and femaleness exists in all of the cells of which the hemp plants are composed.

As regards the ratio of 1:1 of carpellate to pistillate plants, when hemp is grown in the open, such incidence may be anticipated from chance alone, as is the ratio of heads and tails when a eoin is tossed.

Galun and Atsmon (1960) considered the influence of age of leaves upon the sex expression of proximate floral buds of cucumber, *Cucumis sativus.* They concluded that every flower bud is potentially hermaphrodite. But when the floral buds arise near young leaves the content of growth substances in the young leaves induces a shift in sexual expression in the developing flowers toward becoming carpellate whereas when developing floral buds are near mature leaves the shift is toward becoming staminate. How can one aseribe differences in production of sex determiners to genetic mechanisms in cucumber? What relationship could meiosis have to postulated hermaphroditism? How can one employ the activities of nuclear structures to account for hermaphroditism and for the shifts toward sexual expression herein?

Interpretational Discussion

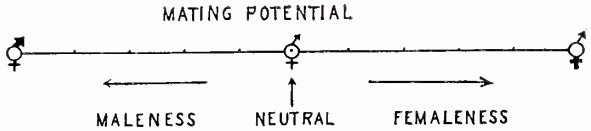
A clarification of concepts relative to the nature of sexuality and sex reversal in plants or the reappraisal of current credos for the purpose of trying to explain these phenomena will be impossible, regardless of the kind of answers that readers may have given to the various questions propounded herein, if one takes the all too common position that "My mind is already made up, so don't confuse me with facts." Nevertheless

an attempt is being made to bring unity out of the foregoing apparent contradictions and state of chaos.

If higher organisms have evolved from lower ones, a fundamental tenet in biology, attention may reasonably be directed to the fact that structural sex-differences are wholly lacking among many species of lower organisms, i.e. those which are universally regarded as primitive. Among lower organisms morphological differentiation of maleness and femaleness was antedated by expressions of sexual behavior. Could one conclude that sexuality must have evolved at several different times in the course of evolution of living organisms and that morphologic sexuality among higher organisms is therefore basically different from functional sexuality among lower organisms? The writer's answer to both parts of this question is an emphatic "No."

Further it is being asserted that sexuality basically is an ever-present, intrinsic, innate property of all living protoplasm that manifests itself by sexual behavior, as was previously indicated by the writer (Wolf, 1954) in his interpretation of sexuality in fungi. It is not structural because sexual structures, all of them, are the results not the causes of sexuality. Sexuality did not evolve but is a property which was possessed by the first bit of living protoplasm. Sexual structures however, have evolved. Sexuality is never lost by any living organism or is never acquired *de novo* by any process or as the result of the presence of any structure. From this it follows that living cells or organisms are never asexual. They may not express at all times their sexuality but they possess the potential for sex expression.

If sexuality is functional it is indivisible either at meiosis or at any mitosis. It does not consist of two entities, but rather of two complementary moieties. These moieties should be designated two mating potentials or compatibility types, as they express degree of imbalance between maleness and femaleness. This interpretation of sexuality is portrayed in the graph below. This



graph indicates the unity of sexuality with gradual increase of male potential and concomitant decrease of female potential in one direction and with gradual increase in female potential and decrease in male potential in the opposite direction. Such interpretation eliminates the existence of pure males and pure females, but indicates that there may be graduated degrees of complementary potentials from very strong to very weak in opposite directions.

Mating between gametes can occur only if there is a sufficient gradient or magnitude of imbalance in the potential for maleness and femaleness between a given pair of gametes. If, for example, the potentials are equal the gametes are neutral, and therefore they will not mate unless, through the operation of external or internal factors, the mating potential of one or both gametes becomes changed. The activity of hormonal growth controlling substances may be established eventually to be the internal factor. External factors, in turn, influence the internal factors.

Sexuality, as interpreted herein, cannot be Mendelian and is not heritable in any sense different from that of inheritance of any other property of living protoplasms, such as ability to respire, to photosynthesize, to synthesize any of the many products elaborated by plants, or to respond in metabolic activity to external environmental stimuli.

Whether a given gamete is able to mate with another gamete is determined by the degree of mating imbalance between them or by the relative strength of potential of the one to the other. This makes it possible for a given gamete to react as a male in one mating and as a female in another mating. But the fact remains, as stated by Snyder (1940) that "the fertilized egg cell, although it reacts normally in a way to manifest only maleness or femaleness yet these characteristics are only specific degrees of a continuous series of stages." This statement argues for the unity of sexuality but at the same time allows for lack of fixity of this property or characteristic.

Sexual patterns of behavior, as interpreted herein, cannot be attributed solely to the presence or the functioning of any single cellular component or structure. All of the structural elements of the cell interact interdependently in conditioning expression of sexuality as well as in controlling other activities. Unless all operate synchronously and harmoniously aberration and malfunction result.

The final chapter remains to be written that will adequately explain how external and internal factors are interrelated in the determination of differentiation of gametes and of shift in their expression of sexuality or mating potential. The solution of this problem, in relation to the entire problem of functional cell differentiation, is being earnestly sought. It is suggested that eventually functional differentiation may be found to be correlated with the configuration of the peptide chains composing the nucleoproteins.

Summary

Sex reversal, so-called, in plants is given consideration by a review of certain selected publications that deal with this phenomenon among fungi and seed plants. The data supplied by these publications are reinterpreted in an effort to harmonize differences among the interpretations.

Reinterpretation to indicate that sex is not reversed is based upon the credo that sexuality is a fundamental property possessed by all living protoplasm. It has existed since life began. Sexuality basically is not morphological or structural but is functional or physiological. Sex structures thus are not regarded as causal in sexuality but as resultant features.

Sexuality is an indivisible entity with binary potentials called mating potentials, having different gradations of maleness and femaleness. From this it follows that there are no pure males or pure females. Thus there can be no reversal of sex but only a shift in imbalance between the potentials. Such shift may be induced by internal factors (hormones) or by external or environmental factors.

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Control Mechanisms in Invertebrates

At the 22nd meeting of the Association of Southeastern Biologists, held in Lexington, Kentucky, 20-22 April 1961, a symposium on control mechanisms in invertebrates was sponsored jointly by the Society of General Physiologists and the ASB. The following are outlines of the three papers presented at the symposium.

Control of Pigmentary Effectors

Milton Fingerman
Newcomb College, Tulane University
New Orleans, Louisiana

The two types of pigmentary effectors occur in crustaceans, retinal pigment cells in the compound eye and chromatophores primarily in the integument underlying the exoskeleton. The retinal pigments are involved in photomechanical adaptation of the compound eye in response to changes in illumination. The major function of chromatophoral pigments is to provide protective coloration.

Migration of the pigments in both types of effector is mediated by substances produced in neurosecretory cells. The distribution of these cells has been determined in the dwarf crayfish, *Cambarellus shufeldti*. Five groups of neurosecretory cells were identified in the supraesophagieal ganglia alone.

The role of endocrines in regulating the distal retinal pigment has been investigated in recent years. It had been known that migration of this pigment toward the fully light-adapted position was mediated by a substance in the sinus gland and central nervous organs. Only recently, however, has direct evidence been adduced for a principle that causes the distal pigment to migrate toward the fully dark-adapted position. Injection of eyestalk extracts into the crayfishes *Orconectes clypeatus* and *Cambarellus shufeldti* and into the prawn *Palaemonetes vulgaris*, all of which were in a darkroom, resulted in immediate migration of the distal pigment toward the fully light-adapted position. However, if throughout the experiment the assay animals were exposed to an intensity of illumination which would maintain the distal pigment in a state approximately midway between the fully light-adapted and dark-adapted positions, then after the light-adaptational response had run its course, a dark-adaptational response would be observed. Through the use of filter paper electrophoresis, these antagonistic light-adapting and dark-adapting principles have been separated from one another.

Investigations in which the same crustaceans, *Cambarellus, Orconectes,* and *Palaemonetes,* as well as the grapsoid crab *Sesarma reticulatum* were utilized, have revealed that the chromatophores of these animals are also regulated by antagonistic substances. In each of these animals it has been shown that migration of their chromatophoral pigments is mediated by pigment-concentrating and pigment-dispersing principles. An attempt was made to determine the effects of long-term adaptation to a specific background upon the chromatophores and neurosecretory cells. It was found that the rate of pigment migration gradually decreased during the

period of adaptation and futhermore, that the hormone in the circumesophageal connectives not needed by the animals during the period of adaptation, e.g. darkening hormone in animals on a white background, was present in greater quantity in them than in animals that needed the hormone for background adaptation. This experiment (1) showed what happens to the target organ and the endocrine sources when animals are exposed to the same background for a long period of time and (2) provided the first direct evidence that chromatophorotropins outside the eyestalk play a normal role in control of color changes. No chromatophorotropin is chemically the same as either of the retinal pigment activating principles. This conclusion is based upon differences in the electrophoretic behavior of the hormone.

Invertebrate Contributions to the Analysis of Organized Systems of Neurons

THEODORE H. BULLOCK
University of California, Los Angeles

Analysis of mechanisms of control proceeds at several levels from the integrative properties of the single neuron to the organizational features of the brain.

The neuron has been shown to include a variety of differentiated types of membrane and correspondingly different kinds of response. Only one of these is the all or none spike or nerve impulse, specialized for long distance propagation, in axons. The others are graded, labile and local and may give rise to a spike if they depolarize enough and at the right place. The spike initiating locus, generator synaptic, pacemaker and local potentials each occur in limited regions of dendrites or soma. Integrative flexibility comes from their gradation, their spread which is local and decrementol, the anatomy of the cell and its opportunities for convergence and the timing of the several labile prepotentials, which can sum facilitate or defacilitate. Much of this has been worked out with intracellular electrodes in lobster cardiac ganglion, crayfish stretch receptor, squid and gastropod giant cells among other invertebrates.

Evidence of increasingly complex integration in groups of neurons includes such recent observations as the following. Some cells require a convergence of certain presynaptic elements to fire. This reaches considerable complexity as exemplified in 3rd or 4th order cells of the visual system only to moving objects of small radius.

Another set of possibilities for control is represented by the cases of centrogenic pattern. Some actions like a lobster heart beat, swimming in the leech and feeding rhythms in lugworms are probably due to rhythms arising in the central nervous system and requiring no timing cues from sense organs but only an adequate steady state. Even more actions depend on a sensory trigger but are formulated by pre-existent central patterns of command as in sneezing, coughing, and ordinary reflexes.

Besides the analysis of nervous organization by methods of electrical recording and of stimulation and ablation of parts, significant contributions are being made by the methods of control systems engineer observing the whole animal's reaction while interrupting some feedback link permits useful and quantitative statements of minimal connections time constants and components of the system controlling that reaction.

Some Recent Advances in Insect Endocrinology

DIETRICH BODENSTEIN
University of Virginia

Growth in insects finds its visual expression in molting. It is a cyclic process, in which periods of rest alternate with those of active growth. Because of this peculiar organization, molting is a feature of cardinal importance to insects and all physiological and metabolic functions are adapted to serve an aid its progress. Molting involves not only growth but also differentiation; it is a highly complicated process in which a precise integration of all the component parts involved is prerequisite. This integration is under the control of hormones, the great biological co-ordinators. In the last two decades, we have learned a great deal about insect hormone activities, and recently impressive progress has been made in the analysis of the chemical components of some of these hormones. And yet, our understanding of the mechanism by which these substances exert their effects on the target systems is almost nil. Great difficulties are further encountered in appraising the role played by each gland of internal secretion in the humoral system. Far too little is known concerning the factors humoral, nervous, or other that activate, enhance, or depress the secretory activity of specifie glands or hormone systems. In some instances, we are not even certain as to which hormone is responsible for a specific task. With so much uncertain, it is timely to discuss briefly how these and other difficulties affect the interpretative accuracy of the physiology of action of insect hormones.

News of Biology in the Southeast

About People

Dr. Harry Bennett, Secretary of the ASB Bulletin, is Director of a program of summer training sponsored by the NSF. This program is for high school students who wish to work in Marine Biology at the Gulf Coast Research Laboratory, and will be run in three separate periods of three weeks duration. Ten boys will be selected to attend each session. Dr. Bennett was also recently elected President of the Louisiana Science Teachers Association.

Dr. Ronald C. Fraser of the University of Tennessee Department of Zoology and Entomology has received a one-year grant of $7,417 from the American Cancer Society to continue studies on immunization against tumors in mice.

C. W. Hart, Jr., Editor of the ASB Bulletin, has received a grant from the American Philosophical Society to continue his work on the freshwater shrimps of the Caribbean islands. In 1962 he will collect shrimps on Guadeloupe, Martinique, Dominica, and Barbados.

Dr. S. Leonard Doerpinghaus of the Biology Department at Agnes Scott College has been promoted to Associate Professor.

Dr. Nancy Groseclose, long a member of the Biology teaching staff at Agnes Scott College, received her Ph.D. degree from the University of Virginia this June; she has been promoted to Associate Professor.

Mr. Fred Parrish, Instructor of Invertebrate Zoology at Agnes Scott College, has received a Danforth grant to continue his research.

Dr. S. Leonard Doerpinghaus, Associate Professor of Botany at Agnes Scott College, is attending the National Science Foundation Institute for Marine Biology this summer in Oregon.

Mr. Francis M. Bush, who will complete all of his requirements for the Ph.D. in August at the University of Georgia, has accepted a positioin as Assistant Professor of Biology at Howard College, beginning September, 1961.

Dr. C. C. Hall of the Department of Biology at Howard College is teaching in the Summer Science Institute in the Department of Biology held at Stephen F. Austin State College, Nacogdoches, Texas.

Mr. Bruce Dowling, Assistant Executive Director of the Nature Conservancy, Washington, D. C., visited the State of Alabama and observed various natural areas with Mr. Gibbs Patton of the University of Alabama Department of Biology, who is Alabama State Representative for the Nature Conservancy.

Dr. B. Theodore Cole, Associate Professor of Biology at the University of South Carolina has recently received a two year grant of $25,000 from the National Science Foundation. Dr. Cole is undertaking a comparative study of lipid constituents and changes therein, of normal, adult, embryonic and pathological cells and cell fractions.

Three graduate students in Zoology at L. S. U.—**Delwyn G. Berrett, Laurence C. Binford,** and **Edward Armstrong**—have just returned from southern Mexico, where they pursued problems in avian biology. This was Mr. Berrett's second 4-month expedition to Mexico.

George C. Kent, Jr., L. S. U., appeared on the Lecturers and Artists Series at Maryville College in April. The lecture, designed for a general audience, was entitled "The Biologist's Entelechy," and was concerned with the charaeteristics of life as presently understood at the molecular level.

Professor J. T. Penney at the University of South Carolina is anxious to obtain specimens of Spongillidae from many areas. It would be appreciated if Louisiana biologist who are in the field would find it possible to collect small pieces and send them to Dr. Penney. The specimens may be preserved dry or in any of the conventional fluids. Dr. B. T. Cole, former editor of the *Proceedings*, is now a colleague of Dr. Penney's.

Norman Negus, Tulane University, is spending a sabbatical working on mammal population dynamics at Jackson Hole, Massachusetts.

Dr. George Penn, Tulane University, is on leave to work on hybridization and in specific competition of dwarf crayfishes in Louisiana.

Dr. A. J. Sharp, head of the Department of Botany at the University of Tennessee, will relinquish his administrative duties in September, 1961, in order to devote full time to teaching and research. Since coming to the University of Tennessee in 1929, Dr. Sharp has made many studies of the plants in the Southern Appalachians. and has also studied the flora of Guatemala and Mexico where he spent two years as a Guggenheim fellow. Dr. Sharp has held offices in numerous botanical societies and is now President of the American Society of Plant Taxonomy. Succeeding Dr. Sharp as head of the Botany Department will be **Dr. Walter R. Herndon, Jr.** of the University of Alabama. Dr. Herndon received his B.S. and M.S. degrees from the University of Alabama and the Ph.D. from Vanderbilt University. He has taught at Vanderbilt and Middle Tennessee State College, and is now associate professor of botany at the University of Alabama. He has spent several summers at Woods Hole, Mass., studying marine algae and is now engaged in studies on radioactive effects on algae.

Charles DePoe who will receive his Ph.D. from the Department of Botany at North Carolina State College, Raleigh has accepted a position as Assistant Professor of Biology at Northeast Louisiana State College in Monroe, La. and will begin his duties September 1.

Dr. R. W. Menzel of Florida State University has received a grant from the Fire Island Sea Clam Company of New York to conduct research on clam mericulture. Clams will be planted on a semi-commercial basis to determine what precautions will be needed to grow clams commercially in Florida. The results of the investigation will be available to anyone interested in such a venture.

Dr. Beryl C. Franklin, formerly Assistant Professor of Zoology at L. S. U., and **Dr. Herbert S. Wallace,** formerly Professor of Biology at Franklin College in Indiana, have joined the staff of the Biology Dept. at Northeast Louisana State College.

E. B. Chamberlain, Jr., left employ of Florida Game and Fresh Water Fish Commission May 1, 1961, to accept employment with the U. S. Fish and Wildlife Serviee in Atlanta, where he will serve as Assistant Federal Aid Supervisor. He was employed by the Florida Game

and Fresh Water Fish Commission for 13 years during which time he served as Assistant Federal Aid Coordinator, Federal Aid Coordinator and Chief of Game Management.

E. T. Heinen left employ of Florida Game and Fresh Water Fish Commission March 19 to accept employment with the International Cooperation Administration for assignment in Sudan working on a hyacinth control project in the Nile River. He was employed by the Florida Game and Fresh Water Fish Commission for 12 years during which time he served as Fish Management Technician, Division Director and Chief of Fish Management.

Dr. William H. Adams, Jr. Associate Professor of Biology at Tennessee Wesleyan College, has received two NSF grants for this summer—one as an independent investigator at the Highlands Biological Station conducting research on the ecology of mammals in the gorges of the southeastern escarpment of the Blue Ridge Mountains, and another for participation in the ORINS Radiation Biology Institute at Oak Ridge.

Mary Warters, Centenary College of Louisiana, has received a grant of $3,478.00 from the Atomic Energy Commission to continue studies on X-autosomal translocations of *Drosophila melanogaster*.

Institutions and Organizations

Northeast Louisiana State College at Monroe has under construction a new Biology-Geology building which is scheduled for completion January 1, 1962. The two story air conditioned structure will house laboratories and classrooms for both biology and geology. Faculty offices are provided with research areas. A dark room, animal room, constant temperature room, walk-in-freezer, and herbarium are also provided in the new structure. A uniquely designed, circular museum area will provide display space for both departments and will be made available for public viewing.

The Highlands Biologieal Station has been awarded a grant of $91,500 by the National Science Foundation to support research in the gorges of the southeastern escarpment of the Blue Ridge Mountains over a 3-year period. Two types of grants are provided: (1) Post- and Pre-doctoral grants for independent investigators, and (2) Post- and Pre-doctoral grants for Research Participants. Dr. H. J. Oosting, Duke University, is the Coordinator of the Project. Full details and application blanks may be secured from the Director, Highlands Biological Station, Highlands, N. C.

The Biology Department of Spring Hill College was awarded a grant of $1000 by the Esso Foundation for the support of research by staff members.

The University of Kentucky has recently opened new 2-year University Centers, and dedicated new buildings, at Henderson (Northwest Center), Covington (Northern Center), and Cumberland (Southeast Center). The University now has a total of 5 off-campus centers; the other two being at Ashland and at Fort Knox.

The Department of Botany, University of Kentucky, recently added **Dr. Edward T. Browne, Jr.** to its staff as an Assistant Professor. Dr. Browne came to Kentucky from the University of Georgia and received his Ph.D. from the University of North Carolina. Dr. Browne's speciality is in systematic botany. He has been appointed Curator of the Herbarium.

The Gamma Rafinesque Chapter of Phi Epsilon Phi, the National Botanical Honorary Fraternity, has been reactivated at the University of Kentucky. Faculty advisor of the group is Dr. Carl E. Henrickson.

A chapter of **Alpha Epsilon Delta,** International Premedical Honor Society has been installed at the University of Kentucky. It will be known as the Kentucky Beta Chapter. Faculty advisor is Dr. Robert A. Kuehne, Assistant Professor of Zoology.

The new Medical Center at the University of Kentucky began operations last fall with the admission of its first class of 40 students. Total cost of the Center will be $27,000,000. The Medical Science Building ($5,300,000.) is already completed, and the Hospital ($9,100,000.) and Dental Science Building ($2,300,000.) are scheduled for completion by the end of the year.

The University of Kentucky is scheduled to start or complete within the next two years buildings totalling approximately $16.000,000. These include a Chemistry-Physics building ($5,600,000.), Library addition ($2,000,000.), Woman's Dormitory and Central Dining Unit ($1,750,000.), College of Commerce ($1,800,000.), four Fraternity Houses ($600,000.), Addition to Student Union ($2.000,000.), Spindletop Research Institute ($1,300,000.), and an Agricultural Research Center ($1,000,000.).

The Department of Zoology, University of Kentucky, recently added **Dr. John A. Wallwork** to its staff as an Assistant Professor. Dr. Wallwork is an acarologist and soil zoologist, a graduate of the University of Wales, United Kingdom. He received his Ph.D. from the University of Michigan and has been teaching the last three years in the University College of Ghana at Legon, Accra, Ghana.

The University of North Carolina Department of Botany has been awarded a $24,200-grant by the National Science Foundation. The money will be used to purchase an electron microscope and other instruments.

The Biology Department of Alabama College recently received a grant of $9.200 from the Atomic Energy Commission for the purchase of teaching equipment to be used with radioisotopes. A new laboratory has been prepared for this equipment in which a Radiation Biology course will be taught. The equipment will also be used for demonstration purposes in the introductory courses.

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NIH Laboratory—Williams Building, South Carolina State Hospital, Columbia

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The Association of Southeastern Biologists

ASB BULLETIN

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C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
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To enable the nominating committee to function more effectively this year, nominations for persons to fill the following positions should be made at this time: **President elect, Vice-president, Treasurer, and two Executive Committee members.** Please mail your nominations to *Dr. Victor A. Greulach, Department of Botany, University of North Carolina, Chapel Hill, N. C.*

The National Institutes of Health Laboratory at Columbia, South Carolina

By MARTIN D. YOUNG[1, 2]

In 1831 the Office of Malaria Investigations, National Institute of Health, U.S. Public Health Service, under the direction of Dr. L. L. Williams, Jr., Washington, D. C., decided to establish a field station for the purposes of perfecting methods of the use of malaria in the treatment of neurosyphilis and of studying the biology of malaria.

After a survey, Dr. Bruce Mayne selected the South Carolina State Hospital on May 26, 1931.

During the first years, the work was on the epidemiology of malaria, using as an investigational method the inducing of malaria in neurosyphilitic patients. Particular interest was placed on the transmission of malaria by injecting sporozoites. On June 16, 1937, the writer joined the staff for the purpose of enlarging the work in parasitology. In March of 1938, Dr. G. Robert Coatney joined the laboratory staff for the main purpose of working on pigeon malaria, which he had discovered some years previously. Dr. Coatney remained until January 1941 when he transferred to Washington to devote his time to the development of new drugs for malaria.

Dr. Bruce Mayne died April 30, 1941. The writer was placed in charge of the laboratory. On January 28, 1942, Dr. Robert W. Burgess joined the laboratory as entomologist. His immediate objective was to establish an insectary of anopheline mosquitoes and to produce large quantities of these insects infected with malaria.

Upon the outbreak of World War II, it became obvious that foreign malarias were being returned in troops from the South Pacific and that we had inadequate knowledge of the ability of these malarias to be transmitted by native mosquitoes and to establish themselves in this country. At the request of the Army and Navy, the U. S. Public Health Service through the National Institute of Health and the Malaria Control in War Areas Office established the "Imported Malaria Studies Program." This special study was activated in November 1943 with headquarters in the NIH laboratory in Columbia. A branch laboratory was set up in Letterman General Laboratory in San Francisco, California, in December 1943. The object of this laboratory was to study the vectorial ability of the California mosquitoes. During the one year that this laboratory operated, it was found that the mosquitoes of the west coast were efficient vectors of foreign malarias. The work led to the colonization for the first time of *Anopheles freeborni* which has proven by comparative studies to be the best malaria vector in the United States. Because of this charaeteristic, it has been used extensively in experimental work with human and simian malarias.

Other laboratories were established at the Harmon General Hospital in Longview, Texas, and the Moore General Hospital in Swannanoa, North Carolina, for the purpose of studying relapsing malaria in returned troops. In addition to these IMS operated laboratories, foreign malaria were studied in several other military hospitals. There were eight cooperating state, Veterans, and private hospitals who used the

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foreign malarias for the treatment of neurosyphilis, thus adding to the information.

Over 1000 military personnel with relapsing malaria were observed to collect various data. Approximately another 1000 patients, either neurosyphilitic patients or volunteers, were given the foreign malarias.

The biology of the foreign malarias was extensively studied. The *vivax* malarias were shown to be similar in many respects to the domestic malarias but are more virulent. The Chesson strain of *Plasmodium vivax* from the Pacific, because of its characteristic of early and frequent relapses, was isolated and has become the standard for the testing of potential antimalarial drugs. The foreign malarias, although varying in their ability to infect native mosquitoes, could be transmitted by them under usual malariogenic conditions. The malarias were infective to mosquitoes during both symptomatic and asymptomatic parasite relapses.

The IMS group at Swannanoa also did a detailed study on returned cases of infections of *Wuchereria bancrofti* which showed a diurnal periodicity of microfilariae in the blood stream rather than a non-periodic or aperiodic periodicity formerly ascribed to filariasis from the South Pacific. Further, it was shown that 10 American mosquito species could transmit this worm but epidemiologically probably only two, namely, *Culex pipiens* and *C. quinquefasciatus,* were potentially dangerous.

The Imported Malaria Studies accomplished its objectives and upon recommendation of its Director officially discontinued its work on June 30, 1945. At this time the laboratory at Swannanoa became a part of the National Institute of Health, as a branch of the Columbia laboratory.

On November 29, 1944, the laboratories entered into a cooperative drug experiment with the Division of Chemotherapy under the direction of Dr. Coatney. Prisoner volunteers in Atlanta, Georgia, and at Seagoville, Texas, were given malaria against which new drugs were tried.

Shortly after the Atlanta prison work was started a similar cooperative drug experiment was begun with Dr. Alf S. Alving at Chicago, wherein we infected his prisoner volunteers at the Illinois State Prison, Statesville, Illinois. First the Columbia and later the Milledgeville laboratory cooperated in this project.

In June 1945 a field laboratory for a short time (11 months) study of the ability of native mosquitoes to transmit indigenous malaria was established at Manning, South Carolina. The study showed that in an area of low endemicity the asymptomatic malaria carrier, often with very low parasitemia, is the important factor in the transmission and maintenance of the malaria. This helped explain some puzzling epidemiological problems in other parts of the world.

We had been requested several times by the superintendent to establish a laboratory at the Milledegeville, Georgia, State Hospital. The work with relapsing malaria in returned soldiers being completed at Swannanoa, that laboratory, with its personnel, was moved to Milledgeville, Georgia, on March 8, 1946. The principal objectives were to study the biology of foreign malarias induced in neurosyphilitic patients and to continue the participation in the cooperative drug studies by producing infected mosquitoes and infecting prisoner volunteers. Dr. Geoffrey M. Jeffery joined the Milledgeville staff on June 3, 1948, and assumed charge of the laboratory when Dr. Eyles left for post-graduate study.

During the summers of 1944, 1945, and 1946, Dr. Mary Stuart MacDougal, head of the Biology Department of Agnes Scott College and an internationally known cytologist, worked at Columbia on the eytology of the malaria parasite. In June 1948, Dr. Gordon B. Wolcott joined the staff to conduct research in the cytology of malaria and other parasites.

During the first twenty years the main emphasis was on malaria in the areas of host-parasite relationships, biology and cytology of the parasites, chemotherapy, use of malaria in the treatment of neurosyphilis, and the biology, colonization, hybridization, and vectorial abilities of anopheline mosquitoes. Much basic information was obtained.

In addition to the internal programs, the laboratory was the principal supplier of human malaria for the large seale programs for the development of new and better antimalarial drugs. This was made possible by techniques perfected here for the mass production of mosquitoes infected with human malaria. Out of the cooperative chemotherapy program came the superior drugs now standard for the treatment of malaria. At the same time, independent researches in the laboratory developed the chemotherapy of *P. malariae* (quartan) malaria, which type was not included in the large cooperative studies.

Other researches were performed in the field of parasitology, especially the particular problems related to patients in mental hospitals, such as the high rate and intensity of infections. Investigation of some patients with severe dysentery revealed *Balantidium coli* infections, the first time this parasite had been described from South Carolina. Several cases were found, representing about twenty per cent of all found to that date in the United States. Treatment with carbarsone was successful, proved by a ten-year follow-up.

On June 15, 1950, the Columbia laboratory became the headquarters for the Section on Epidemiology consisting of laboratories at Columbia, South Carolina, Memphis, Tennessee, Milledgeville, Georgia, and Seagoville, Texas.

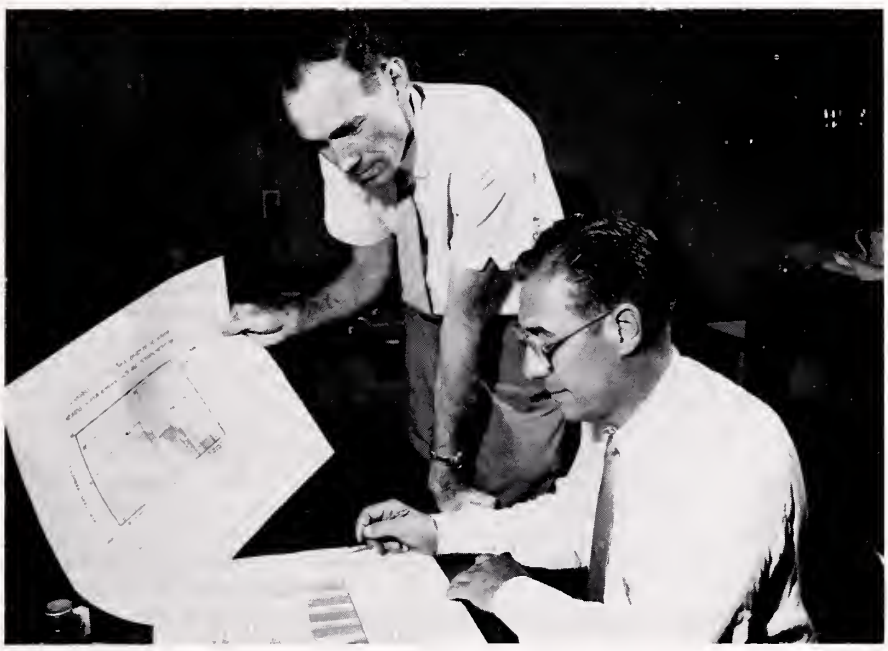
The Memphis laboratory was changed completely from malaria to the study of toxoplasmosis and the epidemiology of intestinal parasites, with Dr. Don E. Eyles in charge.

The Milledgeville laboratory continued to do basic research in malaria, as well as the cooperative malaria chemotherapy study with Dr. Coatney. The epidemiological study of intestinal parasites in a mental hospital population was begun. The laboratory at the Federal Correctional Institution at Seagoville, Texas, was for the study of the transmission of parasites using prisoner volunteers, under the direction of Dr. Robert C. Rendtorff.

The Columbia laboratory, in addition to its malaria studies, began an experimental chemotherapeutic program on intestinal parasites in mental patients. Also started was a study of virusparasite relationships and the relationship of toxoplasmosis to mental conditions.

Malaria work being further de-emphasized, the Milledgeville laboratory was closed on August 15, 1954. Dr. Jeffery and two staff members were transferred to the Columbia laboratory. Dr. Jeffery started a program studying the epidemiology of intestinal parasites in the mental patients and later, upon departure of Dr. Rendtorff in September 1955, undertook the investigation of the transmission of viruses by parasites.

During these years, despite the reduction in the amount of malaria research, there were nevertheless some significant findings. The tissue phases of *Plasmodium falciparum* were found in the liver following careful and detailed experiments. The discovery in a return veteran of *P. ovale,* which species had not been reported previously in the United States, resulted in an epidemiological study elucidating the factors which might contribute to its transmission and establishment in this country. Cooperative work on malaria drugs continued with other groups resulting in much additional knowledge in this field.



Dr. Geoffrey M. Jeffery, former Editor of the ASB Bulletin, and the author, Dr. Martin D. Young, examine charts showing the results of tests with a new hookworm drug.

Basic studies in malaria elucidated for the first time the chromosome patterns for all of the human malarias. Experimentally induced malaria infections observed throughout the complete life history added valuable epidemiological information which became of immediate value in predicting the course and transmissibility of malaria infections. This information was of special value for the evaluation of malaria eradication programs. Hybridization of two important malaria vectors established a new approach in research, which was readily adopted by other laboratories. Research by a summer investigator showed that four anophelines could transmit bird malaria, thus contributing to the revision of the long-held opinion that anophelines were vector specific for human malaria and culicines for avian malaria.

The rapid appearance of resistance to pyrimethamine by *P. vivax, P. falciparum,* and *P.*

The ovaries of caterpillars are removed and transferred to tissue culture slides by Dr. William E. Collins, Biologist.

malariae was shown experimentally. The resistance was evident in the first relapse usually within several weeks, after treatment with the drug. Both the schizogonic forms and the gametocytes were resistant to the drug, the resistance factor was maintained after mosquito transmission and after preservation at low temperatures.

A study of the sporontocidal effects of drugs showed that pyrimethamine was very rapid in its action against susceptible parasites in the mosquito, being effective usually in less than one day. After resistance appeared, the sporontocidal effect was lost. Primaquine was an effective sporontocide but sterilization of the gametocytes required a day or so longer. However, very small doses, as low as 1.5 mg. daily, were sporontocidal. So far no resistance to primaquine has been demonstrated. Chloroquine has no sporontocidal effect. Recently the first documented resistance of human malaria to chloroquine was demonstrated.

In a cooperative experiment with Dr. Coatney at the Atlanta Federal Penitentiary, it was shown that 25 mg. of pyrimethamine or 300 mg. of chloroquine consumed weekly in table salt suppresses malaria.

Phase contrast and cinephotomicrographic studies of living malaria parasites revealed new information about the life cycle, especially fertilization, and about the relationships of the parasites to the host red blood.

Considerable information was obtained on the infectivity of human malarias to mosquitoes. It was shown that in addition to being infectious during the primary attack, malarias might infect mosquitoes during the chronic asymptomatic periods and for a much longer time than had been generally thought.

The development of methods for preserving human malaria parasites at about – 78° C has resulted in the maintenance of virulent strains for over four years and perhaps longer. Many of the important standard strains of malaria are being preserved in the laboratory.

An expansion of the epidemiological work on the heavy parasitic infections in some mental patients revealed valuable basie epidemiological information. It was shown that *Trichuris* and hookworm parasites can exist for at least six years in infected patients without much reduction even when there is no transmission or acquisition of new infections. The interruption of transmission of these two parasites was obtained with improved housing and striet hygienic measures but the transmission of protozoan parasites continued.

For the first time, infeetions of *Isospora* were found in South Carolina. This new parasite apparently was responsible for otherwise unexplained epidemics of diarrhea in a home for mental defectives. So far no treatment is known.

Another parasite new to the State was found, that is, *Gongylonema*. It was actively migrating in the lip mucosa of a rural woman and the most logical source of infection was the contamination of the drinking water. This brought to three the parasites new to the State described by members of the Columbia laboratory.

The Seagoville experimental transmission of intestinal protozoa revealed the infective dosages and duration of the certain parasitic infections as well as other biologieal information.

Field epidemiological studies by the Memphis laboratory related the incidence of intestinal parasitic infections to the various economic and hygienie conditions.

The study of toxoplasmosis at the Memphis laboratory was intensively directed toward therapy following a fatal infection in one of the technicians. This resulted in the development of the first and only known treatment of the disease which is a eombination of sulfas and pyrimethamine. The efficacy of the treatment was demonstrated dramatically by the quick recovery of a second laboratory technician who developed the disease. This therapy has been found useful in other *Toxoplasma* infections in adults.

Also, certain eye conditions respond to this therapy. As the reeognition of the pathogenic

effects of toxoplasmosis grows, the discovery is becoming of inercasing value.

By extensive field and laboratory studies much information was obtained on the epidemiology of toxoplasmosis in man and animals and the possibility of the latter being a reservoir for human infections.

Puromycin, an antibiotic, was found to be curative of symptomatic and asymptomatic *Entamoeba histolytica* infections. Given at weekly doses it appeared to be prophylactic against intestinal parasitic protozoa even on wards where a high degree of risk was involved.

Dithiazanine, a cyanine dye, was shown to be effective with the first treatment against the heavy infections of *Trichuris trichiura* often found in mental patients. However, subsequent treatments were less effective. Regular weekly and quarterly administration of the drug given to the occupants of one entire building did not prevent the transmission of these parasites nor greatly reduce the incidence after the initial dose.

Four salts of bephenium, a quaternary ammonium compound, were shown to be effective against hookworm, the hydroxynaphthoate and chloride salts being about twice as effective as tetrachloroethylene, the standard, albeit comparatively ineffective, hookworm drug.

Diphyllobothrium uris, a tapeworm infecting bears and man in Alaska, was found to have a haploid chromosome number of nine.

The new project on viruses showed that parasite larva entry into the skin could simultaneously inoculate papilloma viruses which were present. Some associations were shown between intestinal parasites and viruses.

Improvements were made steadily in the technique of inducing and handling malaria for the treatment of neurosyphilis. The laboratory acts as the national center for strains of therapeutic malaria, having supplied some 3000 inocula to other hospitals and physicians for therapy of neurosyphilis, nephrosis, and arthritis. About 2000 neurosyphilitic patients at the South Carolina State Hospital have been inoculated and followed during the course of the disease as a eooperative program with the hospital. It is estimated that some 20,000 neurosyphilitic patients have been inoculated or subinoculated with strains of malaria maintained and furnished by this laboratory.

In January 1959, in a reorganization, the Laboratory of Tropical Diseases was dissolved and four new laboratories organized. The Columbia laboratory was placed in the new Laboratory of Parasite Chemotherapy as the Section on Epidemiology and the Memphis Laboratory also became a separate Section on Cytology, thus severing its administrative connection with Columbia.

With the reorganization, malaria research was again emphasized, especially as related to problems concerned with eradication programs in various countries. Basic information was sought on the life histories, response to drugs, infectivity to mosquitoes during all phases of the life cycle, etc., as these factors are important in understanding the epidemiology of the disease, especially in evaluating its disappearance.

The result of the above researches at the Columbia and associated laboratories have been published in over 200 papers.

Many foreign scientists have visited the laboratory for short periods, and in some cases for several months to do research. The laboratory has frequently given training courses in malaria for Public Health Service personnel.

As the laboratory enters its thirtieth year, the field of investigation is much broadened. In addition to the malaria investigations, study continues on the problem of the heavy parasitism found in patients of mental institutions with particular emphasis on epidemiology and improved therapy. The association of viruses with protozoan and worm parasites as well as with mosquito larva is being investigated. Attempts are being made to culture insect tissues. A study of parasite physiology is directed toward elucidating drug action, especially against malaria and intestinal worms. Drug resistance in these parasites and ways to avoid or overcome resistance are of particular interest.

Margaret Jean Westbrook, Medical Biology Technician, removes a baby chick from a cage containing mosquitos infected with malaria.

Items of Interest: The Denver AAAS Meeting

The 128th meeting of the American Association for the Advancement of Science, which will be held at Denver, Colorado, 26-31 December 1961, will include sessions of 18 AAAS sections and of some 75 participating organizations. The following programs may be of interest to members of the ASB who plan to attend this meeting.

Sectional Programs

AAAS Section C—Chemistry and cosponsors. Among the sessions will be a two-session symposium, "Extraterrestrial Biochemistry and Biology," arranged by Charles R. Phillips, Dec. 27. Titles and speakers at the morning session will be: "Factors Limiting the Long Term Viability of Organisms," Philip H. Abelson; "The Borders of Biochemical Evolution," Sidney W. Fox; "Life Spectra," Harry C. Stubbs; and "Studies of Microorganisms under Extraterrestrial Environment," Richard Ehrlich and Ervin J. Hawrylewicz. Titles and speakers at the afternoon session: "Biological Profile of Mars," Hubertus Strughold; "Interstellar Panspermia," Carl Sagan; "Concerning the Entry and Survival of Microorganisms in Meteorites," Frederick D. Sisler and Walter L. Newton; and "Safety Practices Applicable to Exobiological Research," Charles R. Phillips and Arnold G. Wedum.

AAAS Section N—Medical Sciences and cosponsors. Four-session symposium, "Physiological and Biochemical Aspects of Human Genetics," arranged by Alexander G. Bearn and Oscar Touster, Dec. 29, 30. Topics and speakers will be:

A. Structure and Specific Action of DNA—J. Marmur, R. L. Sinsheimer, J. Hurwitz, A. E. Mirsky;
B. Gene-Protein Relationships, Part I—C. Baglioni, David M. Bonner, G. D. Novelli, O. Smithies;
C. Gene-Protein Relationships, Part II—R. Ceppelini, H. N. Kirkman, A. G. Motulsky, A. G. Steinberg;
D. Tissue Culture and Immunological and Evolutionary Aspects—C. L. Markert, R. D. Owen, T. T. Puck.

Societal Programs

Alpha Epsilon Delta. Annual symposium, "Career Opportunities in the Health Professions," arranged by Maurice L. Moore; annual luncheon and address; Dec. 28.

American Nature Study Society. Among the sessions: "Molecular Biology," Alfred Novak presiding, Dec. 27; "Nature Study Around the World," Richard L. Weaver presiding, Dec. 27; "Outdoor Nature Interpretation," Dec. 28; joint program with the National Association of Biology Teachers, "Conservation and International Resource Department," Dec. 28; joint field trip with NABT, Dec. 29; motion-picture film, *Nature Adventure Around the World*, Dec. 29; sessions on "Natural History of the Rocky Mountains," Ruth Hopson presiding, Dec. 30.

American Physiological Society. Session, "Physiological Factors in Manned Lunar Space Flight," arranged by Robert E. Smith, with Loren D. Carlson presiding, Dec. 29. Included will be: "Neurophysiological Aspects," W. Ross Adey; and "Hemodynamic Evaluation at Null Gravity," Nello Pace; and a panel discussion, "Space Physiologists: Their Role, Availability, and Training."

American Psychiatric Association, Committee on Research. Two-session symposium, "Genetics and Evolution in Relation to Human Behavior," arranged by David A. Hamburg, Dec. 27. Among the titles and speakers will be: "An Outline of Human Evolution," S. L. Washburn; "Baboon Behavior," S. L. Washburn and Irven DeVore; "Evolution of Primate Social Behavior," Irven DeVore; "Evolution of Culture in Africa," J. Desmond Clark; "Selective Forces in the Evolution of Man," Ernst W. Caspari; Theodosius Dobzhansky.

American Society of Naturalists. Annual national meeting, arranged by Ernst W. Caspari, will feature the presidential address of Marston Bates, "Man's Ecological Niche," Dec. 27, morn. The business meeting of the society will follow.

American Society of Zoologists. Final program of the national meeting of the Society, arranged by Ray L. Watterson, with more than 30 sessions, includes 15 sessions for contributed papers, sponsored by all six divisions of the Society, throughout the meeting period; business meetings of five divisions; and a series of symposia. Symposia are as follows: "Neurosecretion," three sessions, arranged by Nancy S. Milburn, Dec. 28, 29; "Vertebrate Locomotion," arranged by D. Dwight Davis, Dec. 29; "Evolutionary Changes in the Hormonal and Neural Bases of Reproductive Behavior," arranged by William C. Young, Dec. 29, and "Cellular Endocrinology," arranged by Paul A. Wright, Dec. 30. The annual business meeting of the ASZ as a whole is planned for Dec. 29.

Beta Beta Beta Biological Society. The biennial meeting of the Society, arranged by Mrs. Frank G. Brooks, will be held Dec. 27, morn. It will be followed by the biennial luncheon and address, arranged by H. P. Sturdivant, at which Martin W. Fleck will speak.

Biomedical Information-Processing Organization. Session for invited papers, arranged by Robert S. Ledley, Dec. 27.

Biometric Society, Western North American Region. Three-session program, arranged by Franklin A. Graybill, Dec. 28.

Ecological Society of America. Two-session symposium, Dec. 26; other symposia and some six sessions for contributed papers on plant ecology, animal ecology, human ecology, and aquatic ecology, and a series of sessions jointly sponsored by the Section on Animal Behavior and Sociobiology and with the Division of Animal Behavior and Sociobiology of the American Society of Zoologists, arranged by Martin W. Schein; Dec. 27, 28.

Mountain Lake Biological Station. Annual breakfast with the AAAS, arranged by Horton H. Hobbs, Jr., for all persons who have been students, investigators, or staff members at the station, Dec. 29.

National Association of Biology Teachers. Annual national meeting, Dec. 26-30. Included in the program will be the NABT annual luncheon, Dec. 27, presidential address, Dec. 28, and a series of separate sessions, Dec. 27, 28, and 30, with the theme "Accent on Investigating."

Nature Conservancy. Meeting of the Conservancy's National Committee for Natural Areas for Schools, arranged by John W. Brainerd.

Sigma Delta Epsilon. Regional meeting, arranged by Ernestine B. Thurman, will include a tea for all women in science.

Society for Industrial and Applied Mathematics. Session, arranged by D. L. Thomsen, Jr., "Biology and Mathematics," Dec. 29, aft.

Society of Protozoologists. Fourteenth annual meeting, arranged by Norman D. Levine, includes four sessions for contributed papers, Dec. 27-30, and a round-table symposium, "Biochemical Phyletic Markers Among the Protozoa," arranged by Seymour H. Hutner. Among the titles and speakers at the symposium will be: "Are There Biochemical Boundaries to a Phylum Protozoa?", Ellsworth C. Dougherty; "Which Protozoa (if any) Should Be Called Humanoid?", S. H. Hutner; "Biochemical Intimations of the Phylogenetic Position of the Ciliates," G. G. Holz, Jr.; and "Biochemical Taxonomy of Trichomonads," John J. Lee. Annual luncheon and business meeting, Dec. 29.

Society of Systematic Zoology. Annual meeting will include sessions for contributed papers, annual breakfast and business meeting, Dec. 30; three-session symposium, "The Data of Classification," arranged by R. E. Blackwelder, Dec. 27, 28; and a two-session symposium, "The Biogeography of the Philippine Islands," arranged by Walter C. Brown, Dec. 29.

Society of the Sigma Xi. Sixty-second annual Convention, joint luncheon with the Scientific Research Society of America, and joint address with Phi Beta Kappa, "Science and Government," by Harrison Brown; Dec. 29.

The AAAS Exposition of Science and Industry and the AAAS Science Theatre, with recent foreign and domestic films, will be prominent features of the meeting. Coupons for sleeping accommodations and advance registration will be found in *Science.*

News of Biology in the Southeast

About People

Dr. Rene J. Bienvenu, head of the Department of Bacteriology of Northwestern State College, Natchitoches, Louisiana, has received an NIH grant of $40,000 to continue studies on the natural resistance to brucellosis.

Dr. Edward K. Sobers, Assistant Professor of Bacteriology, Northwestern State College, Natchitoches, Louisiana, is directing an undergraduate research project under a Louisiana Heart Association grant recently awarded to Miss Clydell Davenport. Miss Davenport also received a fellowship stipend from the same source.

Dr. Richard E. Garth, Assistant Professor of Biology, Northwestern State College, Natchitoches, Louisiana, will be director for the undergraduate research program sponsored by NSF for the academic year 1961-1962. Fourteen students in five areas of research will participate in the program. He will also direct a summer institute for twenty high-ability high school students.

Dr. George Ware, Associate Professor of Biology, Northwestern State College, Natchitoches, Louisiana, will teach plant ecology at the University of Oklahoma Biological station at Lake Texoma during the summer of 1962. He plans to continue his study of cottonwood groves and sand bar plants on the Red River.

The Atomic Energy Commission announced a grant of $28,000 to **Dr. Alan Conger,** Professor Radiation Biology (Botany-Zoology) at the University of Florida. This grant is to be used in the Radiation Biology program that has been in operation since 1958. Most of the money will be used to purchase a new X-ray machine capable of producing about one-half million roentgens per minute. This powerful and versatile machine will be used to irradiate biological materials as part of Dr. Conger's work on the biological after-effect and long-lived free radicals in irradiated seeds. The Atomic Energy Commission also awarded $12,500 to **Dr. George Fritz,** Assistant Plant Physiologist, Department of Botany, Agriculture Experiment Station, University of Florida, to support his studies on the metabolism of molecular oxygen by plants.

Dr. Leland Shanor, head of the Department of Biological Seiences at Florida State University, was awarded an honorary Doctor of Science degree by Illinois Wesleyan University at the 1961 June Commencement. Dr. Shanor was also appointed as chairman of the Mycologia Memoirs Committee of the Mycological Society of America by the Council of the society at its meeting at Purdue University.

Dr. A. M. Winchester, head of the Biology Department at Stetson University, has accepted an appointment as visiting professor of biology at the University of South Carolina. He will be on leave of absence from his position at Stetson during the tenure of his appointment at South Carolina.

Dr. J. Thomas Mullins, Assistant Professor of Botany at the University of Florida, was awarded $25,200 by the National Institutes of Health for a project "The Ge-

nctical Basis of Heterothallism in *Dictyomorpha.*" *Dictyomorpha* is an aquatic fungi that is a particularly favorable organism for genetical studies and mutational analyses.

A $45,683 research grant was awarded to **Dr. Warren S. Silver,** Department of Bacteriology and **Dr. Robert D. Powell,** Department of Botany at the University of Florida, by the National Institutes of Health to aid a three-year study of interrelationships between certain trees and the microbes living within their roots. Two of the trees under study, Southern waxmyrtle and Australian pine, are widely used in Florida for reforestation and soil erosion control.

Dr. Henry Stevenson, Department of Biological Sciences at Florida State University, was awarded a three year research grant by the NIH for a study on the "Abundance of Neotropical Birds in Florida." Studies of migration dates and pathways are also included in the proposal.

Dr. Dorothy Crandall and **Dr. James Chamberlain,** Biology Department, Randolph-Macon Woman's College, have been working during the past summer on a three year forest ecological study of the piedmont area. Particular attention is being directed toward plant succession and small mammal populations.

Dr. Kirtley Mather, Geology Department, Harvard University, will be at Randolph-Macon Woman's College November 13 and 14 to participate in two seminars and to give a public lecture.

Dr. Franklin F. Flint has been appointed Acting Chairman of the Biology Department at Randolph-Macon Woman's College.

Dr. Lyman R. Emmons, a graduate of Trinity College, who received his Ph.D. from the University of Virginia, has been appointed Assistant Professor of Biology at Washington and Lee University.

Mr. Joe E. Coggins, formerly with the Educational Division, Virginia Commission of Game and Inland Fisheries, and later conducting research for the same agency, has been appointed to the staff of the Biology Department, Hampden-Sydney College.

Dr. D. H. Messersmith, Biology Department, Radford College, completed the requirements for the Ph.D. degree in entomology at Virginia Polytechnic Institute during the past summer.

Dr. R. H. Hoffman, Biology Department, Radford College, conducted studies during the past summer on the millipede fauna of the southeastern appalachians under a grant from the National Science Foundation administered by the Highlands Biological Station.

Dr. John G. Barker, Head, Biology Department, Radford College, has recently been named chairman of the Committee on Science Teaching, Virginia Academy of Science.

Dr. Willie M. Reams, Zoology Department, Louisiana State University, participated in the 5th International Pigment Cell Conference sponsored by the New York Academy of Sciences in New York, October 11-14, 1961.

Dr. Harry Wheeler, Department of Botany and Plant Pathology, Louisiana State University, has received a grant of $59.000 over a five year period from the USPHS for research in phytopathogenic toxins.

Dr. John P. Hollis, Department of Botany and Plant Pathology, Louisiana State University, has received a Fulbright grant to study plant parasitic nematodes in Kenya, Africa.

Dr. Robert W. Kelley, Assistant Professor of Biology, Southeastern Louisiana College, attended the Tulane University Institute of Radiation Biology sponsored by the AEC and NSF from 3 July through 24 August.

Dr. Rosamond Killigrew and **Dr. Bernard Carrier** has recently joined the faculty of the Department of Biological Sciences of the Southeastern Louisiana College.

Dr. Temd R. Deason has joined the staff of the Biology Department of the University of Alabama as Assistant Professor. Dr. Deason, a phycologist, receives his Ph.D. under Professor Harold Bold at the University of Texas. He has been Assistant Professor of Biology at the University of Delaware.

Dr. Joab L. Thomas has joined the staff of the Biology Department of the University of Alabama as Assistant Professor. Dr. Thomas, a plant taxonomist, received his Ph.D. under Professor Reed C. Rollins at Harvard. He has been associated with Arnold Arboretum.

Dr. J. Gordon Carlson, Head of the Department of Zoology and Entomology at the University of Tennessee, gave two lectures on the effects of radiation on cell division at the Institute for Seeondary School and College Science Teachers held at East Tennessee State College, Johnson City, June 12-August 4.

Dr. James N. Liles of the University of Tennessee Department of Zoology and Entomology has received a renewal one-year grant of $9,300 from the U. S. Army Biological Laboratories to continue studies of longevity, aging, and productivity in *Aedes aegypti.*

Mr. George Conner, Instructor of Biology at the University of Southwestern Louisiana from 1959 to 1961, has entered the graduate school at the University of Arizona, Tucson, to continue his graduate work.

Dr. Matt Dakin, Instructor of Biology at the University of Southwestern Louisiana during 1960-1961, has entered Auburn University to continue his graduate work.

Additions to the staff of the Department of Biology, at the University of Southwestern Louisiana include: **Dr. M. J. Fouquette,** who recently received his Ph.D. in Zoology (Herpetology) from the University of Florida, Gainesville, and **Mr. L. V. Davis,** who has been working toward the doctorate at Vanderbilt University in the field of entomology. Both have received appointments to the rank of Assistant Professor.

Dr. Joseph M. Sobek, who recently received his Ph.D. in microbiology from Stanford University, has been appointed to the position of Assistant Professor in the Department of Bacteriology at the University of Southwestern Louisiana.

Dr. William D. Reese, Department of Biology, University of Southwestern Louisiana, spent 6 weeks during the summer in Mexico collecting bryophytes along the Gulf Coast. The work was done in connection with an N.S.F. Grant.

Dr. Jurgen H. Franz has returned to the Radiologisches Institut der Universitat, Freiburg, Germany, after spending a year in the Radiation Microbiology group of the Oak Ridge National Laboratory.

Dr. Tuneo Yamada, formerly of Nagoya University, Nagoya, Japan, has joined the staff of the Cell Growth and Reproduetion Group of the Oak Ridge National Laboratory.

Dr. Frank J. Finamore has retuned to Southern Illinois University, Carbondale, Illinois, after spending a year in the Nucleic Acid Enzymology Group at Oak Ridge under a grant from the U. S. Public Health Service.

Dr. Forrest C. Grimm, who has just completed a two-year Research Associateship in the Biology Division at Oak Ridge, has accepted a position with The Rockefeller Institute, New York.

Dr. Rea Marie Fulkerson, who has been associated with the Maize and Phage Group in the Cytology and Genetics Section at Oak Ridge, has accepted a position with the University of Hawaii, Agriculture Experiment Station, Honolulu, Hawaii.

Dr. Douglas Davidson, who has been associated with the Cytology and Genetics Section at Oak Ridge for the past three years, left the Division on August 18. Dr. Davidson has aecepted a position with the Department of Botany, University of St. Andrew's, Fife, Seotland.

Dr. Edwin Powell Puckett, who has been assoeiated with the Experimental Animal Facility at Oak Ridge during the summer months, left the Division August 18. Mr. Puckett will resume his teaching duties with the Oak Ridge Public School System this fall.

Dr. Alexander Hollaender of Oak Ridge attended the International Symposium on Tissue Transplantation at the Universidad de Chile, Santiago, August 30-September 2, and presented a paper on "Recent developments in the border fields of basie biology." From Septemher 3-9, he was in Lima, Peru, to consult with scientific investigators at the Universiry of Peru, the Laboratorio de Investigacion de Cancer, and the Universidad Nacional Mayor de San Marcos.

Dr. Arthur C. Upton of the Oak Ridge National Laboratory was in Lawrence, Kansas, September 5-9, to attend the International Symposium on The Effects of Ionizing Radiation on Immune Processes and to chair the session on antibody formation, genotypes, bone marrow, and irradiation. The Symposium was sponsored by the University of Kansas and the U. S. Atomic Energy Commission.

Dr. G. David Novelli of the Oak Ridge National Laboratory also attended the Symposium at Lawrence, Kansas, and presented a paper on entitled, "The Effect of Ultraviolet and X-Irradiation on the Induced Synthesis of Beta-galactosidase in *E. coli* and the Relationship to antibody Synthesis."

Dr. Charles C. Congdon of the Oak Ridge National Laboratory was in Santiago, Chile, August 30-September 2, to attend the Symposium on Tissue Transplantation Problems at the Universidad de Chile and to present a paper entitled, "Changes in Lymphatic Tissues During Foreign Tissue Transplantation." On September 3 and 4 he visited the Laboratorio de Investigacion de Cancer and the National University of San Marcos, Facultad de medicina, Lima Peru.

Dr. Ernest H. Y. Chu of the Oak Ridge National Laboratory attended the Second International Conference on Human Genetics in Rome, Italy, September 7-12, and presented a paper entitled, "Chromosome Studies in a Family with Four Cases of Atypical Mongolism." Dr. Chu was in France September 14-16 visiting the University of Paris and Laboratoire de Genetique Physiologique du CNRS, Gif-sur-Yvette. From September 18-20 he was in England visiting the following institutions: Medical Research Council, Radiobiological Research Unit, Harwell; Population Genetics Unit, Medical Research Council, Oxford; and Galton Laboratory, University College, London. Dr. Chu visited in Scotland from September 22-26 at the Institute of Animal Genetics, University of Edinburgh, and the Western General Hospital, Edinburgh.

Dr. Eugene C. Bovee, Associate Professor of Biology, University of Florida, has been appointed associate research professor, also, and associate professor of sanitary science. He will continue to serve on the graduate staff of the biology department, will serve on the graduate staff of civil engineering, sanitary engineering section, and will conduct research in biological problems of sanitary engineering for the Engineering and Industrial Experiment Station at the University of Florida.

Dr. Warren Deacon, Consulting Bacteriologist and Vanderbilt University Biology Professor for 42 years, received the Meritorious Award for Teaching from the Association of Southeastern Biologists at the annual meeting last April. Dr. Deaeon joined the Vanderbilt Biology Faculty in 1919, served from 1946 to 1958 as Chairman of the Biology Department, and then resigned the Chairmanship to devote his whole time to teaching and research. He is a past president of the Association of Southeastern Biologists, the Tennessee Academy of Science, and the Kentucky-Tennessee Branch of the Society of American Bacteriologists.

Dr. Warren Deacon—Recipient of the 1961 meritorious teaching award.

Dr. Carter Gilbert, who received his Ph.D. at the University of Michigan, and has this past year served as an associate with the Florida State Museum, has been appointed interim Assistant Professor of Biological Sciences at the University of Florida. His *forte* is ichthyology.

Dr. F. G. Nordlie, who recently received his Ph.D. in ecology and limnology from the University of Minnesota, has joined the staff of the biology department at the University of Florida as assistant professor.

Dr. Eileen M. Otis, Ph.D. in genetics, University of Rochester, has been appointed interim Assistant Professor of Biological Sciences at the University of Florida. Her husband, **Dr. Arthur B. Otis,** is head professor of the physiology department in the medical school, J. Hillis Miller Health Center at the University of Florida.

Mr. Brian McNab, who will receive his Ph.D. from the University of Wisconsin in February, has been appointed interim Assistant Professor of Biological sciences at the University of Florida. His research field is physiological ecology.

Dr. Donald A. Jenni, who received his Ph.D. in biology from the University of Florida last June, has been appointed interim Assistant Professor of Biology there. He is a vertebrate ecologist.

Mr. Dale Birkenholz, who has his M.S. degree from Iowa State University and is a doctoral candidate in biology at the University of Florida, has been appointed

there as interim Assistant Professor of Biology. His area of research is vertebrate biology.

Dr. George W. Hunter, III, is on leave of absence from his post as lecturer in medical parasitology and biological sciences at the University of Florida to serve with the University of Costa Rica on a developmental program in medical parasitology.

Dr. William C. Massey, Associate Professor of Biological Sciences and Anthropology at the University of Florida, will take a leave of absence during the spring semester 1962 to teach graduate courses in anthropology at Louisiana State University.

Dr. E. Ruffin Jones, Professor of Biology at the University of Florida, has been appointed Assistant Dean of the graduate school at the University of Florida. He will head a program designed to direct superior prospects for the teaching profession toward a master's degree, the program being planned from the beginning of the students' junior year in college.

Dr. Lewis Berner spent two weeks in August at the University of California, Davis, California; he was there in the capacity of a reserve officer of Army Medical Service Corps (he was recently promoted to the rank of Colonel), representing the 355th Reserve and Development Unit which is based in Gainesville, Florida.

Dr. E. G. F. Sauer, internationally known for his studies on celestial navigation by birds, will join the staff of the biology department at the University of Florida in February 1962. He is presently on a research fellowship at the University of California. He studied at the Universities of Freiburg and Heidelberg, and has served as *dozent* at the University of Freiburg.

Dr. Rodger D. Mitchell has been promoted to the rank of Associate Professor of Biology at the University of Florida. He joined the staff in 1957, having previously taught at the University of Vermont, after taking his Ph.D. degree at the University of Michigan, and is well known for his studies on water mites.

Institutions and Organizations

An Institute of Radiation Ecology has been established at the University of Georgia for the purpose of coordinating and extending the regional ecological program which has been developing during the past ten years on the campus of the University, at the Savannah River Plant, and at the Marine Institute at Sapelo. Dr. Eugene P. Odum will serve as the Director of the new Institute, which will have headquarters in the new 13 million dollar Science Center at Athens, while Dr. Frank B. Golley has been appointed Resident Director of The University of Georgia facilities on the Savannah River Plant located at Aiken, South Carolina. A permanent laboratory building to replace the present field quarters is being provided to increase the effectiveness of the field research on the 250,000 acre Savannah River reservation.

The Institute will stress research, graduate and postdoctoral training in modern functional ecology, especially in the fields of energy flow, nutrient cycling, and population dynamics where radio-isotopes have extremely important applications. The direct effects of atomic energy in nature will be a secondary emphasis, but nonetheless important consideration in the program. The present close coordination with the radio-ecology program at the Oak Ridge National Laboratory will be maintained.

One of the main functions of the Institute-type of organization is to provide a convenient mechanism whereby post-doctoral students and investigators from other institutions can apply for NIH, NSF, AEC or other fellowships to pursue research or study for which the unique regional facilities of the University of Georgia Institute offer special advantages. Ecologists who may be interested in possibilities along these lines for 1962-63 should correspond with Dr. Odum.

The International Conference on Opportunistic (Secondary) Fungus Infections will be held in Durham, N. C., 28-30 June 1962. Information regarding this conference may be obtained from *Dr. Ernst W. Chick, Veterans Administration Hospital, Durham, N. C.*

A Public Health Service graduate training grant of $80-000 for the year 1961-2, and an additional $50,000 annually for the four succeeding years has been awarded to the University of Tennessee Institute of Radiation Biology. The Director of the Institute is Dr. J. Gordon Carlson, who is also Head of the Department of Zoology and Entomology. This grant provides for the training of five predoctoral candidates the first year and eight predoctoral and one postdoctoral trainee each of the four succeeding years. In addition to stipends for trainees, the grant includes funds for visiting professors and research and teaching equipment.

The Louisiana Wildlife and Fisheries Commission has opened a new marine biological laboratory on Grand Terre Island, about one mile east of Grand Isle, Louisiana. The laboratory, consisting of 7410 square feet of space, includes the following facilities: a complete microscopy laboratory, a limited chemical and bacteriology laboratory, a running sea water system, compressed air, bottled gas, photographic dark room, holding cages at dock-side, and a library. The laboratory is completely air-conditioned. The staff of the laboratory includes five biologists, one geologist, scientific aides, boat captains, and maintenance staff. Scientific studies are aimed at the commercial species inhabiting the Louisiana coast and at the ecology of the area. Boats include one 38′, 480 HP cruiser, one 28′, 350 HP cruiser, and two 23′, 180 HP cruisers. Plans for increasing the biological staff have been approved pending the availability of personnel. Visiting investigators are invited, pending approval of the Director. Address inquiries to *Dr. L. S. St. Amant, Chief Marine Biologist, Louisiana Wildlife and Fisheries Commission, Marine Laboratory, Box 37, Grand Isle, Louisiana.*

The Department of Biology, Randolph-Macon Woman's College, has recently acquired 50 acres of forested land to be known as the William Buford Russell and Robert Achilles Russell Nature Preserve. The tract, obtained by partial purchase from and donation by Mr. W. B. Russell is located 12 miles from the Campus and will be used for student and faculty study and research. The Preserve contains two small streams and one or more ponds will be constructed in the near future. A departmental station wagon has been purchased for transportation to and from the new facility as well as for other uses of the department.

The Genetics Training Program at the University of North Carolina at Chapel Hill is a cooperative effort involving the departments of Zoology, Anatomy, Biochemistry, and Pathology in Chapel Hill, and includes the opportunity to participate in the courses taught in the Department of Genetics at North Carolina State College in Raleigh. Applications will be entertained from persons with varied backgrounds and goals, and the training programs will be designed to fit the needs of the individual. The training committee is committed to the principle that knowledge of genetics is fundamental in all areas of biological science including medicine, and to this end, a one year sequence of courses in genetics has been arranged which is available to all fellows. Prior training in genetics, biochemistry, or mathematics will permit applicants to enter the program at more advanced levels. Inquiries regarding more detailed information or requests for applications should be directed to: *Dr. John B. Graham, Department of Pathology, University of North Carolina, Chapel Hill, N. C.*

The ASB BULLETIN

Volume 9, Number 1 January, 1962

New Laboratory for Delphinid Research—St. Thomas, Virgin Islands

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 9, Number 1—January 1962

The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tenn. Subscription rate for non-members of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

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C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Elsie Quarterman, Business Manager

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ASSOCIATION AFFAIRS

Library subscriptions . . .

In the call for papers and list of important deadlines mailed out earlier this month, a tabulation, by states, of the number of library subscriptions to the ASB Bulletin was published. A list of these libraries appears on page 21 of this issue.

But it is not these libraries that should concern us. It is, instead, the *absence* from this list of many of the major southeastern libraries that should be our concern. Indeed, the absence of three entire states supposedly represented by us is not a thing to be proud of.

In the past year, two libraries have purchased complete runs of the Bulletin, and another has asked for a quotation on a complete run—but these libraries were not in the southeast. Sadly enough, there are now fewer than ten complete sets still available. They should logically find their way to southeastern libraries.

It is up to you to see that they do.

C. W. H., Jr.

October ASB Bulletins sent to the following addresses were returned because the addressees had moved without leaving forwarding information.

BALL, CARROLL RAYBOURNE, Dept. of Biology, Mississippi Southern Coll., Hattiesburg, Miss.

BUSH, FRANCIS M., Dept. of Zoology, Univ. of Georgia, Athens, Ga.

LAWSON, JAMES E., Box 2306, East Tennessee State Coll., Johnson City, Tenn.

RICE, LUCILE A., East Carolina Teachers Coll., Greenville, N. C.

WELLS, MARGARET, 200 Ridge Road, Muncie, Ind.

If anyone knows the whereabouts of any of these people, please communicate with *Dr. Harry J. Bennett, Secretary, Dept. of Zoology, Louisiana State University, Baton Rouge, La.*

A New Laboratory

For Research On Delphinids

Dr. Lilly—whose controversial book, Man and Dolphin, *was recently published by Doubleday —is the Director of the Communication Research Institute of St. Thomas. He was graduated from the California Institute of Technology in 1938; received his M.D. from the University of Pennsylvania in 1942; and has worked in the fields of electrophysiological amplifiers, perception, and reward and punishment systems within the brain of delphinids.*

—John C. Lilly

Of all of the cetacea, those which are available for proper experimental seientific research are the smaller members of the delphinid group. Some limited experimental work has been done on *Phocoena communis* (the harbor porpoise), on *Delphinus delphis* (the common dolphin), *Stenella plagiodon* (the spotted dolphin), *Lagenorhynchus obliquidens* (the striped dolphin), *Tursiops truncatus* (the bottlenose dolphin) and *Globicephala scamonni* (the pilot whale). The suitability of these various species for experimental work in captivity varies greatly between the species. Their reactions to capture, to captivity, and to the personnel maintaining them are also different.

One factor of importance in setting up facilities for research on these animals is cost. In general, one can say that the larger the animal the higher the cost of the facilities and of the maintenance. The smaller animals eat less than do the larger ones. The tanks can be smaller for certain species than for others, depending not only upon size, but on the adaptability of the animals to a confined situation. The cost of the water supply for the larger tank can be considerable and, to date, prohibitively expensive for a purely scientific organization. (Pumping a million gallons of sea water a day through tanks 12 feet deep and 75 feet in diameter—as in certain oceanaria—adds considerably to the overhead.)

Surprisingly enough the smallest of the delphinids, *Phocoena,* has not yet been shown to be adaptable to a captive situation. Several investigators have reported deaths within a few days or weeks of capture. Generally these deaths are associated with descriptions of very high speed swimming behavior continuing to exhaustion and/or impact damage against the walls of the container. It is not known yet whether this is characteristic of the animal or is caused by unknown factors in the catching procedures.

Delphinus delphis and *Stenella plagiodon* have been maintained successfully for several months in fairly large tanks. However, they are reported to be hyperexcitable and much more diffieult to deal with than other speeies.

Lagenorhinchus obliquidens, Tursiops truncatus, and *Globicephala scamonni* have all been maintained for many, many months in captivity. *Lagenorhyncus* and *Globicephala* both need fairly large tanks: *Lagenorhynchus,* because of its tendency to swim at high speeds and to jump to great heights, and *Globicephala* because of its very large body length. Deep sea techniques of capture are used with both of these species. For ease of continued work with any one of the delphinids, the warm-water species are preferable for research for 12 months of the year.

This leaves *Tursiops truncatus* as the present choice for the least expensive and most convenient experimental animal. More is known of this species than of any other of the delphinids. It is available in shallow water in the southeastern United States. Capture by netting in shoal water is the usual technique. If properly caught and maintained, it can live for years in captivity and it survives extremely well in very small tanks. It does not become inordinately large: individuals can be carried by two to four men quite easily. The cost of feeding such animals is not as great as it is for the pilot whale. Experience shows that 10 to 20 pounds of whole frozen fish per animal, on the average, per day is adequate. The diet includes butterfish, blue-runner, thread-herring, and mullet. In our experience, animals can be maintained for months on butterfish alone.

Tursiops truncatus functions very well in water from 60° to about 88° F. At the upper end of this range the animals become extremely sluggish and at the lower end extremely active: an optimal temperature range lies between about 76°

and 84 . In this range the animals are interested and curious and actively participate in any program set up for them, whether in the laboratory or in a "circus" setting.

The Communication Research Institute of St. Thomas has started an organization for delphinid research. Two laboratories are being established, one in Miami, Florida, and one at St. Thomas in the United States Virgin Islands. The animal chosen as the current experimental one in these two laboratories is *Tursiops truncatus* for the reasons given above. Insofar as is known by the author, this is the first organization in the world to be founded for research exclusively on these interesting marine mammals.

The facilities at Miami include three holding tanks constructed of fiberglas and plexiglas, with observation and photographic windows. These tanks are fed continuously with new sea water pumped from a sea-water well (62 feet deep) at the rate of 100 gallons per minute. The water from the well runs 76° F. in the winter and 78° F. in the summer. Each tank is 7×8 feet and 30 inches deep. We have shown that *Tursiops* can be kept at least a year in water no deeper than 22 inches. Associated with these tanks are two plexiglas arms into which the animals can be conducted for detailed observations and experimental procedures. These transparent tanks allow observation of the whole body of the animal, and confine it for the collection of urine, measurement of body temperatures, measurement of respiration, etc. By means of a removable gate between two of the tanks, animals can be transferred back and forth without removing them from the water. Various shipping boxes to allow the animals to be carried in water while on a truck or in an airplane or on board a ship are also available. Various slings, confinement apparatus, and so forth are also available in this laboratory. Facilities also include several tape recorders, hydrophones, air microphones, underwater loud speakers, air loud speakers, amplifiers, and graphical recorders needed in research on the vocalization and the brain activity of these animals. In addition there are rooms for analyses of data, photographic dark room, and so forth. This laboratory also has a small school bus for the transportation of captured animals and for carrying the equipment for field studies in the waters of southeastern Florida.

The laboratory in St. Thomas is larger and more elaborate and its sea water facilities are unique. The island of St. Thomas is in the trade winds belt; the location of the laboratory was chosen so that a constant supply of waves approaches the coast at that point from the southeast. These waves are piled up on a reef outboard from a wave ramp up which the water travels and falls through a gate into a pool. This pool is the residence pool for a future colony of *Tursiops*. It is about 70 feet long, 20 feet wide, and 10 feet deep. The laboratory is built partly over this pool. An elevator carries a water box containing a given animal from the pool into the laboratory. In the dolphin laboratory room it is planned to construct an octagonal tank 8 feet in diameter with plexiglas sides for isolation of an individual or a pair of animals. In addition plexiglas confinement boxes as used in Miami are planned for this laboratory. This laboratory has a large wide aluminum door through which a truck can be backed for delivering of animals directly to the octagonal pool. The carrying boxes will be lifted off the truek, transported across the laboratory on an overhead trolley system for delivery into the main tank outside or for confinement in the dolphin lab. Immediately to the south of this dolphin laboratory is an observation roof from which the behavior of the animals in the pool below can be photographed. Beside this roof there is an eleetronies laboratory and immediately to the south there is a photographic dark room. To the north of the dolphin lab is the immediately adjacent store room and chemistry laboratory. Beside the chemistry laboratory is the histology lab, a shower room, and ward room.

The building is so constructed that several stories can be added at future dates. The present second floor consists of one large room for record analysis and office space. There are three large cisterns for the storage of fresh water and sea water pumps for supplying water to the laboratories upstairs. There is sufficient land owned by the Institute around the laboratory for future expansion and for the construction of housing for the scientific personnel in the future. Immediately southeast of the laboratory is Jersey Bay and south of that the Caribbean Sea. Nearby there are shallow lagoons, reefs, keys, and deep ocean. St. John Island is about 3 miles from the laboratory.

The island of St. Thomas has deep water port facilities and an airport. The town on the island is Charlotte Amalie, the capital of the U. S. Territory of the Virgin Islands.

It is expected that the St. Thomas Laboratory will be in full operation by December 1961.

This laboratory is built with funds from a grant from the National Science Foundation in cooperation with the Office of Naval Research and the Department of Defense. It will be used primarily for research and teaching purposes. Summer student programs have been run for two summers and are expected to continue in 1962. A limited number of graduate students are desired as the staff is expanded. Currently there are 12 employees of the Institute. The Scientific Staff has room for several additional investigators.

THE WAKE FOREST COLLEGE CAMPUS

1.—Reynolda Hall 2.—Library 3.—Wait Chapel 4.—Wingate Hall

Winston and Salem Halls are in the background to the right of the library.

About the Winston-Salem Meeting

The Association of Southeastern Biologists will hold its twenty-third annual meeting April 12-14, 1962, at Wake Forest College, Winston-Salem, North Carolina. This meeting has special significance, since it is the 25th anniversary of the association's founding. Meeting with the ASB this year will be three other organizations: the *Southern Appalachian Botanical Club,* a regional section of *Beta, Beta, Beta,* and the *National Association of Biology Teachers* regional group.

The meetings will commence on Thursday afternoon, April 12, with registration in the lobby of Winston Hall on the Wake Forest College campus. The first general meeting will be held on Thursday night in Wait Chapel, located at the head of the campus plaza, and plans for this program will be announced later.

At the conclusion of this evening meeting, members and guests are invited to the Smoker to be held in the main lounge of Reynolda Hall at the opposite end of the campus plaza. Paper sessions and the annual business meeting will occupy Friday. Friday night's activities include a banquet, retiring presidential address, and presentation of awards. Tentative plans have been made for a joint botanical-zoological field trip Saturday, April 14.

Accommodations

Ample housing space has been reserved at the **Robert E. Lee Hotel**, which is about four miles from the college. Since Winston-Salem is near the heart of the North Carolina furniture industry—and furniture fairs, conventions, etc., are scheduled for this area the week following the ASB meeting, it will be advisable to make reservations before the end of March, 1962. No rooms have been reserved at the other hotel and motels. When writing, use the blank provided or *mention the association.*

Hotels

Robert E. Lee (Cherry and 5th, PA 2-6161, 4 m. South of Campus), 225 rooms reserved, single $5.50-8.75, double $8.00-11.00, twin $9.75-12.50, extra person $2.00.

Carolina—no rooms reserved (407 W. 4th, PA 2-1181, 4 m. South), single $4.00-5.00, double $6.50-7.50, twin $8.00, extra person $2.00.

Motels

Beacon Hill (17 units, 3618 Reynolda Road, Jct. Hwy. 421 and 67, WA 4-2151, 5 m. NW.), single $6.00-7.00, double $10.00, extra person $1.00.

Blue Bird (22 units, Hwy. 52 North, PA 3-9691, 5 m. NE.), single $5.00-6.00, double $9.00, twin $7.00-8.00, extra person $1.00.

Green Valley (16 units, Hwy. 52 North, PA 5-0615, 4 m. NE.), single $7.00, double $12.00, twin $10.00, extra person $1.00.

Howard Johnson's Motor Lodge (82 units, 150 Stratford Rd., Hwy. 158 on the Interstate Expressway, PA 5-7501, 4 m. SW.), single $7.00-9.50, double $12.00, twin $8.50-11.00.

Kembly Inn (82 units, Cloverdale Avenue, Hwy. 158-Interstate Expressway, P.O. Box 5231, PA 5-1305, 4 m. SW.), single $7.00-9.00, double, $9.00, twin $10.00, extra person $1.50.

The Myer-Lee (New Greensboro Rd., Hwy. 421 E.), and Salem Manor (2500 Greensboro Rd. Jct. Hwys. 158-421 E.) are available but are considerable distance from the college. Rates are slightly lower than those quoted above. The Parkway Chalet will be completed by spring (Peters Creek Expressway) and will be five miles south of the campus.

Parking.—The Robert E. Lee Hotel has free overnight parking from 5 p.m. to 9 a.m. A large parking lot adjacent to Winston Hall will be reserved for organizational use, and an extremely large parking area is located behind Wait Chapel and is available to members.

Regarding segregation.—Howard Johnson's Motor Lodge will accommodate Negroes. Other establishments are segregated. It is the policy of the Robert E. Lee Hotel to arrange housing for any Negro requesting it.

Dining.—The Robert E. Lee Hotel and Howard Johnson's Restaurant are non-segregated. K and W Cafeteria near the Robert E. Lee is segregated. There are cafeteria and dining room facilities located in Reynolda Hall on the Wake Forest campus open to all persons; members are invited to dine on the campus if they so desire.

General Information

1. Registration will be Thursday afternoon, April 12, and Friday morning, April 13, in the lobby of Winston Hall.

2. A $1.00 registration fee will be charged.

3. Paper sessions will be scheduled in Winston Hall and nearby Salem Hall.

4. Tickets to the banquet Friday evening, April 13, are to be purchased at the time of registration. The price will be near $3.50.

5. Smith Reynolds Airport is five miles west of the Wake Forest campus and is served by Piedmont Airlines. Better connections may be made, perhaps, using the Greensboro, North Carolina Friendship Airport which is served by a number of major airlines. However, this airport is some 30 miles east of Winston-Salem. Piedmont flies the Greensboro–Winston-Salem route.

Winston-Salem is served by the Southern Railway Co. However, service is admittedly bad or slow except from the northeast. Several bus lines also serve the city.

6. Arrangements are being made to provide guided tours of local points of interest Friday morning and afternoon, April 13, for the wives and families of attending members.

Points of Interest

1. Old Salem—A number of the buildings from this old Moravian settlement have been restored. A fee of $1.50 is charged.

2. Whitaker Park—The world's largest single cigarette factory was completed this fall; tours through the factory are given Monday through Friday. No admission charge.

3. Tanglewood Park.

4. Reynolda Gardens—Lovely gardens on the Reynolda Estate, home of the late R. J. Reynolds. The cherry trees are considered the finest in the country.

Local Arrangements Committee

Members of the local arrangements committee at Wake Forest College are: Dr. C. M. Allen; Dr. H. G. Britt; Dr. E. C. Cocke; Dr. J. E. Davis; Dr. J. F. Dimmick; Dr. R. P. Higgins; Dr. D. W. Johnston; Dr. J. C. McDonald, *Chairman;* Dr. A. T. Olive; and Dr. R. L. Wyatt.

Mary Glide Goethe Travel Awards

For the fifth year there will be funds available through the generosity of Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year in Winston-Salem, North Carolina. It is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from Winston-Salem.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1962 meeting of the Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Indicate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.

2. Give information as to whether or not a paper is being presented by the applicant.

3. In a paragraph, give a brief history of your education to date, of how many years you have been—and plan to be—in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.

4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.

5. Have your major professor or departmental head write a letter supporting your application.

6. Applications and supporting letters, both in triplicate, should be in the hands of *R. B. Short, Dept. of Biological Sciences, Florida State University, Tallahassee, Florida,* by March 1, 1962. Applicants will be notified of the decision of the Committee during March.

COMMITTEE
E. C. Cocke
Joseph O'Kelly
R. B. Short, *Chairman*

Meritorious Award Nominations

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)
1961. Dr. Warren Deacon (Vanderbilt)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting materials to *C. C. Goodchild, Dept. of Biology, Emory University, Atlanta 22, Georgia,* by April 1, 1962.

COMMITTEE
Harry Wheeler
William J. Koch
C. C. Goodchild, *Chairman*

Association Research Prize

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Judges will be eminent biologists outside the Southeast. They will set their own criteria, and may withhold the award if no paper is judged to have sufficient merit.

5. Papers must be submitted *in triplicate* and in their entirety not later than March 1, 1962, to *Charles Jenner, Dept. of Zoology, University of North Carolina, Chapel Hill, N. C.* One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Phipps and Bird Research Fellowship

A Research Fellowship of $150.00 for summer research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia.. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and, especially in the case of younger workers, by references and educational data. Applications should be sent to *Charles Jenner, Dept. of Zoology, University of North Carolina, Chapel Hill, N. C.*, not later than April 1, 1962. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE
Alan Conger
Victor Cutter
Charles Jenner, *Chairman*

IMPORTANT DEADLINES

Please note the following deadlines, all of which are to be met before our Twenty-third Annual Meeting at Wake Forest College, Winston-Salem, N. C., April 12-14, 1962. Members can help facilitate plans for the meeting by sending in all requested material as far in advance of the deadlines as possible. Because the time available for preparation of the program and publication of abstracts is already at a minimum it will be necessary for the program committee and the editor to adhere strictly to the deadline set; NO TITLES CAN BE ACCEPTED THEREAFTER.

January 15—Suggestions for nominations for ASB officers and executive committee members.

February 10—Titles and abstracts of papers to be presented at the Wake Forest meeting.

March 1—Applications for Goethe Awards to graduate students.

March 1—Papers to be considered for the Association Research Prize.

April 1—Applications for Phipps and Bird Research Fellowship at Mountain Lake.

April 1—Nomination letters for the Meritorious Award for Teaching.

Because of certain restrictions placed on applications and forms mailed at second-class postage rates, those forms usually included in the January ASB Bulletin that pertain to the April meeting were mailed to ASB members early in January. For your convenience, however, the deadlines which must be met before the April meeting are reprinted above.

DIRECTORY OF ASB MEMBERS

The following directory is, to the best of our knowledge, correct as of 1 November 1961. Because some mistakes invariably find their way into listings such as this, the Editor would greatly appreciate it if members who note omissions and mistakes would call them to his attention.

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Florida: Arata, A. A.; Bennett, C. F.; Berner, L.; Boliek, M. I.; Bovee, E. C.; Breen, R. S.; Brookbank, J. W.; Brown, R. B.; Burlingham, G. K.; Cole, C. F.; Conger, A. D.; Damian, R. T.; Davis, Jr., J. H.; De Busk, A. G.; DeWitt, R. M.; Dickinson, Jr., J. C.; Easton, D. M.; Edington, C. W.; Ellias, L. C.; Field, H. M.; Ford, E. S.; Friedl, F. E.; Frye, Jr., O. E.; Fuller, D. L.; Funderburg, Jr., J. B.; Gilbert, M. L.; Gilman, L. C.; Godfrey, R. K.; Goin, C. J.; Gordon, D. P.; Gregg, J. H.; Hetrick, L. A.; Holliman, R. B.; Hood, M. N.; Ingie, R. M.; Jackson, Jr., C. G.; Jones, Jr., E. R.; Keitt, Jr., G. W.; Kilby, J. D.; Kiser, R. S.; Krivanek, R. C.; Kruse, D. N.; Kurz, H.; Lackey, J. B.; Laessle, A. M.; Latina, A. A.; Layne, J. N.; Leigh, W. H.; Liston, R. H.; MacInnis, A. J.; Madsen, G. C.; Martin, E. P.; McCoy, J. J.; McCrone, J. D.; McFadden, S. E.; McNulty, J. K.; Menzel, M. Y.; Menzel, R. W.; Meyers, S. P.; Mitchill, R. D.; Moewus, L.; Monk, C. D.; Montgamery, J. G.; Mullins, J. T.; Nelson, Jr., G. E.; Nez, M. M.; Noggle, G. R.; Oglesby, L. C.; Pates, A L.; Perry, R.; Phillips, R. C.; Pierce, E. L.; Poitras, A. W.; Powell, R. D.; Prichard, E. C.; Redmond, J. R.; Reed, C. T.; Reid, Jr., G. K.; Reynolds, J. P.; Richardson, G. M.; Riemer, W. J.; Sagawa, Y.; Schwartz, A.; Shanor, L.; Sherman, H. B.; Short, R. B.; Sivik, F. P.; Smith, F. G. W.; Stone, Jr., W. M.; Summerlin, II, L. R.; Taylor, J. L.; Taylor, S. E.; Vestal, P. A.;

Vilar-Alvarez, C. M.; Waldarf, G. W.; Wallace, H. K.; West, E.; Westfall, Jr., M. J.; Williams, R. H.; Winchester, A. M.; Waad, Jr., F. G.; Waalever, J. D.; Yerger, R.; Ziegler, A. W.

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New Jersey: Zipf, E. M.

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Ohia: Campbell, T. H.; Gradner, R. M.; Grodner, Mrs. R. M.; Haubrich, R. R.; Jahnsan, Jr., M. A.; Williams, L. G.; Willis, J.; Yaw, F. W.

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South Dakota: Morgan, Jr., W. C.

Tennessee: Adams, Jr., W. H.; Adler, H. I.; Amy, R. L.; Anderson, N. G.; Baker, C. L.; Baker, M. D.; Barclay, F. H.; Barrington, Jr., B. A.; Baehms, C. N.; Bowling, A.; Carlson, J. G.; Carrier, W. L.; Chadwick, C. S.; Channell, R. B.; Chapman, J. A.; Clebsch, E. E. C.; Cole, Jr., A. C.; Cook, M. J.; Copeland, T. P.; Castner, R. M.; Darden, E. B.; Denaburg, C. A.; De Selm, H. R.; Dickenson, Jr., H. F.; Exum, D. M.; Farrell, C. E.; Ford, F. M.; Fraser, R. C.; Freemon, J. R.; Friauf, J.; Gaskins, H.; Goulden, M. E.; Gilbert, W. A.; Gude, W. D.; Herndon, Jr., W. R.; Hesler, L. R.; Hollaender, A.; Horton, G.; Howell, G. L.; Howe'l, J. C.; Hunt, G. E.; Hyde, C. F.; Janes, A. W.; Kaye, S. V.; Kim, Y. T.; Kimball, R. F.; Kisner, R. L.; Lawson, J. E.; Liles, J. N.; Lord, L. P.; McArthur, W. H.; McCrady, E.; McGilliard, E. R.; McVeigh, I.; Miller, Jr., I. H.; Miller, T. J.; Myles, M. R.; Nelson, D. J.; Nichols, H. W.; Norris, F. H.; Odell, Jr., T. T.; Osborne, T. S.; Owen, H. M.; Owings, E. S.; Patten, J. A.; Pharris, D. I.; Quarterman, E.; Ramseur, G. S.; Rawls, J. M.; Reesar, J. C.; Rack, H. F. L.; Rouch, L. A.; Russell, L. B.; Russell, W. L.; Shanks, R. E.; Sharp, A. J.; Shorpley, J. M.; Sherman, H. L.; Shaup, C. S.; Smith, A. I.; Stevenson, R.; Tanner, J. T.; Threlkeld, W. L.; Tiptan, S. R.; Underwood, J. M.; Van Pelt, Jr., A. F.; Van Pelt, G. S.; Ward, H. L.; Webb, A. M.; Williams, D. B.; Wilson, J. L.; Wiser, C. W.; Witherspaan, Jr., J. P.; Walf, F. T.; Yates, H. O.; Zager, R. D.; Zirk, M.

Texas: Fugler, Jr., C. M.; Hughes, W. N.; Lewis, W. H.; McRitchie, R. G.; Miller, C. E.; Odum, H. T.; Rabbins, H. C.; Weinmann, C. J.; Wolcott, G. B.

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Libraries: Alabama Palytech Institute, Auburn, Ala.; Clemson College, Clemsan, S. C.; Duke Univ., Durham, N. C.; Emory Univ., Atlonta, Ga.; Florida State Univ., Tallahassee, Fla.; Highland Bialagical Labaratary, Highlands, N. C.; Iawa State College, Ames, Iawa; Louisiana State Univ., Baton Rauge, La.; Mauntain Lake Biolagical Statian, Mauntain Lake, Va.; Narth Carolina State College, Raleigh, N. C.; Ohia State Univ., Columbus, Ohia; Sauthern Methadist Univ., Dallas, Tex.; Univ. af Alabama, University, Ala.; Univ. af Florida, Gainesville, Fla.; Univ. af Haustan, Haustan 4, Tex.; Univ. af Illinois, Urbana, Ill.; Univ. af Kentucky, Lexington, Ky.; Univ. af Miami, Coral Gables, Fla.; Univ. of Texas, Austin, Tex.; U. S. Atomic Energy Commissian, Oak Ridge, Tenn.; U. S. Dept. af Agriculture, Washingtan, D. C.

Miscellaneous: Carolina Bialagical Supply Co., Elan College, N. C.; Lindstahls Lilla Baklada, Birgen Jarlsgatan 102, Stackholm, Sweden; Oak Ridge Institute af Nuclear Studies, Midway Warehause Na. 2, Oak Ridge, Tenn.; Walter Drey Assaciates, 257 Faurth Ave., New York 10, N. Y.; Will Corp. of Geargia, Atlanta, Ga.

PERCY VIOSCA, JR.

1892-1961

Percy Viasca, Jr., internatianally known Lauisiana naturalist, died Sunday, August 29, 1961, fallawing a pralanged illness. At the time af his death he was marine bialagist far the Lauisiana Wildlife and Fisheries Cammissian.

Viasca really started his bialagical career as a bay, but made it farmal when he received the B.S. and M.S. degrees fram Tulane University in 1913 and 1915 respectively.

His interests and varied contributions ta bialagical science easily rank him as ane af America's last great naturalists. He was widely recagnized as an authority an amphibians, reptiles, shrimp, crawfish, aysters, fish, masquitaes, and wild flawers (particularly Lauisiana irises). His publicatians, bath technical and popular, numbering close to 100, not only mirror his knawledge and abservations of his "special" animals and plants, but alsa diverse other animals and situatians such as millipedes, water pallution, snails, spontaneaus combustion in marshes, freshwater medusae, biageagraphy, leaf-cutting ants, crabs, and teaching af bialagy. In additian he wrate twa baaks: *Louisiana Out-of-Doors* (1933) and *Pondfish Culture* (1937).

In the caurse af his life Viasca was emplayed in many capacities; perhaps this diversity stimulated his curiasity with such a vast array of organisms. Priar ta, and during his callege years, he was a cammercial fisherman. At Tulane he was an undergraduate assistant and then graduate assistant (1911-

1916). In 1915 he organized and became president of the Southern Biological Supply Co.; also, in the same year he was appointed curator of reptiles, amphibians, and fishes at the Louisiana State Museum. In 1917 he added to these activities the duties of biologist for the Louisiana Department of Conservation. This association with the state lasted until his death, although it was never permanent; he was in-and-out depending upon the turbulence of Louisiana politics. From 1923 to 1926 he was an instructor at Tulane, and overlapping this period he was entomologist for the New Orleans Board of Health. In 1939 he conceived, organized, and directed his second commercial venture, Ganivory Crafts, in which costume jewelry was manufactured using garfish scales. For a few years he was an independent consulting biologist working mostly for industries in Louisiana having water pollution problems.

His ability was acclaimed a number of times, starting with initiation into Phi Beta Kappa at Tulane. Viosca was elected a Fellow of the AAAS (1924); vice-president of the American Society of Ichthyologists and Herpetologists in 1939; vice-president (1947) and president (1948) of the Louisiana Academy of Sciences; and, president of the New Orleans Botanical Society in 1955. His latest honors came in 1961 when he was named "Conservationist of the Year" by the Louisiana Outdoors Writing Association, and shortly before his death "Tulane Biologist of the Year."

To commemorate this great, kindly, and unassuming man, a special issue of *Tulane Studies in Zoology* will be dedicated shortly to Percy Viosca, Jr.—naturalist. He will long be remembered.

PERCY VIOSCA, JR.

News of Biology in the Southeast

About People

George Ware, Northwestern State College, Natchitoches, Louisiana, taught a course in plant ecology at the University of Oklahoma Biological Station during the summer. He also collected plants on numerous sandbars of the Red River westward to its headwaters.

Marilyn Stewart and **Billie Slatten**, undergraduates in the Department of Bacteriology, Northwestern State College, Natchitoches, Louisiana, have received an undergraduate research grant from the Louisiana Heart Association to study the serum and glycoprotein fractions of bovine serum during gestation. Dr. E. K. Sobers will direct the project.

Rene J. Bienvenu, Northwestern State College, Natchitoches, Louisiana, has received a Senior Research Grant from the Louisiana Heart Association to study the rate of magnesium absorption into the circulatory system, and its effect upon brucellacidal activity in serum.

Glenda Jo Walters, Northwestern State College, Natchitoches, Louisiana, undergraduate biology major, received an undergraduate research grant from the Louisiana Heart Association to study the effects of activity on sarcosome size in house flies.

Jesse C. Thompson, Jr., Department of Biology, Hollins College, spent ten weeks at the Virginia Fisheries Laboratory, Gloucester Point, Virginia, doing research on marine ciliates, under a grant from the NSF. In August, Dr. Thompson presented a paper at the First International Conference on Protozoology in Prague, Czechoslovakia. Afterwards, he visited laboratories in Hungary, Italy, France, and England.

The honorary degree of Doctor of Science was conferred on **Thelma Howell**, Executive Director, Highlands Biological Station, by North Carolina State College at its May Commencement.

William H. Adams, Jr., Associate Professor of Biology since joining the faculty in 1960, has been appointed Chairman of the Department and Professor of Biology at Tennessee Wesleyan College effective September 1, 1961.

Thomas C. Barr, Jr. and **Robert A. Kuehne** of the Department of Zoology, University of Kentucky, recently

received a 2-year grant of $31,300 from the National Science Foundation for support of research entitled "Ecology of the Cave Community."

J. M. Carpenter, Head, Department of Zoology, University of Kentucky has received a one year grant of $2,300 from the National Institutes of Health for a study of the "Nutritive Effects of Various Yeast Species on Reproductive Potential in *Drosophila*."

Roger W. Barbour recently received $6,590 for a renewal of his research contract with the National Institutes of Health for "A Traffic Survey of *Microtus ochrogaster* Runways."

A. C. Clement, Department of Biology, Emory University, has been named to the American Tables Committee for the Naples Zoological Section.

John E. Simmons has been appointed Assistant Professor of Biology at Emory University.

W. B. Baker has retired from the Department of Biology at Emory University, but continues with the University as Director of the Museum. Dr. Baker is a former recipient of the ASB's Meritorious Award for Teaching.

Charles Ray, Jr. and **W. D. Burbanck,** Department of Biology, Emory University, presented papers at the First International Conference on Protozoology in Prague, Czechoslovakia, which met from August 21-31, 1961.

C. G. Goodchild, Department of Biology, Emory University, has been elected a member of a Committee for International Centers of Medical Research and Training, National Institutes of Health.

Robert B. Platt and a group of graduate students of the Department of Biology at Emory University presented papers on their research in radiation effects on ecological systems to the First National Symposium in Radioecology at Ft. Collins, Colorado, in September, 1961.

Robert B. Platt, Emory University, has received an AEC grant of $143,000 for studies in radiation ecology.

O. Henry has recently rejoined the faculty of Newberry College as Assistant Professor of Biology after a year's absence for continued graduate work. He expects to complete his doctorate in the near future.

B. L. Ridley has joined the staff of Louisiana Polytechnic Institute as Associate Professor of Zoology.

James M. Walker has been appointed Acting Assistant Professor of Zoology at Louisiana Polytechnic Institute.

Robert F. Thorne, Dept. of Botany, State University of Iowa, Iowa City, Iowa, has returned to this country after two years of travel through Australia, Java, Singapore, Ceylon, India, Iran, and London. Dr. Thorne, who specializes in the phylogeny of angiosperms, was in Australia on a Fulbright Research Fellowship, and for the last year has studied under an NSF Postdoctral Fellowship.

Thomas Barr, Jr., has joined the faculty of the University of Kentucky as Assistant Professor of Zoology.

J. M. Herr of the Dept. of Biology of the University of South Carolina has received an NSF grant for a study of the rearrangement of nuclei in the megagametophyte of *Oxalis*.

Cecile Huggins of the Dept. of Biology of the University of South Carolina has received a renewal of her NIH grant for the study of bacteria in *Gambusia affinis*.

Grants and Fellowships

The National Science Foundation announces that final proposals for Antarctic research for the 1962-63 field season should be submitted by February 15, 1962, in order to allow the necessary time for scientific review and field planning. Proposals should be addressed to the *Director, National Science Foundation, Washington 25, D. C., Attention: Office of Antarctic Programs.* Proposals will be accepted for aurora and airglow, biology and medicine, cosmic rays, geodesy and cartography, geology, geomagnetism, glaciology, gravity, ionospheric physics, meteorology, oceanography, seismology, and for such other research as may be pertinent to Antarctica. The staff of the Office of Antarctic Programs of the National Science Foundation will be pleased to discuss ideas for proposals informally prior to their final submission or to answer questions regarding the preparation of proposals and problems of research in the Antarctic.

Applications are now being received for grants-in-aid to conduct research on the ecology of the escarpment gorges of the Blue Ridge Mountains. The program is supported and financed by the National Science Foundation at the Highlands Biological Station. For information and blanks write *Executive Director, Highlands Biological Station, Highlands, N. C.*

Institutions and Organizations

The Departments of Bacteriology and Biological Sciences, Northwestern State College, Natchitoches, Louisiana, conducted an NSF sponsored institute for superior high school students this past summer. They are currently conducting an institute involving undergraduate research participation for 14 students who are working on five separate projects. **Dr. R. E. Garth** served as director in both.

The Department of Zoology of the University of Kentucky has received a grant of $12,500 from the Atomic Energy Commission to give a course in Radiation Biology. The course is scheduled to start the second semester of the 1961-62 school year.

The Haitian-American Tuberculosis Institute has been established under the sponsorship of the North Carolina Tuberculosis Institute for the purpose of conducting a cooperative tuberculosis control and vaccine field evaluation program involving scientists associated with the N.C. Sanatorium System, Duke University, University of

North Carolina, The Research Triangle, and the Ministry of Health in Haiti, as well as the MEDICO unit stationed there. **Dr. H. M. Vandiviere** will serve as Director of the new Institute which has its headquarters in Chapel Hill, while **Dr. Turgot Cintellus** will serve as Co-Director in Haiti. The program is designed: first, to evaluate two well standardized antitubercuIosis vaccines, one of which (R_1) was developed in the N.C. Sanatorium System Research Dept., the other being one of the better BCG strains; and secondly, to abate one of the two major health problems of Haiti-tuberculosis. Haiti, with a very high incidence of tuberculosis and a death rate of approximately 60 times that in the United States, provides the perfect locale for evaluation of the effectiveness of the vaccine, as well as a population in dire need of medical service. The U.S. Navy has donated a 85-foot YP boat to the Institute for use in this project. It will be equipped with a laboratory for the sterile handling of biologicals, provide partial housing for the personnel, and serve for medical supply and provision transportation. Also, a tuberculosis pavillion is being constructed in the district of Jeremie where the program is to be instituted. The program is being financed by voluntary contributions at the present.

The Biology Department at Emory University expects to occupy a new wing in the building shortly after the first of the year.

Under an NSF grant, an **Emory University Biological Field Laboratory** is being constructed on nearby, recently acquired, land. Besides woodland, a lake and two small streams will provide facilities for varied studies in the Biology Department.

Expanded activities in the field of health protection have resulted in recent additions to the **Biology Branch of the Atomic Energy Commission's Oak Ridge Operations.** New personnel include **Raymond L. Hervin,** health physicist, formerly of the Lockland Area, AEC, Cincinnati; **William Thornton,** health physicist, and **Howard Heacker,** health physicist, both formerly of the Health Physics Division, Oak Ridge National Laboratory; and **William A. Pryor** and **Wiley A. Johnson,** nuclear safety specialists. Mr. Pryor was formerly on the staff of General Electric's nuclear propulsion program, Cincinnati, and Mr. Johnson was formerly at the Oak Ridge Gaseous Diffusion Plant. These personnel work under direction of **C. S. Shoup,** Chief, Biology Branch, which also includes **Joseph A. Lenhard,** principal health physicist, and **Claude L. Yarbro,** education and training coordinator, operates in the areas of health protection, life science administration, and the national training programs. Oak Ridge Operations include not only major facilities in Oak Ridge, Tennessee, but also research, development, production, and training facilities in four other States and Puerto Rico.

The Dept. of Biology of the University of South Carolina has received a $15,200 grant from the NSF for the purchase of research equipment and for new research quarters.

Before the academic year 1962-1963, the **Biology Dept. of the University of South Carolina** will move into its portion of the new Life Science Building. The building will be occupied jointly with the School of Pharmacy.

Reprinted below is a comic strip sequence from the New York *Herald Tribune* of 18 February 1961. It seems fitting to reproduce it here because it so well depicts the biologist confronting the layman—and the frustrations so often met with on such occasions. As far as I know, the author of this comic strip is no relation to your editor.—C. W. H., Jr.

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The ASB BULLETIN

Volume 9, Number 2 April, 1962

WINSTON HALL—WAKE FOREST COLLEGE

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 9, Number 2—April 1962

The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Elsie Quarterman, Department of Biology, Vanderbilt University, Nashville, Tenn. Subscription rate for non-members of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

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C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Elsie Quarterman, Business Manager

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ASSOCIATION AFFAIRS

Treasurer's Report January 1, 1961-December 31, 1961

SAVINGS ACCOUNT			
Balance on hand January 1, 1961	$1,093.38		
	30.28		
		$1,123.66	
CHECKING ACCOUNT			
Balance on hand January 1, 1961		$142.07	
Receipts:			
Registration–Lexington	$ 291.00		
Will Corporation	100.00		
Dues & Subscriptions	1,961.50		
Sale of reprints & back issues	242.89		
		$2,595.39	
			$2,737.46
EXPENDITURES			
Travel awards	$ 254.00		
Meritorious Teaching Award ...	100.00		
		$ 354.00	
Lexington meeting:			
Speakers	25.00		
Other	271.00		
		296.00	
Bulletin:			
Mailing & printing Jan., Apr., July	1,271.31		
Editor's Miscellaneous	108.59		
		1,379.90	

(*Continued on page 48*)

Program of the 23rd Annual Meeting of the Association of Southeastern Biologists

A Joint Meeting with the Southeastern Section of the Botanical Society of America, Southern Appalachian Botanical Club, Regional Section of the National Association of Biology Teachers, and the Southeastern Region of Beta Beta Beta National Honorary Biological Society—held at Wake Forest College, Winston-Salem, North Carolina, April 12-14, 1962.

THURSDAY, APRIL 12

10:00 a.m. **Executive Committee Meeting:** Robert E. Lee Hotel, ASB suite.
2:00 p.m.-7:45 p.m. **Registration:** Lobby of Winston Hall.
8:00 p.m. **General Session:** Wait Chapel, Royal E. Shanks, Presiding.
Address of Welcome: Harold Tribble, President, Wake Forest College.
Reponse: Royal E. Shanks, University of Tennessee, President of the Association of Southeastern Biologists.
Invitational Address: *Counter-Currents in Biology,* Norman G. Anderson, Oak Ridge National Laboratory.

The invitational address will be followed by a smoker to be held in the main reception lounge of Reynolda Hall on the campus. Refreshments will be served.

FRIDAY, APRIL 13

MORNING

8:00 a.m.-11:00 a.m. **Registration:** Lobby of Winston Hall.
8:00 a.m.-12:00 noon **Exhibits:** Rooms 101, 102, 103, 104, 107, 112.
8:30 a.m.-11:30 a.m. **Paper Sessions:**
Plant Ecology—Room A, Winston Hall.
Cytogenetics and Plant Physiology—Room B, Winston Hall.
Invertebrate Zoology—Room C, Winston Hall.
Parasitology—Room 223, Winston Hall.
11:45 a.m.-12:30 p.m. **Business Meeting:** Association of Southeastern Biologists. Wait Chapel.

AFTERNOON

1:00 p.m.-5:00 p.m. **Exhibits:**
2:00 p.m.-4:30 p.m. **Paper Sessions:**
Animal Physiology—Room A, Winston Hall.
Endocrinology and Animal Ecology—Room B, Winston Hall.
Systematic Botany—Room C, Winston Hall.
Cryptogamic Botany—Room 223, Winston Hall.
2:00 p.m.-5:00 p.m. **Registration, Beta Beta Beta:** Lobby of Winston Hall.
4:45 p.m.-5:15 p.m. **Business Meeting:** Southeastern Section of the Botanical Society of America—Room A, Winston Hall.

EVENING

7:00 p.m.-8:15 p.m. **Banquet:** Main Ballroom, Robert E. Lee Hotel.
8:15 p.m. **General Session:*** Royal E. Shanks, presiding, President of the Association of Southeastern Biologists.
Past-Presidential Address: Victor A. Greulach.

* This is a program commemorating the 25th anniversary of the ASB, and it will be held in the Main Ballroom immediately following the banquet. A special printed program will be distributed, and the Presentation of Awards will take place at this time. Members are urged to come whether or not they attend the banquet.

SATURDAY, APRIL 14

8:30 a.m. **Field Trip:** The Combined Botanical and Zoological field trips will be to nearby Hanging Rock State Park and surrounding areas.
8:00 a.m.-12:00 noon **Beta Beta Beta General Meeting and Paper Session:** Room A, Winston Hall.
9:30 a.m. **Tours** will be available for those interested in seeing Old Salem, Reynolda Gardens, and the R. J. Reynold's Cigarette Plant.

SCHEDULE OF PAPER SESSIONS

FRIDAY MORNING—APRIL 13, 8:30 A.M.

Plant Ecology

Room A—Winston Hall

Presiding: Albert E. Radford

8:30 1. McCormick, Franklin J. and Robert B. Platt (Vanderbilt Univ.). Ecotypic Differentiation in Southeastern *Juniperus.*
8:43 2. Woods, Frank W., Maxwell L. McCormack, and Mitchell D. Ferrill, (Duke Univ.). A technique for "forcing" absorption of isotopes by trees for ecological studies.
8:56 3. Eggler, Willis A. (Newcomb College of Tulane Univ.). Nitrogen in Ash and Cinders from Paricutin Volcano, Mexico.

9:09 4. Farmer, Joe A., (Univ. of Alabama). The Two Populations of a Narrowly Endemic Shrub, *Croton alabamensis* E. A. Smith.

9:22 5. Plummer, Gayther L. and Catherine Keever, (Univ. of Georgia). Dispersal and Distribution of *Heterotheca latifolia* in the Georgia Piedmont since 1954.

9:35 6. Clebsch, Edward E. C. and Royal E. Shanks, (Univ. of Tennessee). Computer Programs for the Estimation of Forest Stand Weight and Mineral Pool.

9:48 7. Shanks, Royal E., Edward E. C. Clebsch, H. R. DeSelm, (Univ. of Tennessee). Estimates of Weight, Mineral Pool, and Flux of Material in Appalachian Ecosystems.

10:01 8. DeSelm, H. R. and R. E. Shanks, (Univ. of Tennessee). Organic Accumulation and Decay in some Natural Systems.

10:14 9. Ritchie, Jerry C., (Univ. of Tennessee). Distribution of Fallout Cesium-137 in the Great Smoky Mountains.

10:27 10. Caplenor, Donald, Judy Brook, and Anne Regan, (Millsaps College). Plant Communities on Deep Loess, Shallow Loess, and Clay Soils in West-Central Mississippi.

10:40 11. Daniel, Charles P., (Emory Univ.). Photoperiod Control in Plant Succession.

10:53 12. Woodmansee, Robert A., (Mississippi Southern College). The Distribution of the Planktonic Diatom Genus *Rhizosolenia* in Biloxi Bay and Mississippi Sound.

10:06 13. Edmisten, Joe A., (Univ. of Florida). The Ecology of Florida Pine Flatwoods.

11:19 14. McGinnis, John T., (Emory Univ.). Ionizing Radiation Effects in Litter Production of White Oaks.

Cytogenetics and Plant Physiology

Room B—Winston Hall

Presiding: Elton C. Cocke

8:30 15. Sarvella, Patricia, (Mississippi State Univ.). Male Sterility in Cotton.

8:45 16. Beatty, A. V. and J. W. Beatty, (Emory Univ.). Biochemical Modification of Radiation Recovery.

9:00 17. Whiting, P. W., (Univ. of Pennsylvania). Genes as Units of Segregation.

9:15 18. Yeagers, Edward K., (Emory Univ.). The Effect of Centrifugation upon X-Ray-Induced Chromosome Aberrations in Microspores of *Tradescantia paludosa*.

9:30 19. Herr, J. M., Jr. Maturation of the Embryo in *Ilex crenata* Thunbg.

9:45 20. Brumfield, Robert T., (Longwood College). A photographic instrument for determining cellular growth rates in roots of small-seeded grasses.

10:00 21. Wolf, F. T., G. W. Koehne and E. A. Jones, (Vanderbilt Univ.). The Pigments of *Microsperum cookei*.

10:15 22. Plummer, Gayther L. and John Kethley, (Univ. of Georgia). On the Uptake of Nutrients by the Leaves of the Pitcher Plant, *Sarracenia flava*.

10:30 23. Keitt, George W., Jr., (Florida State Univ.). Interaction of Benzoic acid Derivatives and Kinetin on Cultured Tobacco Pith Tissue.

10:45 24. Parchman, L. Gerald, (Emory Univ.). The Effect of Certain Growth Substances Upon the Stamen Hair Cells of *Tradescantia paludosa* in Artificial Culture.

Invertebrate Zoology

Room C—Winston Hall

Presiding: Charles M. Allen

8:30 25. Hopkins, Thomas S., (Univ. of Florida). Sexual Dichromatism in the Chelae of *Callinectes sapidus*.

8:45 26. Darlington, Julian T., (Furman Univ.). A Survey of the Triclad Turbellaria in a Section of Northwest Georgia.

9:00 27. Bovee, E. C. and S. R. Telford, Jr., (Univ. of Florida). Some New Inqulinic Flagellated Protozoa From Endmic Florida Reptiles.

9:15 28. Holt, Perry C., (Virginia Polytechnic Institute). Geminate Species of Branchiobdellids: A Problem in Zoogeography.

9:30 29. Bamforth, Stuart S., (Newcomb College of Tulane Univ.). Anatomy and Ecology of Hypotrichous Protozoa.

9:45 30. Porter, Evan Dwain, (Emory Univ.). Effect of Mechanical Pressure on *Paramecium aurelia* during Stomatogenesis.

10:00 31. Menzel, R. Winston, (Florida State Univ.). Seasonal Growth of Northern and Southern Quahaugs and Their Hybrids.

10:15 32. Cole, Arthur C., Jr., (Univ of Tennessee). The harvesting ant *Pogonomyrmex comanche* Wheeler.

10:30 33. Schmitz, Eugene H., (Louisiana State Univ.). Anatomical Studies of the Alimentary Tract of *Gammarus lacustris lacustris* Sars (Crustacea: Amphipoda).

10:45 34. Wells, Carolyn and Lindy Hatch, (Longwood College). Possible Breeding Systems for the Study of Recessive Mutations in *Tetrahymena pyriformis*.

Parasitology

Room 223—Winston Hall

Presiding: H. Grady Britt

8:30 35. Miller, Grover C. and Reinard Harkems, (N. C. State College). Parasitic Helminths of the Raccoon.

8:45 36. Phifer, Kenneth O., (U. S. Public Health Service). A Comparative Study of the Aldolase Systems of *Aedes aegypti, Anopheles quadrimaculatus,* and *Culex quinquefasciatus*.

9:00 37. Bogitsh, Burton J., (Georgia Southern *College*). The Chemical Nature of Metacercarial Cysts I. Histological and Histochemical Observations on the Cyst of *Posthodiplostomum minimum*.

9:15 38. Kirk, Daniel E., (Catawba College). *Trichinella spiralis* in Humans in Piedmont North Carolina.

9:30 39. Jeffery, Geoffrey M., and Kenneth O. Phifer, (U. S. Public Health Service). Investigations on Intestinal Helminth Infections in a Coastal South Carolina Area.

9:45 40. Bogitsh, Burton J. and Robert R. Cardell, Jr., (Georgia Southern College). Observations on the Ultrastructure of the Cyst of *Posthodiplostomum Minimum*.

10:00 41. Vandiviere, H. M., (N. C. Tuberculosis Assoc.). Epidemiologic Investigations of Tuberculosis in Haiti.

10:15 42. Collins, William H., (U. S. Public Health Service). Experimental Transmission of Semliki Forest Virus by Anophelinc Mosquitoes.

10:30 43. Greene, Nathan D., (N. C. State Collcge). Thc Life History of *Heterobilharzia americana* Price, 1929.

FRIDAY AFTERNOON—APRIL 13, 2:00 P.M.

Animal Physiology

Room A—Winston Hall

Presiding: Samuel R. Tipton

2:00 44. Bush, Francis M., (Howard College). Effects of Exposure to Light and to Temperature on the Annual Cycle for Fat and Lean Weight of *Bufo fowleri*.

2:15 45. Stidham, James D., (Univ. of Tennessee). The Effects of Various Larval Diets on Biting Rate and Longevity in the Mosquito *Aedes aegypti* (L.).

2:30 46. Bell, Rondal E., (Millsaps College). Electrophoretic Analysis of the Serum Proteins of *Citellus* Species: Taxonomic Implications.

2:45 47. Thomson, J. Richard, (Chemotherapy Division—Southern Research Institute). A Hypothesis for Eventual Failure of Antileukemic Agents Against Experimental Mouse Leukemia.

3:00 48. Baker, Clinton L., (Southwestern College). Spermatozoa of Amphiumae: Spermateleosis, Morphology, Helical Motility and Reversibility.

3:15 49. Martinez, Irving R., Jr., (Louisiana State Univ.). The Effects of Colchicine Upon the Olfactory Epithelium.

3:30 50. Reams, Willie M. and Thomas C. Mayer, (Louisiana State Univ.). Migratory Behavior of Pigment Cells in the PET Mouse.

3:45 51. Moore, Jack H., (Southern Research Institute). The Drug Response Correlation of Some Experimental Animal Tumors and Certain Classes of Human Cancer.

4:00 52. Cole, B. Theodore, (Univ. of South Carolina). Comparison of Electrocardiographic Characteristics in Vertebrates.

4:15 53. Leonard, Martha R., (Oak Ridge National Laboratory). Capacity of Spleen Cells to Respond to Antigen and to Proliferate after Sublethal Irradiation.

Endocrinology and Animal Ecology

Room B—Winston Hall

Presiding: Frank B. Golley

2:00 54. Turnball, John G. and George C. Kent, Jr., (Louisiana State Univ.). Chronological Study of Deciduomata in Hamsters.

2:15 55. Cardell, Robert R., Jr., (Edsel B. Ford Institute). Observations on the Formation and Release of Secretory Cranules in the Pituitary Cland of the Salamander (*Triturus Viridescens*).

2:30 56. Daugaard, Allen T. and George C. Kent, Jr., (Louisiana State Univ.). Failure to Maintain Deciduomata with Progesterone in Hamsters.

2:45 57. Tanner, James T., (Univ. of Tennessee). Effect of Food Supply on the Egg-laying Date of Juncos (*Junco hyemalis*).

3:00 58. Raulerson, Lynn and W. D. Burbanck, (Howard College). The Life-Cycle and Ecology of *Elliptio hopetonensis* Lea.

3:15 59. Parrish, Fred K., (Agnes Scott College). Comparative Observations on the Behavior of Marine and Fresh Water Turtles.

3:30 60. Lackey, James B., (Univ of Florida). Ecology of the Microbiota of Mission Bay.

3:45 61. Shadowen, H. E., (Western Kentucky State College). A Live-trap Study of Seed-eating Mammals.

4:00 52. Pelt, Arnold Van, (Tusculum College). Crater density and Above-ground Activity of Two Dominant Old Field Ants.

4:15 63. Colley, Frank B., (Univ of Georgia). Energy Flow in an Old Field Ant Population.

Systematic Botany

Room C—Winston Hall

Presiding: R. L. Wyatt

2:00 64. Bell, C. Ritchie, (Univ. of North Carolina). Taxonomic Characteristics of Some Species of *Matelea* (Asclepiadaceae).

2:15 65. Radford, Albert E., (Univ. of North Carolina). Vascular Flora of the Carolinas.

2:30 66. Matthews, James F., (Emory Univ.). Paper Chromatographic Studies of the Biochemical Profiles of *Tradescantia* Species.

2:45 67. Wagner, W. H., Jr., (Univ. of Michigan). The Endemic Botrychiums of the Southeastern United States.

3:00 68. Aiuto, Russell, (University of North Carolina). Experimental Approaches of Taxonomic Problems in Southeastern *Phlox*.

3:15 69. Morzenti, Virginia M. and W. H. Wagner, Jr., (Univ. of Michigan). Southeastern American "Blackstem Spleenworts" of the *Asplenium Heterochroum-Resiliens* Complex.

3:30 70. Flagg, R. O. and W. S. Flory, (Univ. of Virginia). Origins of the Yellow-Flowered Cooperias and of *Zephyranthes refugiensis*.

3:45 71. Guhardja, Edi and E. T. Browne, Jr., (Univ. of Kentucky). The Flora of Bourbon County, Kentucky.

4:00 72. Flory, W. S. and R. O. Flagg, (Univ. of Virginia). *Zephyranthes atamasco* and Z. *treatiae*.

Cryptogamic Botany

Room 223—Winston Hall

Presiding: William J. Koch

2:00 73. Nichols, Wayne and Walter Herndon, (Univ. of Tennessee). Observations on the structure and development of the fresh-water red alga, *Boldia.*

2:15 74. Frederick, Lafayette, (Southern Univ.). Differences in Spore Appendage Formation Among Species in the Genus *Robillarda.*

2:30 75. Sharp, A. J., (Univ. of Tennessee). Some Interesting Mosses in Tennessee.

2:45 76. Herndon, Walter, Delbert Philpot, and Charles O'Kelley, (Univ. of Tennessee). Observations on the fine structure of *Protosiphon.*

3:00 77. Miller, Charles E., (Texas A&M). Some Fungal Parasites of *Pythium* from Texas Soils.

3:15 78. McCullough, Herbert A., (Howard College). The Non-Crustose Lichens of Two Localities in Alabama.

3:30 79. Nichols, H. Wayne, (Univ. of Alabama). Cytology and Development of *Compsopogon Coeruleus* in Culture.

3:45 80. Miller, Charles E., (Texas A&M). Some Aquatic Phycomycetes of the Mountain Lake Locale.

Abstracts of Papers Presented at the 23rd Annual Meeting of the Association of Southeastern Biologists

Ecotypic Differentiation in Southeastern *Juniperus*

J. Franklin McCormick, *Vanderbilt University*
Robert B. Platt, *Emory University*

The chief objective of the present study is to relate genetic variability in selected populations of *Juniperus virginiana* to the contrasting environments in which these populations exist. Evidence indicates that southeastern *Juniperus* is a hetrogeneous gene pool containing introgressant genes from *J. ashei;* and that the granite outcrops of the Southeastern United States present an ecological opportunity, actually a selective agent, for segregation of genes from *J. ashei.* The products of evolutionary progress in southeastern *Juniperus* are described as disjunct, discordantly variable populations which are at the ecotypic state of differentiation within the midst of an otherwise heterogeneous but concordantly variable gene pool.

A Technique for "Forcing" Absorption of Isotopes by Trees for Ecological Studies

Frank W. Woods, *Duke University*
Maxwell L. McCormack, *University of Southern Illinois*
Mitchell D. Ferrill, *Duke University*

For radio-ecological investigations, applications of gamma-emitting isotopes are sometimes made in forest stands to either small spots on the soil surface or at selected depths. However, such materials may not be absorbed in sufficient quantities to permit detection in trunks and leaves of trees, even though present. Increased absorption of radioiodine by roots can be forced by (1) local sterilization of the soil with methyl bromide at the point or depth of application immediately prior to application of the isotopes, and (2) application of liberal quantities of water immediately following application of isotope solutions. Several things seem to contribute to increased absorption: (1) roots are killed and the differential permeability of root cells destroyed; (2) bacteria and fungi, which normally absorb minerals biologically, are destroyed; (3) cation exchange capacity of soil micelles is filled by bromine at the expense of the iodine; and (4) water, absorbed freely by dead roots, floods radioactive materials into the vascular elements.

Nitrogen in Ash and Cinders from Paricutin Volcano, Mexico

Willis A. Eggler,
Newcomb College of Tulane University

Nitrogen content in ash and cinders from Paricutin Volcano, as determined by the Kjeldahl method, ranged from about 20 ppm to 350 ppm. Content varied greatly from place to place and often between samples similar in appearance and only a few feet apart. Where plant life was absent nitrogen content increased rather uniformly with depth, and was about ten times as great at 3 feet as at 3 inches. It is concluded that this is the result of concentration by percolating water. Where plants are present upper zones have as high nitrogen concentration as lower, and it is concluded that plants concentrate nitrogen in the upper zones. It is believed that most of the nitrogen is derived from the original magmatic material.

The Two Populations of a Narrowly Endemic Shrub, *Croton alabamensis* E. A. Smith

Joe A. Farmer, *University of Alabama*

Croton alabamensis E. A. Smith, a small, semi-evergreen, monoecious shrub, is found localized in the Cahaba River drainage in Bibb County, Alabama, and in the Warrior River drainage in Tuscaloosa County, Alabama. Separated by approximately thirty miles, these areas support two distinct populations which differ in morphology, physiology, and cytology.

The morphological differences include (1) overall plant size and appearance; (2) leaf size, shape, and color; (3) trichome color; (4) intrapopulational variation; (5) seed size and dispersal range; (6) flower size and sex distribution; and (7) fruit size.

Physiologically the populations differ with regard to: (1) flowering and fruiting time; (2) seed viability and germinability; (3) susceptibility to "damping-off" fungi; (4) seedling and transplant survival; (5) drought-induced wilting; (6) calcium-deficiency symptoms; and (7) frequency of albino seedlings.

Cytologically the populations differ in chromosome number. The roles of heredity and environment in differentiating these populations are presently being analyzed.

Dispersal and Distribution of *Heterotheca latifolia* in the Georgia Piedmont since 1954

Gayther L. Plummer, *University of Georgia*
Catherine Keever, *Millersville State College*

Keever outlined the ecological relationships as well as the distribution of camphor weed in Georgia and South Carolina until 1954. Since then this autumnal weed has spread from an area of about 1500 sq. mi. to cover an area of 8000 sq. mi. around Athens. Dispersal has been followed biennially. The greatest movements have been toward the south and southeast where it is approaching the northern range of the Coastal Plain species, *H. subaxillaris*. Convergence of the two populations occurs in an area near Augusta and Sandersville within a north-south distance of 10-20 miles. The two populations are of heterogeneous morphology in this area of convergence. It is presumed that some hybridization has occurred.

Dispersal of *H. latifolia* follows patterns of the direction of prevailing winds. Autumnal weather patterns will be presented and associated with present distribution.

Computer Programs for the Estimation of Forest Stand Weight and Mineral Pool

Edward E. C. Clebsch and Royal E. Shanks,
University of Tennessee

A series of programs has been developed by the authors for the IBM-1620 for use in processing the voluminous data required in the computation of estimates of stand weight and chemistry. The programs and the flow of information through them are discussed. They combine compilation, computation, and statistical manipulation in various ways. The key program is one for simple linear regression. The others are: bole weight, branch weight, tree weight, tree height and form factor, tree growth, tree chemistry, and stand weight and chemistry.

Estimates of Weight, Mineral Pool, and Flux of Material in Appalachian Ecosystems

Royal E. Shanks, Edward E. C. Clebsch,
H. R. DeSelm, *University of Tennessee*

The above-ground biomass of a high altitude spruce-fir forest was twice that of the mountain beech forest sampled, and 13 times as great as that of a heath bald. The mineral content of evergreen and deciduous forests differed less than their weight, differing least in P, and successively more in K, Mg, and Ca. The heath bald is notably low in mineral content. The litter and humus compartment of the heath bald is 3 times as great as that under spruce-fir and 40 times as great as that under beech. These systems are chemically as well as physically differentiated, and it is probable that mineral poverty is a factor in maintenance of heath balds. This study. supported by the AEC, provides a frame of reference for studies of the distribution of radioactive fallout materials.

Organic Accumulation and Decay in Some Natural Systems

H. R. DeSelm and R. E. Shanks,
University of Tennessee

Production rates and rates of litter accumulation and decay are discussed from data obtained during the study of vegetation on The White Oak Lake bed, Oak Ridge, Tennessee. A statement is derived in which accumulation is related to time. This generalized statement is then applied to the cycling of calcium and radiostrontium on the lake bed. It is further used to calculate decay parameters for litter of other local vegetation types.

Distribution of Fallout Cesium-137 in the Great Smoky Mountains

Jerry C. Ritchie

Estimates of the total amount of fallout cesium-137 prior to the 1961 Soviet test series in the organic horizons and the upper four and one-half inches of mineral soil in the Great Smoky Mountains have been made. The distribution of the fallout cesium-137 between altitudes and cover types differs. As in other studies, this relationship appears to be most closely related to annual rainfall.

Plant Communities on Deep Loess, Shallow Loess, and Clay Soils in West-Central Mississippi

Donald Caplenor, Judy Brook, and Anne Regan,
Millsaps College

Four forest communities in west-central Mississippi have been sampled by a modified point centered quarter method. These communities are located along a line running almost due east-west just north of Morton, Jackson, and Vicksburg (lat. 32°25′). The obvious variable in the environment of these communities is presence or absence of a surface deposit of loess. Of the four communities, two were on deep loess (45-115 ft.), one on shallow loess (0-8 ft.), and one on clay soil without loess. Species composition of the forests on the different soils was distinctive. Sorensen's Quotient of Similarity for the various conditions of soil was as follows: Deep loess—shallow loess, 41.6; shallow loess—no loess, 29.5. The most obvious differences in species composition noted thus far are the near-absence of pines and the predominance of certain highly mesophytic species on the deep loess.

Photoperiod Control in Plant Succession

Charles P. Daniel, *Emory University*

Aster pilosus and *Erigeron canadensis* germinated in greenhouse flats in February. Aster rosettes became shoots about March twentieth. Erigeron rosettes became shoots after May first when day length was 14 hours.

Erigeron and Aster germinated in July in soil containing horseweed roots, horseweed tops, and controls were divided into 12 and 14 hour day length groups. No Aster germinated at 12 hours but gave 96 per cent shoots at 14 hours. Erigeron seed germinating at 12 hours yielded 3 per cent and at 14 hours 20 per cent shoots. Erigeron roots in the soil culture lowered dry weight production significantly at 12 hours but not at 14 hours. Horseweed tops did not cause a significant difference at either photoperiod. This suggests that Aster assumes successional dominance by earlier stem and root development than photoperiod retarded Erigeron.

The Distribution of the Planktonic Diatom Genus *Rhizosolenia* in Biloxi Bay and Mississippi Sound

Robert A. Woodmansee, *Mississippi Southern College and Gulf Coast Research Laboratory*

Plankton samples were collected during June and July along a salinity gradient off the Mississippi coast extending from Davis Bayou through Biloxi Bay and into Mississippi Sound. The temperature was recorded and the salinity, dissolved oxygen and phosphate were determined and compared to fresh-water discharge. *Rhizosolenia alata* was the most numerous species and was found to increase in abundance as the salinity increased. *R. setigera* and *R. stolterfothii* were fairly numerous and both showed maximum concentrations in the intermediate salinities of the Bay. An attempt to trace the dispersal of *R. alata* indicated that this diatom is being transported toward the sea in the surface layer and toward the land in the bottom layer.

The Ecology of Florida Pine Flatwoods

Joe A. Edmisten, *University of Florida*

Quantitative analysis of the vegetation of relatively undisturbed pine forests was accomplished with the quarter system. These fifteen stands of flatwoods, located in a ten-county area in north central Florida, were predominantly located on the Leon series of soils which are somewhat poorly drained. Soils were tested from each stand at four or five horizons in the profile. The soils were checked for pH, bulk density, soil separates, major nutrients, organic matter, depth of litter, and moisture equivalence. Importance values for the species of plants encountered were plotted against the above edaphic factors. Preliminary data indicate that, when protected from fire and grazing, these pine forests tend to be replaced by hardwood species. The succession seems to be accompanied by edaphic changes such as a raising of the pH, lowering of bulk density, incorporation of ground litter, and increasing of major nutrients.

Ionizing Radiation Effects on Litter Production of White Oaks

John T. McGinnis, *Emory University*

This paper is a continuation of previously published studies on ionizing radiation effects on forest litter production. White oak components of the oak-hickory-pine stands surrounding the air shielded ten megawatt radiation effects reactor on Air Force Plant 67 Reservation in north Georgia includes *Quercus alba* and *Quercus stellata*. Litter was collected from 1/10 milacre screen wire bottom frames and sorted into species groups. These collections were made over a two year period from four irradiated forest stands and one control. Sub-lethal doses of radiation (3-15,000 rads) to the trees caused early leaf fall in the summer of irradiation, followed by great reduction in the number of leaves produced the next spring. However, leaves produced were much heavier than non-irradiated leaves, and this reduced the apparent radiation effects on a weight basis. Equations are presented and illustrated concerning these effects.

(This project was supported in part by A.E.C. Contract AT-(40-1)-2412.)

Male Sterility in Cotton

Patricia Sarvella, *Mississippi State University*

In a cytological study of two genetic partially male-sterile stocks of cotton, differences in degree of sterility corresponded to plant age. These stocks, Western Stormproof (*ms-1 ms-1*) and Roux (*ms-3 ms-3*), were studied in the summer of 1960 at Mississippi State University. Throughout the season the young plants were more sterile than one-year-old plants. The sterility decreased as the season progressed. In 1961, the studies were repeated at two locations, Stoneville, Mississippi and Mississippi State University. The plants at Stoneville were more sterile than those at Mississippi State University. Young plants were more sterile than one-year plants except for (ms_1 ms_1) seedlings at Mississippi State University. Two-year-old plants of both stocks grown at Mississippi State University were more sterile than one-year-old plants. A stock containing cytoplasmic male sterility also became more fertile as the season progressed. The influence of various environmental factors are being investigated.

Biochemical Modification of Radiation Recovery

A. V. Beatty and J. W. Beatty, *Emory University*

Chromosomal aberrations observed in the microspores of Tradescantia after treatment with 400 r of X-rays, administered at 50 r per minute at 30°C in a helium atmosphere, were used as a measure of radiation damage. The control experiments yielded 0.24 aberrations per cell. The experimental material was pretreated for 1½ hours in chemical solutions. Some reduetion in aberration yield was found in material treated with citrulline, histidine, proline, glycine, phenylalanine, eysteine, isoleucine, alanine, threonine and serine. The other amino acids had little or no effect. Material treated with chloramphenicol and dinitrophenol exhibited considerable recovery.

Genes as Units of Segregation

P. W. Whiting, *University of Pennsylvania*

If genes be defined as units of heredity, it is conceivable that they may exist strung along the chromonemata in definite number or floating free in the cytoplasm. If they be defined as units of meiotic segregation, they are produced in indefinite numbers by mutation. A series of multiple allelic pleiotropic genes has been formed by mutation of different factors at the *R* locus of the wasp Mormoniella. As yet no limit appears to the number of these factors and some at least have many alternative states. It is probable that any other locus would mutate similarly to *R* could its possibilities be similarly explored. Locus *R* is exceptionally convenient for such exploration in having two factors, *O* and *S*, which mutate with relatively high frequency to the marker eye colors oyster white and scarlet.

The Effect of Centrifugation upon X-Ray-Induced Chromosome Aberrations in Microspores of *Tradescantia paludosa*

Edward K. Yeargers, *Emory University*

Inflorescences of *Tradescantia paludosa,* removed from plants growing in a greenhouse, were given 400 r of X-radiation at 50 r per minute. Simultaneously, by means of a specially built centrifuge, the inflorescences were subjected to constant forces ranging from 0 to $10{,}000 \times g$ in a series of 17 experiments. Ninety-six hours after irradiation acetocarmine smears of the anthers in the first microspore division were made and the number of two-hit aberrations was scored from the metaphase configurations. In a graph of aberrations vs. force, a threshold for increase at $800 \times g$ can be seen followed by an exponential rise, a parabolic decrease and a second exponential rise with slope identical to the first. An explanation for these results is postulated in terms of varying distances of separation of broken ends. (Supported in part by A.E.C. Contract No. AT-(40-1)-2669.)

Maturation of the Embryo in *Ilex crenata* Thunbg.

J. M. Herr, Jr.

Mature seeds of *Ilex* L. bear rudimentary, heart-shaped embryos which undergo maturation after dispersal but prior to germination. Seeds of *I. crenata* separated from their endocarps and placed in culture on moist cotton at room temperature or at 31°C. were fixed at 3-7 day intervals in Carnoy's #1 fluid for one hour. The embryos were removed, and measurements were taken of cotyledon junction. Associated cellular changes were recorded and hypocotyl length and of the width at the hypocotyl-cotyledon junction. Associated cellular changes were recorded from squash preparations or serial sections of the embryo. Embryo maturation may be initiated by growth either in the hypocotyl or cotyledons. The cotyledons may elongate uniformly or unevenly and often become lobed at the apices. The epicotyl develops at a later time during germination. The rate of maturation is usually increased in seeds initially subjected to a 5%

glucose solution for 24 hours. Maturation is directly correlated with cell enlargement, but cell divisions are conspicuously absent. The pattern of maturation is controlled by the manner in which water enters the seed.

The report is based on work performed under Contract No. AT (38-1)-153 between the U. S. Atomic Energy Commission and the University of South Carolina, Columbia, South Carolina.

A Photographic Instrument for Determining Cellular Growth Rates in Roots of Small-Seeded Grasses *

Robert T. Brumfield, *Longwood College and Oak Ridge National Laboratory*

The growth and division of the surface cells of the small-seeded grasses can be studied from photographic records taken at successive intervals of time. Since the growing point is long and narrow, a series of overlapping frames is necessary when conventional methods of photomicrography are used. The labor involved in reconstructing the whole length of the growing point from the separate frames seriously limits the number of experimental observations. A special camera has been developed which records the whole length of the growing point on a single 38-cm. length of 35 mm. film at a magnification of 175×. The root is transported from tip to base of the growing point through the objective field and its moving image is projected onto a moving film; the motions of the image and film are synchronous. Increments in cell lengths or displacement of points from the apex are measured directly by superimposing two of the transparent strips.

* Supported by National Science Foundation grant G-8763.

The Pigments of *Microsporum cookei*

F. T. Wolf, G. W. Koehne, and E. A. Jones, *Vanderbilt University*

The dermatophyte, *Microsporum cookei*, produces a purple pigment on Sabouraud's agar. By paper chromatography it was found that this is a mixture which included a purple component and a yellow component, both of which are pH indicators and redox indicators. Quantities of these pigments, separated by means of column chromatography, were prepared in solid form. From evidence derived from infrared absorption spectra, it is shown that both are polyhydroxy methyl anthraquinones. Both pigments must have at least one beta substituent on each of the lateral rings, and must have at least one alpha hydroxyl and one beta hydroxyl. The yellow pigment is fluorescent, and must have two alpha hydroxyls in the 1,4 positions.

On the Uptake of Nutrients by the Leaves of the Pitcher Plant, *Sarracenia flava*

Gayther L. Plummer, *University of Georgia*
John Kethley, *University of Georgia*

Both radioisotopes and amino acids were delivered to the sarcophageal region of this plant. Absorption by the leaves was determined by means of autoradiograms and paper chromatographs. Four kinds of digestive processes in the sarcophagus have been recognized: acid hydrolysis, liquor hydrolysis, bacterial enzymatic activities, and possibly autolytic processes within the insects. It is not known exactly what nutrients are available to the plants or how much of the few that have been recognized. Nevertheless, some field studies have shown that those plants with flower buds in the autumn had fewer insect carcasses in the trumpets than did those plants without flower buds.

Interaction of Benzoic Acid Derivatives and Kinetin on Cultured Tobacco Pith Tissue

George W. Keitt, Jr., *Florida State University*

Uniform sections of tobacco (*Nicotiana tabacum* L. var. Wis. 38) pith, a tissue requiring exogenous factors for growth in culture, were placed on media containing four concentrations of the benzoic derivative ± kinetin (K). Fresh and dry weights were taken after 30 days. Basal, indoleacetic acid (IAA), K, and IAA + K media were used as checks. By itself, 2,3,6-trichlorobenzoic acid caused modest cell enlargement, and with K, growth. Inactive in both tests were 2,3,5-triiodobenzoic acid (TIBA), 2,3,5-trichlorobenzoic acid, 2,4,5-trichlorobenzoic, and 3,4,5-triiodobenzoic acids were inactive in both cases. More active than 2,3,6-trichlorobenzoic in both tests was 3-amino-2,5-dichlorobenzoic. The 2,5-dichloro-3-nitro- analog was inactive in both tests. These results, and those of dichlorinated derivatives thus far tested, indicate that stimulation of enlargement alone is correlated with growth in the presence of K. The failure of TIBA to show "co-kinin" activity suggests that it causes callus redistribution on stem explants by transport inhibition, while the other compounds causing redistribution may do so by acting as auxins. This work was supported by NSF Grant No. C14545.

The Effect of Certain Growth Substances upon the Stamen Hair Cells of *Tradescantia paludosa* in Artificial Culture

L. Gerald Parchman, *Emory University*

The culture of the stamens of *Tradescantia paludosa* in a sucrose-agar medium supplemented with various plant growth factors allows microscopic observation of living stamen hair cells under various physiological conditions. The stamen hair cells live in artificial culture for some weeks but do not undergo mitosis *de novo*. Indole acetic acid, kinetin, gibberellic acid, and certain amino acids have been added to White's tissue culture medium in various concentrations in an attempt to induce division. The early stages of prophase are inhibited by light as well as the lack of an available supply of precursors to division. The cell wall of the hair cells appears to be rather impermeable to larger molecules so that nutrients must diffuse up the column of cells from the stamen. This process is apparently inhibited or halted after several hours in culture because of the death of the wounded, basal cells. Cell elongation and division depend upon the osmotic pressure as well as a ready supply of oxygen, nutrients, and growth hormones, and the proper balance of these is probably critical in the culture medium if further growth is to take place. (Supported in part by A.E.C. grant AT-(40-1)-2669.)

Sexual Dichromatism in the Chelae of of the *Asplenium heterochroum-*

Thomas S. Hopkins, *University of Florida*

The blue crab, *Callinectes sapidus* Rathbun, exhibits a striking case of sexual dichromatism in the orange colored carotenoid-protein complex in the terminal portions of the chelae. The female displays four distinct colors in her general appearance while the male exhibits only three. Green or brown carapace, blue or blue-green appendages with the orange "fingered" chelae terminating in purple tips characterize the female, but the male lacks the orange in the chelae. Since the carotenoid astaxanthin appears to be the only pigment present in the tissues considered, the color difference of the female is presumably due to the nature of the carotenoid-protein link or to the structure of the protein involved. This trait appeared consistently in several populations investigated.

A Survey of the Triclad Turbellaria in a Section of Northwest Georgia

Julian T. Darlington, *Furman University*

Collections within an approximate twenty mile radius of Rome, Georgia during the interval 1955-1960 have shown this area to have an unusually rich and varied fauna of aquatic, epigean triclad turbellaria. The family Planariidae is represented by one species each of *Dugesia, Curtisia,* and *Planaria,* and by two species of *Phagocata.* The family Dendrocoelidae is represented by one species of *Procotyla.*

Some New Inqulinic Flagellated Protozoa from Endemic Florida Reptiles

E. C. Bovee and S. R. Telford, Jr.,*
University of Florida

The sand skink, *Ncoseps reynoldsi,* and the short-tailed snake, *Stilosoma extenuatum arenicolor,* are both endemic to Florida, and restricted to dry scrub and sandhill habitats; and the Florida variety of the crowned snake, *Tantilla coronata,* is similarly restricted. It is no surprise to find that some of their cloacal flagellated protozoa are different from species of the same genera in the more vagile reptiles, and those of moister habitats.

The sand skink harbors *Monocercomonas* sp. different from the more common species in other reptiles, *Monocercomonas colubrorum;* and it also contains *Rigidomastix* sp. different from *Rigidomastix coprocola* from the horse.

The crowned snake yielded still another *Monocercomonas* sp.

The short-tailed snake produced a coprozoic flagellate, *Cercobodo* sp., which differs from any other species of that genus which we can find described in the literature.

* Present address: University of California, Los Angeles.

Geminate Species of Branchiobdellids: a Problem in Zoogeography

Perry C. Holt, *Virginia Polytechnic Institute*

Several species of branchiobdellids epizoic on crawfish of the suborder Cambarinae have as their closest relative species from the Pacific area of North America where the host animals are members of the subfamily Astacinae. Several hypotheses which might explain these peculiar facts of distribution are discussed and rejected due to the paucity of data. The hope is expressed that collecting of representatives of the presently unknown Mexican fauna will at least partially resolve this problem.

Anatomy and Ecology of Hypotrichous Protozoa

Stuart S. Bamforth, *Newcomb College* of
Tulane University

Three anatomical features—adoral zone of membranelles (AZM), dorso-ventral body flattening, and cirri differentiation—influence hypotrich distribution. The large AZM of most forms serves swimming and ingestive functions. Planktonic types (*Hypotrichidium*) and sessile forms (*Stichotricha, Chaetospira*) have bodies round in cross section, but most hypotrichs have flattened bodies, well adapted for interface locomotion. Lower Oxytrichidae (e.g., *Uroleptus, Epiclintes, Urostyla*), with many uniform ventral cirri, and Paraeuplotidae, lacking ventral but possessing caudal cirri, crawl over surfaces. *Oxytricha* and *Stylonychia,* with small groups of well-developed cirri, walk; and Euplotidae with longer cirri move more agilely. The reduced AZM of Aspidiscidae restricts their diet to bacteria and detritus; their squarish highly flattened bodies and few prominent cirri enable them to maneuver rapidly. These last four taxonomic groups are the most cosmopolitan hypotrichs.

Effect of Mechanical Pressure on *Paramecium aurelia* during Stomatogenesis *

Evan Dwain Porter, *Emory University*

If paramecia are compressed during stomatogenesis, the new buccal area will evert and the new buccal organelles will develop externally. If the pressure is too great fission will be inhibited and the cortex between the two mouths will form large bulges which often burst. If the pressure is released enough for movement of the animal but still maintaining it in a flattened condition, fission occurs. As the old mouth migrates forward, the buccal aperture is stretched and the buccal cavity is opened along its length. The buccal organelles are forced to the surface of the body and lie fully exposed. They will remain on the surface if the pressure is maintained until the cortex is no longer plastic. If the pressure is released early the old organelles will sink into the cytoplasm and assume a normal appearance. The new buccal organelles remain everted. The opisthe then cannot feed and does not divide.

* This investigation was carried out during the tenure of a predoctoral fellowship from the Division of General Medical Sciences, United States Public Health Service.

Seasonal Growth of Northern and Southern Quahaugs and Their Hybrids

R. Winston Menzel, *Florida State University*

Monthly measurements of growth have been made of the northern quahaug, *Mercenaria mercenaria,* the southern quahaug, *M. campechiensis* and their reciprocal hybrids for fifteen months in Alligator Harbor, Florida. The fastest growth for the four groups of clams occurs during the spring and fall. The northern quahaug has the least overall growth and shows least growth during the hottest period of the year. The southern quahaug has the best overall growth and has the least growth during the coldest period. The growth of the hybrids is between the two parents but is closer to the southern parent than to the northern parent. The growth rate of the hybrids is better than either of the parents in late spring and early fall.

The Harvesting Ant *Pogonomyrmex comanche* Wheeler

Arthur C. Cole, Jr., *University of Tennessee*

Pogonomyrmex comanche Wheeler is a valid species in the Maricopa Complex of the subgenus *Pogonomyrmex.* It has previously been considered generally as a subspecies of *occidentalis* (Cresson) but it possessses no characteristics in any caste which could place it in the Occidentalis Complex and there is no evidence of subspeciation. The species is limited to sand areas, where it constructs crater nests, in parts of Texas, Oklahoma, Kansas, and Louisiana. The known eastern extent of its range is in northwestern Louisiana east of which it is replaced by *badius* (Latreille). The ant described by Olsen in 1934 as *occidentalis var. utahensis* is not a synonym of *comanche* but is a minor variant synonymous with *occidentalis.* The species *occidentalis* and *comanche* are considerably divergent in structure, behavior, and distribution.

Anatomical Studies of the Alimentary Tract of *Gammarus lacustris lacustris* Sars (Crustacea: Amphipoda)

EUGENE H. SCHMITZ, *Louisiana State University at Alexandria*

The alimentary tract of the western North American amphipod, *Gammarus lacustris lacustris* Sars consists of three main divisions: fore-gut, mid-gut, and hind-gut. A dorsal median caecum and two pairs of hepatopancreatic caeca join the mid-gut near its anterior end. A pair of rectal caeca join the mid-gut near its posterior end. A complex gastric mill and a pyloric filter apparatus characterize the cardiac stomach and pyloric stomach, respectively. The walls of the fore-gut and hind-gut consist of a chitinous intima, columnar epithelium, tunica propria, circular and sometimes longitudinal muscle, and a discontinuous "serosa." The mid-gut wall is composed of a syncytium, basement membrane, circular and longitudinal muscle, and a "tunica externa." The columnar cells of the dorsal median caecum and rectal caeca are thought to function in salt resorption. The columnar cells of the hepatopancreatic caeca are mostly vacuolated and function in enzyme secretion and absorption. The function of the tegmental glands remains unknown.

Possible Breeding Systems for the Study of Recessive Mutations in *Tetrahymena pyriformis* *

CAROLYN WELLS AND LINDY HATCH, *Longwood College*

In order to study recessive mutations in the ciliate, *Tetrahymena pyroformis,* it is desirable to establish either a close inbreeding system such as selfing, or a reliable micronucleate x amicronucleate conjugation resulting in haploid progeny. Many attempts to discover such a system in several strains of this species have been fruitless. Recently it was found that certain cultures of strain EU 6010, a member of variety 6, mating type III, will undergo selfing conjugation when washed in distilled water. Micronuclear reorganization appears normal in about 30% of the washed cells. On the other hand, when cells of this strain are washed in Dryl salt solution, they do not self, but conjugate with complementary mating types. A strain (EU 6525) of mating type I is amicronucleate. Other instances of selfing and of amicronucleate x micronucleate pairing are known in *T. pyriformis.* The latter type of mating has been aberrant in other strains; true nuclear reorganization fails. In selfing matings, the progeny from other strains are usually inviable. Often the selfing phenomenon is not reproducible. It is not known at present whether EU 6010 will be free of these difficulties.

* Work supported by United States Atomic Energy Commission Contract No. AT-(40-1)-2793.

Parasitic Helminths of the Raccoon

GROVER C. MILLER AND REINARD HARKEMA, *North Carolina State College*

From 1957 to 1962 a total of 285 raccoons from the Southeastern states was examined for parasitic helminths. One hundred and eighty-four of the host animals were taken from 17 counties in N. C.; 54 from S. C.; 22 from Georgia; 19 from Florida; and 6 from Virginia. Most of the hosts in N. C. were taken in the vicinity of Raleigh. The majority of the parasites have been indentified to species and grouped as follows: NEMATODA—9 species; TREMATODA—21 species; CESTODA—3 species and ACANTHOCEPHALA—1 species. A significant difference was noted in the parasites of coastal animals and those of inland habitats.

A Comparative Study of the Aldolase Systems of *Aedes aegypti, Anopheles quadrimaculatus,* and *Culex quinquefasciatus*

KENNETH O. PHIFER, *U. S. Public Health Service**

Homogenates of the mosquitoes, *Aedes aeqypti, Anopheles quadrimaculatus,* and *Culex quinquefasciatus,* contain aldolase systems which are quite similar in physical characteristics. The apparent Michaelis-Menten constants ranged from 3.2×10^{-3} M; to 3.6×10^{-3}; the optimal pH's lay between pH 7.4 and pH 8.2. The two culicine species differed in small degree with respect to linearity of enzyme activity with time and to effect of temperature on activity. The sex of the mosquito had no effect upon the aldolase activity. The enzyme activity was enhanced by ethylenediaminetetraacetate and was inhibited by the cations magnesium, manganese, and calcium. The data are related to those of other aldolase systems and the relation of these studies to the closer definition of host-parasite interaction is discussed.

* Department of Health, Education, and Welfare, Public Health Service. National Institute of Allergy and Infectious Disease, Laboratory of Parasite Chemotherapy, Section on Epidemiology, P. O. Box 717, Columbia, South Carolina.

The Chemical Nature of Metacercarial Cysts. I. Histological and Histochemical Observations on the Cyst of *Posthodiplostomum minimum* *

BURTON J. BOGITSH, *Georgia Southern College*

On the basis of histological and histochemical tests, the cyst walls of metacercariae of *Posthodiplostomum minimum* are found to be composed of two distinct layers. The outermost layer is fibroblastic and is apparently elaborated by the host. The innermost layer is non-cellular. Chemically it is composed of carbohydrate-protein complexes that are similar to the ground substance of vertebrate tissue.

* Supported in part by research grant (E-2738 C_1) from the National Institutes of Health, Department of Health, Education and Welfare.

Trichinella spiralis in Humans in Piedmont North Carolina

DANIEL E. KIRK, *Catawba College*

In four years, 167 muscle samples from routine autopsies have been examined for larvae of *Trichinella spiralis.* All subjects were adults and most were residents of Rowan County. Inspection was by microscopic examination of six to twelve square inches of pressed diaphragm. Two massive infections were found and six lighter ones, an incidence of 4.7 per cent of the total to date.

Investigations on Intestinal Helminth Infections in a Coastal South Carolina Area

GEOFFREY M. JEFFERY AND KENNETH O. PHIFER, *U. S. Public Health Service*

In a group of 212 residents of a coastal area of South Carolina *Ascaris lumbricoides* infection was found in 64% and *Trichuris trichiura in* 37%, representing one of the highest prevalences ever reported from the continental United States. Highest prevalence and intensity of infection were found in the younger age groups. Hookworm was found in only 4% of the population. Blood studies revealed a high eosinophilia which could be correlated with the presence of *Ascaris* in the younger

individuals. With a view toward possible control of these infections in the absence of improved sanitation, treatments with single doses of piperazine were given. Approximately 60% of *Ascaris* infections treated were cured, and there was an overall worm reduction of about 92%.

* Department of Health, Education, and Welfare, Public Health Service, National Institute of Allergy and Infectious Diseases, Laboratory of Parasite Chemotherapy, Section on Epidemiology, P. O. Box 717, Columbia, South Carolina.

Observations on the Ultrastructure of the Cyst of *Posthodiplostomum minimum* *

Burton J. Bogitsh and Robert R. Cardell, Jr., *Georgia Southern College and Edsel B. Ford Institute for Medical Research, Henry Ford Hospital*

Encysted metacercariae of *Posthodiplostomum minimum* were taken from fresh-water fish. Portions of the cyst wall, as well as the enclosed parasite, were fixed in Palade's buffered osmium at pH 8.4 and embedded in Vestopal W. Ultra-thin sections were cut and subsequently examined with an R.C.A. EMU-II electron microscope. The dual nature of the cyst wall is illustrated. Comparisons are made with light microscopy slides and previous chemical studies.

* Supported, in part, by research grant, E-2738 C_2, National Institutes of Health, Department of Health, Education and Welfare.

Epidemiologic Investigations of Tuberculosis in Haiti

H. M. Vandiviere, *N. C. Tuberculosis Association*

Epidemiologic investigations of the status of tuberculosis in the republic of Haiti are reported. These studies are preliminary to large scale field trials of two antituberculosis vaccines, a BCG and a human variant R_1. Haiti where tuberculosis thrives in its undoctored, natural state was chosen as an ideal locale for the evaluation of these well standardized vaccines. Results of preliminary tuberculin testing indicate almost 100% of the population to be tuberculin reactors by the time they are 25 years of age. The percent of reactors during the early school years range between 20-30%, suggesting that this may prove to be an excellent group for the vaccine evaluation. If this trend holds true the 1st grade ages will be the most scientifically productive from the standpoint of money and effort expended.

Experimental Transmisison of Semliki Forest Virus by Anopheline Mosquitoes

William E. Collins, *U. S. Public Health Service* *

Semliki Forest Virus has been reported by other workers to be transmissible in the laboratory by *Aedes aegypti* L. and by *Aedes togoi* Theo. Transmissions have been obtained in this laboratory by the use of anopheline mosquitoes. The virus titers, infection rates, and transmission rates reported for *Anopheles quadrimaculatus* and A. *albimanus*. The significance of transmission of this virus by anopheline mosquitoes is discussed.

* Department of Health, Education, and Welfare, Public Health Service. National Institute of Allergy and Infectious Diseases, Laboratory of Parasite Chemotherapy, Section on Epidemiology, P. O. Box 717, Columbia, South Carolina.

The Life History of *Heterobilharzia americana* Price, 1929

Nathan D. Greene, *N. C. State College*

Heterobilharzia americana (Trematoda: Schistosomatidae) is a common parasite of raccoons in the Coastal Plain of North Carolina. The adult flukes live in the hepatic sinuses, hepatic portal vein and branches of the superior mensenteric vein. Eggs pass through the intestinal wall and out of the body with the feces. In water, they hatch immediately into ciliated miracidia characterized by 2 pairs of flame cells and an epidermal plate pattern of 6:8:4:3. The intermediate host in *Lymnaea columella,* in which there are two generations of sporocysts. Cercariae are produced 31 to 39 39 days following exposure. The cercaria is of the apharyngeal, brevifurcate distome type with a flame cell formula of 2(3+2)(1), 5 pairs of penetration glands, spinose body and tail stem, a pair of eyespots, and furcal fin folds. Cercariae enter the final host by direct penetration. The prepatent period in raccoons is 77 days, and in dogs, 66 days.

Effects of Exposure to Light and to Temperature on the Annual Cycle for Fat and Lean Weight of *Bufo fowleri*

Francis M. Bush, *Howard College*

During the annual cycle a 1½ to 2-fold increase occurred in the average quantity of fat (% dry wt) in 258 toads (14.1-28.0), their livers (22.6-32.8) and their carcasses (11.7-19.8). The amount of ovarian fat remained about the same (27.1) despite the relative ovarian weight decreased significantly from March (26.6% live wt) to June (6.6) and to September (9.0). Absolute fat in the dry fat-bodies increased 28-fold (23-650 mg) and the dry weight of the lean livers more than 3-fold (71-266 mg).

Toads (13-33) were kept in boxes for 60 days (May-July, 1960; April-June, 1961) at 21 ± 1° C on 4 light/24 hrs (average amount of fat = 26.5% dry wt), 8L (29.5), 12L (31.8), 16L (33.6), 20L (31.3) and at 31 ± 1° C on 4L (33.3), 12L (28.1) and 20L (29.6). Toads on all photoperiods at 31° C and those on 12L, 16L, and 20L at 21° C possessed absolute dry weights for total fat, the fat of the liver and the fat-bodies larger than September toads whose weights were still larger than those on 4L and 8L at 21° C. All toads at 31° C had larger absolute dry weights of the lean bodies, the lean livers and the lean ovaries than the September toads and those at 21° C. Additional support was given to these results once the initial weights of the toads were equated by an analysis of variance and least-square means computed for the components were subjected to a range test.

The data suggest that increased temperature, rather than increased light, caused the enlargements, particularly in the lean dry weights, while exposure to increased light caused primarily the storage of fat and then enlargements in the lean dry weights.

The Effects of Various Larval Diets on Biting Rate and Longevity in the Mosquito *Aedes aegypti* (L.)

James D. Stidham, *University of Tennessee*

Larvae of the yellow fever mosquito *Aedes aegypti* (L.) were given various diets ranging from a high protein diet on the one extreme to a low-intake partial starvation diet on the other. The differences in amount of food given in the several diets caused a wide variation in larval life span and consequently in emergence of adults. Both mated and unmated females were used from each

larval diet and biting rate, longevity, egg production and individual weight of the adults were obtained. All experiments were carried out under uniform conditions, the adults being reared in a constant temperature laboratory at 80° F and 80% humidity. The results of the above will be given.

Electrophoretic Analysis of the Serum Proteins of *Citellus* Species: Taxonomic Implications

Rondal E. Bell, *Millsaps College*

Filter paper electrophoresis yields results that seem to have value for taxonomic studies. Electrophoretic patterns of serum from four species representing three subgenera of the genus *Citellus* were compared. Although individual variations exist, the electrophoretic patterns show distinct species variations in mobility, relative proportions of electrophoretic fractions, and failure to show good resolution of the components. In general, similarities of the patterns tend to verify existing taxonomic relationships.

A Hypothesis for Eventual Failure of Antileukemic Agents Against Experimental Mouse Leukemia *

J. Richard Thomson, *Southern Research Institute*

A quantitative bioassay for L1210 leukemic cells in mouse tissues and fluids has been developed in our laboratories, (Cancer Research 21 (9) pp 1154-64, 1961). There appears to be a direct relationship between the number of leukemic cells inoculated into appropriate inbred mice and their respective life spans.

The usual experimental inoculum of L1210 leukemic cells (1×10^5 to 1×10^6) given intraperitoneally in mice will uniformly kill the animals in six to eight days and small numbers of these cells can be detected by bioassay methods in various tissues and organs shortly after inoculation. Detectable numbers of leukemic cells appear in the brain in two to four days after intraperitoneal inoculation. The rate of appearance in the brain appears to be associated with the size of inoculum employed.

Amethopterin (an antimetabolite of folic acid) will effectively increase average life span of these animals to greater than 100% above untreated controls. If treatment is delayed until intracerebral infiltration has occurred, only slight life span increases are observed. In addition, if as few as 100-1,000 cells were inoculated intracerebrally and intraperitoneal therapy begun twenty-four hours later, Amethopterin (and other agents which uniformly markedly increase life span if the leukemic cells were inoculated intraperitoneally or intravenously) failed to show significant life span increase in the mice so inoculated. The ultimate failure of presently known anticancer agents may be related to the inability of these effective agents to cross the so called "blood brain barrier" thereby leaving growing (enlarging) foci of leukemic cells in the brain which are unaffected by antileukemic drugs and serve as a persistent source of peripheral leukemic cells which materially contribute to the death of the animals.

* This work was supported by a grant from the American Cancer Society.

Spermatozoa of Amphiumae: Spermateleosis, Morphology, Helical Motility and Reversibility

Clinton L. Baker, *Southwestern College*

Acrosome is an elongated cone fitting over anterior extension of the nuclear membrane (perforatorium); observed best after treatment with periodic-acid Schiff method. A granule and ring (proximal and distal centrioles of others) appear in spermatid independent of meiotic centrioles. Axial filament arises from granule and is not homologous in structure, origin or function to flagellar filament of non-urodelean sperm. Neck piece anlage forms from nucleus and remains within nuclear membrane. The ring encircles the axial filament in the spermatid, never divides, and elongates down middle piece. Flagellum is margin of undulating membrane. Mitochondria of middle piece are observed after tetrazolium salt reaction. Motility results from flagellar planar wave movement, yet helical shape of sperm causes helical motility. Reverse waves of flagellar movement, observed by motion pictures, result in reverse motility that may be as rapid and as directive as normal forward movement.

The Effects of Colchicine upon the Olfactory Epithelium

Irving Ricardo Martinez, Jr.,
Louisiana State University School of Medicine

It has been reported by LeGros Clark that if one olfactory bulb is removed, 50% of the receptors on the affected side degenerate after three days. Similar results were reported by Martinez, removing both bulbs in order to determine if there was any interrelationship between receptors and bulbs of the opposite side.

If 0.123 mg/kg of colchicine is injected intraperitoneally into a rabbit, striking degeneration of the olfactory epithelium occurs within 24 hours. Within three days one finds that there now remains in the epithelium less than half of the normal population of receptors. Progressive degeneration occurs until the fourteenth day, and now the receptors are no longer visible, except in the form of granular lines.

It is apparent from the results that some of the receptors undergo immediate degeneration, and some are residual at least up to ten days. These results are similar to those of LeGros Clark, following removal of one bulb, and Martinez, following removal of both bulbs.

The above information contributes to the suggestion that functional differences reflected in the biophysical structure or biochemical constitution may be an important factor in determining the degrees of selective degeneration of the olfactory receptors.

Migratory Behavior of Pigment Cells in the PET Mouse [1]

Willie M. Reams and Thomas C. Mayer,[2]
Louisiana State University

In an attempt to correlate the occurrence of melanocytes in the musculature of the posterior compartment of the leg with their interfollicular occurrence in the skin over the same region, autoplastic exchanges of skin were made in newborn PET mice. Since melanocytes are lacking interfollicularly in the skin and in the muscles of the abdomen, skin from the belly was exchanged with the pigment cell laden skin from the posterior surface of the leg in the hope that there might be an invasion of pigment cells into the belly muscles. Although no such invasion occurred, the behavior of pigment cells in the skin of the graft areas was of interest. It was noted that there was an invasion of belly skin by pigment cells from a graft of leg skin. However, no migration of pigment cells occurred into a graft of belly skin when made into the pigment cell rich posterior leg skin. These data with those from previous investigations seem to indicate that although the overlying skin may possess a reservoir of pigment cells capable of migration, the invasion of muscle by pigment cells occurs at a specific

stage in embryonic development. The factors involved in the differential migratory behavior of pigment cells in the skin grafts and the localized occurrence of melanocytes in the leg muscles will be discussed.

[1] Supported by N.S.F. Grant G-14153.
[2] Science Faculty Fellow of the N.S.F.

The Drug Response Correlation of Some Experimental Animal Tumors and Certain Classes of Human Cancer

Jack H. Moore, *Southern Researeh Institute*

There is evidence (Cancer Research Vol. 21, No. 6, Part 2, pp. 235-339) that some experimental animal tumor screening systems will select classes of drugs which are temporarily useful in the treatment of some chronic and acute leukemias and a small number of other types of human cancer. There are also animal tumors which, like some important forms of human cancer, respond to no known drug at tolerated doses, so it would appear of considerable importance to study carefully the compiled data correlating the drug response of "animal cancer" and "human cancer."

A brief review of the sensitivity of certain "human" and "animal" neoplasms, which respond to various classes of drugs, will be given.

Comparison of Electrocardiographic Characteristics in Vertebrates

B. Theodore Cole, *University of South Carolina*

Electrocardiographic studies have been made on the bullfrog and necturus among amphibians; turtle (including *Terripinnen carolina*, *Chrysemys* sp., and *Trionyx ferox spinitera*) horned toad, glass snake and *Natrix* sp. among the reptiles; rabbit, rat, muskrat, and man among mammals.

All animals included in this report, except man, were anesthetized with nembutal and electrodes placed either directly on various parts of the heart or on the surface of the body. Two active electrodes from the beating heart, or right and left arms and a ground lead on the left hind leg were used. Signals were amplified, sounds recorded on tape and simultaneous photographic record made from the screen of a Tektronix dual beam oscilloscope.

Heart rate in beats/min. in Poikiliotherms (26°-30° ambient temperature) ranged from 25 in the horned toad and glass snake to 107 in the glass snake. Magnitude of positive deflection measured directly from the heart, "R" wave from 0.286 millivolts in *R. catesbeiana* to 4.27 millivolts in *Trionyx*. Negative "Q" and "S" wave deflections ranged from zero in *R. catesbeiana* to 1.41 millivolts in *Natrix* and zero in *Natrix* to 2.11 millivolts in *Trionyx* respectively. The Q-R-S interval in Poikiliotherms as a group ranged from .004 seconds in *Phgrnosoma* to 0.016 seconds in Trionyx, as compared to a low of 0.019 sec. in the muskrat to 0.082 sec. in man among Homiotherms.

Heart rate in beats/min. in Homiotherms ranged from a high of 290 and 316 in rabbit and rat respectively to a low of 62 in man. The muskrat was intermediate with a rate of 172 beats/min.

Capacity of Spleen Cells to Respond to Antigen and to Proliferate after Sublethal Irradiation

Martha R. Leonard, *Oak Ridge National Laboratory*

Following sublethal X irradiation, the immune mechanism of mice is suppressed. The degree of suppression is dose-dependent. To investigate the antibody-forming capacity of cells during secondary response following irradiation, an *in vivo* tissue culture technique was used. At regular intervals a constant number of spleen cells from preimmunized irradiated mice was transferred intravenously into lethally irradiated, isologous, recipients and the secondary antigenic stimulus given simultaneously. Five days later the antibody titers were determined. The greatest rate of recovery in antibody synthesis following 150, 300 and 500 r occurred during the first 7 days after irradiation. Proliferation of the spleen cells during recovery from 500 r was studied by means of tritiated thymidine. When sublethally (500 r) irradiated mice were secondarily stimulated with the test antigen immediately after irradiation and labeled either immediately before or after exposure, the proliferation of spleen cells was depressed. However, the capacity of cells labeled 2 or 4 days after irradiation was normal. It can be concluded that the rate of recovery of the immune mechanism is greatest during the first 7 days after irradiation, during which time there is also the greatest change in spleen cell proliferation.

Chronological Study of Deciduomata in Hamsters

John G. Turnbull and George C. Kent, Jr.,
Louisiana State University

Day 1 is herein defined as the first twenty-four hours after sterile mating, Day 2 as the second twenty-four hours, etc. In hamsters traumatized at the end of Day 2 the initial decidual cell response (DCR) is evident near the middle of Day 4. The maximal DCR is exhibited during Day 7 and part of Day 8. Necrosis is evident in the periphery before the end of Day 8. By the end of Day 9 the necrotic decidual mass has been extensively undercut by the regenerating uterine epithelium. Four days elapse between the first observable DCR and the first observable necrosis. Fifty hamsters were traumatized. Not all evinced an observable DCR.

Observations on the Formation and Release of Secretory Granules in the Pituitary Gland of the Salamander (*Triturus viridescens*)

Robert R. Cardell, Jr.,
Edsel B. Ford Institute for Medical Research

Electronmicroscopic evidence is presented which indicates that the secretory granules of the pituitary parenchyma cells are formed within the Golgi apparatus and are stored in the cytoplasm of the cell until they are discharged into the blood stream. The discharge of the granules is accomplished by the formation of a cytoplasmic bud, which contains one or more secretory granules, from a parenchyma cell. This cytoplasmic bud protrudes into a pericapillary cell and eventually is pinched off to form a vacuole within the pericapillary cytoplasm. The author proposes that the secretory granules are dissolved while within the vacuole thus releasing the hormone into the pericapillary cytoplasm. The hormone diffuses from the pericapillary cytoplasm into the pericapillary space and finally reaches the blood stream by way of the endothelial cells of the capillary wall. No evidence has been obtained of secretory granules being present within the capillaries, as proposed by previous investigators of the salamander pituitary.

Failure to Maintain Deciduomata with Progesterone in Hamsters

Allen T. Daugaard and George C. Kent, Jr.,
Louisiana State University

Sixty young pseudopregnant female golden hamsters were traumatized on the second day following sterile mating and injected with varying amounts of progesterone

commencing on different days. Twenty-four animals were injected with 1.0 mg, on the day of trauma and daily thereafter until killed on Days 7, 8, 9, 10, 11, or 12. Twelve animals were injected with 1.0 mg, starting on the fourth day after trauma and daily thereafter until killed on Days 9, 10, 11. Twelve animals were injected with 0.5 mg. on the day of trauma and daily thereafter until killed on Days 7, 8, or 9. Twelve animals were injected with 0.5 mg. on the fourth day after trauma and daily thereafter until killed on Days 9, 10, or 11. Subsequent histological examination of the uteri indicated that the life span of the deciduomata (cf. Turnbull and Kent in this issue) was not prolonged by progesterone as herein administered.

Effect of Food Supply on the Egg-laying Date of Junco (*Junco hyemalis*)

James T. Tanner, *University of Tennessee*

Juncos nest in the Great Smoky Mountains at progressively later dates with increasing elevation. This could be a result of temperature affecting the birds, or of temperature affecting their food supply and the availability of food determining the time of nesting. At this season, Juncos feed almost entirely on ground-inhabiting arthropods. The abundance of this kind of food was measured before and during the egg-laying dates at four different elevations. There were very significant differences between the amount of food available at the different elevations at the time egg-laying was initiated at each elevation. This indicates that the food supply is not the factor determining the time of egg-laying.

The Life-Cycle and Ecology of *Elliptio hopetonensis* Lea

Lynn Raulerson, *Howard College*
W. D. Burbanck, *Emory University*

The fresh-water mussel, *Elliptio hopetonensis* Lea, is one of the major faunal forms of Lake Creek, a tributary of the Altamaha River system. The life-cycle of this species is characterized by the development of gametes and fertilization in late summer, an overwintering of developing larvae in marsupial gills, and emergence of hookless glochidia in late spring. Parasitism of fish by glochidia does not appear to be host-specific. The period of parasitism is approximately thirty days, after which glochidia leave the fish to develop as juveniles. Dispersal of this mussel may be accounted for by the movements of infected fish. Adults probably live for a few years, and except for those carried by flood waters, tend to remain in a limited area characterized by a rocky substrate and a abundance of plankton. Usually associated with *Elliptio hopetonensis* is the commensal ciliate *Conchophthirius anodontae* (Ehrenberg).

Comparative Observations on the Behavior of Marine and Fresh Water Turtles

Fred K. Parrish, *Agnes Scott College*

The observations reported below were made as a frame of reference for projected physiological studies to explain certain aspects of turtle behavior. These observations were made on 29 marine turtles (4 species) at Marineland, Florida, and on 11 fresh water turtles (4 species) maintained in a greenhouse tank 1 meter × 3.4 meters with a depth of from 2.5 cm. to 54 cm. Only occasionally did one turtle bite another at Marineland, females being more prone to this activity. The fresh water turtles have ignored each other, despite a wide difference in size. Sea turtles use their foreflippers as "wings" to "fly" through the water; the hind flippers normally serve only as elevators or rudders (when turning). Fresh water turtles use all four feet as paddles held square to the line of motion; fore and hind feet on opposite sides move sychronously. Scratching, which is so characteristic of sea turtles, has been observed in the fresh water forms. The respiratory patterns of sea turtles reported by Parrish, 1958, have been undetectable in fresh water chelonians.

Ecology of the Microbiota of Mission Bay, California, in the Summer of 1961

James B. Lackey, *University of Florida*

Mission Bay and adjacent waters were studied, June-August 1961. The microbiota showed qualitative differences varying from distinctly different poulations in small isolated baylets to a few species in the main bay which were different from the oceanic outer waters. The Bay had its own blooms, some of which were synchronous, but was subject to invasion by oceanic species. Many of these failed to maintain themselves in the Bay. It is evident that many differences exist between Bay and Ocean habitats, but some ubiquitous species are equally at home in either.

A Live-Trap Study of Seed-Eating Mammals

H. E. Shadowen, *Western Kentucky State College*

A 27-month study of small mammals was made in a cutover, shortleaf-loblolly pine-hardwood forest in north Louisiana. Two plots were established, one of which was burned to study the effect of controlled burning on small mammals. One hundred live traps were used on each plot. Animals were trapped, marked, and released. Length of trapping periods varied from five to six days. Species trapped included *Peromyscus nuttalli*, *Peromyscus gossypinus*, *Reithrodontomys fulvescens*, *Pitymys pintorum*, and *Blarina brevicauda*. The two species of *Peromyscus* were retrapped in sufficient numbers to calculate home range and density. The mean home range of *Peromyscus nuttalli* was 1.31 acres, and the highest trap-revealed density was 2.79 mice per acre. The mean home range of *Peromyscus gossypinus* was 1.12 acres, and the highest trap-revealed density was 1.22 mice per acre. The controlled burning of one plot had a negligible effect on the small-mammal population.

Crater Density and Above-Ground Activity of Two Dominant Old Field Ants

Arnold Van Pelt, *Tusculum College*

For the past twelve years investigators associated with the University of Georgia Ecological Research Team have been intensively studying and analyzing the dynamics of abandoned crop fields on the Savannah River Plant, South Carolina. Ants are a dominant animal form in these old field situations. To learn more of the role of ants in the old field community dynamics, the present investigations were carried out during the summer and fall. Density of one of the two dominant ant species, *Dorymyrmex pyramicus*, as expressed by the number of craters present, increased to a maximum in September. The greatest density of *Dorymyrmex* craters was in a portion of a field in which the *Andropogon* clumps were discrete and well-spaced. *Pogonomyrmex badius*, the other dominant ant, maintained fewer nests; the most favorable areas for the mounds were well-drained slopes. *Dorymyrmex* averaged one crater per 2.7 square meters, and in contrast, there was a *Pogonomyrmex* nest for approximately every 820 square meters.

In *Dorymyrex*, optimum temperature for above-ground activity was 40° C., while 57° C. caused a diminution or cessation of activity. These ants remained active

at night, but driving rain sometimes caused activity to stop. *Pogonomyrmex* will cease their activity at temperatures above 50° C., and at night.

Taxonomic Characters of Some Species of *Matelea* (Asclepiadaceae)

C. Ritchie Bell, *University of North Carolina*

The ten currently recognized species of *Matelea* found in the southeastern United States have been variously treated by Small, Fernald, Alexander, and others, as components of five different genera: *Gonolobus, Cyclodon, Edisonia, Odontostephana* and *Vincetoxicum.* Plants of two of the ten species have smooth, angled follicles; plants of the other eight species all have muricate follicles and present an interesting pattern of centrifugal variation centering on the polymorphic *Metelea carolinensis.* Plants of four of the eight species, *M. carolinensis, M. floridana, M. flavidula,* and *M. alabamensis,* have few-flowered inflorescences and spreading petals under 10 mm. long; plants of *M. obliqua, M. decipiens, M. Shortii* and *M. Baldwyniana* have many-flowered inflorescences and erect petals over 10 mm. long. *M. flavidula, M. alabamensis,* and *M. Baldwyniana* are yellow flowered, *M. obliqua* rose flowered, and the others have maroon flowers. No cytological information is yet available.

Vascular Flora of the Carolinas

Albert E. Radford, *University of North Carolina*

Of the 175,000 specimens collected in the field exploration phase of the flora project 140,000 are now mounted and filed in the herbarium. The identification and mapping of the Carolina Flora is essentially complete. Over 900 genera have been illustrated. The keys are now being tested by students for manual publication. About 30% of the descriptions of the 3,000 species have beeen written. Ranges, habitats and synonymy have been worked out for over 50% of the species. The edited manuscript should be ready for the publisher by August 1, 1963.

Paper Chromatographic Studies of the Biochemical Profiles of *Tradescantia* Species

James F. Matthews, *Emory University*

Recent studies of the biochemical components of related species as determined by the application of paper chromatographic methods have demonstrated many chemical similarities, as well as some differences. Such a study of four North Central Georgia species of Tradescantia has been carried out. These exhibit morphological and physiological differences. Chromatograms of these species have shown many similarities as well as some differences in the biochemical makeup of the plants. Acid ethanol extracts of leaves and roots, spotted on Whatman No. 1 filter paper and developed in descending manner with a water saturated phenol-ammonia solvent has proved to be the most satisfactory method. Detection of the biochemical profiles was best accomplished by the use of ultra-violet light and by dipping in ninhydrin-pyridine. Ninhydrin reacting components (amino acids and indoles) and fluorescent components ("secondary substances") have proven more suitable in the biochemical taxonomy of *Tradescantia* than have the phenols, sugars, or organic acids. This work was supported in part by AEC Contract AT-(40-1)-2669.

The Endemic Botrychiums of the Southeastern United States

W. H. Wagner, Jr.,* *University of Michigan*

Three species of grapeferns (Botrychium) in Sect. Sceptridium are especially characteristic of the southeastern United States—*B. alabamense, B. biternatum* (syn. *B. tenuifolium*), and *B. lunarioides* (syn. "*B. biternatum*" by misapplication of name). The traditional problems concerning them have been (a) whether *B. biternatum* is a species distinct from the wide-ranging *B. dissectum;* and (b) whether *B. alabamense* is distinct from *B. lunarioides.* Both of these problems have been investigated in field work in Maryland, Indiana, Kentucky, Tennessee, South Carolina, and Alabama, as well in herbarium and laboratory studies. The new evidence, especially from mass collections of local populations, indicates that *B. dissectum* and *B. biternatum* are distinct, though closely allied, species which grow sympatrically nearly throughout the area. *Botrychium lunarioides* is the most peculiar species in the group; it is rare and little-collected. *Botrychium alabamense* is a valid and distinct species. However, it is intermediate between *B. lunarioides* and *B. biternatum* morphologically; and cytological evidence supports the view that *B. alabamense* may be an allotetraploid that arose from hybridization.

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Experimental Approaches to Taxonomic Problems in Southeastern *Phlox*

Russell Aiuto, *University of North Carolina*

Within the genus *Phlox,* the subsection *Ovatae* has three taxonomically difficult species (*P. carolina, P. glaberrima, P. maculata*) forming a complex in the Southeastern United States. Wherry (1955) admits the extent of the problem by recognizing 12 taxa and 20 variants within the six species of the subsection, while rejecting 23 names as synonyms. In all cases purely morphological criteria appear to break down in the presence of the many intermediates found in nature. Thus preliminary considerations indicate the possible existence and taxonomic value of more subtle differences, or lack of differences, due to hybridization, polyploidy, and/or ecotypic responses, areas all apparently unexamined in this genus. Therefore, some of the aspects which are under study in an effort to determine the paths of evolution and speciation of the *Phlox carolina* complex are pollen morphology and viability, chromosome number, ecotypic responses, crossability, statistical relationships, and biochemical differences.

Southeastern American "Blackstem Spleenworts" of the *Asplenium heterochroum-resiliens* Complex

Virginia M. Morzenti and W. H. Wagner, Jr., *Northeastern Michigan College and University of Michigan*

Asplenium heterochroum has been commonly confused with *A. resiliens* but they are distinct species. Research on them, as they occur in the southern United States, especially Florida, indicates that there are actually at least four different elements in the complex. *Asplenium resiliens* is an apogamous fern, with a sporophytic chromosome number of 108 and a gametophytic number of 108, and lacks sexual fertilization. *Asplenium heterochroum,* on the contrary, is a sexual species; but there are two types—one of them, a plant generally small in stature, which is tetraploid ($2n = 144$); and the other, larger, which is hexaploid ($2n = 216$). No evidence, thus far, of the existence of diploid forms of *A. heterochroum* has been found in Florida, but spores of certain collections from the islands of the Caribbean suggest that diploids may exist there. The most peculiar plant of the four Floridian representatives of this complex is a pentaploid apogamous spleenwort (in which both "$2n$" and "n" = 180) which is morphologically intermediate between *A. heterochroum* and *A. resiliens,* and which

probably represents a new species, heretofore unrecognized in North America.

* Research supported by National Science Foundation G-10846 and based upon materials supplied by Thomas Darling, Jr. and E. S. Ford.

Origins of the Yellow-Flowered Cooperias and of *Zephyranthes refugiensis*

R. O. Flagg and W. S. Flory
The Blandy Experimental Farm, University of Virginia

The first yellow-flowered *Cooperia* was described from Brownsville, Texas, in 1939. In 1950 another was described from the Texas coastal bend. Morphological, cytological, ecological, distributional and genetical data indicate that these two clearly distinct and quite fertile "species" arose as natural hybrids between different forms of *C. drummondii* Herb. and *Zephyranthes aurea* Wats. Variation in the Brownsville complex has been somewhat limited by apomixis producing the illusion of well defined "specific" boundaries. Some backcrossing has complicated the history of the coastal bend complex. Outcrossing to *C. traubii* Hayw. has given it reticulation. It is now apparent that three nothomorphs were described as species: *C. smallii* Alex. (1939), *C. jonesii* Cory (1950) and Z. *refugiensis* F. B. Jones (1961). The existence of fertile hybrids, both natural and artificial, is interpreted as supporting the inclusion of *Cooperia* in *Zephyranthes*. Synonymy and necessary nomenclatural changes are presented. The work was supported by N.S.F. Grant G-11080.

The Flora of Bourbon County, Kentucky

Edi Guhardja and E. T. Browne, Jr.,
University of Kentucky

Bourbon County lies in the "Blue-grass" region of Kentucky. There are several reasons for the study of this county: It is a fertile region, it lies near the University of Kentucky, and very little is known about its vegetation. The climate is temperate, with moderate sunlight, heat, moisture, and wind, regular rainfall, and long growing season. The geologic materials of the county belong to the Ordovician Period and contain limestones, calcareous shales and siltstones. In the western part the maior soil association is the "Inner Bluegrass" with undulating to gently rolling topography, whereas the northern part is the "Hills of the Bluegrass," with hilly, winding ridges and valleys, and steep topography.

The natural vegetation is primarily deciduous forest and grassland. A study of earlier and recent collections shows many species of: Aceraceae, Asclepiadaceae, Caprifoliaceae, Compositae, Cruciferae, Euphorbiaceae, Fagaceae Gramineae, Juglandaceae, Labiatae, Leguminosae, Moraceae, Oleaceae, Rosaceae, Salicaceae, Scrophulariaceae, Solanaceae, and Vitaceae.

Zephyranthes atamasco and Z. *treatiae*

W. S. Flory and R. O. Flagg,
The Blandy Experimental Farm, University of Virginia

No floral character has been found which separates *Zephyranthes atamasco* and Z. *treatiae*. The two are cytologically indistinguishable. Their characters vary with environmental conditions. The question is raised and discussed as to whether the differences encountered in the two taxa are not nutritional and ecological, rather than genetical. (Work supported by N.S.F. Grant G-11080.)

Observations on the Structure and Development of the Fresh-Water Red Alga, *Boldia*

Wayne Nichols and Walter Herndon,
University of Tennessee

Boldia, a recently discovered bangiodean alga, develops from monostromatic discs of branching filaments united in a common matrix which become cushion-like and ultimately produce saccate thalli up to 20 cm. in length. Monospores are produced from narrow branching filaments (derived from vegetative cells) which form a reticulate pattern in the intercellular matrix at the juncture between groups of vegetative cells. After liberation, monospores produce small prostrate branching filaments with occasional erect branches (which may liberate additional spores and reproduce this phase) or they develop directly into the monostromatic discs which produce the saccate thallus. In monospores (liberated from the mature thalli in prophase) the chromosome number was determined as 8 ± 1. While certain features of *Boldia* are comparable to *Prophyra* and other bangiodean algae, in structure and life cycle it is unique among the Rhodophyta.

Differences in Spore Appendage Formation Among Species in the Genus *Robillarda*

Lafayette Frederick, *Southern University*

Critical studies of spores representing species of *Robillarda* reveal a basic difference in the the manner of appendage development. In some species appendage formation results from protrusive outgrowths at the apical end of the spore. During the early stages of development appendages of this type are filled with cytoplasm. At maturity a septum forms at the base of the pedicel of the appendage and the three, long, tapering branches lose their cytoplasm. In other species of *Robillarda* appendages are not the result of apical protrusions. Instead, appendages appear to represent recurved strips of the wall of the conidiophore in which the spore forms. As the spore develops it appears to remain attached at its apical and to a point inside the tip of the conidiophore. Upon discharge, 3 long, slender, translucent strips of the conidiophore wall remain permanently affixed to the spore apex and become extended as tri-radiate branches. As a result of the differences in appendage formation, in combination with other concommitant morphologic variations, it is clear that certain species presently assigned to *Robillarda* are not congeneric.

Some Interesting Mosses in Tennessee

A. J. Sharp, *University of Tennessee*

Archidium ohioense previously reported from limestone in Middle Tennessee has been collected in Knox County. Two new records for Tennessee include *Physcomitrium collenchymatum* collected by Mr. Alfred Clebsch in Montgomery County and *P. kellermanii* from Meigs County.

Observations on the Fine Structure of *Protosiphon* *

Walter Herndon, *University of Tennessee*,
Delbert Philpot, *Boston University*
and Charles O' Kelley, *University of Alabama*

Cells of *Protosiphon botryoides* grown in an inorganic medium were killed and fixed in 2% $KMnO_4$, embedded in Vestapol, sectioned and examined with the electron microscope. Young cells are in many respects similar in fine structure to *Chlamydomonas*. The chloroplast is

surrounded by a double envelope and comprised of lamellar discs some of which partially or completely traverse the pyrenoids at the junctures of starch plates. The nuclear membrane is perforate and double; nuclear cysternae are apparently continuous with an endoplasmic reticulum. The golgi complex is prominent and is replicated as the cells become multinucleate. The lamellar discs of plastids of larger vacuolate cells penetrate narrow cytoplasmic strands but even when one or few in number are bounded by the double envelope. Preliminary comparisons of the morphology of cells grown under similar conditions but with Sr replacing Ca in the medium indicate that, the lamellar discs are more widely separated (and frequently serpentine), the mitochondria are enlarged and the walls, of different structure.

* This research supported in part by grant A-3680 of the National Institute of Arthritis and Metabolic Diseases.

Some Fungal Parasites of *Pythium* from Texas Soils *

Charles E. Miller, *Texas A & M*

During early summer, 1961, a search for two plasmodiophoraceous parasites of *Pythium* was made. Dry soil collections from fields and pastures from many localities in the State of Texas were "baited" with organic substrates; these substrates were searched for host and parasitic fungi. Isolates of *Pythium* were found in 43% of collections examined. One species, *P. pulchrum* von Minden, was isolated several times. Other species collected are still being identified. Both plasmodiophoraceous parasites sought were found, *Woronina pythii* Goldie-Smith and *Sorodiscus cokeri* Goldie-Smith. *Pythium* parasites, *Olpidiopsis pythii* (Butler) Karling and *O. gracile* (Butler) Karling, were also collected. An isolate of the genus *Petersenia*, an infrequently found parasite of water fungi and marine algae, was found parasitizing *Pythium intermedium* de Bary. This isolate is new to science and is presently being described.

* Supported by a grant from the Texas A & M Research Fund.

The Non-Crustose Lichens of Two Localities in Alabama

Herbert A. McCullough, *Howard College*

The foliose and fruticose lichens of the Yellowleaf Narrows in Shelby County and the Howard College Natural Area in Jefferson County were studied as a preliminary to a survey of the lichen distribution and ecology in the state of Alabama. The Yellowleaf Narrows, a gorge cutting through rocks of the Pottsville formation, shows thirty species distributed in thirteen genera with the rocks of the area being covered chiefly with *Parmelia isidiata* and *Parmelia caparata*. The vertical cliffs of the area are most frequently covered with the crustose form *Crocynia membranacea*. The Howard College Natural Area is a region of oak-hickory forest covering rocks of the Parkwood formation. In this sixty-acre tract, forty-three species distributed in fourteen genera have been located. The predominate genus in the area is *Parmelia*.

Cytology and Development of *Compsopogon Coeruleus* in Culture

H. Wayne Nichols, *Univ. of Alabama*

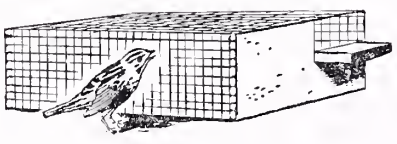
In *Compsopogen coeruleus* variations embracing several species has been observed in clonal cultures. Cells of the thalli are typically uninuclcate but may be multinucleate when forming sori. The chromosome number was determined as 6 ± 1. Soral spores (microaplanaspores) originate from a vegetative cell by progressive cleavage, other monospores originate singly. The spores in either case develop into morphologically indistinguishable plantlets. On the basis of the variation observed in sporangia, Drew-Baker's classification of sporangial types seems impractical. Germination processes also vary in this single species and most probably depends on the substrate on which the spores germinate. New cell walls are formed centripetally and when incomplete appear as pits; however, these are not homologous to pits commonly found in the Floridiophycidae. Chromatophores vary with the age of the cells; younger cells have a sheet-like parietal chromatophore and successive divisions result in discoid plastids connected by cytoplasmic strands.

Some Aquatic Phycomycetes of the Mountain Lake Locale *

Charles E. Miller, *Texas A&M*

The latter part of the summer, 1961 was spent at Mountain Lake Biological Station, Virginia studying some aquatic Phycomycetes of that region. Twenty-five species, collected by "baiting" water and soil collections with sweet gum, pine and corn pollen, hemp seeds, shrimp exoskeleton and human skin were identified and studied. Also found during this study are what appear to be new species of *Rhizidium*, *Chytridium* and *Rhizophydium*. In addition, several very interesting collections of a dentigerate *Rhizophydium*, with the sporangial ornamentation varying in number from none to a great many and in form from a simple pointed enation to a bipartite tooth-like structure, were found. This fungus, growing on pollen and skin, resembles *R. keratinophilum* Karling. Other interesting species identified include *Cladochytrium tenue* Nowakowski, *C. replicatum* Karling, *Chytridium rhizophydii* Karling, *Septosperma rhizophidii* Whiffen, *Phlyctidium mycetophagum* Karling, *Pythium carolinianum* Matthews, *Zoophagus insidians* Sommerstorff and *Rhizidiomyces hirsutus* Karling.

* Supported by a National Science Foundation Grant-in-aid administered by the Mountain Lake Biological Station.



Items of Interest: The Winston-Salem Meeting

The Host Institution

Wake Forest College, a Baptist affiliated college, was formally chartered in December, 1833, by the North Carolina State Legislature as Wake Forest Institute. Sixteen students attended the opening classes. In 1838 the institution was rechartered Wake Forest College, and the first four degrees were conferred in June, 1839.

The College was exclusively a college of liberal arts until 1894 when the School of Law was established; the School of Medicine was added in 1902, the School of Business Administration in 1948, the Division of Evening Classes in 1957, and the Division of Graduate Studies in 1961. In 1942 the College became co-educational.

Wake Forest College was located in Wake Forest, North Carolina until June, 1956. In 1946 the Trustees of the College accepted an offer of $350,000 annual perpetuity made by the Z. Smith Reynolds Foundation on the condition that the College be relocated in Winston-Salem, North Carolina. Friends of the College donated time, money, and land toward establishment of the College. In October, 1951, groundbreaking ceremonies were held with the President of the United States delivering the principal address. Construction started the following spring. The actual move from Wake Forest to Winston-Salem took place in May and June of 1956. It attracted national interest. The Bowman-Gray School of Medicine of the College had been moved to Winston-Salem in 1941. The old campus and buildings now house the Southeastern Baptist Theological Seminary.

Winston Hall, the most recently completed addition to the campus, was dedicated in November, 1961. The building, completely air-conditioned, is equipped with conduit, control room and studio for the addition of closed-circuit television facilities, constant temperature rooms, a walk-in incubator, a radiology room, wet and dry animal preparation rooms, and a small, holding greenhouse. Thematic aspects of Biology and Psychology have been used in the building decor, such as the fossiliferous stone facing of the foyer.

Lodging

The January issue of the Bulletin contained a partial listing of hotels and motels situated in the Wake Forest area. If your reservations are still not made, write or call the Local Arrangements Chairman, and the necessary arrangements will be made. The majority of the members will probably stay at the Robert E. Lee Hotel. We understand that ample space remains.

Registration

Registration will be held Thursday, April 12, from 2:00 p.m. to 7:45 p.m. and on Friday, April 13, from 8:00 a.m. to 11:00 a.m. in the lobby of Winston Hall. A $1.00 registration fee will be charged. Beta Beta Beta representatives will register Friday, April 13, from 2:00 p.m. to 5:00 p.m. in the lobby of Winston Hall.

Families Attending

Special thought has been given to an agenda of interest to families of members attending the meeting. A chartered bus will be provided to transport this party to restored Old Salem, Reynolda Gardens, and the newly completed R. J. Reynolds Cigarette Plant. Luncheon will be available in the Magnolia Room of Reynolda Hall, at nominal cost, and time permitted for a tour of the Wake Forest campus. Those interested will be requested to meet and register in the Robert E. Lee Hotel lobby, leaving by bus at 9:30 a.m. and returning around 3:30 p.m.

Exhibits

We are extremely pleased with the exhibits this year. Eighteen or more firms will be represented, and we anticipate an outstanding display of books and equipment. The exhibits will be located in six rooms on the main floor. To further aid your enjoyment of the exhibits, coffee and soft drinks will be provided.

Banquet

The Friday night ASB banquet will be held in the main ballroom of the Robert E. Lee Hotel. Tickets for the dinner will be available only during registration at a cost of $4.25 per person. Wives of members are welcome. Since this is the 25th anniversary of the ASB founding, we are anticipating an interesting general session following the dinner.

Field Trip and Tours

A combined zoological-botanical field trip is planned for Saturday, April 14. The group will visit Hanging Rock State Park and surrounding areas. Members are requested to sign up for this trip at the time of registration.

For parties interested in seeing Old Salem, Reynolda Gardens, and the new Reynolds Cigarette Plant, the open hours are as follows:

Old Salem, Mon.-Sat., 9:30 a.m. to 4:30 p.m., admission $1.50

Reynolds Plant, Mon.-Fri., 8:00 a.m. to 3:00 p.m., 6:00 p.m. to 10:00 p.m., no charge

Reynolda Gardens, daily, all hours, no charge

Parking Facilities

Free overnight parking (5:00 p.m. to 9:00 a.m.) is accorded guests of the Robert E. Lee Hotel. There will be a day-time charge. Large parking areas will be available to ASB members on the Wake Forest campus. One lot adjacent to Winston Hall will be reserved for member use. Bus service is poor.

Local Arrangements Committee

Members of the Committee of local arrangements at Wake Forest College are Dr. C. M. Allen; Dr. H. G. Britt; Dr. E. C. Cocke; Dr. J. E. Davis; Dr. J. F. Dimmick; Dr. R. P. Higgins; Dr. D. W. Johnston; Dr. J. C. McDonald, chairman; Dr. A. T. Olive; and Dr. R. L. Wyatt.

Map of the Winston-Salem area, showing Wake Forest College and other points of interest to ASB members.

Terra Alta Biological Station

Earl L. Core

West Virginia University plans to open for its first season during the summer of 1962 a new instructional and research facility, The Terra Alta Biological Station. The name *Terra Alta* has a double significance, indicating the location of the Station (elev. 2,575 ft.) on "high land" atop the Allegheny Mountains, as well as designating the post office address. Terra Alta, a town with a population of 1,504 (1960 census), is within two miles of the Station.

The first session of the new Station is scheduled to begin July 23 and end August 24, 1962. Dr. Herald D. Bennett, professor of biology at the Univerity, will be the first director of the Station and will offer courses in Plant Communities and Taxonomy of Vascular Plants. Robert L. Birch, instructor in biology, will give courses in field zoology. In addition, there will be opportunities to study special topics or to pursue research. Abbreviated sessions will be held during the first few years but later it is expected that the Station will remain open throughout the summer months.

Transportation facilities providing access to the Station are excellent. While the Station itself is hidden from view in the center of a 60-acre tract of wooded land, the property borders on a paved road and is only one mile from a main state highway, W. Va. Route 7, with through bus service. The main line of the Baltimore & Ohio Railroad passes through the town of Terra Alta and a passenger depot is located only two miles from the Biological Station. Scheduled plane service is available at the Morgantown airport, an hour's drive away, and a small airport for private planes is located at Terra Alta itself.

Although to a considerable extent the Station's facilities are of a temporary nature, its basic utilities, including water, sanitation, electricity, gas, and telephone service, have already been installed and the educational unit is a "going" concern. Faculty and students will be subjected to some inconveniences for a few seasons, but modern laboratories and residences are being planned to replace temporary buildings now available. The location of the Station, only an hour's drive from the main campus of West Virginia University, renders the libraries, medical center, and other services of the University readily accessible.

Terra Alta Biological Station is virtually ideally located with respect to the diversified plant and animal habitats of the mid-Appalachian region. Its high Allegheny Mountain situation is less than an hour's drive from forests of spruce and northern hardwoods. The western slopes of the Appalachians, with an annual rainfall up to 65 inches, provide ample opportunities to investigate cove hardwoods and other mixed hardwood forest types. The eastern slopes, with annual rainfall as low as 30 inches, support the more sparse oak-pine forests of the Ridge and Valley province. Fascinating shale barrens, with endemic species, are less than 50 miles away. Aquatic life may be studied in Terra Alta Lake, a 5-minute walk from the Station, or in Deep Creek Lake, 20 miles away in Garrett County, Maryland. For stream studies there is Cheat River, 10 miles to the west, or the Potomac River, with numerous large tributaries, only a few miles

to the east. Interesting bog communities are in Cranesville Swamp Nature Sanctuary, 8 miles from the Station, where an "island" of northern life exists as a relict colony in a southern latitude. Spruce Knob (elev. 4,860 ft.), the highest point in West Virginia, is about 75 miles by road south of the Station. Intriguing grassy balds, as yet inexplicable, and desolate heath barrens, on the high Appalachian summits, are accessible by automobile. Mt. Davis (elev. 3,213 ft.), the highest point in Pennsylvania, is about 50 miles away, while the highest point in Maryland, Backbone Mountain (elev. 3,340 ft.) is within 30 miles.

Numerous publicly owned and protected areas are conveniently located. The northern boundary of the Monongahela National Forest is less than 15 miles away. Coopers Rock State Forest and Mont Chateau State Park are 25-30 miles away, Blackwater Falls State Park is 30 miles away; Cathedral State Park, with a stand of virgin hemlock, is 12 miles away. Just across the state line, in Garrett County, Maryland, are Swallow Falls State Forest, Potomac State Forest, Deep Creek State Park, and Savage River State Forest. Laurel Hill State Forest, in Pennsylvania, is within easy reach of the Station by automobile.

Interesting geological outcrops, from Cambrian to Permian, provide habitats for wide diversification of plant and animal life. Limestone, sandstone, and shale formations are abundant, while more unusual quartzite and other formations are available for study. Natural features of biological as well as general interest within relatively short distances from the Station include Blackwater Falls, Canaan Valley, Sinks of Gandy, Blister Swamp, Bald Knob, Roaring Plains, Dolly Sods, Seneca Rocks, Seneca Caverns, the Smoke Hole, the Trough, Ice Mountain, and Greenland Gap. Elevations that may be reached within a 3-hour drive from the Station range from 240 feet above sea level at Harpers Ferry National Monument to 4,860 feet on the summit of Spruce Knob.

Inquiries concerning Terra Alta Biological Station should be sent to Dr. Herald D. Bennett, Director, addressed to Terra Alta, W. Va., during periods while the Station is in session, and to Morgantown during the remainder of the year.

VICTOR MACOMBER CUTTER, JR.

Dr. Victor Macomber Cutter, Jr., 45, Head of the Department of Biology at The Woman's College of the University of North Carolina, died on February 26 at Moses Cone Hospital, Greensboro, North Carolina.

Born in Quiriqua, Guatemala, of American parents, Dr. Cutter received his A.B. degree from Dartmouth College in 1938, and his doctorate from Cornell University in 1941. He came to the Woman's College in 1952 as professor of biology and head of the department. Previously he had been Associate Professor of Microbiology at Yale University, Instructor of Botany at Cornell University, and Lecturer in Botany at the University of Minnesota.

Dr. Cutter's special interest was in the cytology, genetics, physiology, and taxonomy of the fungi. He held successive grants from the National Science Foundation for research on the genetics of fungi, and other grants from the American Cancer Society. Alone and in collaboration with others, he published a number of research papers in his field. He spoke frequently on scientific topics to professional, conservationist, and nature study groups. He was a pioneer in North Carolina in the teaching of science by television.

He was a member of Sigma Xi and Phi Kappa Phi honorary scientific societies, and the Botanical Society of America, Mycological Society of America, Torrey Botanical Club, American Institute of Biological Sciences, and New Hampshire, New York and North Carolina Academies of Science. He was a member of the Executive Committee of the Association of Southeastern Biologists.

Surviving are his wife; daughter, Ann; a son, Victor M. Cutter, III, a brother, Donald Cutter, of Hanover, New Hampshire; and a sister, Mrs. Harold Levenberger, of Falls Church, Virginia. The Cutter's home address is 3225 Forsythe Drive, Sedgefield, Greensboro, North Carolina.

News of Biology in the Southeast

About People

A. A. Humphries, Jr., of the Department of Biology at Emory University, has been awarded a National Science Foundation Senior Postdoctoral Fellowship for the year 1962-63. Dr. Humphries will spend the year working at the Université Libre de Bruxelles, Belgium in biochemical embryology with Dr. Jean Brachet.

W. D. Burbanck of the Department of Biology at Emory University has received a National Science Foundation grant of $31,200 to continue for three years his work on various aspects of the biology of the estuarine isopod, *Cyathura polita* (Stimpson, 1855) (Miller and Burbanck, 1961).

Bernard Fried is now in the Department of Biology at Emory University where he is an NIH postdoctoral fellow in parasitology under Dr. C. G. Goodchild, his specific problem being studies on the bionomics of turtle blood flukes. Dr. Fried comes to Emory University from the Parasitology Department at the University of Connecticut where he studied *Philophthalmus* sp., an ocular trematode, under Dr. L. R. Penner.

W. Ralph Singleton, Miller Professor of Biology and Director of the Blandy Experimental Farm has completed a textbook entitled *Elementary Genetics,* which will appear in publication next May. Its chief illustrator is Dr. Te-Hsiu Ma, Assistant Professor of Biology at Emory and Henry College.

T. M. Harris has joined the faculty at the University of Richmond as an Assistant Professor of Biology. Mr. Harris will teach courses in histology and cytology.

Jack D. Burke, Associate Professor of Biology at the University of Richmond, has received from N.I.H. the terminal part of a three-year grant which enables him to continue an investigation of the blood of fishes.

Dorothy L. Crandall and **James L. Chamberlain** have received a grant from the U. S. Forest Service to continue their research on Forest Ecology of the Virginia Piedmont Region this summer.

James H. Starling will teach at Western Maryland College, Westminster, Maryland, during the summer session.

Lyman R. Emmons is the recipient of a Glenn Grant to continue his research in cytogenetics at a marine laboratory during the summer.

Daniel E. Sonenshine, Assistant Professor, Norfolk College of William and Mary has a Public Health grant for identification of larval ticks. He is also studying the behavioral patterns of ticks. Dr. Sonenshine came here from the University of Akron, Akron, Ohio.

Rose Mary Johnson, Assistant Professor, Norfolk College of William and Mary, has completed her work for the Ph.D. degree to be awarded in June, 1962, from the University of Virginia. Miss Johnson came to us from Sweet Briar College.

F. C. Brewer, Assistant Professor, Norfolk College of William and Mary is moving to Christopher Newport Junior College, Newport News, Va.

John H. Richardson, Instructor, Norfolk College of William and Mary, came to us this year from the Norfolk County Public Schools.

Jacques S. Zaneveld, Professor and Chairman of the Department of Biology, Norfolk College of William and Mary, has two National Science Foundation grants. One, which began last year and continued for two years for the study of the taxonomic, ecological, and distribution of algae from Cape May to Cape Hatteras. The second is the National Science Foundation undergraduate science grant for work in marine biology—mainly in the field of intertidal zonation.

Institutions and Organizations

A $500 grant has been awarded to the **Harwell G. Davis Library** at Howard College in Birmingham by the Association of College and Research Libraries, a division of the American Library Association.

Chosen from 348 applications, the Howard Library is one of 78 libraries in the nation and the only library in Alabama to receive a grant from the ACRL this year.

The money will be used to buy books relating to the field of Biology, said Head Librarian F. Wilbur Helmbold. Dr. Herbert A. McCullough, head of Howard's Biology Department is aiding the library in selecting the books to be added.

The ACRL Grants Program was made possible this year by several companies and corporation foundations: McGraw-Hill Publishing Company, Micro-card Foundation, Microx Photo, Inc., National Biscuit Company, Olin Mathieson Chemical Corporation, Pitney Bowes, Inc., Reader's Digest, Time, Inc., and the United States Steel Foundation, Inc.

Begun in 1955 with a grant of $30,000 from U. S. Steel Foundation, the Grants Program is directed to the general needs of all colleges and universities. It is designed to improve the quality of library service to higher education through fundamental research in librarianship and otherwise to aid in the best use of the most modern teaching and learning.

This is the second time in four years that the Howard College Library has received a grant of this kind, said Mr. Helmbold.

Containing more than 121,714 volumes for the use of students and faculty, the Howard Library has also served as a depository of government documents and publications since 1884.

In addition to the books, Howard's library contains 90,000 microfilmed volumes and a collection of phonograph recordings, particularly classical and foreign language records.

The Biology department at **Randolph-Macon Woman's College** is undertaking a series of seminars to acquaint biology majors with the research in progress by Biologists in or near the State of Virginia. Dr. John Mahan of Lynchburg College and Dr. Nolan E. Rice of the University of Richmond have been the first two speakers.

The Southern Section of the American Society of Plant Physiologists met with the Association of Southern Agricultural Workers at Jacksonville, Florida, February 5-7. In addition to 34 contributed papers, there was a symposium on the culture of cells and tissues of higher plants. Dr. A. C. Hildebrandt was chairman of the symposium; participants included Dr. Gene Guinn, Dr. Walter Tulecke, and Dr. Ernest Ball. Officers for 1962 are Chairman, Dr. Robert D. Powell; Vice-Chairman,

Dr. Joseph C. O'Kelley; Secretary-Treasurer, Dr. Frederick T. Wolf; Executive Committee Members, Dr. Howard J. Teas, Dr. Robert E. Burns and Dr. Howard E. Joham; Southern Section representative to the American Society of Plant Physiologists, Dr. Wayne C. Hall.

Officers of the **American Society of Plant Taxonomists** for 1962 are: Arthur Cronquist (New York Botanical Garden), President; Mildred E. Mathias (University of California at Los Angeles), Chairman of the Council; Lawrence R. Heckard (University of California, Berkeley), Secretary; Richard W. Pohl (Iowa State University), Treasurer; C. Ritchie Bell (University of North Carolina) new Council Member.

Other appointments made by the Council are: Richard S. Cowan (Smithsonian Institution) and A. C. Smith (U. S. National Museum) to serve as representatives of the Society on the Council of the A.A.A.S.; Reed C. Rollins (Harvard University) as representative on the Governing Board of the A.I.B.S.; David D. Keck (National Science Foundation) as representative of the Society on the National Research Council; Albert E. Radford (University of North Carolina) to represent the Society on the Editorial Board of the American Journal of Botany.

Rogers McVaugh (University of Michigan) will continue as Editor-in-Chief of *Brittonia.* Duane Isely (Iowa State University) and George F. Papenfuss (University of California, Berkeley) were appointed to serve four year terms on the editorial board of *Brittonia.*

Wallace R. Ernst (Stanford University) received the Cooley Award for the best paper presented at the last annual meeting of the Society at Purdue University. His paper was entitled, "On the family status of the Fumariaceae."

In July, 1961, the **Department of Marine Science** became, by resolution of the Board of Visitors, the **School of Marine Science of the Colleges of William and Mary.** Along with this the marine science training program, which has been operated at the marine laboratory at Gloucester Point since 1940, has been enlarged to include majors in biological oceanography (marine biology) general oceanography and fisheries biology. The degree offered is the Master of Arts in Marine Science. A doctoral program is being planned. The curriculum, consisting of over twenty courses in different fields of marine science, is designed mostly for graduate students; however, qualified advanced undergraduates may enroll in summer courses and some of those offered throughout the academic year.

Dr. William J. Hargis, Jr., Director of the **Virginia Institute of Marine Science,** recently announced the advancement of Dr. Morris L. Brehmer, Dr. Edwin B. Joseph, Mr. Willard A. Van Engel and Dr. John L. Wood to the grade of Senior Marine Scientists. Mr. Dexter S. Haven and Mr. William H. Massmann were advanced from Assistant Marine Scientists to Associate Marine Scientists.

Messers. Maynard M. Nichols, Langley H. Wood, Dana Eldridge and Ernest Warinner have been added to the research staff at Virginia's marine laboratory making a total of twenty-nine scientists engaged in research. Staff vacancies in physical oceanography and physiology remain to be filled. Seventeen staff members are also members of the faculty of the School of Marine Seience.

Grants and Fellowships

The **Mountain Lake Biological Station** has available from the National Science Foundation three types of awards for summer research and study at Mountain Lake: (1) Postdoctorate for research, stipend $900; (2) Predoctorate for supervised research, stipend $400; and (3) Postgraduate for training in field biology, stipend $300. Preference is given for studies concerned with the biota of the region. Application blanks for these awards may be secured from *Dr. James L. Riopel,* Department of Biology, University of Virginia, and must be submitted before April 12, 1962.

For the past three summers, the **Virginia Institute of Marine Science at Gloucester Point** has conducted research programs sponsored by the National Science Foundation. The current programs for the summer of 1962 are:

Research Participation for College Teachers, designed to assist college teachers throughout the United States to do personal research at a marine station.

Undergraduate Research Participation Program, designed to give a selected number of undergraduates an opportunity to explore the possibilities of marine science as a vocation.

College teachers and undergraduates interested in applying for either of these programs should direct their correspondence to: *Mr. Robert S. Bailey, Director, NSF Programs, Virginia Institute of Marine Science,* Gloucester Point, Virginia.

(*Continued from page 26*)

Secretary:			
AIBS Membership	100.00		
Membership maintenance & labels	109.76		
Research award certificates	35.00		
Travel to meeting	70.84		
Miscellaneous	7.86		
Treasurer:			
Postage	35.00		
Assistant	29.52		
		64.52	
			$2,417.88
Checkbook Balance			319.58
Outstanding check			34.94
Bank Balance			$ 354.52

—Elsie Quarterman, *Treasurer*

The ASB BULLETIN

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Photo by Harry Steeves, Jr.

PSEUDOSCORPION

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ASB BULLETIN

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The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Subscription rate for nonmembers of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

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C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Leland Shanor, Business Manager

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ASSOCIATION AFFAIRS

MINUTES OF THE ANNUAL BUSINESS MEETING

Wake Forest College—Winston-Salem, N. C.
April 13, 1962

President Royal D. Shanks called the meeting to order at 11:45 A.M. and announced that the election of officers would be held at the end of the meeting and that the results would be announced at the banquet in the evening.

Report of the Secretary. Dr. Harry J. Bennett, Secretary, reported that the membership was now 885 and that it had increased approximately 10% over that of the previous year. He discussed briefly the difficulties of keeping an accurate list of the members because of the failure of so many to pay their dues promptly, and mentioned that he had recently notified 85 members, who had last paid their dues in 1959, that the constitution required that members be dropped from the rolls when they were two years in arrears. He stated that others who had last paid their dues in 1960 and 1961 would be notified of that fact as rapidly as feasible. He mentioned that the early records of the Association were such that it was not possible to determine who the Founders of the Association were and that the same was true for those who were Charter Members.

Report of the Treasurer. Dr. Elsie Quarterman, Treasurer, presented a detailed report, and pointed out that it was an interim one now that the fiscal year of the Association had been changed to coincide with the calendar year. She stated that the Association was usually overdrawn, and that for the first time money had to be withdrawn from the savings account of the Association. She stated that the Association was not paying its way and suggested that dues might have to be raised.

Dr. Shanks commented on the Treasurer's suggestion that dues might be raised to the effect that it would not be necessary to raise dues immediately. He stated that the drawing upon the savings account was due to the unusual expenses associated with the Twenty Fifth Anniversary program.

(*Continued on page 55*)

Septima C. Smith, 1962 Meritorious Teacher

The Meritorious Award Committee of the Association of Southeastern Biologists considered it a great pleasure to designate as Meritorious Teacher for this 25th Anniversary Year, Dr. Septima Cecilia Smith of the University of Alabama.

The winner is a native of Texas with A.B. and M.A. degrees from the University of Texas, and a Ph.D. degree conferred by the School of Hygiene and Public Health of the Johns Hopkins University in 1927.

The same year she began a distinguished teaching carrer in the Biology Department of the University of Alabama, where she has remained in active and continuous service ever since. In 1944 Dr. Smith was appointed Professor of Biology, the first woman to attain this rank in that College of Arts and Science. This appointment was cited at a special convocation of the women students of the University.

In addition to devoted and stimulating teaching at the undergraduate and graduate levels, she has had heavy responsibilities in extracurricular activities and has continued a productive research career. Many of her students have been led by her personalized encouragement to pursue studies for the PhD., M.D., D.D.M. and other degrees, and many now hold prominent positions in academic circles and in professional life.

Dr. Smith is a member of numerous professional societies, a fellow of the American Association for the Advancement of Science, an honorary member of Alpha Epsilon Delta, an honorary member of the Medical and Dental Society of the University, and its advisor since 1955. She is a charter member and first president of the local chapter of the American Association of University Women. She is listed in Who's Who in America and other select biographical publications.

More than 2000 professional and vocational biologists have been inspired during her 35 years of continuous efforts and dedication to Biology. Few college teachers in the southeast, or for that matter elsewhere in the nation, have exerted greater influence on the hearts and minds of the fortunate young men and women who have universally been charmed by her wit, impressed by her brilliance, warmed by her friendliness, and comforted by her counsel.

W. W. SCOTT TO CONTINUE AS DIRECTOR OF THE VJAS PROGRAM

Dr. Jackson J. Taylor, President of the Virginia Academy of Science, announced at the 40th annual meeting of the VAS the reappointment of Dr. William W. Scott, Associate Professor of Botany at Virginia Tech, as Director of the Virginia Junior Academy of Seience program.

Dr. Scott has served in this position for the past four years. During this time the Junior Academy has grown to a membership of over 3000 students affiliated with more than 55 high school and community science clubs. Over 325 members attended the annual meeting held May 9-11th in Norfolk, Virginia.

For the first time VJAS members presented thc results of their scientific research in the form of formal papers read before the academy membership. Over 130 papers were given in biology, chemistry, biochemistry, physics, engineering, mathematics, astronomy, and earth sciences. Awards totalling $900.00 were made to the outstanding young scientists and their teaeher-sponsors.

Award winning papers presented by southwestern Virginia students included: Hazel Hatcher, Floyd High School, $50.00 first place award in biology; Bill MacAfee, Patrick Henry High School of Roanoke, honorable mention in biology; David Leach, Bedford High School, $20.00 third place award in earth sciences; Jo Ann Jamison, William Fleming High School of Roanoke, 30.00 second place award in chemistry and biochemistry; Robert L. Williams, William Fleming High School of Roanoke, $50.00 first place award in physics and engineering; Aubrey Strode, Bedford High School, $30.00 second place award in physics and engineering.

Mr. Max Thomas of Floyd High School was awarded a Teacher-Sponsor Scholarship to the College of William and Mary for the summer of 1962. The S.O.S. Science Club of Bedford High School received an honorable mention as one of the outstanding high school science clubs in Virginia. Mrs. J. J. Thaxton is sponsor of the Bedford club and Mr. David Leach of Bedford is the student president of the VJAS for 1962-63.

News of Biology in the Southeast

Institutions and Organizations

The Department of Biology, College of William and Mary, received a $10,000 grant from the NSF under the Undergraduate Instructional Scientific Equipment Program.

The Department of Biology, College of William and Mary, received a grant of $2,220 from the Atomic Energy Commission for the acquisition of equipment.

The Biology Department of Washington and Lee University expects to occupy its new quarters in the recently completed Science Building before the fall opening of the university

Eastern Mennonite College, Harrisonburg, Va. has been granted $17,250.00 from The NIH for support of research on melanism in *Drosophila.* **Dr. M. E. Jacobs,** Professor of Biology, is the principal investigator.

The Department of Biology, Emory and Henry College, has been awarded a grant from the National Science Foundation for a five-week summer program in Physiology and Radiation Biology for superior high school students. **Dr. Jack S. Brown,** Professor and Chairman of the Department, and **Dr. Te-Hsiu Ma,** Assistant Professor, will instruct the program.

The Institute of Marine Science, University of Miami, has established a program of visiting professorships in all branches of oceanography. Each visitor will offer special lectures and provide instruction and advice to graduate students, for periods ranging from six months to a year. Visiting professors will not be limited to United States citizens, but will include distinguished scientists from overseas. The program is partially supported by the National Science Foundation.

Advance notion will be provided, giving information as to the names of visiting professors and the special fields of study in which they will lecture. Students from other institutes and universities will be invited to engage in the research and to study under the supervision of the visiting professors.

Present incumbents of the international visiting professorships are Dr. Pierre Welander, Institute of Meteorology, University of Stockholm, on meteorology and physical oceanography; Dr. Harold Humm, Duke University, on marine botany; Dr. Michael Reeve, University of Southampton, England, on plankton ecology; and Dr. John Steele, Marine Laboratory, Aberdeen, Scotland, on physical oceanography. Participants in the program during 1963-1964 will include Dr. Gunnar Thorson, Marine Biological Laboratory, Elsinore, Denmark, on marine invertebrates; Dr. Ferguson Wood, CSIRO Marine Laboratory, Cronulla, New South Wales, on marine microbiology; Dr. Alexander Ivanoff, Labotoire de Physique Appliquée aux Sciences Naturelles, Paris, on Physical oceanography; and Dr. James A. Crutchfield, University of Washington, Seattle, on fishery economics. Dates will be announced later.

The Virginia Institute of Marine Science, (Virginia Fisheries Laboratory), is participating in a Cooperative Menhaden Program with the U. S. Fish and Wildlife Service Laboratory at Beaufort, North Carolina. Dr. William J. Hargis, Jr. is the project leader from the Institute.

The Virginia Institute of Marine Science is also cooperating with the Hampton Roads Sanitation District under a small grant to study the Surface and Subsurface Currents of the near-shore Atlantic off Virginia Beach. Dr. Morris L. Brehmer is the project leader from this Institute.

Grants and Fellowships

The National Seience Foundation announces that the next closing date for receipt of basic research proposals in the life sciences is September 15, 1962. Proposals received prior to that date will be reviewed at a meeting of the Foundation's advisory panels, and disposition will be made approximately four months following the closing date. Proposals received after the September 15, 1962, deadline will be reviewed following the winter closing date of January 15, 1963. Inquiries should be addressed to the *Biological and Medical Sciences Division, National Science Foundation, Washington 25, D. C.*

About People

Teruo Nishida, Chief, Research Section, National Gamma Feld, Tokyo, Japan, recently spent five months in the United States studying especially the use of irradiation in the treatment of horticultural seeds and plant breeding purposes. Short periods were spent at Beltsville, Md.; Raleigh, N. C.; Oak Ridge, Tennessee; Gainesville, Fla.; Geneva, N. Y.; and Davis, California. Mr. Nishida worked for several months with W. S. Flory at the University of Virginia's Blandy Experimental Farm.

James H. Starling will teach at the Summer School of Western Maryland College, Westminister, Maryland.

Lyman R. Emmons Will participate in the College Teachers Research Program of the NSF at the Virginia Institute for Marine Science. He plans to study marine invertebrate cutogenetics.

Mitchell A. Byrd has been appointed Head of the Department of Biology, College of William and Mary, Williamsburg, Virginia. Dr. Byrd has served as Acting Head of the Department since December, 1961.

Miriam F. Bennett, Associate Professor of Biology,

Sweet Briar College, plans to continue work on rhythms of activity in honey bees in the Institute of Zoology, University of Munich, Germany during the summer, 1962.

Elizabeth F. Sprague, Associate Professor of Biology, Sweet Briar College is attending the N.S.F. Seminar in Tropical Biology in Costa Rica during July and August. She will continue her research on floral evolution as affected by specific pollinators.

James D. Eisen will be Assistant Professor of Human Genetics at the University of Nebraska College of Medicine in Omaha where his principal duties will be the establishment of a human cytogenetics laboratory and research at the new Mental Retardation Clinical Research Center. He has just completed spending a year at the University of Uppsala and another at the University of Lund on an NIH postdoctoral fellowship. His duties begin September 1, 1962.

Paul J. Osborne, Associate Professor of biology at Lynchburg College, returns to that institution after a sabbatical year at the University of North Carolina, where he has been working on the cytology and histoehemistry of the Turbellaria, with special reference to the use of hydrolytic enzyme patterns as a key to ontogenetic and phylogenetic correlation.

John G. Mahan, Professor of Biology at Lynchburg College, will devote the next three summers to developing a teaching collection for his course in entomology.

C. W. Hart, Jr., Editor of the ASB Bulletin, and his wife, Dabney, spent a month this summer collecting freshwater shrimp and conducting water analyses in Jamaica, Puerto Rico, and Trinidad, W. I. This was a continuation of work begun three years ago by Mr. Hart, and the present work was partially supported by the American Philosophical Society. During the trip, Mr. and Mrs. Hart were the first investigators to use the new research station in the rain forest at El Yunque, P. R., operated by the Biology Department of the University of Puerto Rico.

William H. Adams, Professor of Biology at Tennessee Wesleyan College, has been selected as a participant in the 1962 Summer Institute in Comparative Anatomy at Harvard University. In addition, Dr. Adams is the recipient of the first Tennessee Wesleyan College Faculty Award of one thousand dollars. Dr. Adams will use the award for visiting numerous univesities, museums, research centers and government agencies after completion of the Summer Institute. The dual purpose of the visits will be to establish a graduate school guidance and placement program for biology majors at TWC and to establish an undergraduate research program in ecology at TWC upon completion of the proposed science building.

H. P. Riley, University of Kentucky, received an $8,000 NSF grant for a continuation of his chromatographic studies on *Haworthia*. In February, Dr. Riley served on an NSF screening panel for Cooperative Fellowships, and gave two lectures at Ohio University, Athens, Ohio, on paper chromatographic studies in *Haworthia* and on the vegetation of Southern Africa.

C. W. Hart, Jr., Editor of the ASB Bulletin, will participate this fall in an NSF sponsored elementary teacher education program at Temple University. Mr. Hart will conduct the course and laboratory work in botany.

Samuel R. Tipton, University of Tennessee Department of Zoology and Entomology, has received a NSF grant of $20,000 to continue studies on the binding and transport of thyroid hormones in serum and tissue fluids of rats after partial hepatectomy. Dr. and Mrs. Tipton will attend and present papers at the XXII International Physiological Congress at Leiden, The Netherlands, in September, 1962.

Joseph C. Howell, University of Tennessee Department of Zoology and Entomology, will present a paper, "The 1950-59 Breeding Populations of Certain Tennessee Birds," at the Thirteenth Ornithological Congress at Ithaca, New York, in June, 1962.

James T. Tanner, University of Tennessee Department of Zoology and Entomology, will spend the summer of 1962 in Mexico studying the status, habits, and requirements of the Imperial Woodpecker of Mexico . This study is being supported by grants from the Frank M. Chapman Fund, American Museum of Natural History, and the International Committee for Bird Preservation.

Arthur C. Cole, Professor of Entomology at the University of Tennessee, will spend the summer of 1962 at the Nevada Test Site studying ants as a staff member of the Brigham Young University. The study is part of an Atomic Energy Commission project entitled "Comparative ecological studiees of animals at the Nevada Test Site with special referenee to their reaction to exposure of nuclear effects." This will be followed by a two weeks' trip into California and Arizona to complete the field work pertaining to revisionary studies of the harvesting ant genus *Pogonomyrmex.*

Ronald C. Fraser, University of Tennessee Department of Zoology and Entomology, has been awarded a Public Health Service grant of $85,135 to continue studies on the synthesis of hemoglobins in the developing chiek embryo. The grant is to cover a five year period. Dr. Fraser presented a paper, "Serum protein ontogeny in the chick embryo," at the Developmental Biology Conference in New Orleans.

A. J. Sharp, University of Tennessee Department of Botany, will assist in the First Annual West Virginia Wildflower Pilgrimage to be held at Blackwater Falls State Park, Davis, W. Va., May 15-18, 1962. Dr. Sharp will again teach Bryology and Lichenology at the University of Michigan Biological Station during the summer of 1962, and will then attend the AIBS meetings at Corvallis, Oregon.

Amos I. Chernoff, University of Tennessee Memorial Research Center, has received a *career award* from the National Institutes of Health. The initial five-year grant totals $122,488 and will provide $24,000 annually; the

grant will be renewable every five years. Dr. Chernoff is conducting researeh dealing with abnormal hemoglobins in the blood.

P. S. Job, a member of the staff of Ewing Christian College, Allahabad, India, has been on leave of absenee for the past two years as a Danforth Foundation Fellow working under the direction of Dr. Arthur W. Jones, Professor of Zoology, University of Tennessee. Mr. Job's work has been on the effeets of sueeessively irradiating cestodes; he will reeeive the Ph. D. in June, 1962, and will then return to India.

Thomas M. Harris, Assistant Professor in Biology, University of Richmond, will reeeive the Ph.D. Degree from the Department of Zoology at the University of North Carolina in June, 1962. His speeialty is developmental biology.

William S. Woolcott, Assoeiate Professor in Biology, University of Richmond, will participate in the NSF sponsored program at Highlands Biologieal Station, North Carolina. His research will include a survey of the fishes present in the gorges near Highlands.

James Norman Dent and **W. Ralph Singleton,** Department of Biology, University of Virginia, have received funds from the Atomie Energy Commission for the continuation of their researches. Professor Dent received $10,000 for 12 months and Professor Singleton $18,000 for 21½ months.

W. Ralph Singleton, Miller Professor of Biology and Director of the Blandy Experimental Farm of the University of Virginia, was the guest of EUCARPIA, the Association of Plant Breeders of Western Europe, at their meetings in Paris on 21-24 May. Professor Singleton lectured on *Mutation Breeding.* He and Mrs. Singleton also visited London and Amsterdam while they were in Europe.

William J. Hargis, Jr., Direetor of the Virginia Institute of Marine Science at Glouester Point, has reeently received a copy of "Monogenetic Trematodes" from his publisher. Hargis is the editor of this English translation of a 627-page monograph on little-known flatworms written by the Russian seientist, B. E. Bychowsky. In the translation of the Russian monograph Hargis worked with Pierre C. Oustinoff, ehairman of the department of modern languages, who did the basie translation. Mrs. Reinaldo Morales of the Virginia Institute of Marine Seience transeribed, typed, and assembled the manuseript.

Competition For Design Of A Seal For The ASB

Over a period of several years the Executive Committee of the ASB has diseussed the matter of adopting an official seal for the Association, but delayed making any recommendations to the members. A seal appeared to be desirable, but not essential, for use on letterheads, certificates, and publications. With the incorporation of the ASB, however, a seal became essential for use on various official documents. While a standard legal embossing seal with nothing but the name of the Association on it would serve for this purpose, the decision was reached at the Winston-Salem meeting that a decorative seal with an appropriate design would be more suitable, since it could be used in a variety of ways as well as for legal documents. The Committee reeommended that the Association acquire a seal and that a competition for its design be set up. The recommendation was also made that a prize of five years paid-up membership in the ASB be awarded to the designer of the winning seal, to supplement the honor of having his design accepted. These recommendations were approved by the members at the business meeting at Winston-Salem.

It is hoped that many members of the ASB will submit designs, from among which a suitable one can be selected. The rules for the design competition follow:

Rules

1. The design shall be enclosed within a circle, and may consist of a suitable monogram, illustration or illustrations, or escutcheon or combinations of these.

2. The design submitted shall be on heavy white drawing paper or cardboard 8×10 inches in size and the circle shall be 6 inches in diameter. The design shall be drawn with black India ink and in a finished form for direct reproduction and use. It shall be packed for mailing in such a way as to avoid bending or other damage in transit.

3. Criteria to be used in judging will include appropriateness for the Association of Southeast-

ern Biologists, artistic merit and attractiveness, and freedom from fine detail that could not be successfully incorporated in an embossing seal.

4. A contestant may submit any number of designs he wishes, but his name and address must appear on the back of each entry.

5. Entries must be postmarked no later than October 1, 1962, and should be sent to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La.

6. The winning entry will be selected by the Executive Committee of the ASB, subject to approval by the membership at the 1963 Annual Meeting. The Executive Committee may, at its discretion, appoint a special panel of qualified judges to advise it on selection of the best design. The Executive Committee reserves the right to reject all entries in the event that none is deemed suitable. The winning design will be announced at the 1963 Annual Meeting.

(*Continued from page 50*)

Report of the Editor. Mr. Hart stated that no unusual problems had arisen with the Bulletin. He discussed at some length the need for articles of scientific interest for the Bulletin, and appealed to the membership for such articles or suggestions as to whom he might contact for articles of interest to the membership.

Report of the Auditing Committee. The Chairman, Dr. Claude S. Chadwick, reported that his committee had examined the books of the Association and found them in order.

Dr. Shanks reported on the decision of the Executive Committee to accept the invitation of the University of Florida to meet there in 1963. He stated that the Executive Committee, at a meeting on April 26, 1961, had tentatively accepted the invitation and that he had written to Dr. J. Wayne Reitz, President of the University of Florida, on June 27, 1961, stating that the invitation could not be formally accepted until acted upon at the annual business meeting of the Association in April of 1962. Dr. George C. Kent, Jr., asked that the third week-end in April be made the meeting date, and Dr. B. Theodore Cole reminded the membership that the constitution states that the meetings of the Association will be held on that week-end. He also reminded the membership that a special vote was taken to change the date of the meeting for 1962. Dr. Mary Esther Gaulden suggested that the constitution probably should be amended to provide for more freedom in the selection of a date for the meeting of the Association. She recommended that the Executive Committee be empowered to set the date for the meeting in 1963. Dr. E. Ruffin Jones said that the calendar at the University of Florida would have some bearing on the date of the meeting for 1963. Dr. Shanks called for a show of hands expressing a preference for the date of the meeting, and a majority voted to hold the meeting on the third week-end in April. A motion was made to accept the invitation of the University of Florida, it was seconded, and passed.

Dr. Shanks then called upon Retiring President Greulach to discuss the need for a corporate seal by the Association. Dr. Greulach discussed the Executive Committee's proposal that a member be given remission of dues for five years for submission of a winning design. He stressed that the seal should be more decorative than those designed for commercial purposes. He then discussed briefly the plans for the celebration of the Twenty Fifth Anniversary and announced that Dr. Martin D. Young would speak at the banquet that evening. He reminded the members that those persons who attended the 1937, 1938, and 1939 meetings of the Association, and had paid their dues, were eligible for Charter Membership and asked for the submission of names of those who were eligible for such recognition. A motion to the effect that the Association should have a seal and that the member submitting the winning design would receive an award of five years dues was made, seconded, and passed.

Report of the Chairman of the Nominations Committee. Dr. Greulach placed the following names in nomination: Drs. Harold J. Humm and E. Ruffin Jones for President-Elect; Drs. Robert T. Brumfield and Harry E. Wheeler for Vice President; Drs. William D. Burbanck and Leland Shanor for Treasurer; and Drs. C. Ritchie Bell, John H. Carpenter, Claude S. Chadwick, Glenn R. Noggle, Grace T. Wiltshire and Father Patrick H. Yancey for the Executive Committee. He explained that the three members to the Executive Council were to be elected and that the two receiving the highest number of votes would be elected to regular terms of office, and that the third highest would be elected to fill the unexpired term of Dr. Victor M. Cutter, Jr., deceased. President Shanks then ordered the prepared ballots to be distributed and called for nominations from the floor. There were no additional nominations and a motion was made, seconded and passed that the nominations be closed. Drs. Clint L. Baker, Alvin V. Beatty, and Willis A. Eggler were appointed as tellers.

Report of the Chairman of the Mary Glide Goethe Travel Award Committee. Dr. Robert B. Short reported that there were 13 applicants and that 12 awards were made. A

motion was made, seconded, and passed to accept his report.

Report of the Chairman of the Constitution Committee. Dr. E. Ruffin Jones reported that an amendment to Article III to provide for affiliation of interested organizations with the Association was recommended by his committee. Dr. Shanks explained that the amendment was broadly designed so that no specific restrictions should be placed on affiliate organizations. A motion to adopt the amendment was made, seconded, and passed. The amendment is given below:

Article III Eligibility
change title to read
Article III Eligibility and Affiliation
Sections 1-4 remain unchanged
add Section 5

Section 5. Any organized group which is interested in biology may become an affiliate of the Association of Southeastern Biologists upon approval of the Executive Committee.

or alternative reading

Section 5. Any organized group which is interested in biology may become an affiliate of the Association of Southeastern Biologists upon recommmendation of the Executive Committee and approval of the Association at its annual business meeting. The purpose of affiliation is to promote communication and cooperation among the Societies involved but such affiliation does not confer the privileges of individual membership in the Association of Southeastern Biologists upon members of affiliated Societies. The terms of affiliation shall be arranged between the Executive Committee of the Association of Southeastern Biologists.

Dr. Shanks then called for new business. Dr. Elon T. Bird suggested that the records relative to the early years of the Association be placed in an archives. No action was taken by the Association on his suggestion.

Dr. Mary Esther Gaulden submitted a motion to the effect that President Shanks send greetings and an expression of regret from the Association to the following members who were not able to attend the Twenty-Fifth Anniversay meeting: Dr. George H. Boyd, Dr. Mary Stuart MacDougall, and Dr. Elton Cocke. A motion was made, seconded and passed unanimously.

Dr. Shanks then called for the report of the Resolutions Committee. The Chairman of the Committee, Dr. Dorothy Crandall, read the report of the committee, which follows:

The Committee presents the following resolutions:

WHEREAS, the Association of Southeastern Biologists, the Southeastern Section of the Botanical Society of America, Southern Appalachian Botanical Club, Regional Section of the National Association of Biology Teachers, and the Southeastern Region of the Beta Beta Beta National Honorary Biological Society are successfully holding meetings on the beautiful new campus of Wake Forest College, Winston-Salem, North Carolina, April 12-14, 1962; and

WHEREAS, every possible convenience has been made available to all members attending these meetings; therefore

Be it resolved, a. that these groups express sincere appreciation to President Harold Tribble for the cordial invitation to meet here, for the gracious welcome extended, and for the use of campus facilities for these meetings, and

b. that special thanks be expressed to C. M. Allen, H. G. Britt, E. C. Cocke, J. E. Davis, J. F. Dimmick, R. P. Higgins, D. W. Johnston, A. T. Olive, R. L. Wyatt, and Chairman J. C. McDonald of the Local Arrangements Committee who have so carefully arranged for the very adequate space, excellent equipment and general comfort for all in attendance.

WHEREAS, this being the 25th anniversary of the Association of Southeastern Biologists

Be it resolved that the sincere appreciation and gratitude of the Association be expressed to Dr. George H. Boyd and the founders for their part in establishing this organization.

WHEREAS, the Carolina Biological Supply Company has continued to contribute $100.00 each year as a research award; therefore

Be it resolved, that the sincere appreciation of the Association be expressed to Dr. Thomas E. Powell, President of the Company, for his contribution.

WHEREAS, the Will Corporation of Georgia has continued to contribute $100.00 each year as an award for meritorius teaching, now therefore

Be it resolved, that the genuine appreciation of the Association be expressed to Mr. Charles Waite of that Corporation for this contribution.

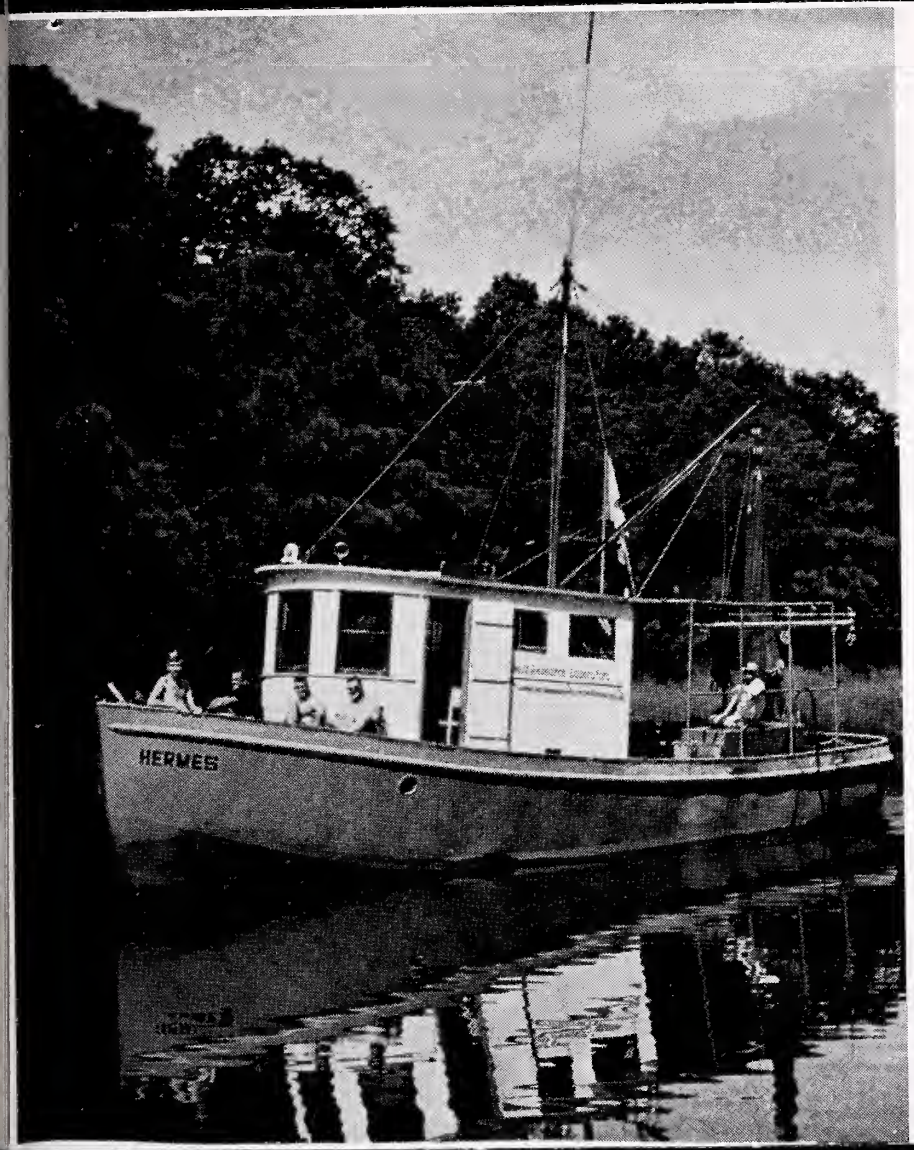
WHEREAS, the Phipps and Bird Corporation has continued to award the Mountain Lake Research Fellowship, now therefore

Be it resolved, that the sincere thanks of the Association be expressed to Dr. Lloyd Bird, President of the Corporation, for this contribution.

Dr. Shanks called for a motion to adjourn. Such a motion was made, seconded, and passed. The meeting adjourned at 12:30 P.M.

Respectfully submitted,
HARRY J. BENNETT
Secretary

The ASB BULLETIN



Volume 9, Number 4
October, 1962

THE HERMES—One of the work boats in use at the Gulf Coast Research Laboratory, Ocean Springs, Mississippi

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN *Volume 9, Number 4—October, 1962*

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ASB BULLETIN

The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from libraries and other institutions should he sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Subscription rate for nonmembers of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

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C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Leland Shanor, Business Manager

The Gulf Coast Research Laboratory At Ocean Springs, Mississippi

By

Gordon Gunter

The Teaching Program

In 1936, Dr. R. L. Caylor brought students on summer field trips to the coast from Delta State College, at Cleveland, Mississippi. The movement grew and in the summers of 1947 and 1948 formal courses in marine biology were taught at Magnolia State Park on Davis Bayou by the Mississippi Academy of Scienees. The various teachers volunteered their services without pay. In 1949 the State Legislature formally established the Laboratory by charter and placed it under the Board of Trustees of the Institutions of Higher Learning, the Board which controls all public colleges of Mississippi. In the same year a forty acre plot of ground was purchased on Davis Bay and surplus property buildings were moved to the new site.

Under the terms of the charter the Laboratory does formal teaching in the marine sciences for the colleges of the State, both private and public. However, the Laboratory is responsible to the Board of Trustees and is not under any individual college or university. State of Mississippi institutions which send students to the Laboratory are the University of Mississippi, Mississippi State University, the University of Southern Mississippi and Delta State College. The following private institutions, Belhaven College, Millsaps College and William Carey College also send students to the Laboratory under the same arrangement. These institutions list the various courses in their own catalogue under their individual numbers, and the student's grade cards are sent to the respective registrars. Additionally, five out-of-state institutions are affiliated with the Laboratory for teaching purposes by special contract with the Board of Trustees. They also list the courses, register their own students, and pay a fee depending upon the number of students registering. Louisiana State University has a special contract in that it furnishes one summer instructor and contributes a nominal sum for support. The other out-of-state institutions are: Louisiana Northwestern State College, Louisiana Polytechnic Institute, Louisiana Northeastern State College and Missouri Northwestern State College.

All courses are taught at an advanced level suitable for senior or graduate credit and most courses require eonsiderable background as prerequisites. Courses given are Physical Marine Geology, 3 semester hours, Chemical Marine Geology, 3 semester hours, and Problems in Geology; Introduction to Marine Botany, 4 semester hours, Introduction to Marine Zoology, 4 semester hours, Marine Invertebrate Zoology, 6 semester hours, Marine Vertebrate Zoology and Ichthyology, 6 semester hours, and Problems in Zoology. Marine Fisheries Biology is taught during years when there is sufficient demand. A service course in physical oceanography for students in geology and biology will be taught in the near future and it is expected that professional courses in oceanography and in marine microbiology will be established in the future years.

During the 1962 session seventy-one students were registered in the various courses at the Laboratory.

Two of the regular staff members of the Laboratory engage in teaching. Additionally, summer teachers come from Hamline University, Louisiana State University, Millsaps College, the University of Alabama, the University of Southern Mississippi and Vanderbilt University.

All formal teaching is done in the summer, but students who wish to work out their master's or doctor's thesis may work during the whole year. Living and working quarters are furnished free to professionals who are visiting or carrying on research at the Laboratory.

In addition to the college teaching program, for the past three years a Summer Institute for highly selected high school students and high school teachers from all over the country has been given at the Laboratory by Louisiana State University, with support from the National Science Foundation.

College field trip groups in geology and biology visit the Laboratory over the week-end in considerable numbers. During the 1961-62 college year forty-six groups from Kansas, Tennessee, Alabama, Arkansas and Louisiana visited the Laboratory and made collecting trips by boat into the Gulf of Mexico. Quarters and the boat trips are provided free. Laboratory staff members go on the trips to help the students identify the organisms caught and to explain some of the features of the marine environment.

Permanent Staff and Research Activities

A research staff of seven people and a nontechnical staff of six people, three of them half-

time workers, remain at the Laboratory all the year round. The technical staff eonsists of one geologist, two physical oceanographers, and four biologists.

The physical oceanographers have been studying distribution of water of the Mississippi River after it reaches the Gulf of Mexico. During the past three years they liberated 25,000 drift bottles off the mouth of the Mississippi and have studied current patterns in the Gulf in other ways. This work has been supported by the Office of Naval Research and a series of interesting results have accumulated, some of which have already been published. For one thing, the influx of tropical animals into the northeastern Gulf has been explained on the basis of currents and wind patterns, and it has been shown that about twenty-five per cent of Mississippi water goes to the eastward while the remainder goes west.

The geologist has been concerned with the movements of the sand spits, the ends of the islands, which move about like a snake's tongue over a period of a few weeks time, depending upon the forces of the winds, currents and tides.

One staff biologist is also a member of the Mississippi Marine Conservation Commission and is biologist for that Commission. He spends full time working with the oyster reefs and shrimp populations. The reefs are shelled, seeded, and sometimes transplanted and the shrimp and oyster seasons are opened and closed and otherwise regulated by acts of the Commission. The biologist carries six votes on biological matters within the ten man Commission, and it may be said that the Mississippi marinc fishery regulations are unique in being based almost solely upon biological considerations. During the fiscal years 1959-60 and 60-61 the Mississippi oyster production was the largest in its history.

Two of the biologists have been concerned with thc racial studies of the menhaden, whieh supports the largest fishery on the Gulf coast and which yielded one billion pounds in 1961. The life history of this fish has also been studied and the catch data of the commercial fishery has been examined. It has been shown that the fishery itself is of an estuarine nature. No catches are made in full sea water. The gonadal cycle of the menhaden has also been studied as well as the geographic distribution of the three Gulf species. A bibliography of the menhaden literature and a review of menhaden biology have been published. This work was supported by U. S. Fish & Wildlife Service through funds made available by the Saltonsall-Kennedy Bill. One of the biologists conducted a two year quantitative faunistic study of the waters of Grand Isle, Louisiana. Collections were made by trawls, dredges, plankton nets and bottom grabs. Several species new to the northern Gulf and some new to the Gulf, and one new species of fish was discovered. Several reports on these minor components have been published. The major portion of these data will not be utilized because of strictures imposed by the industrial company which supported the work. Another biologist has been concerned with fish which survive extreme injuries caused by predators, and a second step in this work is the description of the many specimens of fishes which develop abnormalities, many of which grow up and survive as virtual monstrosities. A bibliography of 750 papers on this subject has been gathered and specimens, photographs and records of all kinds are being collected and solicited from all available sources. A taxonomic revision of the scaleless naked, broad soles has been carried out by a grant from the Society of the Sigma Xi.

During the summer ten to fifteen research people come to the Laboratory and are given small grants through support from the National Science Foundation. These people are given a

Exterior of the teaching laboratory building. This building, completed in 1956, houses two teaching laboratories—both of which are equipped with running fresh and salt water, compressed air, and aquariums.

One of the teaching laboratories. Although spacious and seemingly adequate, they are over-crowded with researchers in the summer months. Only this year, the Mississippi Legislature voted a bond issue to build a new research building within the next two years.

place to work free of charge. They have worked upon sueh diverse matters as catelepsy in the toadfish, the effeet of various degrees of heat upon histological and cytological fixatives, parasites in tuna, the biology of the mouth breeding catfishes in whieh the male carries the eggs in his mouth until they hatch, light production in the midshipman, new rapid chemical tests for nitrate and nitrite in brackish waters, and new tests for sulphate, calcium and magnesium ions in the same waters. Various parasitic crustaceans on fishes and various other animals in the Gulf have been described. The mixed populations of fresh water and salt water fishes in low salinity water have been studied. With help of oil company geologists who made corings and bottom sediment studies of Mississippi Sound and the adjacent Gulf, a relatively thorough study of the distribution of Amphioxus in the area was made. Meristic studies of the population were made. It was estimated that a few hundred million, or possibly even a few billion, Amphioxus live in Mississippi Sound around the barrier islands. Sometimes a few thousand are collected at one time by student groups. All in all 150 papers and notes have been published by Laboratory staff members during the past eleven years.

People with their own grants visit the Laboratory and are given a place to work. In the past specialists on mushrooms, lichens and the Compositaceae have used the station as headquarters. During the past four summers a team of biochemists from the University of Mississippi School of Medicine have worked at Ocean Springs on fishes blood. They have found that the plasma proteins of fishes show a trend of increasing complexity from the generalized to more specialized species; the total cholesterol is 10 times higher in the plasma of some fishes than in man; the relations of cholesterol and plasma proteins in the blood of fishes resemble pathological conditions in man.

The Laboratory has established its own journal, Gulf Research Reports, and three issues have been printed. The first one covers the mollusks in the salt waters of Mississippi. The second one gives the history and lists the known flora and fauna of Horn Island, most of which is now a wildlife preserve. This paper includes insects.

The Laboratory has a small but rapidly growing library in which the greatest emphasis is placed upon the reprint collection. Modern texts in the various fields are bought for the use of the students.

The Laboratory also has a museum into which most of the common animals of the northern Gulf of Mexico have already been aceessioned. In the future examples of all animals and plants of the northern Gulf of Mexico and finally the whole Gulf will be acquired.

Plant and Equipment

The Laboratory property consists of forty aeres of woodland on which a large summer home and two small buildings were present when it was acquired. Three wooden buildings, which were Surplus Property from the various Armed Services, were moved on to the property in 1951, and they are still in use. One of these was the caretakers cottage. One was made into a kitchen and dining hall, and another was made into a rough but fully equipped marine laboratory for teaching, with water tables, sinks, etc. They are all still in use. The laboratory building now houses the museum and a modernized midsection is used as a teaching laboratory for geologists. It also now contains a modern darkroom and one office.

The botany laboratory. This laboratory contains four work tables with room for 16 students. In past years, specialists in mushrooms, lichens, and the Compositaceae have used the station as their headquarters.

The downstairs part of the summer home houses offices for the oceanographers and the geologist, and one room is a classroom. The upstairs part of this building has been turned into dormitories for men. Two other dormitories, one for men and one for women, were built of wood and asbestos shingles. Each one will house 20 people. One of the small wooden buildings which went with the big house is used for a shop and storeroom, and the other has been turned into a chemistry laboratory. A brick research building was constructed on the grounds in 1952 at a cost of $20,000. It contains six work tables and four water tables for running seawater, and also houses the administrative offices. A teaching laboratory was completed in the spring of 1956. It consists of two large rooms which between them contain eight water tables and eighteen work tables. A smaller room is used as a botany laboratory and contains four work tables. Each one of the tables has space for four students. The water tables are equipped with running fresh water, salt water, compressed air and aquariums.

During the summer the Laboratory has been over-crowded with research people. Fortunately, the 1962 Session of the Legislature voted a bond issue for a $400,000 research building which is to be erected within the next two years.

The Laboratory has a 38-foot all steel trawler named the Hermes which is powered with a diesel motor. It has passed Coast Guard certification, but is too small and will not handle all of the field trips and class groups which use the boat. Therefore, a T-boat, 65 feet long, was recently acquired through the Surplus Property Agency, and is being renovated at a cost of approximately $20,000.

Since 1955 to the end of the fiscal year 1961 Laboratory support was about fifty-fifty from outside contracts and the State of Mississippi. State appropriations come through the State Legislature and the Board of Trustees. The State Building Commission also helps through special allotments from time to time. In 1962 the Session of the Legislature also granted the Laboratory ten per cent of the future sales of dead reef shell from the buried oyster reefs along the coast. The Laboratory expenditures have quadrupled sinee 1955.

Doctor E. Gibbes Patton, Director of the University Arboretum, University of Alabama, has written that a mimeographed extract from Charles Mohr's *Plant Life of Alabama,* is available upon request from the University Arboretum.

Charles Mohr's *Plant Life of Alabama* was published over 60 years ago. The book needs revision; it is out of print; and many extant copies are brittle-paged, deteriorating rapidly with use. Mohr's work nevertheless still serves as a treasury of thorough, masterfully-organized information on the flora and the plant geography of the state.

The extract from *Plant Life of Alabama* is temporarily reproduced with the principal objective of making this part of the book more widely available to teachers, researchers, and amateurs of natural history in the Southeastern United States. An important secondary objective is to obtain an estimate of the demand for verbatim printed copies of the 137 pages of Mohr's work which is partially represented by this mimeographed extract. *Expressions of interest in, and need for, a formal reprinting of this material are needed by the University Arboretum.*

A mimeographed check list of Alabama woody plants, both native and naturalized, is also available upon request from the University of Alabama.

ROYAL E. SHANKS (1912-1962)

Royal E. Shanks was born in Ada, Ohio, November 11, 1912. He lost his life on August 4, 1962, while swimming and studying coral reef in a bay of the Caribbean Sea, at Porte Limon, Costa Rica. His early schooling was in the public schools of Ada. While in college he at one time considered the ministry as a calling, but toward the end of his undergraduate days at Ohio Northern University he became interested in ecological botany and this interest became his career. After graduating from Ohio Northern, with an A.B. in 1933, he taught in the North Bloomfield, Ohio, school system. Here he was the principal of a consolidated school where he taught in the primary and senior high school and coached baseball and basketball. He was married to Betty Morris in 1935. During the summer he attended Ohio State University and in 1936 he was appointed a graduate assistant at the university and matriculated for graduate study there as a full time student. Under the influence of the strong group headed by Dr. Transeau in ecology, he completed his M.S. in 1937 and Ph.D. degree in 1938.

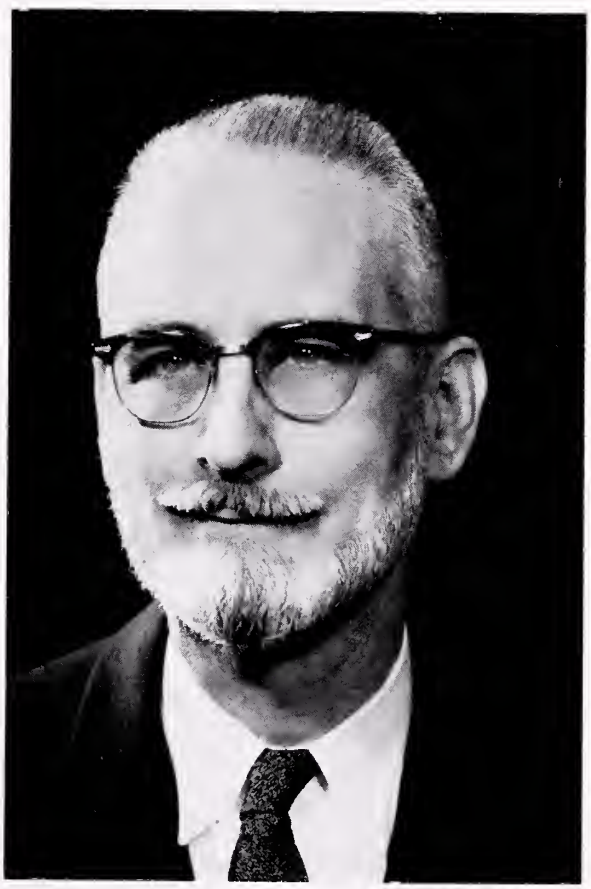
A temporary appointment at the University of Tennessee, 1940-41, brought him to this state for the first time, and he remained in Tennessee as a Professor of Biology at Austin Peay State College from 1941 to 1946. During some of these war years he was on leave and served briefly in the Army and finally in the Navy as a navigation instructor. In 1947 he was asked to come to the State University to succeed Dr. Stanley Cain as an Associate Professor of Botany. He became a Professor two years later.

In 1955, a concern with environmental aspects of ecosystems led him to propose some fundamental studies in the most simple environments, those of the Arctic region. The Arctic Institute supported five summers of study at Point Barrow, Alaska, and scientific exploration on the north shore of Alaska eastward nearly to the Canadian border and south to the mountains and forest.

At the end of the summer of 1955, White Oak Lake in Oak Ridge, the lake below the old graphite reactor, was drained, exposing a relatively flat bottom which had absorbed low-level radioactive wastes for years. Here was a challenge to study the ecology of a large radioactive area on a field rather than a laboratory basis. The AEC supported his proposal for such a study. For the last six years a substantial portion of the graduate research in eeology involved problems such as the evaluation of isotope movement in plants and soils and accumulation in plant materials.

Those students and colleagues of Royal Shanks speak from the heart when they describe him as an unusual man. His recreations, for which he had too little time, were likely to be bus-man's holidays. He had been an active member of the Smoky Mountains Hiking Club, and was keenly interested in the preservation of wilderness areas. Scarcely secondary was his love of music. His early years in Ohio were colored by the influence of many Welsh settlers and their eisteddfods, or musical competitions. Not only is his wife a good pianist, but his two adopted girls, Emily, 13, and Harriet, 15, are gifted instrumentalists—and one of their happiest diversions is with home musical groups. This interest carried into community choral music as well and he sang in the Knoxville Men's Chorus and for a time led the choir of the Lake Forest Presbyterian Church, of which he was a devoted member. Many students and staff will remember his leading and participating in the singing on trips and around camp fires on the nights of hikes and field trips.

He was a member of numerous scientific societies and his ability had been recognized by his election to offiees of responsibility in several. Only this year, he retired as president of the Assoeiation of Southeastern Biologists. His manner was gentle, his activity great, his enthusiasm



Royal E. Shanks

contagious. When a matter of principle was involved he did not compromise. He built not only a large working laboratory but did much for his field at Tennessee by bringing research associates and students to the University. He was the first biologist at Tennessee to begin to make use of the modern computing technology and strongly backed the establishment of the university as a computing center.

In the year before he died he made eighteen talks through the state of Tennessee. In all, he supervised thirteen master's and nine doctoral theses from 1949 to 1962. His students found him a constructive critie and a warm friend.

Though not always obvious, his human interests were strong. One year, returning from national meetings, a colleague commented, "We have some good laboratories to come back to now." "I come back to the people in this building," said Royal, "these are what I return to!" His loss will be an irreplaceable one to those who were associated with him in any way.

The AAAS Philadelphia Meeting

DECEMBER 26-30, 1962

THE 129TH MEETING of the American Association for the Advancement of Science will include sessions of 20 AAAS sections and of some 86 participating organizations. Programs of particular interest to biologists are:

AAAS General Sessions. Moving Frontiers of Science I: Sterling B. Hendricks whose topic will be "Biological Timing," Dec. 26, eve; and Sydney Brenner, Cambridge University, who will speak on "Perspectives in Molecular Biology," Dec. 28, aft.

AAAS Committee on Desert and Arid Zones Research. A two-session symposium arranged by Harold E. Dregne, Dec. 27.

AAAS Interdisciplinary Symposia, Dec. 28, morn. One of three will be "Biochemistry of Genetic Transcription," arranged by Severo Ochoa and Philip H. Abelson. Speakers: Sol Spiegelman, University of Illinois; William Jones and Marshall W. Nierenberg, National Institutes of Health; Severo Ochoa, Joseph Speyer and associates, New York University; Sydney Brenner, Cambridge University.

AAAS Presidential Address and Reception, Dec. 28, eve. Retiring president Thomas Park will speak on "Beetles, Competition, and Populations."

AAAS Section C—Chemistry. Papers in organic chemistry, Dec. 26, aft. Two-session symposium on "Mechanisms of Organic Chemistry," arranged by Paul Schleyer, Dec. 27.

AAAS Section F—Zoological Sciences. Zoologists' Dinner and vice presidential address by Ernst W. Caspari, Dec. 29, eve., "Genes and the Study of Behavior."

AAAS Section G—Botanical Sciences. Two-session symposium, "Plant Biology Today," a continuation of the series of basic papers for teachers, Dec. 27. Speakers: Bruce A. Bonner, Harvard University; Herbert Stern, University of Illinois; John G. Torrey, Harvard University. This year's papers will be on structure and function. The Botanists' Luncheon, also Dec. 27, will be followed by the vice presidential address by John N. Couch, "Are Bacteria and Fungi Related?"

AAAS Section N—Medical Sciences. Four-session symposium, "New Concepts Regarding Biological Control Mechanisms," arranged by DeWitt Stetten, Jr. and Oscar Touster, and cosponsored by Section F—Zoological Sciences, and the American Society of Zoologists. Dec. 27, 29. Topics and speakers:

A. *Repression Mechanisms*—Boris Magasanik (Chm.); Bruce Ames; Luigi Gorini; Hans Kornberg; University of Leicester, England;
B. *Feedback Control of Enzyme Action*—H. E. Umbarger (Chm.); Georges Cohen, Centre National de la Recherche Scientifique, Gif-Sur-Yvette, France; H. S. Moyed; A. B. Pardee; J. C. Gerhart;
C. *Hormonal Phenomena*—E. W. Sutherland, Jr. (Chm), O. H. Lowry, Theodore Rall, G. M. Tomkins;
D. *Transport Across Cell Membranes*—C. R. Park (Chm.), Alexander Leaf, D. O. Rudin, J. Skou.

DeWitt Stetten, Jr. will give the vice presidential address for Section N, "Forecasts in Medical Education."

AAAS Section Nd—Dentistry. Four-session symposium, "Mechanisms of Hard Tissue Destruction," arranged by Ned B. Williams and Reidar F. Sognnaes, Dec. 29, 30. Topics include rock-boring by mollusks and other animals, bone-remodeling, antler-shedding, biochemistry of bone destruction, and dental caries. Speakers: M. R. Carriker; David B. Scott; C. M. Yonge, Glasgow, Scotland; Thomas F. Goreau, University College of West Indies; Franklin C. McLean; Robert E. Rowland; S. N. Bhaskar; Richard J. Goss; Marshall Urist; Jenifer Jowsey; Norman M. Hancox, Liverpool, England; James Irving; Richard W. Young; George Nichols, Jr.; Bernard Forscher; Paul Goldhaber; A. I. Darling, Bristol, England; Erling Johansen; David Francis; John Gray; Reidar F. Sognnaes; Willard D. Hartman, Peabody Museum, Yale University; Ingjald Reichborn-Kjennerud, University of Oslo, Norway; C. S. Handelman, Harvard University;

L. F. Belanger and B. B. Migicovsky, University of Ottawa; Harold Copp, University of British Columbia; Jacques Vincent, Belgian Congo; C. M. Lapiere J. Gross, Massachusetts General Hospital; G. N. Jenkins, King's College, England; C. Dawes, Harvard University; Paul Keyes and Harold Jordan, National Institute for Dental Research; C. R. Barnicoat, New Zealand; W. V. Mayer, Wayne State University; David Cameron, Johns Hopkins Hospital; J. Robichon, University of Ottawa.

AAAS Section O—Agriculture. Five-session symposium, "Food Quality as Affected by Production and Processing," arranged by George W. Irving, cosponsored by four AAAS sections and ten societies. Individual sessions will be on genetic and environmental factors, protection of food crops against insects and diseases, processing factors, quality evaluation and measurement, and food-grading and standardization. Considered in this symposium will be cereals, fruits, vegetables, meats, dairy products, poultry, and eggs.

There will be a **Biologists' Smoker,** jointly sponsored by Sections F and G and all biological societies, Dec. 27, at the Academy of Natural Sciences.

SOCIETAL PROGRAMS

Aeademy of Psychoanalysis. Four sessions on the general topic of "Violence," arranged by Sandor Rado. Areas include neurophysiology and ethnology, anthropology and sociology, psychoanalysis, and large-group relationship, Dec. 28-30.

Alpha Epsilon Delta. Annual luncheon, Dec. 28.

American Association of Clinical Chemists. Symposia on instrumentalism and biological analysis, and on endocrine function; contributed papers. Dec. 26, 27. Speakers: D. A. Turner, Sinai Hospital of Baltimore; S. R. Gambino, Englewood Hospital; S. Udenfriend, National Heart Institute; S. Raymond, University of Pennsylvania.

American Nature Study Society. Annual meeting. Whole period includes sessions on nature study movement, early naturalists of the region, nature photography, nature instruction, and use of areas for nature study.

American Physiological Society and NASA. Joint two-session symposium on "Space Biology and Life Support Problems of Manned Space Missions," arranged by Orr Reynolds and Robert E. Smith, Dec. 30. Speakers: Ernest C. Pollard, Carl Sagan, Sidney Fox, C. S. Pittendrigh, Cornelius A. Tobias, W. A. Lee, R. S. Johnston, J. Correale, J. A. Conner, E. J. McLaughlin.

American Psychiatric Association, Committee on Research. Five-session program on "Human Reactions to Unknown or Impending Disaster," arranged by Milton Greenblatt, George H. Grosser and Henry Wechsler. Topics will be "General approach," "Psychological reaction to arbitrary authority and power," "Emotional reactions to the threat of nuclear war," "Reaction to natural catastrophe," and "Political reactions in the face of uncertainty." Dec. 27, 28.

American Society of Naturalists. Annual national meeting will include a two-session symposium, "Principles and Methods of Phylogeny," arranged by William K. Baker, Dec. 27; the presidential address of Ernst Mayr, "What Is a Fauna?", and the business meeting, Dec. 28, morn. Symposium Speakers: Ernst Caspari, Howard Sanders, Walter Bock, Robert F. Thorne, Arnold W. Ravin, Seymour S. Cohen, Edwin H. Colbert, Marvin Wasserman, Colin S. Pittendrigh.

American Society of Zoologists. The tentative program of the national meeting of the Society, arranged by Ray L. Watterson, with more than 30 sessions, includes 23 sessions for contributed papers sponsored by all six divisions of the Society, throughout the meeting period; business meetings of the divisions; and a series of symposia. The two-session symposium, "Growth," arranged by Lawrence I. Gilbert, is Dec. 28. Speakers: Allison L. Burnett, Dorothy E. Bliss, Howard A. Schneiderman, William Etkin, Dorothy Price, Ernst Knobil, Richard A. Edgren, K. France Baker-Cohen, Jane Coffer Kaltenbach, Bruce B. Stowe.

The two-session symposium, "The Evolution of Behavior," arranged by William C. Dilger, is Dec. 27. Speakers: William C. Dilger, Richard D. Alexander, George W. Barlow, John F. Eisengerg, Richard J. Andrew, Peter Marler, Robert W. Ficken. The two-session symposium, "Energetics," arranged by L. R. Slobodkin, is Dec. 30. Speakers: T. R. Punnett, W. Vishniac, J. J. Blum, K. F. Guthe, L. R. Slobodkin, I. Prigogine. The two-session symposium, "The Regulation and Function of Heterosynthetic and Autosynthetic Molecules in Developmental Processes," arranged by George W. Nace, is Dec. 30. Speakers: Albert Tyler, Laurel E. Glass, Ole Arne Schjeide, William H. Telfer, George W. Nace, Reed A. Flickinger, C. P. Dagg, James D. Ebert.

Biomedical Information-Processing Organization. Session, on computers to aid biology and medicine, arranged by Robert S. Ledley, Dec. 28, aft.

Biometric Society, Eastern North American Region. Session on high speed computers in statistics, arranged by T. A. Bancroft, Dec. 27, morn. Speakers: H. O. Hartley, Max A. Woodbury, Martin Lipkin, Lee D. Cady, and Murray Eden. In the concurrent session on problems of mathematical biology, arranged by H. L. Lucas, the speakers are: H. R. van der Vaart and W. S. McCulloch. The session in genetics, jointly with Sections U—Statistics and G—Botanical Sciences and cosponsored by the Society for the Study of Evolution, Dec. 27, aft., will have papers by S. Karlin, Howard Levene, and Sewall Wright. The session on sampling for zoologists, arranged by E. Fred Schultz, Jr., Dec. 30, morn., will have as speakers: L. L. Eberhardt, D. S. Robson, E. L. Atwood, and D. G. Chapman.

Ecological Society of America. Program, arranged by Robert B. Platt, Dec. 26-30, includes several symposia, some six sessions for contributed papers on plant ecology, animal ecology, and aquatic ecology, and a series of sessions jointly sponsored by the Section on Animal Behavior and Sociobiology and the Division of Animal Behavior and Sociobiology of the American Society of Zoologists.

Herpetologist's League. Session for contributed papers, a business meeting, and a visit to the Philadelphia Zoological Gardens, Dec. 27-29.

Mountain Lake Biological Station. Annual breakfast with the AAAS, arranged by C. W. Hart, Jr.; Horton H. Hobbs, Jr. presiding; for all persons who have been students, investigators, or staff members at the station, Dec. 29.

National Association of Biology Teachers. Annual national meeting, Dec. 26-30. Included in the program will be a luncheon, Dec. 28, with an address by Severo Ochoa, and a series of separate sessions, Dec. 27, 29, and 30, with the theme "Manning the Frontiers."

National Speleological Society. Session on "Cave Biology," Dec. 29, morn.

Sigma Delta Epsilon. National meeting, arranged by Dorothy Quiggle, will include a luncheon for all women in science, with Sue C. Stevens, Veterans Administration Hospital, Lincoln, Nebraska, speaker, Dec. 28.

Society of Systematic Zoology. Annual meeting will include sessions for contributed papers; a symposium, "U. S. and International Programs in Biological Oceanography," cosponsored by the American Society of Zoologists, AAAS Section F, and the American Society of Limnology and Oceanography, Dec. 29; and the annual breakfast and business meeting, Dec. 30. Symposium Speakers: Eugene Wallen, John H. Ryther, Vernon E. Broek, Melbourne R. Carriker, Dixy L. Ray, Rolf L. Bolin, Robert L. Menzies.

Society of the Sigma Xi. Sixty-third annual convention, joint luncheon with the Scientific Research Society of America, and joint address with Phi Beta Kappa, by Loren C. Eiseley, "Man: The Lethal Factor," Dec. 29.

The AAAS Exposition of Science and Industry—131 booths—and the AAAS Science Theatre, with recent foreign and domestic films, will be prominent features of the meeting. Coupons for sleeping accommodations and advance registration will be found in *Science* beginning July 20.

News of Biology in the Southeast

Institutions and Organizations

Mary Washington College of the University of Virginia was the recipient of a substantial fund from an anonymous donor in the fall of 1960 for Scholarships to aid students majoring in Biology. Awards may be made to worthy undergraduate students as well as to students continuing in graduate school. About $1200 was awarded from this fund to assist four students in the 1961-62 session, and similar grants have been made for the 1962-63 session. The conditions of the grant specify that both principal and income of the fund are to be expended over a fixed period of years.

The Science Division of Rollins College was one of the recipients of the Undergraduate Instructional Equipment Grants from the National Science Foundation for $23,160. This was matched with $25,000 from Rollins College to be expended for the equipment and instrumentation needed to modernize the biology offerings to give them a more physiological-biochemical orientation.

About People

Bernard C. Patten has been invited to participate in the 10th annual symposium of the Houston Neurological Society. The subject of the symposium is "Information Storage and Neural Control." Dr. Patten will speak on information storage and transfer in ecological systems.

Harold J. Humm, Department of Botany, Duke University, was a visiting professor at the Virginia Institute of Marine Science this summer and taught the course in Marine Botany.

John N. Couch and **Walton C. Gregory** have been appointed members of the Scientific Advisory Committee to the Governor of North Carolina, Terry Sanford. The committee, appointed in December, 1961, consists of approximately 40 representatives of all disciplines with the responsibility of helping to implement the scientific and industrial development of North Carolina.

Robert K. Burns will join the faculty of Bridgewater College as Interim Professor of Biology in the session of 1962-63, following his retirement from the staff of the Laboratory of Embryology of the Carnegie Institution of Washington.

William W. Scott, Associate Professor of Botany at Virginia Tech, was honored at the 40th Annual Meeting of the Virginia Academy of Science with an Honorable Mention Award and a check for $50.00 for meritorious and original research in competition for the J. Shelton Horsley Award. Dr. Scott presented a paper entitled "A Monograph of the Genus *Aphanomyces*." The award winning paper was one of 205 papers presented at this year's meeting. More than 700 senior scientists and 325 junior scientists attended concurrent sessions during the 5-day meeting.

Dr. Scott and his students presented four additional papers before the Biology Section of the VAS. These were: "A Preliminary Report of Fungi Associated with Diseased Fish," by W. W. Scott, Aaron H. O'Bier, and James Powell; "The Life-cycle of a Keratinophilic Fungus *Leptolegniella keratinophilum*," by Roland Seymour and W. W. Scott; "Some New and Unusual Fungi from Virginia," by W. W. Scott and Charles Warren; and "The Genus *Calostoma* Zeller in Virginia," by Mary Virginia Charlton.

George H. Lauff, director of the University of Georgia Marine Institute at Sapelo Island, and associate professor of Zoology at the University of Michigan, has been elected to the Board of Trustees of the Sapelo Island Research Foundation and has accepted the position of research coordinator for the Foundation supported activities, effective July 1, 1962.

J. Gordon Carlson, Head of the University of Tennessee Department of Zoology and Entomology, spent several weeks of the summer attending meetings in Europe. In the early part of August he presented a paper entitled "Mitotic Effeet of Monochromatic Irradiation of the Nucleolus" at a Symposium on Partial and Microbeam Irradiation of Cells at the University of Cambridge, England. Later he attended the sessions of the Second International Congress of Radiation Research at Harrogate, England. He then attended a Symposium on "Repair from Genetic Radiation Damage and Differential Radiosensitivity in Germ Cells" at the University of Leiden, Holland.

Albert Collier will become Director of the Oceanographic Institute at Florida State University on November 1, 1962. Prof. Collier is now directing the Marine Laboratory of the A. & M. College of Texas at Galveston.

Winston Menzel of the Oceanographic Institute and Department of Biological Sciences at FSU has received a 3 year renewal of a grant from the National Science Foundation to continue his study of *Dermacystidium marinum* in oysters.

Margaret Menzel, Research Associate in the Department of Biological Sciences at FSU, will be a guest investigator in the Institute of Space Biosciences at the University.

Charles Metz, former Assoeiate Director of the Oceanographic Institute at Florida State University, is now working full time in the Institute for Space Biosciences at FSU.

Two new instructors have been added to the Department of Biological Sciences at Florida State University. **William H. Heard,** Ph.D., University of Michigan, will teach general biology and continue his research in malacology. **Andre Clewell,** who is working for his Ph.D. degree at the University of Indiana, will teach ecology and plant taxonomy.

Leland Shanor resigned as Head of the Department of Biological Sciences at Florida State University on July 1, 1962. He is now on a leave-of-absenee from the University as Dean of Advanced Studies in the Florida Institute for Continuing Studies, Tallahassee. **Robert K. Godfey** is the acting head of the department at present.

Paul B. Sears, Professor Emeritus of Yale University, where he directed the Conservation Program, has joined the Wake Forest College staff as Mary Reynolds Babcock Professor of Botany. In addition to Dr. Sears, **Ralph D. Amen,** plant physiologist, from the University of Colorado and **Robert L. Sullivan,** geneticist at Washburn University, have also recently joined the Wake Forest staff.

G. Ray Noggle, Chairman, Department of Botany, University of Florida, took part in the Advanced Seminar in Tropical Biology in Costa Rico during the summer. This is one of his many visits to Central America where he is planning to extend the work and facilities for studies of tropical botany by University of Florida students and staff, and for others interested in the region.

Alan D. Conger, Research Professor in Radiation Biology, University of Florida, worked at the Brookhaven Laboratory in August this summer and then attended meetings of the International Congress of Radiation Research at Harrogate, England, and a Symposium in radiation genetics at the University of Leiden, Leiden, The Netherlands.

W. L. Selser spent five weeks during the summer at the Inter-American University of Puerto Rico teaching teachers how to use the B.S.C.S. materials in High School teaching.

Paul A. Vestal, Rollins College, is directing the Visiting Scientist Program for the secondary schools of Florida. It is a project of the Florida Academy of Sciences sponsored by a grant from the National Research Foundation.

Rose Mary Johnson, Department of Biology of the Norfolk Division of William and Mary, was awarded her Ph.D. at the June Commencement at the University of Virginia. In September she joined the staff of Mary Washington College of the University of Virginia as Assistant Professor of Biology.

After two years leave of absence at Duke University and the University of Wisconsin, **Anna Scott Hoye** received her Ph.D. in Physiology from the University of Wisconsin in June. In September she returned to Mary Washington College of the University of Virginia as Associate Professor of Biology.

Thomas Johnson is on leave from the Department of Biology of Mary Washington College for the 1962-63 session. After a summer spent touring in Europe, he is pursuing studies toward the doctorate at the University of Virginia.

Nancy S. LePrade of Richmond, Va. has spent the summer as a trainee in the Division of Radiobiology at Oak Ridge, Tennessee. The summer of 1961 was spent at the University of Tennessee under the National Science Foundation's Undergraduate Research Participation Program. She returned to Mary Washington College in September as Senior Major in the Department of Biology.

Bruce L. Welch has joined the faculty of the College of William and Mary as an Assistant Professor of Biology.

Garnett R. Brooks, Jr. has joined the staff of the College of William and Mary as an Instructor in Biology. Mr. Brooks will complete his Ph.D. degree requirements at the University of Florida in December.

Marie Jenkins has been appointed Associate Professor of Biology and **Beverly Pleasants** has been appointed Instructor of Biology at Madison College. Dr. Jenkins was formerly on the staff of the University of Oklahoma, and Miss Pleasants on the staff of Richard Bland College.

Dorothy Crandall will be on Sabbatical Leave from Randolph-Macon Woman's College next year. The first semester she will be at North Carolina State College studying forest soils; the second semester at University of Tennessee.

William S. Hooks of Illinois Northern University will join the faculty of Randolph-Macon Woman's College in September, replacing Dr. Crandall while she is on sabbatical leave.

Alvin H. Nielsen, Head of the University of Tennessee Department of Physics, is succeeding Dr. Kenneth L. Knickerbocker as Dean of the College of Liberal Arts. Dr. Nielsen received his degrees from the University of Michigan and was on the staff of Ohio State University before coming to the University of Tennessee in 1935. He is recognized as a leading authority on infrared spectroscopy in this country and abroad.

NEWS FROM THE BIOLOGY DIVISION— OAK RIDGE NATIONAL LABORATORY

Robert T. Brumfield, Biology Division Consultant, has returned to Longwood College, Farmville, Virginia, after spending the summer months in the Cytology and Genetics section.

Roderick K. Clayton, Microbiology Group, is taking a leave of absence for one year; Dr. Clayton will be on the faculty of Dartmouth College during the coming year.

Piero Cammarano of the Institute of General Pathology, University of Milan, Milan, Italy, has joined the Enzymology Group for one year under the sponsorship of the Comitato Nazionale Energia Nucleare. Dr. Cammarano received the M.D. degree from the University of Rome, Italy.

William Robert Finnerty, who has been with the Enzymology Group, under the sponsorship of the United States Public Health Service, has accepted a position with the Department of Biology, Indiana University Medical School, Indianapolis, Indiana.

Akira Kaji, Department of Microbiology, Vanderbilt University School of Medicine, Nashville, has joined the Enzymology Group for one year under a grant from the Helen Hay Whitney Foundation. Dr. Kaji received the B.S. degree from Tokyo University, Tokyo, Japan, and the Ph.D. degree from the Johns Hopkins University, Baltimore, Maryland.

Frank Seto of the Department of Biology, Berea College, Kentucky, has joined the Radiation Immunology Group for the coming year under a grant from the U. S. Public Health Service.

Michael Hanna, Jr., an ORINS Fellow, has joined the Mammalian Recovery Group. Mr. Hanna received the M.S. degree in Zoology from the University of Notre Dame, Indiana.

Robert R. Becker, who has been associated with the Cell Physiology Group, has accepted a position with the Department of Chemistry, Oregon State University, Corvallis, Oregon.

James C. Copeland, who has been with the Radiation Microbiology Group for the past two years, left the Division August 24. Mr. Copeland received a U. S. Public Health Service Traineeship for graduate work leading to the Ph.D. at the Institute of Microbiology, Rutgers University, New Brunswick, New Jersey.

Alexander Hollaender attended the Second International Congress of Radiation Research at Harrogate, England, in August; Dr. Hollaender chaired the session on Linear Energy Transfer. The Second International Congress was also attended by A. C. Upton, Raymond A. Popp, Gustavo Cudkowicz, Howard I. Adler, M. A. Bender, George F. Stapleton, Elmo E. Capalbo, R. F. Kimball and Joan Wright Goodman. Dr. Upton chaired the session on Metabolic Disturbances III and gave a paper entitled, "Relative biological effectiveness of fast neutrons for production of late somatic effects in mice." Dr. Popp chaired the session on Radiation Immunology. Dr. Cudkowicz presented an invited paper entitled "Suppression of the foreign marrow reaction in mouse chimeras by preirradiation of donor cells." Dr. Adler presented an invited paper entitled "Genetic analysis of radiation sensitivity of Escherichia coli." Dr. Bender presented a paper, co-authored by P. C. Gooch, "Persistent irradiation-induced aberrations in human somatic chromosomes." Dr. Capalbo presented an invited paper, co-authored by M. R. Leonard and T. Makinodan, entitled "Proliferation of lymphoid cells after X-irradiation." Dr. Kimball presented a paper entitled "Fractionation of dose and radiation intensity in the induction of recessive lethal mutations by X-rays in Paramecium aurelia." Dr. Goodman presented an invited paper, "Transplantation of white blood cells in irradiated mice."

The ASB BULLETIN

Volume 10, Number 1 January, 1963

THE *Anton Bruun*—ONE OF THE INDIAN OCEAN EXPEDITION RESEARCH VESSELS

The Official Quarterly Publication of
The Association of Southeastern Biologists

COVER PHOTOGRAPH: The *Anton Bruun*, formerly the presidential yacht *Williamsburg*, was recently outfitted as an oceanographic vessel—and left the United States shortly after Christmas for the Indian Ocean. Most of the investigators will fly to the area and meet her at pre-determined places for their respective cruises.

CONTENTS

ASB BULLETIN

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Subscription rate for nonmembers of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

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C. WILLARD HART, JR.
EDITOR

HARRY J. BENNETT, Associate Editor
LELAND SHANOR, Business Manager

The following invited address was given by Dr. Martin D. Young at the 25th anniversary dinner meeting of the Association of Southeastern Biologists, Winston-Salem, N. C., April 27, 1962.

Founding and Early Days of the Association of Southeastern Biologists

by Martin D. Young

A description of the founding and early days of the Association of Southeastern Biologists appropriately should be given by the man who originated the idea, who was instrumental in the initial organization, who was the first President, and who has been most important in guiding its destinies, Dr. George Hugh Boyd. However, circumstances prevented his preparing such a report and, therefore, I have the distinct honor of talking on this subject.

A historical note of the Assoeiation was published in October 1940 (J. Tenn. Acad. Sci. 15: 406-407). In 1946, Dr. Boyd presented a short history at the annual meeting. Following the 20th anniversary meeting in 1957, he published a factual and interesting history. There is little that I could add of a major nature to the 1957 report concerning the early days of the Association. I shall endeavor to add some sidelights.

Much of this material has been furnished by Dr. Boyd and by Dr. Harry Bennett.

As early as 1932, there was an interest in a general organization that would bring together from time to time the scientists of the South. It seemed that closer contacts within the Southern region would aid materially the progress of the scientific endeavor in the South.

In the effort to do something to overcome the existing isolation, Dr. Boyd wrote letters to a number of persons engaged in scientific activity in this region in an attempt to arouse an interest in the establishment of a Southeastern Section of the American Association for the Advancement of Science. In 1936, the Georgia Academy of Science invited representatives of the neighboring academies to be its guests at its annual meeting in Athens, Georgia, on April 3 and 4, with the purpose of considering such an organization. Enthusiasm was shown at the meeting but there did not appear to be enough general interest to insure the success of a regional organization involving different branches of science. Consequently, it appeared that probably the best approach to this problem would be that of bringing together the biologists of this region at meetings comparable to those already being held by the Southern Society for Philosophy and Psychology, the Southeastern Section of the American Mathematical Association, and the Southern Section of the American Physical Society. The one step necessary, then, for the establishment of a section of the American Association for the Advancement of Science would be that of getting the regional organizations to meet at one place simultaneously and agree to a general over-all organization. These things are mentioned in order to point out the fact that the Southeastern Association of Biologists was organized as an outgrowth of the desire to have a larger science organization in which the various sciences would participate jointly.

Under date of February 20, 1937, Dr. Boyd wrote a letter to all the biologists of Georgia and the bordering states, as far as the names of such persons could be found, inviting them to "a meeting of Southeastern biologists" at the University of Georgia on May 7 and 8 of that year. In this communication, it was stated that the meeting was not being called for the purpose of initiating an organization of biologists; but, if such an organization seemed desirable to the group, opportunity would be afforded for its consideration. A majority of the replies were favorable.

The records indicate that 69 persons attended this meeting and 20 papers, based upon specific research, were read. In addition to these reports on research in progress, a paper on "New Views in Plant Virus Disease Research" was read at the evening session by Dr. L. O. Kunkel of the Rockefeller Institute at Princeton, New Jersey, and a paper was read by Dr. Pearse on Saturday morning on the subject of "The Caves of Yucatan."

At the Saturday morning session, a business meeting of the group was held which resulted in the initiation of an organization to be known as the "Association of Southeastern Biologists." The officers chosen for this organization were G. H. Boyd, president; H. L. Blomquist, vice-president; and J. T. Penney, secretary-treasurer. Members of the official executive committee chosen at that time were Margaret N. Hess, Mary S. MacDougall, E. E. Reinke, and J. S. Rogers.

At the initial business meeting, a committee was appointed to draw up a constitution and report a year later. In the months that followed, such a constitution was drawn up and it was approved at the first annual meeting of the Association. This constitution stated that the organization should be called "The Association of Southeastern Biologists." Why it should not have been called "The Southeastern Association of Biologists" has always been puzzling.

It is interesting to note that the purposes of this Association were stated as follows:

1. To promote scientific research.
2. To provide personal and professional contacts among those engaged in biological work in the Southeast and thus to promote greater unity and cooperation among its members.
3. To promote the development of a sound biological point of view and a realization of the relation of fundamental knowledge in this field to the solution of problems peculiar to the Southeast.
4. To promote study of the biological resources of this region and efforts for their preservation.

After an unsuccessful effort to meet with other regional scientific groups, it was finally decided to hold the first regular meeting at the University of Georgia on April 15-16, 1938. Seventy-six persons attended this meeting and twenty-one research papers were read. The guest speaker on this occasion was Dr. Otis W. Caldwell, General Secretary of the American Association for the Advancement of Science.

The Treasurer's report was as follows:

Collections	None
Expenditures	$5.70

The Treasurer's report was approved, but the minutes do not reveal whose money the Association approved to be spent.

For those of you who are making more money and having less left, the rates for the hotel rooms for the 1937 meeting may be of interest. They were: Single rooms, $1.50-$3.00; double rooms, $2.50-$5.00.

The 1939 meeting was at Duke University. An increase in membership was reported. In his report, the Secretary-Treasurer said, "one or two members have already paid dues for 1940. The Secretary-Treasurer points with pride to this phenomenon, and passes on this news to fellow members of the Association who may have despaired of ever getting close to prosperity again." Note: the dues were $1.00 per year.

During the 1940 meeting at Vanderbilt University in Nashville, Tennessee, the arrangement was made to publish certain material, principally the proceedings and abstracts of the meetings in the Journal of the Tennessee Academy of Science. This arrangement continued in a very satisfactory manner until the Association started its own Bulletin in 1954.

In 1941, the meeting was at the Alabama Polytechnic Institute, known by most football enthusiasts as Auburn. A pertinent discussion arose concerning the meeting place for the following year. One line of discussion emphasized the desirability of meeting in conjunction with such groups as the newly organized Southern Association for the Advancement of Science and the host state academy. The other view was that large meetings result in too much overlapping and a superstructure in the form of a large all-science organization would be a handicap to the ASB. It was decided that just ASB would meet at Miami University the following year.

Subsequent to the meeting in API, a member of the host organization sent the following accounting to the Secretary-Treasurer.

> I sent you a statement regarding the $4.50 deficit incurred by inviting nine guests to the banquet of the Association of Southeastern Biologists. Since then I have received a phone call from the Secretary's office asking that this remittance be made in order to balance the books. I am relaying the information to you. During my correspondence in connection with the meetings, I have written 52 letters requiring three cents postage on each, and I have had to return a pair of shoes to Dr. ——— of Vanderbilt, costing a total of 25 cents express charges. In addition to that, I spent 25 cents for penny postcards which were sent out ot colleges in Mississippi, Louisiana, and Oklahoma requesting bulletins for the Association's use. These last two items I paid out of my own pocket. The postage for the letters I have written amounting to $1.56 was paid by the Department. When these charges are paid, all the details relative to our recent meetings will have been cleared up.

At the University of Miami meeting in 1942, there was 17 inches of rain within 48 hours, per-

haps a portend of dismal news for the next few war years. In spite of this, the meeting was very successful. To cooperate with the botanical interests, it was decided to invite the Southeastern Section of the Botanical Society of America to meet jointly with the Association in Columbia, South Carolina, scheduled for 1943. However, no meeting was to occur for the next four years.

The Secretary-Treasurer, Dr. D. C. Boughton, left to go to Washington, and the speaker was elected to take his place. Due to the war emergency, no meetings were held during the years 1943-1945. The President, Dr. Mary S. MacDougall, and the Secretary endeavored to keep in touch with the membership during this period. The expenses during these years were met by the payment of a single annual membership dues of $1.00 total, perhaps establishing somewhat of a record in modern times of 25 cents per year for dues. During this time, newsletters and announcements were sent out giving the available information on the activities of members, especially those in uniform.

Our members contributed to the war efforts by their services and especially by personal participation. It was disheartening, however, to see some highly trained scientists put into lowly or misfitted positions by the Armed Forces resulting in a tremendous waste of training and intellect. This is a situation from which biologists in general have not been able or perhaps have been unwilling to extricate themselves. It is believed that biologists can better serve humanity by a more realistic appraisal of their relative abilities and worth to their fellow beings and to society.

Annual meetings were resumed in 1946 at the University of South Carolina, Columbia, S. C. A resolution was passed to the effect that each hour of laboratory instruction should have a credit value of 1 hour in determining the teaching load of the instructor. President MacDougall had gathered much information on this point during the war years. Another resolution supported the founding of a National Science Foundation.

The Eighth Annual Meeting was at Emory University, Georgia, in 1947 in association with the Southeastern Section of the Botanical Society and the Southern Appalachian Botanical Club. Ninety-nine new members were elected. The annual awarding of a research prize, underwritten by the Carolina Biological Supply Co., was instituted. It was announced that ASB had become a affiliate of the American Association for the Advancement of Science.

In 1948, a joint meeting with the Southeastern Section of the Botanical Society was held at the University of Florida at Gainesville. In addition to the regular meeting, an interesting field trip was arranged during which the members partook of alligator meat. On the last day, a visit was made to Marineland on the East Coast.

The Tenth Annual Meeting at the University of Tennessee, Knoxville, in 1949 was marked by an attendance of 331, undoubtedly setting a new high.

In 1950, the Eleventh Meeting was held at the University of Virginia in Charlottesville and the award of the Phipps and Bird fellowship for summer research at Mountain Lake, Virginia, was begun. In 1952, the Meritorious Teaching Award supported by the Will Corporation was instituted.

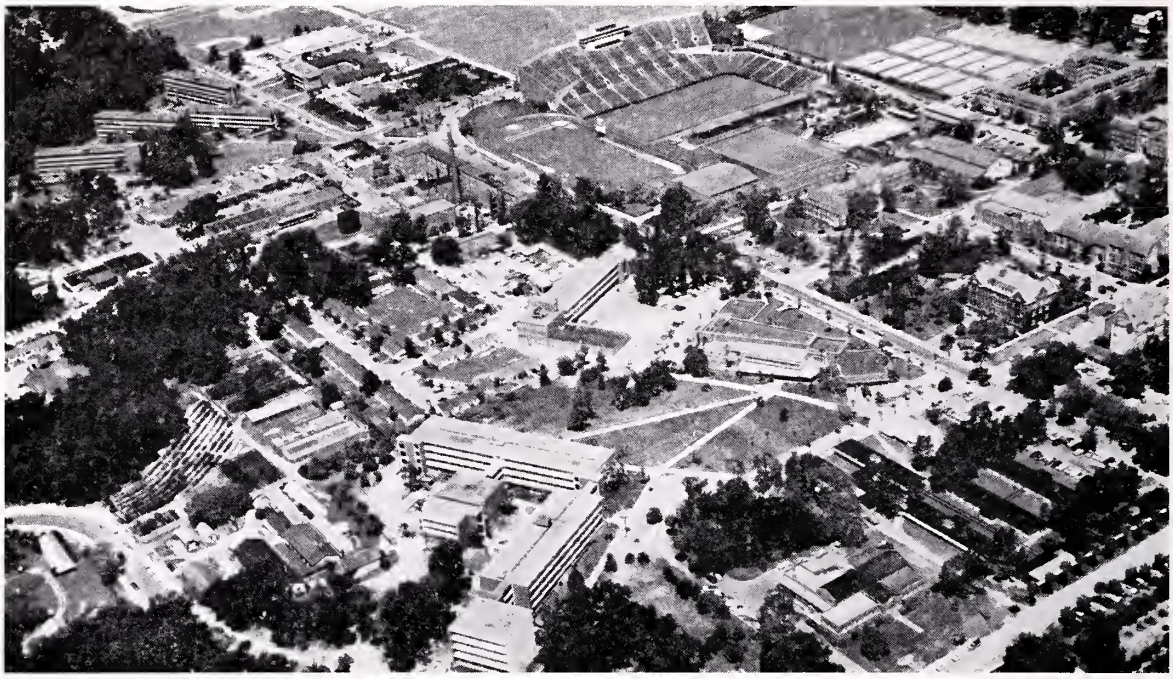
The functions and the pattern of the Association appeared to have been formed by 1950. The annual meetings were informative and had the very friendly atmosphere that has always characterized this organization. Awards of significance had been established. Abstracts and meeting proceedings were published regularly. There had been a steady growth of the membership and the attendance at the meetings was relatively good.

Women biologists have played an important role in this organization since its formative days. Dr. MacDougall of Agnes Scott was one of the original group concerned with the initial organization. She and Dr. Margaret Hess composed 50% of the first executive committee. Dr. MacDougall has been on the executive committee for 3 different terms as well as serving as Vice-President and President. Between the years 1937 and 1951, she held one or other of the above offices for a total of 8 years, which is probably a record for officeholding in this organization. Later, in 1952, she received the Meritorious Teaching Award. Dr. Margaret Hess was a member of the Executive Committee 5 of these 13 years and Vice-President for one, making a total of 6 years of office holding. She was President in 1952-53 and she received the Meritorious Teaching Award later in 1959.

Other women who have held principal offices are: Drs. Gaulden, Bridgemen, Howell, Jones, and Quarterman. In addition, women have served on various important committees and in general have had a prominent voice in the operation of the society.

Various regions, including our own country, have organizations to study the status of women. Perhaps they should take note of the important part women have played in the ASB as a guide and, in our own country, as a shining example of integration.

In the 25th year of its existence, the Association is the lengthened shadow of Dr. Boyd and of those who thought and believed as he did. It obviously is adequately filling a need of biologists in the Southeast and should continue to prosper.



The University of Florida Campus

About The Gainesville Meeting

The Association of Southeastern Biologists will hold its twenty-fourth annual meeting April 18-20, 1963, at the University of Florida, Gainesville, Florida. Meeting with the ASB this year will be five other organizations: the Southern Appalachian Botanical Club, the S.E. Section of Beta Beta Beta, the Southeastern Section of the Botanical Society of America, a regional group of the National Association of Biology Teachers, and the Southeastern Division of the American Society of Ichthyologists and Herpetologists.

The meetings will commence on Thursday afternoon, April 18, with a meeting of the Executive Committee at 1:00 p.m. in Room 208 of the Florida Union on the University campus. Activities of the meeting will take place in the Florida Union unless specified otherwise in the program. Registration will begin at 4:00 p.m. Thursday in Bryan Lounge, the exhibits will be in the adjoining social room and the Thursday evening program, to be announced later, will be held upstairs in the Auditorium.

At the conclusion of the Thursday evening meeting, members and guests are invited to the Smoker to be held in the Bryan Lounge and adjoining Social Room where the exhibits will be on display.

Paper sessions and the annual business meeting will occupy Friday. Friday night's activities include a banquet, the retiring presidential address, and presentation of awards, to be held in the University Cafeteria; further details will be published in the Program of the Annual Meeting. Plans are being made for three field trips, for special rates at some of the Florida tourist attractions, and for activities to include wives and children.

Accommodations

Fifteen air-conditioned rooms are available in the Florida Union to members and guests of the Association. Nine have private baths and six include a lavatory in the room and a connecting toilet and shower. Nine of the rooms have twin beds and six are equipped wtih double beds. Rollaway beds are available for use in ten of the rooms at a slight additional charge. Send requests for reservations to Dr. G. Ray Noggle, Department of Botany, University of Florida, Gainesville. Please indicate whether or not double bed is acceptable. If more than 15 requests for rooms in the Union are received reservations will be made in a nearby motel.

Rates in Florida Union

Room			*Single*	*Double*
401	DB	PB	$6.00	$8.00
402	TB	CB	5.00	8.00
403	DB	CB	5.00	7.00

404	DB	CB	5.00	7.00
405	TB	CB	5.00	8.00
406	DB	CB	5.00	7.00
408	DB	CB	5.00	7.00
409	TB	PB	6.00	9.00
410	TB	PB	6.00	9.00
411	TB	PB	6.00	9.00
412	TB	PB	6.00	9.00
414	TB	PB	6.00	9.00
415	DB	PB	6.00	8.00
416	TB	PB	6.00	9.00
417	TB	PB	6.00	9.00

Please write direct to hotels and motels for reservations. When you write please state that you are coming to the ASB meeting and request the commercial rates.

Hotel

Hotel Thomas 615 N.E. 2nd Street Phone FR 2-9501	One person Two persons	$4.00-7.00 $7.00-12.00

Motels

The following rate schedule has been compiled by the Gainesville Motel Association. The rate structure, as shown below, represents the prices which prevail generally throughout the year. The rates listed do not necessarily apply at times of special events such as football games, etc.

Bambi Motel 2119 S.W. 13th St. Phone FR 6-2622	One person Two persons Two bedroom suite (connecting bath)	$6.50-7.50 $8.50-9.50 $14.00-18.00
Casa Loma Lodge 2120 S.W. 13th St. Phone FR 2-8971	One person Two persons, two beds	$7.00-8.00 $8.00-9.00
Florida Motel 2603 S.W. 13th St. Phone FR 6-3742	One person Two persons, two beds Two persons, one bed	$6.00 $8.00 $7.00
Francisco Motel 2307 S.W. 13th St. Phone FR 2-2045	One person Two persons, one bed Two persons, two beds	$6.00 $7.00 $8.00
Gator Court 4170 S.W. 13th St. Phone FR 6-4667	One person Two persons, one bed Two persons, two beds	$6.00 $7.00 $8.00
Hil-Top Motor Court 3103 N.W. 13th St. Phone FR 2-4319	One person Two persons, one bed Two persons, two beds	$5.00-6.00 $6.00-7.00 $7.00-8.00
Holiday Inn 1900 S.W. 13th St. Phone FR 2-3311	One person Two persons	$8.00-12.50 $9.50-12.50
Howard Johnson Motor Lodge 2820 N.W. 13th St. Phone FR 6-1211	One person Two persons	$8.50-11.00 $10.50-13.50
Manor Motel 2325 N.W. 13th St. Phone FR 6-5212	Single Double, one bed Double, twin beds Extra person, each	$6.00-8.00 $8.00-9.00 $9.00-10.00 $21.00
Richland Heights Motor Court 4155 N.W. 13th St. Phone FR 6-4368	One person Two persons, one bed Two persons, two beds	$5.00-6.00 $7.00 $7.00-8.00
Travelodge Motel 413 W. University Ave. Phone FR 6-1224	One person Two persons, one bed Two persons, two beds	$7.00-9.00 $9.00-11.00 $10.00-12.00
Tom Sawyer Motor Inn 3335 S.W. 13th St. Phone FR 2-1463	Single Double, two beds	$6.50-7.50 $8.50-9.50
University Inn U.S. 441 South 1901 S.W. 13th St. Phone FR 2-6333	One person Two persons	$8.50-10.50 $10.50-12.50
Tabor Motel 4041 S.W. 13th St. Phone FR 6-4423	Single Double	$6.00-7.00 $7.00-8.00

Parking.—Permits to park in restricted areas on campus will not be required; however, *No Parking* signs should be respected. Plenty of parking spaces should be available within one or two blocks of the Florida Union where the meetings will be held.

Regarding Segregation.—Housing in Gainesville is segregated. Howard Johnson's Motor Lodge Restaurant will accommodate Negroes. The facilities of the Florida Union are available to all members and guests of the Association as are any of the cafeterias on campus. Reservations for rooms in the Florida Union should be made as soon as possible as the number is limited (see Accommodations).

Dining.—Gainesville and the campus of the University abound in dining facilities. Members of the Association and their guests will find it convenient to eat on campus. The most convenient place will be the main cafeteria located in the same building complex with the Florida Union. Some of the dormitories also have cafeteries and these will be available.

Field Trips.—Three field trips are planned:

1. Post-meeting trip to Everglades and southern Florida regions for three days, beginning noon, Friday, April 19, and April 20, 21. This trip will not be made unless 30 or more persons apply before March 1 to Dr. John H. Davis, Department of Botany, University of Florida. A deposit of ten dollars ($10.00) is needed to make housing and other arrangements. The full itinerary will be sent to those who apply or inquire.

2. Plant ecology and taxonomy field trip to the Ocala National Forest region Saturday, April 20. Group will leave Flint Hall on campus at 8:00 a.m. with stops at excellent examples of most of central Florida's major terrestrial plant communities. Loblolly bays over twice the size recorded by Charles S. Sargent, the most southern station for eastern white cedar, blue crabs living 100 miles from salt water, etc., will be seen. Group will break up about 3:00 p.m. in the Forest about 70 miles from Gainesville. Private cars will be used. Arrangements for box lunches and

rides (for those without cars) will be made at the Registration desk. Dr. A. M. Laessle and Dr. E. S. Ford in charge.

3. Trip to Sea Horse Key Marine Laboratory. Group will leave Flint Hall on campus at 9:00 a.m., Saturday, April 20. The marine laboratory on Sea Horse Key is on an island two miles off the Gulf coast near Cedar Key. This island, nearly a mile long and 60 feet high is heavily wooded and it is formed from an old sand dune. The distance from Gainesville to Cedar Key is 57 miles. At the Laboratory visitors will have an opportunity to go on a short collecting trip in the laboratory boat. During this trip a small trawl will be used to collect samples of marine life. Birds are abundant in the area and those wishing to do so may take a conducted tour along a trail through the island.

Please bring your car if available. Those without a car may request transportation at the Registration desk. Arrangements can be made at this desk to secure a packaged lunch for the trip. We shall leave Sea Horse Key on the return trip about 3:00 p.m. Persons living north or west of Cedar Key may wish to depart directly from there for their return trip home. Dr. E. Lowe Pierce, in charge.

General Information

1. Registration will begin Thursday, April 18, at 4:00 p.m. and continue through Friday, in Bryan Lounge in the Florida Union.

2. A $1.00 registration fee will be charged.

3. Paper sessions will be scheduled in the Florida Union.

4. Tickets to the banquet Friday evening, April 19, are to be purchased by Friday noon at the Registration desk. The price will be near $3.50.

5. Plane connections with Gainesville are not good. There is only one flight daily into Gainesville (Eastern Air Lines). The nearest big airport is 90 miles away, north of Jacksonville. Bus connections from Jaeksonville are possible. The Atlantic Coast Line Railroad and several bus lines serve Gainesville. The Seaboard Airline Railroad has passenger service to Waldo about 12 miles away. Anyone desiring transportation from the Gainesville Airport, from Waldo, or from the A.C.L. or bus terminals in Gainesville should write to Dr. J. L. Nation, Department of Biology, and give him expected time of arrival.

6. Gainesville is in a "dry" county.

Local Arrangements Committee

Co-chairmen	J. C. Dickinson and H. K. Wallace
Housing	S. R. Noggle
Finance	J. C. Dickinson and H. K. Wallace
Transportation	J. L. Nation
Liaison with Chamber of Commerce	W. J. Riemer
Registration	R. M. DeWitt
Other organizations	E. R. Jones
Food service	J. D. Kilby
Smoker	J. H. Gregg
Exhibits	Y. Sagawa
Field Trips: Sea horse	E. L. Pierce
Botanical	C. D. Monk, E. S. Ford, A. M. Laessle, and J. H. Davis
Tourist attractions	F. J. S. Maturo
Wives' entertainment	Mrs. Dickinson and Mrs. Wallace
Program chairmen	Wallace and Dickinson
Meeting rooms	R. D. Powell
Audio-Visual	T. J. Walker
Parking	R. D. Powell
Publicity	J. C. Dickinson
Signs	A. M. Laessle

Mary Glide Goethe Travel Awards

For the sixth year there will be funds available through the generosity of Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year in Gainesville, Florida. It is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from Gainesville.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1963 meeting of the Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Indicate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.

2. Give information as to whether or not a paper is being presented by the applicant.

3. In a paragraph, give a brief history of your education, of how many years you have been—and plan to be—in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.

4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.

5. Have your major professor or departmental head write a letter supporting your application.

6. Applications and supporting letters, both in triplicate, should be in the hands of *J. C. O'Kelley, Biology Department, P. O. 1927, University, Alabama,* by March 1, 1963. Applicants will be notified of the decision of the Committee during March.

COMMITTEE

Margaret Menzel
E. C. Cocke
J. C. O'Kelley, *Chairman*

Meritorious Award Nominations

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)
1961. Dr. Warren Deacon (Vanderbilt)
1962. Dr. Septima C. Smith (Univ. of Alabama)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting materials to *Dr. William J. Koch, Dept. of Botany, University of North Carolina, Chapel Hill, N. C.,* by April 1, 1963.

COMMITTEE

A. J. Sharp
Harry Wheeler
William J. Koch, *Chairman*

Association Research Prize

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Judges will be eminent biologists outside the Southeast. They will set their own criteria, and may withhold the award if no paper is judged to have sufficient merit.

5. Papers must be submitted *in triplicate* and in their entirety not later than March, 1963, to *Herbert P. Riley, Department of Botany, University of Kentucky, Lexington, Kentucky.* One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Phipps and Bird Research Fellowship

A Research Fellowship of $150.00 for summer research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and especially in the case of younger workers, by references and educational data. Applications should be sent to *Herbert P. Riley, Department of Botany, University of Kentucky, Lexington, Kentucky,* not later than April 1, 1963. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE

Alan Conger
Burton J. Bogitsh
Herbert P. Riley, *Chairman*

IMPORTANT DEADLINES

Please note the following deadlines, all of which are to be met before our Twenty-fourth Annual Meeting at the University of Florida, Gainesville, Fla., 18-20 April 1963. Members can help facilitate plans for the meeting by sending in all requested material as far in advance of the deadlines as possible. Because the time available for preparation of the program and publication of abstracts is already at a minimum it will be necessary for the program committee and the editor to adhere strictly to the deadline set; NO TITLES CAN BE ACCEPTED THEREAFTER.

January 15—Suggestions for nominations for ASB officers and executive committee members.

February 13—Titles and abstracts of papers to be presented at the Gainesville meeting.

March 1—Applications for Goethe Awards to graduate students.

March 1—Papers to be considered for the Association Research Prize.

April 1—Applications for Phipps and Bird Research Fellowship at Mountain Lake.

April 1—Nomination letters for the Meritorious Award for Teaching.

Because of certain restrictions placed on applications and forms mailed at second-class postage rates, those forms usually included in the January ASB Bulletin that pertain to the April meeting were mailed to ASB members early in January. For your convenience, however, the deadlines which must be met before the April meeting are reprinted above.

News of Biology in the Southeast

About People and Places

Bruce MacLean Eberhart, Department of Biology at Princeton University, has accepted the headship of the Biology Department at the Woman's College of the University of North Carolina at Greensboro and will assume his duties there in February, 1963.

Dr. Eberhart did his graduate work with Dr. E. L. Tatum at Stanford University in the Field of Biochemical Genetics.

Helen L. Ward has resigned from the Department of Zoology and Entomology, University of Tennessee, to accept a position with the Division of Technical Information of the Atomic Energy Commission at Oak Ridge. She will continue her research on the Acanthocephala at the University. She is relinquishing the editorship of the *Journal* of the Tennessee Academy of Science after the January issue, and the next Editor will be Dr. James J. Friauf of the Department of Biology, Vanderbilt University.

Margaret Hess, formerly of Winthrop College, is now head of the Department of Biology, Richard Bland College, Petersburg, Virginia.

Noye Johnson and eleven of his senior students from Dartmouth College were guests of the **Virginia Institute of Marine Science** from October 28-30. The group spent Sunday night at the laboratory, toured the laboratories on Monday and on Tuesday went out on the *Pathfinder* for field work in geology. Dr. **Maynard Nichols** of the School of Marine Science acted as host for this group.

The first meeting of the new Board of Administration appointed by Governor Harrison met at the Virginia Institute of Marine Science Wednesday, October 31. Members of the Board now are: **Mr. Frank Miles, Mr. James E. Mays, Dr. Robert W. Ramsey, Mr. Donald A. Holden, Dr. Edgar F. Shannon, Dr. Davis Y. Paschall, Mr. Marvin Minter, Mr. Fred Garrett, Mr. Milton T. Hiekman.**

The Virginia Institute of Marine Science has received a grant from the National Science Foundation for another Research Participation for College Teachers Program during the summer of 1963. Thirty-one requests for information about the program have been received to date.

New members of the staff of the Department of Biology, West Virginia University, include **Dr. W. Newman Bradshaw,** who had his training at the University of Texas in mammalogy and general ecology, and **Dr. Albert G. Canaris,** with his training in parasitology at Oregon State University.

An interesting new phase of biological teaching and research at **West Virginia University** involves cooperation in the staffing of colleges in East Africa already in operation or in the process of development in connection with the Area Development Administration. Staff members and graduate students will be given the opportunity of spending varying amounts of time in Kenya and later. perhaps, in Tanganyika and Uganda. The beginning of this program was made in the fall semester of the 1962-63 term, when Dr. Albert G. Canaris took up his duties as zoologist at Egerton College, Njoro, Kenya.

Old Dominion College, formerly The Norfolk College of William and Mary, has three new teachers. **Mr. Paul J. Homsher,** assistant professor; who came to us from Pennsylvania State. His interests are in general and cytogenetics. **Dr. Edward G. Corbett,** assistant professor; from the University of New Hampshire, whose field is plant breeding. Also, **Mr. John P. McKinlay,** assistant professor; from the University of Wisconsin, whose major interests are neurophysiology and pharmacology.

Daniel E. Sonenshine, Old Dominion College, has a NIH grant and is continuing his work on the taxonomy of larval Argasid ticks. He is also working in cooperation with the Virginia State Department of Health on the ecology of Rocky Mountain Spotted Fever in Virginia.

J. S. Zaneveld recently attended the Gulf-Caribbean Fisheries Institute in Galveston, Texas. He is preparing a manuscript on the distribution, taxonomy and ecology of marine algae of the Atlantic Coast between Cape May and Cape Hatteras.

The staff of the Department of Biology at the **University of Virginia** has been joined by Assistant Professor **J. J. Murray, Jr.** Dr. Murray has received degrees from Davidson College in 1951 and Oxford University in 1962. He taught at Washington and Lee University during the academic years of '56-'57 and '57-'58. His field of interest is ecological genetics, and he has worked primarily with land snails of the genus **Picepaea.** During the last summer, he made extensive collections on the Society Islands in Polynesia, under the auspices of the Royal Society of London.

A gift of $3500 from Smith, Kline and French Laboratories to **Sweet Briar College** has made possible a new autoclave of large size, a Sholander respirometer, a thermostatically controlled sterilizing oven and several recording thermometers, all of which increase efficiency in the laboratory and make possible physiological and ecological work impossible or impractical previous to the arrival of these gifts. Another gift of $4318 from the AEC has made possible several counters, scalers, and associated equipment for the Biology and Chemistry departments, which enable work with isotopes not only for research by faculty and advanced students but introduction to the use of tracers in plant and animal biology in the freshman Biology course.

Edward B. Cutler, who received his master's degree from the University of Michigan in June, has joined the biology staff of Lynchburg College. Mr. Cutler has been selected as a member of the International Indian Ocean Expedition for the summer of 1964, to collect and study the new animal phylum, Pogonophora. Following the Indian Ocean cruise, the expedition will spend two months at a marine laboratory in Madagascar. Mr. Cutler also plans a trip for the summer of 1963 along our northwest Pacific coast to Alaska for collecting Pogonophora.

Paul J. Osborne, Biology Department of Lynchburg College, has resumed teaching duties after a very fruitful sabbatical year spent in the Physiology Department of the University of North Carolina. Currently he is extending his research in cytology and histochemistry to include animal phyla both above and below Platyhelminthes, which he has already investigated. Lynchburg College has been awarded a National Science Foundation grant of $15,000 with which he is to do this work in a period of two years, in collaboration with **Dr. A. T. Miller, Jr.,** and **Dr. Werner Straus,** of the University of North Carolina. Enzyme distribution as related to subcellular particles, especially phagosomes and lyosomes, will be of particular interest.

Dorothy Crandall is on sabbatical leave from Randolph Macon Woman's College. She is working in the Soil Science Department at North Carolina State College in Raleigh. **Mr. William Hooks** has an interim appointment to teach botany in the department. He comes to us from Illinois Northern University.

Jack D. Burke, Biology Department, University of Richmond, received from NIH a continuation of grant for $26,000 to work for the next three years on oxyhemoglobin affinity in the blood of fishes.

William S. Woolcott, Biology Department, University of Richmond, spent six weeks of the summer 1962 at the Highlands Biological Station in Highlands, North Carolina, where he studied the distribution of fishes in the headwater streams of the Savannah and Tennessee Rivers. The work was supported by an NSF grant.

O. E. Frye, Jim Clugston, and **John W. Woods** of the Florida Game and Fresh Water Fish Commission attended the Southeastern Association of Game and Fish Commissioners meeting held at Jackson Hole, Wyoming, on September 10-14, 1962. Jim Clugston presented a paper entitled, "Periodicity of Growth of the Florida Large-mouth Bass, *Micropterus salmoides floridanus* (Le Sueur), and the Northern Large-mouth Bass, *Micropterus salmoides salmoides* (Lacepede), in subtropical Florida."

Melvin T. Huish, Jim Barkuloo, Edward Crittenden, J. B. Copeland, Clayton Phillippy, Bob Klant, and **F. G. Banks** attended the Southern Division of the American Fisheries Society meeting, held in Charleston, South Carolina, on October 15-17, 1962. Papers presented were as follows: "A Comparison of Returns of Jaw Tags and Peterson Tags," by Melvin T. Huish; "A Description and Some Results of a Florida Statewide Fish Tagging Program," by J. B. Copeland; "The Status of *Tilapia nilotica* in Florida," by Edward Crittenden; "Self-Contained Underwater Breathing Apparatus "SCUBA" As an Aid in Fisheries Work," by Jim Barkuloo and Keith Byrd.

Aaron H. O'Bier, Assistant Professor of Biology at Stetson University, spent three months at the University of California, Berkeley, where he began a study of gene linkage in the Basidiomycete, **Schizophyllum commune.** The work was supported by NSF.

Wilson B. Bell, formerly a member of the Biology Department at Virginia Polytechnic Institute and a recent Past-President of the Virginia Academy of Science, on October 1, 1962 became Dean of the College of Agriculture, V.P.I.

The following new staff members joined the Department of Biology at Virginia Tech: **Robert E. Benoit,** assistant professor of bacteriology, B.S., Vermont, 1956, M.S., Rutgers, 1959, Ph.D., Rutgers, 1962; **Rhodes B. Holliman,** assistant professor of zoology, B.S., Howard, 1950, M.S., Miami, 1953, Ph.D., Florida State, 1960; **Duncan T. Patten,** assistant professor of botany, A.B., Amherst, 1956, M.S., Massachusetts, 1959, Ph.D., Duke, 1962; **Richard E. Phillips,** assistant professor of zoology, B.S., Purdue, 1952, M.S., Oregon State, 1954, Ph.D., Cornell, 1959; **David A. West,** assistant professor of zoology, B.A., Cornell, 1955, Ph.D., Cornell, 1959; **Cleo D. Wilder, Jr.,** assistant professor of zoology, A.B., North Carolina, 1948, M.S., Tennessee, 1951, Ph.D., Florida, 1962.

William W. Scott, Associate Professor of Botany at Virginia Tech, was one of eight teachers from various colleges and universities throughout the U.S.A. selected to participate in the NSF sponsored summer research program at the Virginia Institute of Marine Science, Gloucester Point, Virginia. Dr. Scott conducted an investigation dealing with the occurrence and distribution of aquatic fungi in the York River system.

From June 25 to August 4, **Dr. Duke Wilder,** Assistant Professor of Zoology, attended the Institute of Desert Biology at Arizona State University, Tempe, conducted under the sponsorship of the National Science Foundation.

Duncan Patten, Assistant Professor of Botany at Virginia Tech attended the A.I.B.S. meetings in Corvallis, Oregon as a member of the Ecological Society of America. He presented a paper on the results of his recent research entitled "The Vegetation Pattern in Relation to Environments in the Madison Mountains of Montana."

Perry C. Holt, Associate Professor of Zoology in the Department of Biology of VPI, concluded the field work connected with his study of the systematics of the family Branchiobdellidae this summer with a collecting expedition to Mexico. Previous field work from 1958 through 1961 has been done in, or collections received from other collectors from 41 of the states of the Continental United States. The results of the Mexican trip, therefore, complete a fairly thorough survey of North America. This work has been supported since 1957 by the National Science Foundation.

S. E. Neff, Department of Biology, VPI, has returned to Blacksburg after attending the NSF-sponsored Institute of Comparative Anatomy at Harvard University this summer. He also attended the XVth International Congress of Limnology at Madison, Wisconsin, August 19-26, and presented a paper on the use of fly larvae in the biological control of medically important snails. Dr. Neff will conduct a three-year study supported by the National Science Foundation on the immature stages of the Scatomyzinae. This subfamily of flies is poorly known. Contrary to belief, most of the species do not breed in excrement, but they are associated with aquatic and semi-acquatic vegetation. The investigation will be carried out as a part of the Limnology Program at VPI.

William W. Scott, Associate Professor of Botany at Virginia Tech is the recipient of a $13,500 grant from the NSF for the study of "The Degradation of Submerged Organic Debris by Aquatic Fungi." This is the second major research project being conducted by Dr. Scott and his students. He is also directing a project supported by a grant of $15,600 from the NSF for the study of "Aquatic Fungi Associated with Diseased Fish and Fish Eggs."

Perry C. Holt, Associate Professor of Zoology at Virginia Tech has been awarded a renewal grant for a three-year period in the sum of $11,300 from the National Science Foundation. This grant will enable Dr. Holt to continue his research on the "Systematic Studies of the Family Branchiobdellidae."

William H. Adams, Professor of Biology, has been appointed Chairman of the Division of Natural Sciences at Tennessee Wesleyan College.

The **Highlands Biological Station** announces that applications are now being received for grants to conduct research in the area of the Southern Appalachians served by the Station. Attention is called to two programs; (1) participation in the long-term and comprehensive field studies concentrated in the gorges of the southeastern escarpment of the Blue Ridge Mountains now being conducted by the station, and (2) participation in a program outside the gorge areas for significant research projects which require modest sums for support and the station as a base of operations for the field studies and laboratory work involved. Both programs are supported by funds available to the station from the National Science Foundation. For information and blanks write Executive Director, Highlands Biological Station, Highlands, North Carolina.

The ASB BULLETIN

Volume 10, Number 2 April, 1963

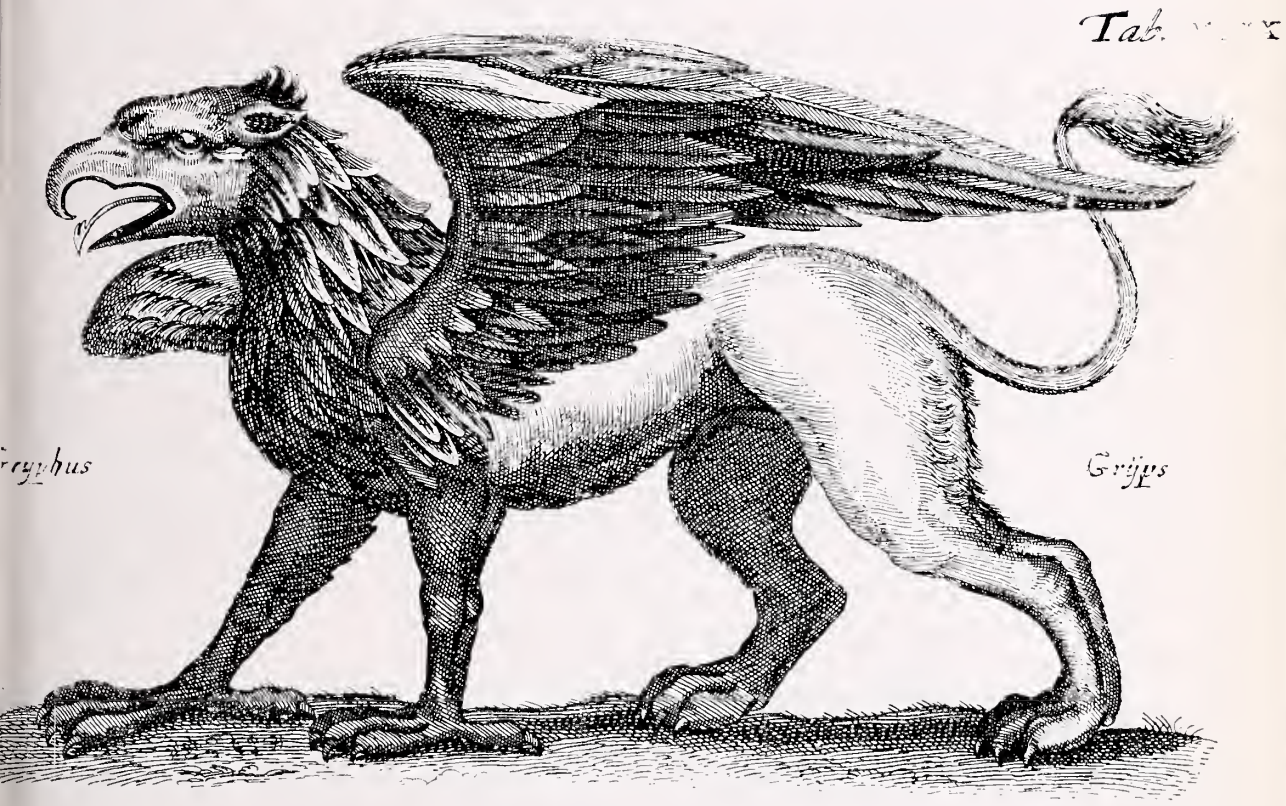


ILLUSTRATION FROM JOANNES JONSTONUS' *Historiae Naturalis de Quadrupedibus*
(See page 44)

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 10, Number 2—April 1963

The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19tb and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from lihraries and other institutions should be sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Suhscription rate for nonmemhers of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

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C Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Leland Shanor, Business Manager

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ASSOCIATION AFFAIRS

Final Report of Retiring Treasurer, 15 April 1962-15 May 1962

SAVINGS ACCOUNT:			
Balance on hand April 1, 1962 ...			$1,143.29
Transferred to checking acct.			250.00
			$ 893.29
Cashiers' check to transfer account to new treasurer			893.29
CHECKING ACCOUNT:			
Balance on hand April 15, 1962 ..		$ 152.70	
Receipts:			
Reprints	$ 8.25		
Dues & subscriptions	338.24		
Goethe Travel Award (1963) ..	75.00		
Wake Forest Convention account balance	1.09		
Will Corp. (1962 Meritorious Award)	100.00		
Transferred from savings account	250.00		
		$ 772.58	
			$ 925.28

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THE NEW TAXONOMY?

A Note on the First International Conference on Taxonomic Biochemistry, Serology, and Physiology Held at Lawrence, Kansas, September 4, 5, 6, 1962

Perry C. Holt
VIRGINIA POLYTECHNIC INSTITUTE

It is twenty years or more now since the "New Systematics" did much to restore the good repute of taxonomists as scientists. The "New Systematics" was, of course, not new, as Ernst Mayr pointed out at the meeting reported on here, but it did result in taxonomists more widely utilizing biological data of all types. The Association of Southeastern Biologists numbers many taxonomists among its ranks, and since few of them attended the meeting on Taxonomic Biochemistry, Serology, and Physiology that was arranged by Charles A. Leone of the University of Kansas and supported by the National Science Foundation, it seems appropriate to call the meeting to the attention of the members of the Association.

There were approximately 250 in attendance. Seventy-two papers were presented. There were representatives from Canada, England, Belgium, Germany, France, Spain, and Ireland. Seven sessions were devoted to "Principles of Systematics," "Perspectives in Molecular Taxonomy," "Comparative Biochemistry," "Comparative Serology" (2), "Comparative Physiology and Biochemistry," and "Comparative Biochemistry of Proteins."

Obviously all of these cannot be reviewed here. A few comments about the sections devoted to the stated aims of the conference--the application of the results of molecular biology to taxonomy--will be followed by some remarks about the most controversial topic discussed—"Numerical Taxonomy"—which in concept has nothing to do with molecular taxonomy.

Alan Boyden's work in systematic serology is too well known to be discussed here, although he presented an interesting review of it, but it should be noted that he was speeially honored by the conference. And many of the better papers were reports of serologieal or immunological work and of work using the techniques of electrophoresis and chromatography. Outstanding among the latter was that of Charles Sibley with birds. But there is little controversy of a fundamental nature here, though it seems to me that these methods are to be used only for carefully selected problems in areas of study well worked by the traditional methods. It is this that gives significance to Sibley's work. The value of a meeting of workers in these fields lies primarily in uncovering and discussing the tricky and difficult problems of technique and interpretation. The basic concepts are well integrated into the "New Systematics," that is, the taxonomy of today.

I am not sure of the distinction between biochemistry and physiology, and neither, from the titles given the various seetions, is Dr. Leone. But to deal with biochemistry first: Marcel Florkin, with an encyclopedic and scholarly grasp of all of biology, alerted biochemists to the meaning that evolution can give their work. Alan Fox warned of the dangers that a neglect of the concepts of parallelism and convergence can produce. Comparative biochemistry, he says, is now at the descriptive level of mid-nineteenth century anatomy. There were examples of comparative studies of biochemical pathways, exemplified by the work of Konrad Bloch of Harvard. But these studies, potentially of great value for systematics, have largely ignored the evolutionary implications.

Comparative physiology (and perhaps I err) seemed to have little to offer and hardly at all to be integrated into the main body of the conference.

Many of the papers were short progress reports, but the interesting ones on the whole were the longer ones of a synthetic nature. If the Sec-

(*Continued on page 21*)

Report on 1963 Meeting of Southern Section of American Society of Plant Physiologists

On February 4 to 6 the Southern Section of the American Society of Plant Physiologists met with the Association of Southern Agricultural Workers at Memphis, Tennessee. All sessions were well attended. The program included 32 contributed papers and a symposium on photomorphogenesis.

The Symposium was chaired by Dr. Warren L. Butler, A.M.S., U.S.D.A., Beltsville, Maryland. The participants in the symposium were Dr. Leonard Price, Smithsonian Institution, Dr. Solon A. Gordon, Argonne National Laboratory, and Dr. Warren L. Butler. The symposium will be published and copies will be available from Scholars Library Publishers.

The annual Plant Physiologists Breakfast was held on the morning of February 6. An award of $25 for the best paper given by a graduate student was made to Mr. Frank E. Bendana, of the University of Florida for his paper with Dr. Robert D. Powell and Dr. Warren S. Silver, "Localization of Exogenous Auxin in Nodules and Roots of Non-legumes." Another award of a copy of the Annual Review of Plant Physiology, Volume 13, was presented to Mr. Lawrence S. Baum of the University of Alabama for his paper with Dr. Joseph C. O'Kelley, "Preliminary Studies on the Replacement of Potassium by Rubidium in Selected Green Algae." The annual breakfast address was given by Dr. Folke Skoog, University of Wisconsin on "Certain Aspects of Kinetin Research."

Officers elected for 1963 were Chairman, Dr. Joseph C. O'Kelley, University of Alabama; Vice-chairman, Dr. Frederick T. Wolf, Vanderbilt University; Secretary-Treasurer, Dr. Joseph Hacskaylo, A.R.S., U.S.D.A., College Station, Texas. Elected for membership on the Executive Committee was Dr. Robert D. Powell, University of Florida, to serve with Dr. Howard E. Joham, Texas A and M College and Dr. Robert Burns, A.R.S., U.S.D.A., Experiment, Georgia. Dr. Wayne C. Hall, Texas A and M College, represents the Southern Section on the National Executive Committee.

The 1964 meeting is scheduled to be held jointly with the Association of Southeastern Biologists; the time and place to be decided.

Who Needs Instruction?

As has been the custom for some years, this year's annual call for papers again clearly spelled out in Item 7 the format that should be used in preparing abstracts for the April *ASB Bulletin*. Yet, 83% of the abstracts submitted were not prepared according to the instructions.

Not all of the improperly prepared abstracts showed a complete disregard for the instructions, but each one that needed attention added to the job of getting the *Bulletin* out on time—and, more important, pointed up the fact that students are not the only ones who find it difficult to follow instructions.

A breakdown of the improperly prepared abstracts follows:

Abstract not double spaced	3
Abstract not on standard sized typewriter paper	2
Title all in capital letters	19
Title with only first word capitalized	13

(*Continued on page 39*)

University of Virginia Announces 1963 Mountain Lake Program

The University of Virginia has announced the program of graduate biology courses to be offered this summer at the Mountain Lake Biological Station on southwestern Virginia. They are as follows:

First Term

Bryology, Dr. Rudolf M. Schuster, University of Massachusetts

Comparative Endocrinology, Dr. B. E. Frye, University of Michigan

Ichthyology, Dr. William S. Woolcott, University of Richmond

Ornithology, Mr. Maurice G. Brooks, West Virginia University

Second Term

Mycology, Dr. Charles E. Miller, University of Maine

(*Continued on page 39*)

Program of the 24th Annual Meeting of the Association of Southeastern Biologists

A Joint Meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Regional Section of the National Association of Biology Teachers, the Southeastern Region of Beta Beta Beta National Honorary Biological Society, and the Southeastern Division of the American Society of Ichthyologists and Herpetologists—held at the University of Florida, Gainesville, April 18-20, 1963.

THURSDAY, APRIL 18

1:00 p.m. **Executive Committee Meeting:** Room 208, Florida Union.
1:00-5:00 p.m. **Opening of Reptile Exhibit:** Florida State Museum, Open House.
4:00-7:45 p.m. **Registration:** Bryan Lounge, Florida Union.
8:00 p.m. **General Session:** Auditorium, Florida Union, Walter Flory, Presiding.
Address of Welcome: Dr. J. Wayne Rietz, President, University of Florida.
Response: Walter S. Flory, Blandy Experimental Farm, President, The Association of Southeastern Biologists.

Invitational Address: *Orientation in Animals,* Dr. E. G. Franz Sauer, University of Florida.

The invitational address will be followed by a smoker, to be held in the Social Room where the exhibits will be on display. Bryan Lounge, across the hall, will also be open. Refreshments will be served.

FRIDAY, APRIL 19

MORNING

8:00 a.m.-11:00 a.m. **Registration:** Bryan Lounge, Florida Union.
8:00 a.m.-12:00 noon. **Open House:** Florida State Museum.
8:00 a.m.-12:00 noon. **Exhibits:** Social Room, Florida Union.
8:30 a.m.-11:30 a.m. **Paper Sessions:**
Systematic Botany—Auditorium, Florida Union.
Plant Ecology—Room 324, Florida Union.
Cytology and Cytogenetics—Room 215, Florida Union.
Invertebrate and Vertebrate Biology—Room 212, Florida Union.
Parasitology—Room 218, Florida Union.
Ichthyology and Herpetology—Johnson Lounge, Florida Union.
11:45 a.m.-12:30 p.m. **Business Meeting:** Association of Southeastern Biologists. Auditorium, Florida Union.
1:30 p.m. **Field Trip to Everglades and other regions in Southern Florida.** Details at registration desk. Dr. John M. Davis in charge.

AFTERNOON

12:00 noon-5:00 p.m. **Open House:** Florida State Museum.
1:00 p.m.-5:00 p.m. **Exhibits:** Social Room, Florida Union.
2:00 p.m.-4:36 p.m. **Paper Sessions:**
Plant Physiology—Auditorium, Florida Union.
Cryptogamic Botany—Room 324, Florida Union.
Animal Ecology—Room 215, Florida Union.
Animal Development and Animal Physiology—Room 212, Florida Union.
Botany and Systematic Botany (cont'd)—Room 218, Florida Union.
Ichthyology and Herpetology—Johnson Lounge, Florida Union.
2:00 p.m.-5:00 p.m. **Registration,** Beta Beta Beta: Bryan Lounge, Florida Union.
4:45 p.m.-5:15 p.m. **Business Meeting:** Southeastern Section of the Botanical Society of America. Florida Union Auditorium.
4:45 p.m.-5:15 p.m. **Informal Meeting:** Southern Appalachian Botanical Club. Room 215, Florida Union.

EVENING

7:00 p.m. **Banquet:** University Cafeteria.
After the Banquet: **Beta Beta Beta Program.** McCarty Auditorium.
ASB Evening Program. Banquet Hall:
REVIEWS OF ECOLOGICAL RESEARCH DEDICATED TO THE MEMORY OF DR. ROYAL E. SHANKS
Introduction, A. J. Sharp, University of Tennessee.
Radiation Ecology and Mineral Cycling, John Witherspoon, Oak Ridge National Laboratory.
Ecological Studies in the Great Smoky Mountains, Dorothy Crandall, Randolph-Macon Women's College.
Ecological Studies in Arctic Alaska, Edward Clebsch, University of Tennessee.

SATURDAY, APRIL 20

8:00 a.m. **Field Trip:** Plant ecology and taxonomy field trip to Ocala National Forest. Drs. A. M. Laessle and E. S. Ford in charge. Details at registration desk.
9:00 a.m. **Field Trip:** To Sea Horse Key Marine Laboratory. Dr. E. L. Pierce in charge. Details at registration desk.
9:00 a.m.-12:00 noon. **Beta Beta Beta General Meeting and Paper Sessions.** Rooms 128 and 133 Dan McCarty Hall.

SCHEDULE OF PAPER SESSIONS

FRIDAY MORNING—APRIL 19, 8:30 A.M.

Systematic Botany

Auditorium—Florida Union

Presiding: R. K. Godfrey

8:30 1. Jones, Samuel B., Jr. (University of Georgia). Studies in the Narrow Leaved *Veronia* (Compositae) of the Southeast.

8:43 2. Fryar, William R. (Florida State University). Evidence on Hybridization of Two Species of *Eupatorium* (Compositae).

8:56 3. Myint, Tin (University of Florida). A Monographic Study of *Stylisma* and a Revision of North American *Bonamia*, North of Mexico.

9:09 4. Sarvella, Patricia and Borislav Stojanovic (Mississippi State University). Amino Acid Analyses in Male-Sterile Cottons.

9:22 5. Pringle, James S. (University of Tennessee). *Gentiana*, Section Pneumonanthae, in the Southeast.

9:35 6. Riley, Herbert P. (University of Kentucky). Some Characteristic Families of Flowering Plants of Southern Africa.

9:48 7. Sharp, Aaron J. (University of Tennessee). Further Observations on Vascular Epiphytes in the Smoky Mountains.

10:01 8. Aiuto, Russell (University of North Carolina). Using Rank-Order Correlation Coefficients in Determining Species Relationships.

10:14 9. Radford, Albert E. (University of North Carolina). A Graduate Program in Plant Taxonomy.

10:27 10. Yates, Harris O. (Vanderbilt University). Taxonomic Status of *Uniola* (Gramineae).

10:40 11. Mulcahy, David L. (Vanderbilt University). Floral Modifications in *Oxalis Priceae*.

10:53 12. Sherman, Harry L. (Vanderbilt University). A Comparison of Southeastern and Western Species of *Schoenolirion* (Liliaceae).

11:06 13. Pinson, Joseph N., Jr. (Vanderbilt University). Morphological and Physiological Differences in Southeastern *Heterotheca* Grown under Uniform Conditions.

11:19 14. Kozuka, Yoshimichi (Vanderbilt University). Preliminary investigation of Floral Color Variation in *Trillium* (Liliaceae).

Plant Ecology

Room 324—Florida Union

Presiding: Margaret Gilbert

8:30 15. Whitford, L. A. and G. J. Schumacher (N. C. State College, and State University of New York). Effect of a Current on Respiration and Mineral Uptake in Species of *Spirogyra* and *Oedogonium*.

8:43 16. McGinnis, John T. (Emory University). Some Environmental Changes in Forest Stands Following Exposures to Radiation.

8:56 17. Faulkner, Bebe Jo (Emory University). Radiation Effects and Population Variability in *Isoetes melanospora*.

9:09 18. Laessle, Albert M. (University of Florida). Spacing in Even Aged Stands of Sand Pine Showing Maximal Competition.

9:22 19. McCormick, J. Frank and Robert B. Platt (Vanderbilt University and Emory University). Ecotypic Differentiation in *Diamorpha eymosa* Nutt.

9:35 20. Woodmansee, Robert A. (University of Southern Mississippi). The Dispersal of the Planktonic Diatom *Rhizosolenia alata* Inferred from Cell-Diameter Frequency Distributions.

9:48 21. DeSelm, H. R. (University of Tennessee). Production in a High Elevation Stand Near Richland Balsam Mountain, North Carolina.

10:01 22. Burbanck, Madeline P. and Robert B. Platt (Emory University). Granite Outcrop Communities of the Piedmont Plateau in Georgia.

10:14 23. Cooper, Arthur W. (North Carolina State College). Establishment of Permanent Plots to Study Effects of Aphid Infestation in Southern Fir Forest.

10:27 24. Cooper, Arthur W. (North Carolina State College). Observations on the Vegetation of the Toxaway River Gorge, Transylvania County, N. C.

10:40 25. Jones, Alice S. (University of Alabama; Livingston State Col.). Correlation of Forest and "Prairie" with Soils in the Black Belt of Sumter County, Alabama, in 1832.

10:53 26. Edmisten, Joe Allen (University of Florida). Ecological Aspects of Florida Pine Flatwoods.

11:06 27. Williams, James E. (Laboratory of Radiation Ecology, Aiken, S. C.). Primary Production on a Moisture Gradient.

11:19 28. Eggler, Willis A. (Newcomb College of Tulane University). Tree Rings as a Means for Dating Volcanic Eruptions.

Cytology and Cytogenetics

Room 215—Florida Union

Presiding: A. W. Ziegler

8:30 29. Hatch, Lindy and Carolyn Wells (Longwood College). A Cytological Study of Tripling Conjugation in *Tetrahymena pyriformis*.

8:43 30. Cardell, Robert R., Jr. (Edsel B. Ford Institute for Medical Research, Henry Ford Hospital). Secretory Cycle of Pituitary Cells.

8:56 31. Hu, Funan and Robert R. Cardell, Jr. (Edsel B. Ford Institute for Medical Research, Henry Ford Hospital). Electron Microscopy of Human Skin.

9:09 32. Sagawa, Yoneo (University of Florida). Cytological Studies of the Genus *Phalaenopsis* (Orchidaceae).

9:22 33. Alvarez, Marvin R. (University of Florida). Studies on the Ontogeny of *Vanda*.

9:35 34. Israel, Herbert W. (University of Florida). Megasporogenesis in *Dendrobium* (Orchidaceae) -- An Electron Microscope Study.

9:48 35. Te-Hsiu, Ma (Emory & Henry College, Emory, Virginia). Chimera in Maize.

10:01 36. Menzel, Margaret Y. (Agricultural Research Service, USDA). Nature of Preferential Pairing in an Intergeneric Allotetraploid.

10:14 37. Wells, Carolyn (Longwood College). An Atypical Conjugation in *Tetrahymena pyriformis*.

10:27 38. Griffin, Dana G., III (University of Tennessee). Oospore Variation in *Chara*.

10:40 39. Herr, J. M., Jr. and M. E. Borom (University of South Carolina). The Use of Centrifugal Force to Rearrange the Nuclei in the Developing Megagametophyte of *Oxalis corniculata* L.

10:53 40. Howe, H. Branch, Jr. (University of Georgia). Nuclear Loss in the Ascospores of *Neurospora tetrasperma*.

11:06 41. Leach, William M. (University of Tennessee). Thymidine "Pool" in Grasshopper Neuroblasts.

11:19 42. Mathen, O. M. and Dr. C. R. Bell (University of North Carolina). Chromosome Number and Behaviour in *Gerardia* and *Aureolaria*.

Invertebrate and Vertebrate Biology

Room 212--Florida Union

Presiding: P. J. Osborne

8:30 43. Damian, Raymond T. and Robert B. Short America.

8:43 44. Cole, Arthur C. (University of Tennessee). A Synopsis of the Harvester Ants of the Genus *Pogonomyrmex* Mary in North

8:56 45. Rinaldi, Robert Arthur (University of Tennessee). Velocity Profiles of Amoeboid Movement.

9:09 46. Hetrick, L. A. (University of Florida). Some Insect Associates of Southern Pine Trees.

9:22 47. Osborne, Paul J. and A. T. Miller, Jr. (Lynchburg College and University of North Carolina). Acid and Alkaline Phosphatase Changes Associated with Feeding, Starvation, and Regeneration in Planarians.

9:35 48. Hassell, M. D. (University of Kentucky). Homing in *Myotis sodalis*.

9:48 49. Davis, Wayne H. (University of Kentucky). Sex Ratios of Hibernating Bats.

10:01 50. Barbour, Roger W. (University of Kentucky). The Behavior of *Plethodon glutinosus* as Influenced by Light.

10:14 51. Jones, Duvall A. (Ferrum Junior College, Ferrum, Va.). Massive Polymorphism, Reflexive Selection, and the Toad, *Bufo typhonius*.

10:27 52. Bush, Francis M. (Howard College). Water, Lean, and Lipid Weights of Five Species of Colubridae.

10:40 53. Funderburg, John B. and Margaret L. Gilbert (Florida Southern College). Observations on a Probable New Race of the Bowfin, *Amia calva*, from Central Florida.

10:53 54. Parsons, Jonathan and Robert R. Cardell, Jr. (Edsel B. Ford Institute for Medical Research). Identification of Statoliths by X-Ray Diffraction.

Parasitology

Room 218--Florida Union

Presiding: B. J. Bogitsh

9:00 55. Miller, Grover C. and Reinard Harkema (North Carolina State College). Parasitic Helminths of Mink.

9:13 56. Bogitsh, Burton J. (Georgia Southern College). Histochemical Observations on *Hymenolepis microstoma*.

9:26 57. Byrd, Elon E. and William P. Maples (University of Georgia). The Egg and Miracidium of *Dasymetra conferta* Nicoll, 1911 (Trematoda: Ochetosomatinae).

9:39 58. Dvorak, J. A. and A. W. Jones (University of Tennessee). The *in Vivo* Incorporation of Tritiated Cytidine and Tritiated Thymidine by the Cestode, *Hymenolepis microstoma*.

9:52 59. Parrish, Fred K., Mary Mead Andrew, and Joanna W. Parrish (Agnes Scott College). The Spontaneous Recovery of the Cricket *Gryllus assimilis* from Gregarine Infections.

10:05 60. Kruse, Dwayne N. (Northwestern State College). Infection of Commercial Shrimps with Spores of the Gregarine *Nematopsis* from Pelecypods.

10:18 61. Jeffery, Geoffrey M. and William E. Collins (DHEW, PHS, NIAID, LPC, Section on Epidemiology, Columbia, S. C.). Fluorescent Antibody Studies in Human Malaria.

Plant Physiology

Auditorium—Florida Union

Presiding: Ray Noggle

2:00 62. McKinsey, Richard D. (University of Virginia). Intra-Cellular Localization of the Pentose Phosphate Cycle in *Ustilago maydis.*

2:13 63. Wheeler, Harry and Homer S. Black (Louisiana State University). Effects of *Helminthosporium victoriae* and Victorin upon Permeability.

2:26 64. Broughton, William S. and K. L. Webb (University of Georgia, Marine Institute, Sapelo Island, Georgia). Investigations on Certain Factors Affecting Growth and Productivity of *Spartina alterniflora* Loisel.

2:39 65. Cabler, John F. (University of Florida). Growth Retarding Chemicals as Substitutes for High Light Intensity.

2:52 66. Barnes, Robert L. (Southeastern Forest Experiment Station, U. S. Forest Service). Nitrogen Metabolism in Relation to Flowering in Pine.

3:05 67. Beatty, Alvin B. (Emory University). The Enhancement of Radiation Recovery Through the Use of Protein Inhibitors and Amino Acids.

3:18 68. Walker, Alma Toevs (University of Georgia). Fluorescing Compounds in Lichens.

3:31 69. Tontz, Joanne C. (Woman's College, University of North Carolina). A Chromatographic Comparison of Luminescing and Non-luminescing Cultures of *Panus stypticus.*

3:44 70. Wolf, Frederick T. (Vanderbilt University). Effects of Light and Darkness on the Biosynthesis of Carotenoid Pigments in Wheat Seedlings.

3:57 71. Henderson, James H. M. (Tuskegee Institute). Characterization of an Unknown Auxin in a Sample of C-14 Labelled IAA.

4:10 72. Plummer, Gayther L. (University of Georgia). Radioactive Fallout and Vegetation in the Georgia Piedmont.

Cryptogamic Botany

Room 324—Florida Union

Presiding: Walter Herndon

2:00 73. McCullough, Herbert A. (Howard College). Foliose and Fruticose Lichens of the Piedmont Upland of Alabama.

2:13 74. Miller, Charles E. (University of Maine). Aquatic Phycomycetes of the Mountain Lake Region.

2:26 75. Rhodes, Russell G. and Walter Herndon (University of Tennessee). Growth and Development of *Gloecodendron* Korsh.

2:39 76. Groover, Robert D. and Temd R. Deason (University of Tennessee and University of Alabama). Growth Studies on *Microthamnion kuetzingianum* Naegeli.

2:52 77. Groover, Robert D. and Walter R. Herndon (University of Tennessee). Zoospores of *Prasinocladus lubricus* Kuckuck.

3:05 78. Hickman, D. W. and W. W. Scott (Virginia Polytechnic Institute). Mineral Requirements of Selected Species of Aquatic Hyphomycetes.

3:18 79. Morrison, Ralph Michael (Woman's College of the University of North Carolina). Factors Affecting the Germination of Conidiospores of *Erysiphe cichoracearum.*

3:31 80. Cocke, Elton C. (Wake Forest College). The Myxophyceae of North Carolina.

3:44 81. O'Kelley, Joseph C. and Temd R. Deason (University of Alabama). Continuous Culture of *Protosiphon botryoides* in Ca- and Sr-media with CO_2-Enriched Atmosphere.

3:57 82. Blackwell, Will H. and Temd R. Deason (University of Alabama). Observations on Alabama Soil Algae.

4:10 83. Ballal, S. K. (University of Tennessee). A Comparative Study of Five Isolates of *Uromyces phaseoli* (Rebent.) Wint. var. *vignae* Arth.

4:23 84. Cowie, Lillian M. (Wesleyan College). Recurring Variations in the Structure of the Thallus of a Lichen of the Genus *Umbilicaria.*

Animal Ecology

Room 215—Florida Union

Presiding: J. M. Carpenter

2:00 85. Eldridge, David W. and John R. Warren (Tennessee Polytechnic Institute). A Comparison of Netted Phytoplankton from Surface Samples in the Littoral and Limnetic Zones of Monterey Lake.

2:13 86. Harvey, Michael J. (University of Kentucky). The Effect of *Sigmodon hispidus* on the Regeneration of Southern Pine Seedlings.

2:26 87. Gresson, Phillip E. (University of Kentucky). Stream Classification and Fish Distribution: Dix River System, Kentucky.

2:39 88. Kuehne, Robert A. (University of Kentucky). Some Limnological Aspects of the Waters in Mammoth Cave, Kentucky.

2:52 89. Hoss, Donald E. (Bureau of Commereial Fisheries, Beaufort, N. C.). Accumulation of Radioactive Gold by Estuarine Animals.

3:05 90. Gray, I. E. and M. J. Cerame-Vivas (Duke University). Circulation in Raleigh Bay, North Carolina, and Its Relation to the Barrier at Cape Hatteras.

3:18 91. Lutz, Paul E. (Woman's College, University of North Carolina). Life Cycle and

Seasonal Differences in Photoperiodic Response by Nymphs of *Tetragoneuria cynosura* (Odonata).

3:31 92. Odum, Eugene P., Timothy Marples, and Shirley Marshall (University of Georgia). Energy Storage in Migrating Birds.

3:44 93. Burbanck, W. D., Robert Grabske, and J. R. Comer (Emory University and University of Kansas). Recovery, After One Year in Natural Habitat, of *Cyathura polita* Labeled with Zn^{65}.

3:57 94. Carpenter, J. M., W. L. Jinks, and B. A. Semp (University of Kentucky). Studies on the Reproductive Potential of *Drosophila affinis* on Various Yeasts.

4:10 95. Pierce, E. Lowe (University of Florida). The Distribution of Lancelets along the East and West Coasts of Florida.

4:23 96. Colley, Frank B. and Richard G. Wiegert (Institute of Radiation Ecology, University of Georgia). Retention of Zinc-65 in Wild Small Mammals.

Animal Development and Animal Physiology

Room 212—Florida Union

Presiding: To be announced

2:00 97. Browder, Leon W. and Willie M. Reams, Jr. (Louisiana State University). A Microchemical Analysis of Mammalian Myogenesis.

2:13 98. Rovee, David T. and Willie M. Reams, Jr. (Louisiana State University). Augmentation of Interfollicular Melanocytes Induced by Trauma in Mouse Skin.

2:26 99. Hollyfield, Joe G. and Willie M. Reams, Jr. (Louisiana State University). Influence of Mysial Architecture on Pigment Cell Morphogenesis in the Mouse.

2:39 100. Reams, Willie M., Jr. (Louisiana State University). Pigment Cell Branching as Triggered by the Tissue Milieu.

2:52 100. Fraser, Ronald C. (University of Tennessee). Acid and Alkaline Denaturation of Chick Embryo Hemoglobins as Determined by Changes in Spectral Characteristics in the Soret Region.

3:05 102. Cowden, Ronald R. (University of Florida). Some Comparative Cytochemical Studies on Blood Cells of Lower Vertebrates.

3:18 103. Dent, James Norman and J. F. Fitzpatrick, Jr. (University of Virginia). Wound Healing in the Crawfish.

3:31 104. Garth, R. E. and R. L. Culpepper (Northwestern State College of Louisiana). Preliminary Study of a Light-induced Hypothalamus Secretion.

3:44 105. Bernard, George R. and Gail G. Wynn (Medical College of Georgia). Phosphatase Activity of the Secretory Cells of Some Vertebrate "Salt Glands."

3:57 106. Roeder, Martin and Rachel H. Roeder (Woman's College of University of North Carolina). The Respiration of Small Whole Fishes.

4:10 107. Thomson, J. Richard, Jack H. Moore, and Frank M. Schabel, Jr. (Southern Research Institute, Birmingham, Ala.). Combination Chemotherapy of Experimental Mouse Leukemia.

Systematic Botany

Room 218—Florida Union

Presiding: Dan Ward

2:00 108. Oosting, H. J. and P. J. Kramer (Duke University). A Phytotron for the Southeast.

2:13 109. Reinert, Grady W. and R. K. Godfrey (Florida State University). Vegetative Characteristics of *Utricularia foliosa* (Lentibulariaceae).

2:26 110. Godfrey, R. K. and Preston Adams (Florida State University and DePauw University). The Identity of *Sagittaria isoetiformis* (Alismataceae).

2:39 111. Hardin, James W. and Clifford R. Parks North Carolina State College). The Eastern Yellow Erythroniums.

2:52 112. Humm, Harold J. (Duke University). The Marine Algae of Virginia.

(*Continued from page 15*—Taxonomy)

ond International Conference on Taxonomie Biochemistry, Serology, and Physiology is held, I would suggest: (1) that it be called Molecular Taxonomy, (2) that the number of papers be reduced and the time for each increased, (3) that these papers be primarily review papers by senior workers in the field, (4) that if there is, and there is, a need for discussion of numerical taxonomy and other questions of a controversial and theoretical nature, a separate symposium should deal with them, and (5) that wider publicity and an increased attendance should be sought. The proceedings of the conference are to be published, and I recommend them to all taxonomists. In the meantime, Bulletin No. 28, November, 1962, of the Serological Museum, Rutgers University, has evaluations of the conference by several of the participants.

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The first background session was entitled "Principles of Systematics." Arthur Cronquist, speaking on "Systematics: the Classical Foundation," and Ernst Mayr, on "The New Systematics," presented scholarly reviews of the nature of systematics that were to serve, and did quite well, as the theoretical background into which

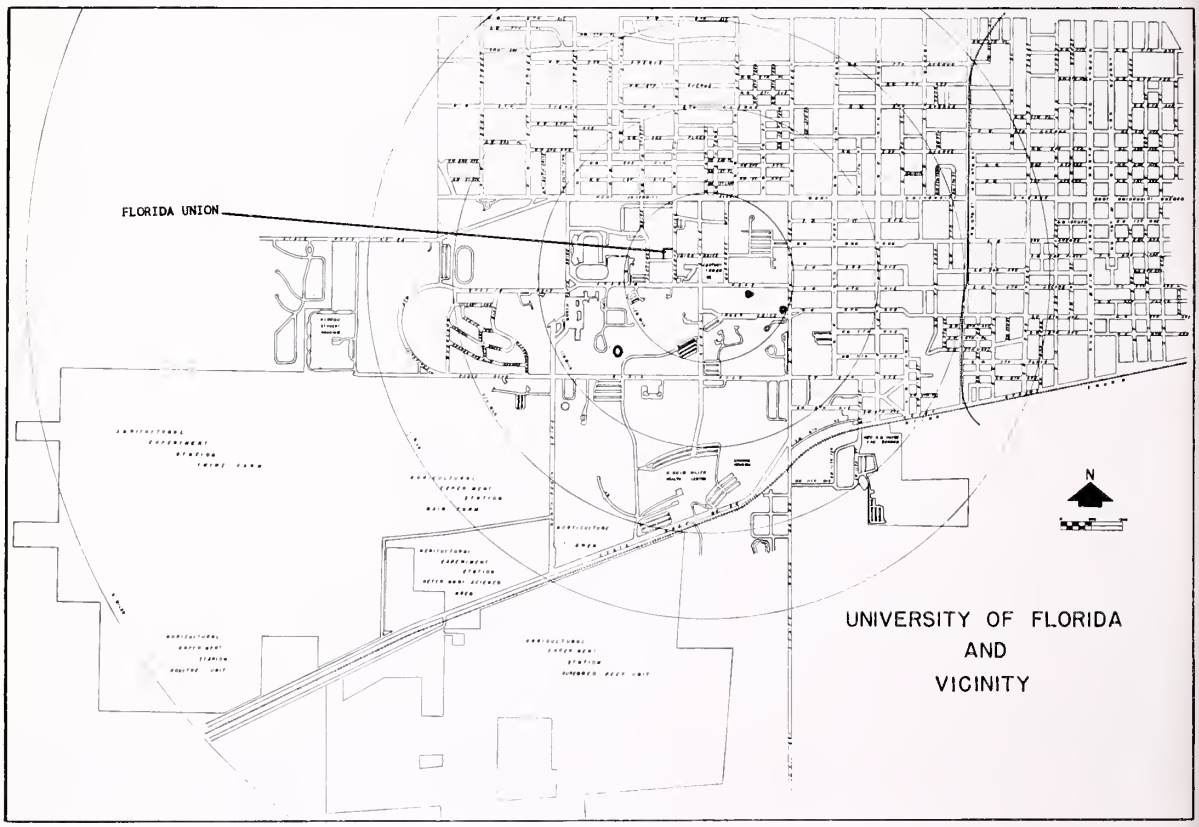
the results of investigations in molecular biology might be integrated.

But, the conference was rather abruptly jostled from its clear course by Robert Sokal's paper entitled "The Future Systematics." As is well known, Sokal proposes that taxonomy, defined as the description, classification, and naming of organized nature, be divorced from systematics which is an attempt to seek causal and historical explanations. Having, thereby, removed taxonomy from the realm of science which can be neither more *nor less* than a search for explanations, Sokal seeks to make taxonomy as an art, i.e., a praetice, scientific by requiring exactness. No one quarrels with the use of quantitative data when it can be obtained, with the use of mathematics, of technical advances such as electronic computers: the quarrel is with an approach to taxonomy that deprives it of much interest or meaning. Taxonomy, however, is scientific precisely to the extent that it operates in the theoretical framework of the science of systematics. To regard, as Sokal seems to do, taxonomy as a science when removed from this framework of theory and to consider many of the concepts of systematics, e.g., homology, as myths, is to accept a Philistine definition of science.

The use of numerieal (quantitative) data is desirable where possible. Advances in mathematical sophistication and technical contraptions (computers) are great boons to all scientists. To be bedazzled by these technical advances into reviving the medieval rationalist dream of absolute truth (exactness, "empirical taxonomy") is to ignore the most significant intellectual results of the twentieth century, namely, the insights into the nature of mathematics and scientific statements deriving from the work of Russell and Gödel. Exaetness is a prized part of the methodology of science: it is redundant to say that it is of value only as it strengthens our conceptual schemes.

Taxonomy and systematics will grow and change. The emphasis upon higher categories that is developing is an example. I don't, however, foresee a "New Taxonomy" that is different either in objectives or basic methodology from the old.

The writer's travel expenses were supplied by NSF grant G-9828.



Abstracts of Papers Presented at the 24th Annual Meeting of the Association of Southeastern Biologists

Using Rank-Order Correlation Coefficients in Determining Species Relationships

Russell Aiuto, *University of North Carolina*

A statistical technique employed by behavioral seientists is the "Rank-Order Correlation Coefficient." Its usefulness as a taxonomie tool has been tested in the analysis of closely related taxa of the genus *Phlox*, and found to give implications of genetic similarities and differences. Although a great number of measurements of a large sampling of plants were involved in this study, this measure of the degree of association between two variables is independent of sample size, and its own size is dependent solely on the extent to which two sets of measurements are related. The technique requires the organization of data into comparative columns of rank, the differences then squared, totaled, and used in the formula

$$r_r = \frac{6\Sigma d^2}{n(n^2-1)}$$

It is suggested that this technique might prove equally effective with other plant groups.

Studies on the Ontogeny of *Vanda*

Marvin R. Alvarez, *University of Florida*

Studies of the embryology and early development of plants are a valuable tool for furnishing an insight of the processes which control the growth and ultimate morphology of higher plants. The Orchidaceae are particularly suited for investigations of this type because of the relative lack of differentiation in the embryo and the absence of endosperm from the seed. A detailed description of the normal sequence of development of *Vanda* was given and abnormal modes were discussed. The role of prominent intracellular lipid inclusions was speculated upon. In addition a study of the effect of light intensity on the morphogenesis of the embryo was made.

As a result of this investigation is was concluded that the embryo differentiates early in its development into a parenchymatous, meristematic, and suspensor region. The suspensor was found to degenerate early in the sequence and the parenchymatous region serves as nutritive tissue for the meristem which differentiates leaves and stems. In addition is was concluded that the inhibitory effects of light intensity on the *Vanda* embryo are directly proportional to its intensity; optimum growth and differentiation being obtained in total darkness.

A Comparative Study of Five Isolates of *Uromyces phaseoli* (Rebent.) Wint. var. *vignae* Arth.

S. K. Ballal, *University of Tennessee*

The results of a preliminary investigation on *Uromyces phaseoli* var. *vignae*, the fungus causing the rust disease of *Vigna sinensis* Endl. are reported. The urediospores remained viable for forty days at 5°C. and at a relative humidity of approximately 50-60%. The urediospores of five isolates consistently differed in size, shape, color, thickness of epispore and echinulations. The reactions of five isolates towards four ions showed that the toxicity fell in the following order Hg > Cu > Ni > Pb. The LD50 value of each ion varied slightly for the five isolates. Nickel acted as a stimulant for the germination of urediospores at extremely low concentrations and was phytotoxic at 100 ppm. The five isolates varied in their pathogenicity towards the four varieties of *Vigna sinensis* tested.

The Behavior of *Plethodon glutinosus* as Influenced by Light

Roger W. Barbour, *University of Kentucky*

Under conditions of 12 hours constant artificial light and 12 hours constant dark, captive *P. glutinosus* exhibited a marked daily activity rhythm. In constant darkness, the peaks of activity were suppressed, but the rhythm was still well marked. In constant light, more marked suppression of the peaks was noted. After the above sequence of light and dark periods, lights were again placed on a 12 hour on, 12 hour off cycle, but with the periods reversed in relation to the normal day. Under these conditions, the animals were most active during the lightless period, which was 12 hours out of phase with their earlier activity period.

Nitrogen Metabolism in Relation to Flowering in Pine

Robert L. Barnes, *U. S. Forest Service*

Nitrogen composition, metabolism, and translocation have been studied in relation to flowering and fruiting in loblolly pine (*Pinus taeda* L.). Arginine is the main free amino acid found in the reproductive structures and young twigs. Arginine synthesis apparently takes place mainly *via* the Krebs-Henseleit urea cycle. Pathways of arginine degradation are not clear; no arginase activity has been found, and utilization *via* γ-guanidinobutyric acid may be an important pathway. Nitrogen translocation in the xylem takes place mainly in the form of amino acids, with glutamine predominating. Glutamine synthesis in sterile roots and seedlings is increased by adding ammonium or urea to the medium. Growing seedlings in sand culture with either ammonium or urea nitrogen increased the free amino acid content in comparison with nitrate-grown seedlings. Arginine level was affected greatly by nitrogen source; ammonium seedlings contained about 20 times more free arginine than nitrate-grown seedlings.

The Enhancement of Radiation Recovery Through the Use of Protein Inhibitors and Amino Acids

Alvin V. Beatty, *Emory University*

Tradescantia inflorescences which were preirradiatively treated for 1½ hours in protein inhibitors dihydrostreptomycin, puromycin or chloramphenicol and irradiated in helium gave lower chromosomal aberration yields than did the chemically untreated controls indicating that, in these experiments, protein synthesis was not necessary for chromosome rejoining and that material treated with these antibiotics showed more recovery from radiation damage than the controls. The recovery is thought to be due to the presence of additional ATP brought about by the inhibition of protein synthesis and through the addition of amino acids in the pool. The amino acids could provide additional ATP through inhibitory feed-

back mechanisms and the catabolism of amino acids. The exogenous use of citrulline, histidine, proline, glycine, phenylalanine, cysteine, isoleucine, alanine, threonine and serine reduced the aberration yield to a value approximating that obtained with the antibiotics.

Phosphatase Activity of the Secretory Cells of Some Vertebrate "Salt Glands"

George R. Bernard and Gail G. Wynn,
Medical College of Georgia

The rectal glands of 2 stingray species (*Dasyatis sabina, D. say*) and 4 shark species (*Negaprion brevirostris, Carcharinus acronotus, C. limbatus,* and *C. maculipinnis*), and the orbital glands of 3 turtle species (*Caretta caretta, Lepidochelys kempi, Malachlemys terrapine*), 2 gull species (*Larus atricilla, L. delawarensis*) and 3 tern species (*Thalasseus maximus maximus, T. sandvicensis acuflavida,* and *Gelochelidon nilotina aranea*) were studied. Azo dye and cobalt sulfide deposition techniques were used to demonstrate alkaline phosphatase activity (ALP) histochemically in the secretory cells; lead sulfide deposition, for acid phosphatase activity (ACP). ALP is most marked in *Caretta* and *L. kempi* orbital glands. ALP is confined to the connective tissues of the glands of captive terrapins. The elasmobranchs and birds show no ALP. ACP could not be demonstrated in the turtle, bird, or shark salt-secretory cells. *D. say* did show ACP. The significance of the findings will be discussed.

Observations on Alabama Soil Algae

Will H. Blackwell and Temd R. Deason,
University of Alabama

In the course of an investigation of the distribution and ecology of the soil algae of Alabama, it became necessary to describe organisms previously unknown. These organisms were isolated into uni-algal cultures by means of the standard bacteriological techniques. They have been maintained for study on modified Bristol's agar slants under constant conditions of temperature and light. The life cycles and morphology of these organisms, including new species of *Spongiococcum* and *Chlamydomonas*, are described.

Histochemical Observations on *Hymenolepis microstoma* *

Burton J. Bogitsh, *Georgia Southern College*

Adult forms of *Hymenolepis microstoma* were recovered from the bile ducts of laboratory infected mice and fixed by the freeze-drying technique. The cuticle of the parasite was found to possess both types of phosphatases (pH 5.0 and pH 9.0), mucoprotein and small quantities of acid mucopolysaccharides. The major polysaccharide of the parenchyma was found to be glycogen. Preliminary observations on the formation of the egg-shell tend to support the premise that the vitelline cells supply the protein necessary for the elaboration of the structure.

* Supported, in part, by a research grant (E-2738 C-3) from the National Institutes of Health, Department of Health, Education and Welfare.

Investigations on Certain Factors Affecting Growth and Productivity of *Spartina alterniflora* Loisel

William S. Broughton and K. L. Webb, *University of Georgia Marine Institute, Sapelo Island, Georgia*

Considerable morphological variation is exhibited by *Spartina alterniflora* Loisel growing on the salt marshes of coastal Georgia. These differences are best exemplified by the height of the flowering culms which vary from about 3.0 meters along the marsh stream edges, to 0.3 meters in the depressions behind the streamside levees landward. Studies have revealed that genetical differences are probably correlated with form variation, but that environmental conditions often result in similar natural variations. Of a number of environmental factors examined, it appears that degree of tidal submergence and the availability of certain nutrients are the most important in affecting the vigor and form of these plants in nature. These findings are taken into account in investigations of carbon dioxide fixation and net production.

A Microchemical Analysis of Mammalian Myogenesis *

Leon W. Browder and Willie M. Reams, Jr.,
Louisiana State University

An analysis of myogenesis is in progress utilizing the techniques of chemical microscopy. The development of muscles is being characterized by studies of muscle protein extraction at various stages in development. The determination of refractive indices, optical sign, optic axial angle, dispersion, fusion properties, etc., are being used to distinguish differentiation of the tissue. Correlations between the chemical microscopic characterization of differentiation and histogenesis indicate ehanges of the tissue substrate properties which influence invasion of muscle by migratory eells.

* Supported in part by Grant #502-62 of Cancer Association Research, New Orleans.

Granite Outcrop Communities of the Piedmont Plateau in Georgia

Madeline P. Burbanck and Robert B. Platt,
Emory University

During one calendar year, the vegetation of 40 island communities (depressions containing soil and surrounded by naturally exposed rock) located on three outcroppings of granitie gneiss near Lithonia, Georgia, were studied intensively to obtain data on seasonal aspect and relative abundance of species, types of communities present, and the role of succession in their floral composition. Four types of communities were recognized based on characteristic flora correlated with maximum soil depth: Diamorpha communities, 2-6 cm.; Lichen-annual herb communities, 7-15 cm.; Annual-perennial herb communities, 14-36 cm.; Herb-shrub communities, 40-50 cm. These types of communities are suggestive of successional stages from a primary bare area to a sub-climax; the climatic forest climax is not reached because of adverse edaphic conditions. Although 76 species of plants, including lichens and mosses, were recorded, only 39 occurred in five or more communities and were considered typical of island communities. There are two main growing and flowering seasons, early spring and late summer.

Recovery, After One Year in Natural Habitat, of *Cyathura polita* Labeled with Zn^{65} *

W. D. Burbanck, *Emory University*
Robert Grabske, *University of Kansas*
J. R. Comer, *University of Kansas School of Medicine*

During July, 1961, 300 cyathurans were collected from a tidal marsh at Pocasset River, Massachusetts, exposed for one hour in groups of 100 to the radioisotope Zn^{65} (as the chloride) in the Radiation Laboratory of the Marine Biological Laboratory, Woods Hole, and then returned to the Pocasset marsh. Approximately one year

later cyathurans recovered from the deposition site were measurably radioactive. Determination of the radioactivity of cyathurans collected at varying distances from the original deposition site showed that there had been relatively little population movement, and those animals that did migrate did not go farther than about 110 cm. The successful labeling of *Cyathura polita* and the recovery of labeled animals from the field will make possible more precise population studies of this estuarine isopod.

* Supported by National Science Foundation Grant G-21145.

Water, Lean, and Lipid Weights of Five Species of Colubridae

Francis M. Bush, *Howard College*

Studies on the body composition of Reptilia have included chiefly *Chelonia, Sauria,* and *Crocodilia.* Accordingly, any comparable quantitative data on the Serpentes are worthwhile.

The following results were obtained and expressed as g./100 g. body weight. Three specimens of *Storeria d. wrightorum* (Apr.) showed: total water, 64.0, total lean, 24.6, total lipid, 11.4; liver water, 3.4, liver lean, 1.0, liver lipid, 0.2; 62.1, 30.7, 7.2; 3.1, 1.4, 0.2; and 68.6, 28.9, 2.5; 3.7, 1.3, 0.8. Three specimens of *Carphophis a. amoenus* (Sept.), 73.8, 22.2, 4.0; 69.7, 27.0, 3.3; and 69.9, 28.5, 1.6. Two *Diadophis p. punctatus* (Oct.), 72.5, 22.4, 5.1; 1.5, 1.0, 0.1; and 70.0, 26.6, 3.4; 3.2, 1.2, 0.1. One *Diadophis p. punctatus* (Nov.), 72.8, 24.6, 2.6; 1.8, 0.6, 0.3. One *Natrix s. pleuralis* (Nov.), 76.0, 21.8, 2.2; 1.8, 0.6, 0.3; and one *Elaphe o. spiloides* (Nov.), 76.3 21.7, 2.0; 2.1, 0.4, 0.1.

When values are compared for all species, apparently some water is stored in the autumn. Proportionally these species contained about the same quantity of lipid in the liver as other Reptilia. Storage of lipid may be associated with the type of diet and the ability of snakes to catch prey.

The Egg and Miracidium of *Dasymetra conferta* Nicoll, 1911 (Trematoda: Ochetosomatinae)

Elon E. Byrd and William P. Maples, *University of Georgia*

The egg of *Dasymetra conferta* is fully mature when oviposited naturally and hatches only after it is ingested by the snail host, *Physa* spp. Hatching appears to be in response to some stimulus supplied by the living snail and this stimulus acts in an undetermined way to cause the larva to exercise a characteristic series of body movements as it liberates a granular substance from the larger pair of its cephalic glands. This substance reacts with the vitelline fluid in such a way as to create pressure within the egg capsule, and with the cement of the operculum in allowing that part of the capsule to be lifted away. The internal pressure aids the squirming larva to escape the shell.

The hatched larva consists of a membranous body wall which supports six epidermal plates, organized into two tiers of three plates each, an apical papilla, two penetration glands and a central matrix, the presumptive brood mass. The larva lives for about half an hour and during this time it completely reorganizes itself through a condensation of the central matrix into a syncytium, in which are six nuclei and two cells, and a miracidial case. The miracidial case ultimately ruptures to liberate the brood mass, which penetrates into the snail host.

Growth Retarding Chemicals as Substitutes for High Light Intensity

John F. Cabler, *University of Florida*

The morphological effects of the growth retarding chemicals CCC (2-chloroethyltrimethylammonium chloride) and phosfon (2,4-dichlorobenzyltributylphosphonium chloride) are known to be similar to those caused by high light intensity. Previous work by this laboratory indicated that CCC and phosfon were successful in retarding growth of *Cynodon dactylon* "tifgreen" (tifton-328 bermudagrass). An experiment was set up to determine if these chemical compounds could, when applied to this economically important turfgrass, increase the shade tolerance of this plant. The experiment showed that these compounds are successful in substituting for high light intensities. It also showed that the effects of CCC and phosfon may differ. While CCC acts as a retardant of the bermudagrass in full sunlight, it may actually promote growth under lower light intensities. The etiolation phenomenon characteristic of low light intensities was absent on grass treated with CCC and phosfon.

A technique to establish the mode of action of growth retardants is being investigated.

The Secretory Cycle of Pituitary Cells

Robert R. Cardell, Jr., *Department of Physics, Edsel B. Ford Institute for Medical Research, Detroit 2, Michigan*

The pituitary secretory cells may be differentiated on the basis of staining properties, characteristic of the secretory granules, and location within the gland. There is considerable variation in the ultrastructure of different cells of the same cell type. It is proposed that this variation in structure is due to the cell being at a different phase of the secretory cycle. The most abundant cell of any cell type is characterized by the cytoplasm being almost filled with secretory granules. This cell has little endoplasmic reticulum and few mitochondria scattered throughout the cytoplasm. The Golgi complex is not well developed. It is proposed that this is the storage stage of the secretory cycle. A cell in the active stage of secretion is characterized by the presence of fewer secretory granules, development of the granular endoplasmic reticulum, extensive development of the Golgi complex, and increase in the size and number of mitochondria. Intermediate stages between these two cells are presented.

Studies on the Reproductive Potential of *Drosophila affinis* on Various Yeasts

J. M. Carpenter, W. L. Jinks and B. A. Semp, *University of Kentucky*

In natural populations of *Drosophila affinis* the yeasts *Pichia fermentans* and *Kloeckera apiculata* are commonly found upon dissection of the crop of this insect species. In the laboratory, a series of experiments was performed to determine a figure for the reproductive potential of *affinis* using these two yeast species as nutritional sources. Preliminary results indicate only minor differences in the figure for reproductive potential using the yeasts indicated.

The Myxophyceae of North Carolina

Elton C. Cocke, *Wake Forest College*

The algal flora of North Carolina is abundant and diverse. This is to be expected since the climate ranges from almost tropical on Smith Island to much cooler con-

ditions in the high mountains. A wide variety of algal habitats is also found in North Carolina. During the past twenty-five years I have collected and identified about three hundred species of blue-green algae from the state; these plus those reported by other workers brings the total recorded number of species of Myxophyceae to approximately three hundred fifty. These species will be described and illustrated in a book which I hope will be published within one year. Several rarer and less known forms of blue-greens are described in this report.

A Synopsis of the Harvester Ants of the Genus *Pogonomyrmex* Mayr in North America

Arthur C. Cole, *University of Tennessee*

The genus *Pogonomyrmex* Mayr in North America is divisible into two subgenera, *Pogonomyrmex* Mayr and *Ephebomyrmex* Wheeler. The subgenus *Pogonomyrmex* comprises the *barbatus, occidentalis, maricopa,* and *badius* complexes. Only a single species, *badius* (Latreille), which is unique in having polymorphic workers, ranges east of Louisiana. There is no evidence of subspeciation in the genus, but some of the species hybridize introgressively with variable degrees of gene flow.

Establishment of Permanent Plots to Study Effects of Aphid Infestation in Southern Fir Forest

Arthur W. Cooper, *North Carolina State*

During 1957 the balsam woolly aphid (*Chermes piceae* Ratz.) was discovered on Mt. Mitchell, North Carolina. Since this time large numbers of fraser firs (*Abies fraseri* (Pursh) Poir.) have been killed and in some areas on Mt. Mitchell 100% mortality has occurred. In view of this potential catastrophe, it seemed desirable to take steps to study the effects of the aphid infestation on fir forests. Therefore, permanent sample plots have been established in several undisturbed fir forest types on Mt. Mitchell. These plots have been surveyed once and these data will be used as a standard by means of which any changes in vegetation due to insect infestation can be determined.

Observations on the Vegetation of the Toxaway River Gorge, Transylvania County, N. C.

Arthur W. Cooper, *North Carolina State*

A general study of the vegetation of the Toxaway River Gorge, Transylvania County, N. C., was made during portions of the summers of 1960 and 1961. Emphasis was placed on floristics and on major vegetation types occurring within the gorges and on the surrounding uplands. Five major vegetation types were recognized. A shrub zone occurred along river and stream banks throughout. Virginia pine stands occurred on gravelly disturbed sites along the river bottom. A mixed mesophytic forest, with three phases, occurred on river slopes, in coves, and on gentle slopes up to about 2100 feet along the river. Oak forests of varying composition covered the uplands and river slopes over 2100 feet. Pine dominated the leads and ridges of the uplands over the gorge. A close parallel seemed to exist between the vegetation types of the Toxaway Gorge and those of low elevations in the Great Smoky Mountains.

Some Cytochemical Observations on the Blood Cells of Lower Vertebrates

Ronald R. Cowden, *University of Florida*

During the past year some preliminary investigations have been undertaken on the cytochemistry of blood cells, their precursors and hemopoietic organs in some of the lower vertebrates. The basophils of Amphibia were of special interest. While blood basophils and peritoneal mast cells were encountered in the newt, an extensive examination of *Amphiuma* failed to disclose any tissue mast cells or peritoneal mast cells. The *Amphiuma* basophils were of a varying diameter and contained round nuclei of varying diameters. The granules exhibited positive metachromatic reactions with toluidin blue, were stained with the copper pthalocyanin dye Astrablau at pH 0.3, were periodic acid-Schiff positive, and were negligibly stained by the paraldehyde-fuchsin reaction. Blood basophils in the newt were apparently identical to those in the *Amphiuma*. The peritoneal mast cells of the newt, however, formed two distinct classes: those which were apparently identical with the blood basophils and those which contained irregular metachromatic inclusion granules of considerably larger size than those encountered in the blood basophils. Transitional stages between the usual basophil granules and the large granules were observed.

Recurring Variations in the Structure of the Thallus of a Lichen of the Genus *Umbilicaria*

Lillian M. Cowie, *Department of Biology, Wesleyan College, Macon, Georgia*

An apparatus is described by which can be identified variations in the structure of the foliose lichen thallus. The principle consists of determining the density of the thallus to a beam of light. Data are presented on the variations so detected. These data display a periodicity, certain implications of which will be discussed.

Development of the Infusoriform Stage of *Dicyema aegira*

Raymond T. Damian and Robert B. Short, *Florida State University*

The infusoriform is morphologically the most complex of the known stages in the life cycle of the dicyemid Mesozoa. Knowledge of the embryogeny of this stage could give a clue to the phylogenetic position of the phylum Mesozoa. The development and cell lineage of the infusoriform of *Dicyema aegira* McConnaughey and Kritzler, 1952 was elucidated from fixed and stained material, and will be presented. In the first five cleavages, the spindles tend to be oblique and, after seven cleavages, the embryo is formed of six quartets of blastomeres, indicating a similarity to spiral cleavage. These results suggest relationship of the Mesozoa to the protostomate Metazoa, thus supporting arguments favoring a closer affinity to the Platyhelminthes than to the Protozoa.

Sex Ratios of Hibernating Bats

Wayne H. Davis, *University of Kentucky*

Among the *Eptesicus fuscus* and *Myotis lucifugus* hibernating in certain mines in New York, the males have a tendency to cluster whereas the females tend to hang singly. Also, females tend to seek the warmer regions of the mine.

Wound Healing in Crawfish *

James Norman Dent and J. F. Fitzpatrick, Jr., *Department of Biology, University of Virginia*

In members of the genus *Cambarus* wounds approximately 1 mm. × 2.5 mm. were made in the dorsal region

of the carapace, plugged with Gelfoam, and then covered over with collodion. These animals were maintained at 18.5° ± 0.5°C. and were killed at various intervals up to 180 days after operation. Histological observations revealed that in the healing process a blood clot formed immediately in and about the Gelfoam. After approximately two months, the blood clot was invaded with epidermal cells that formed a stratum and then laid down, at about 80 days, an external covering of protochitin. The protochitin within a few days was converted to chitin. Irregularities in the healed wounds interfered with moulting, but five experimental animals completed successfully the moulting process. These findings are of particular interest in view of B. G. Anderson's ('33) report that in another crustacean (*Daphnia*) wounds of proportionate size were not healed within one instar.

* Work supported in part by AEC grant #AT-(40-1)-2978 and in part by an institutional grant of the American Cancer Society.

Production in a High Elevation Forest Stand Near Richland Balsam Mountain, North Carolina

H. R. DeSelm, *University of Tennessee*

During the summer of 1959 spruce, fir, and yellow birch trees were cut, mensurational data and specific gravity cores were obtained from the boles, and branches were sent for processing to Knoxville.

Computation of tree weights, when combined with stand data, permits calculation of net productivity. Other stand data were used to calculate a rate of production which assumes temporality.

The *in Vivo* Incorporation of Tritiated Cytidine and Tritiated Thymidine by the Cestode, *Hymenolepis microstoma* *

James A. Dvorak and Arthur W. Jones, *University of Tennessee*

The mouse bile duct cestode, *Hymenolepis microstoma*, was exposed *in vivo* in separate experiments to tritiated cytidine and tritiated thymidine, respectively. Nucleolar and nuelear labelling, by cytidine, and nuclear labelling, by thymidine, as revealed by autoradiographic methods occurred in both host and cestode tissues. As expected, only mitotically or synthetically active nuclei were labelled, those of the neck, developing organs and embryos of the cestode. Bile-duct epithelium and pancreatic acinar cells, autoradiographed as a control, showed the same degree and localization of cytidine labelling as the active cells of the cestode. The assimilation of cytidine and thymidine by direct absorption from the fluid contents of the bile duct implies that cestodes can absorb such materials from their immediate environment.

* This study was supported in part by AEC Contract AT-(40-1)-1749.

Ecological Aspects of the Florida Pine Flatwoods

Joe Allen Edmisten, *University of Florida*

Quantitative analysis of fire-free pine flatwoods and associated soils of northcentral Florida show signifieant vegetation and edaphic changes. With only 5-10 years of protection, the seedling size class was strongly dominated by such hardwood species as sweet gum, red maple, live oak, red bay, water oak, and wax myrtle. Data indicate that between ten and fifteen years of site preparation is required for hardwood domination to reach the sapling size. In cases where 15-35 years of protection were known, significant amounts of hardwood species were sampled in the tree size. The species which shared the canopy with pines included live oak, laurel oak, and ten other hardwood species. Associated edaphic changes ineluded increased bulk density, more even profiles of hydrolic conductivity, increased moisture equivalents, and more calcium in the upper six inches with protection. An increase of available NO_3 was correlated with wax myrtle. A peak of mycorrhizal infections of pine roots was observed to precede hardwood invasion at about twelve years of protection. Increases of bacteria and actinomycetes were observed with time of protection.

Tree Rings as a Means for Dating Volcanic Eruptions

Willis A. Eggler, *Newcomb College of Tulane University*

Accumulations of volcanic ash more than four to five feet deep usually resulted in the killing of pine trees near Paricutin Volcano, Mexico. To find the effect of ash accumulation and proximity to lava flows on trees which did survive four pine trees growing under what appeared to be most austere conditions were cut. Sections taken at four-foot intervals from the tree trunks have been examined for changes in growth rate. Even though the trees had grown within 200 feet of each other, under apparently similar conditions, they did not respond identically. Responses included: retarded followed by increased growth, and no significant change in growth rate.

A Comparison of Netted Phytoplankton from Surface Samples in the Littoral and Limnetic Zones of Monterey Lake

David W. Eldridge and John R. Warren, *Department of Biology, Tennessee Polytechnic Institute*

Comparative quantitative and qualitative investigations were conducted on the phytoplankton of the littoral and limnetic zones of Monterey Lake, Putnam County, Tennessee. Water samples of 1 liter each were collected from the two zones in areas free of floating and emergent vegetation. These samples were passed through a plankton net, and the organisms were examined microscopieally with a counting cell. A taxonomic comparison of phytoplankton between the zones was made. The total number of phytoplankton per liter in each zone was estimated. The investigations and findings of the littoral and limnetic zones are discussed and compared.

Radiation Effects and Population Variability in *Isoetes melanospora* *

Bebe Jo Faulkner, *Emory University*

Isoetes melanospora is a small herbaceous perennial, strictly endemic to certain weather pools on the granite outcrops of the Atlanta area. The plant body consists of an underground perennial corm from which new roots and sporophylls originate each growing season. The rigorous environmental conditions include intense heat and often prolonged drought in the summer and cold in the winter, with a pH range of 4.5 to 5.0. Population variability studies made on the velum, arrangement of sporophylls on the corm, and shape of the ligule have demonstrated marked differences between four outcrop populations, separated from each other by five to twenty-five miles. Plants from one population have been used to study response to ionizing radiation vary-

ing from 1,000 to 40,000 r. Preliminary results show that the median lethal dose is surprisingly low, being in the range of 2,000 to 4,000 r. Radiation effects are analyzed with respect to height, number of sporophylls produced, drought tolerance, and photosynthetic compensation point.

* This project is supported in part by AEC Contract No. AT-(40-1)-2412.

Acid and Alkaline Denaturation of Chick Embryo Hemoglobins as Determined by Changes in Spectral Characteristics in the Soret Region

Ronald C. Fraser, *University of Tennessee*

Two hemoglobin fractions prepared by partition chromatography at low pH have remarkably similar acid and alkaline denaturation characteristics. There is no recognizable shift in the absorption spectrum in the Soret region (413 μ) with either acid or alkaline denaturation in either hemoglobin. The "embryonic" fraction is somewhat more labile than the "adult" fraction at low pH. In both fractions denaturation is accompanied by a quenching of the optical density of the heme component. This reduction in O.D. is progressive with time, and is grossly temperature dependent in the alkaline range, but not in the acid range. There is a recovery in absorbance in the Soret region when the fractions are returned to neutral pH by dialysis. This suggests a recombination of subunits of the molecules or a restoration of molecular structure with return to neutrality. The former explanation is preferred, because of the recognition of a third electrophoretically distinct hemoglobin in such a reconstituted system.

Evidence of Hybridization of Two Species of *Eupatorium* (Compositae)

William R. Fryar, *Florida State University*

Field observations indicate the frequent occurrence of hybridization between *Eupatorium capillifolium* and *E. perfoliatum* (Compositae) under certain ecological conditions. Putative hybrid individuals match descriptions of two or three other named species. Experimental studies being conducted are designed to give more definitive evidence of this hybrid phenomenon.

Observations on a Probable New Race of the Bowfin, *Amia calva*, from Central Florida

John B. Funderburg and Margaret L. Gilbert, *Florida Southern College*

The bowfin of the Kissimmee drainage of central Florida differs from the typical form in being uniformly greenish-gray on the dorsum with no reticulated pattern or markings of any kind. The venter is white, or yellowish-white. The black spot at the base of the caudal is lacking in both sexes and there is no ocellus in the male. Bowfins from the Peace River drainage have the same coloration, but a faint black spot is present at the base of the caudal. Studies on the distribution, ecology, and breeding behavior of this color phase are in progress.

Preliminary Study of a Light-Induced Hypothalamus Secretion

R. E. Garth and R. L. Culpepper, *Northwestern State College of Louisiana*

The phenomenon of photoperiodism as a physiological trigger in the seasonal sexual development of certain birds and the necessity of the hypophysis with its tropins are well documented. Within the past decade the role of the hypothalamus as a mediator between the two has been shown, primarily by the use of hypothalamic lesions; however, the mechanism of the communication is unknown.

We have attempted to demonstrate the presence of a secretory activator originating in the hypothalamus which stimulates, directly or indirectly, the testes in male Bobwhite (*Colinus virginianus*). Entire hypothalami homogenates taken from light-developed birds were injected I.P. into non-light developed birds and the recipients showed a response in one week. Testicular weights increased from 0.05 g. to 0.75 g. which compares favorably to weights of light-developed birds.

The Identity of *Sagittaria isoetiformis* (Alismataceae)

R. K. Godfrey and Preston Adams, *Florida State University and DePauw University*

Relatively recently authors have considered *Sagittaria isoetiformis* J. G. Sm. either as an ecological form of *S. graminea* Michx. or as conspecific with *S. teres* S. Wats. Investigations of the morphological variations exhibited in numerous populations of plants of this complex in relation to varying ecological sites and fluctuating water depths indicate that *S. isoetiformis* is not an ecological form of *S. graminea*. Study of herbarium material of *S. teres* from New England and *S. isoetiformis* from the southeastern United States indicates that these are not conspecific. The conclusion is that there are three species.

Retention of Zinc-65 in Wild Small Mammals *

Frank B. Golley and Richard G. Wiegert, *Institute of Radiation Ecology, University of Georgia*

Experiments on the retention of Zinc-65 in two common small mammals, the cotton rat (*Sigmodon hispidus*) and the meadow vole (*Microtus pennsylvanicus*) are reported. In addition to the species comparison, the effect of a high fiber diet and the result of release into a natural enclosure on zinc retention in the cotton rat are considered.

* Supported by the Contract between the AEC and the University of Georgia, AT-(38-1)-310.

Circulation in Raleigh Bay, North Carolina, and Its Relation to the Barrier at Cape Hatteras

I. E. Gray and M. J. Cerame-Vivas, *Duke University*

Cape Hatteras and Diamond Shoals form a boundary between different marine sub-provinces, Virginian and Carolinian. Returns from drift bottles released over Diamond Shoals (1) revealed a definite southwesterly-flowing coastal current south of Cape Hatteras; (2) presented evidence that the Virginian Coastal Current, normally diverted seaward as it approaches Diamond Shoals, crosses the Hatteras barrier more frequently than has been suspected; and (3) prompted a revision in postulated patterns of circulation in Raleigh Bay. Influenced by moderate northeast winds, coastal flow in Raleigh Bay was more pronounced in late summer than in spring, some drift bottles rounding Cape Lookout. Recovery of bottles from as far south as Onslow Bay and Bogue Sound lends strong support to the theory that temporary winter populations of distinctly northern species in the Carolinian sub-province develop from planktonic larvae that have been liberated from permanent populations north of Hatteras and transported around the capes under favorable conditions.

Stream Classification and Fish Distribution: Dix River System, Kentucky

PHILLIP E. GREESON, *University of Kentucky*

Weaknesses in the classification of freshwater streams present handicaps in the explanation of aquatic ecological studies. Through the incorporation of the Horton (1945) system of stream classification as modified by Strahler (1954, 1957), this handicap may be overcome. By this system, extreme headwaters are considered to be Order 1 and the union of two such units constitutes an Order 2. When two streams of equal order unite, they form a stream of the next highest order. Patterns of fish distribution within the Dix River System, located in the southern portion of the Bluegrass region of Kentucky, illustrate this system of stream classification. Sixty species of fishes, representing thirteen families, were collected and distribution patterns did correlate with stream order.

Oospore Variation in *Chara*

DANA G. GRIFFIN III, *University of Tennessee*

In order to evaluate the reliability of variation in length to width ratios of oospores as a taxonomic character in *Chara*, oospores from clones of six species growing in four different soil-water culture treatments were compared.

One hundred oospores from each culture were measured, and a length to width ratio calculated. Statistical analysis of the ranges of variation by comparing means and standard deviations suggests two conclusions: 1) within clonal material oospore shape variation exceeds that now used in distinguishing taxa, and 2) this variation appears to be random with regard to the physical factors of the environment under which the cultures were maintained. The oospore may still be useful as a key character within the group, but a better understanding of the potential for variation and a more precise definition of range of variation is needed.

Growth Studies on *Microthamnion kuetzingianum* Naegeli

ROBERT D. GROOVER AND TEMID R. DEASON, *University of Tennessee and University of Alabama*

Growth (measured turbidimetrically) and development (evaluated microscopically) of *Microthamnion kuetzingianum* in a basal medium was compared to that in experimental media with mineral element substitution, variation in sources of nitrogen, addition of selected organic compounds, and at varying pH levels. These studies indicate that: (1) *Microthamnion kuetzingianum* has a low calcium requirement for which no other element tested will entirely substitute. (2) Growth with casein hydrolysate and peptone as nitrogen sources surpasses growth in the basal medium. Other sources support growth, but morphological peculiarities are common. (3) Added peptone, yeast extract and dextrose stimulate growth and morphology is normal. (4) Basal medium plus 0.2% dextrose supports growth in the dark for at least 21 days and the culture remains composed of only motile cells and germlings. (5) The optimum pH for rapid growth is 5.85 to 6.05. The ability to produce motile cells in abundance ceases between a pH of 6.65 and 7.15. Abnormal morphology is frequent above a pH of 7.15.

Zoospores of *Prasinocladus lubricus* Kuckuck

ROBERT D. GROOVER AND WALTER R. HERNDON, *University of Tennessee*

Phycologists differ widely in their systematic placement of *Prasinocladus lubricus*, a small branched marine, green alga, in which the protoplasts are largely limited to the terminal cells. In hope of clarifying its taxonomic position, zoospore production, release and development have been followed in a unialgal strain isolated from Great Harbor, Woods Hole, Massachusetts and maintained in Erdschreibers medium.

The four lobed zoospores have a prominent depression or gullet at the anterior end and the four flagella of each are deeply inserted. At cessation of motility a conspicuous wall is formed within minutes with the flagella still protruding. Light and electron microscope studies indicate that subsequent development of the wall is not uniform; it is broader at the anterior end, multilayered and transversed by pits. The outline of the gullet is evident in the wall as the organism develops. With respect to the gullet, motile cells of *Prasinocladus* are similar to those of *Pyraminomonas* and support systematic placement as suggested by Christensen (1962).

The Eastern Yellow Erythroniums

JAMES W. HARDIN AND CLIFFORD R. PARKS, *North Carolina State College*

Detailed morphological and cytological studies indicate five entities within the yellow Erythroniums of eastern United States. This study substantiates the observations and writings of Harper and Wolf made ten to twenty years ago. Evidence indicates that the northern tetraploid *E. americanum* possibly arose through reticulate evolution from two southern diploid species. Subsequent selection pressures and possibly a second reticulation has given rise to two additional taxa.

The Effect of *Sigmodon hispidus* on the Regeneration of Southern Pine Seedlings

MICHAEL J. HARVEY, *University of Kentucky*

A study was made to determine whether or not cotton rats cause damage to southern pine seedlings. The study was conducted during the months February to August, 1962, in the Stephen F. Austin Experimental Forest, Angelina National Forest, Nacogdoches County, Texas. A total of 1,296 loblolly, shortleaf and slash pine seedlings were planted on a one acre plot. The area was enclosed and divided into four equal subdivisions by fence. Known numbers of cotton rats were released on three subdivisions; the fourth was a control. No seedling damage by cotton rats was detected.

Homing in *Myotis sodalis*

M. D. HASSELL, *University of Kentucky*

Seven hundred *M. sodalis* were taken from Carter Caves, Kentucky. These were released at 12 air mile intervals, the farthest release point being 144 miles. One hundred and one bats were recaptured at the cave. Return percentage diminished with distance from the cave.

A Cytological Study of Tripling Conjugation in *Tetrahymena pyriformis* *

LINDY HATCH AND CAROLYN WELLS, *Longwood College*

A cytological study of the conjugation of three organisms was conducted using the ciliate, *Tetrahymena pyriformis, strains* EU 6010 (variety 6, mating type III) and EU 6525 (variety 6, mating type I). The amicronueleate strain EU 6525 was used as a marker in following the events of micronuclear reorganization in this unusual conjugation. A high frequency of homopolar doublets in strain EU 6525 resulted in the union of three organisms at conjugation, i.e., two micronucleate EU 6010 cells fused to one amicronucleate EU 6525 cell at the oral region. Conjugating pairs and triples

were stained with Gomori's hematoxylin, mounted temporarily in 45% acetic acid, and studied under an AO phase microscope. The results indicate that triples undergo normal nuclear reorganization up to the second postzygotic division; after this point, no evidence for completed reorganization has been obtained. In pairs, normal micronuclear reorganization has been observed in many cells.

* This work was partially supported by USAEC Contract No. AT-(40-1)-2793.

Characterization of an Unknown Auxin in a Sample of C-14 Labelled IAA

J. H. M. Henderson

An unkown auxin has been isolated from a sample of radioactive, C-14 labelled IAA synthesized by Pichat *et al.* in 1960. The substance is active in bioassay tests for both straight growth and *Avena* curvature. It is a neutral substance and has indolic characteristics. Radioactivity and biological activity do not fully coincide, so that the auxin appears not to possess the originally incorporated C-14. There also is very little IAA remaining in the sample. Comparisons have been made by R_f values and biological activity with other known and some unknown neutral substances, but to date similarity of identity has not been established. Its exact identity is pending.

The Use of Centrifugal Force to Rearrange the Nuclei in the Developing Megagametophyte of *Oxalis corniculata* L.*

J. M. Herr, Jr., and M. E. Borom

Stages in the development of the megagametophyte of *Oxalis corniculata* L. are characterized by a very precise location of their nuclei. In order to determine the effect nuclear position exerts on the pattern of megagametogenesis, a method has been designed utilizing centrifugal force to rearrange the nuclei during the early stages of development and allowing ontogeny to continue *in vitro*. Finding an effecitve level of centrifugal force constitutes an important step in the development of this method. Floral buds excised during megasporogenesis were mounted vertically in centrifuge tubes and subjected to 213 gravities for ten minutes. The buds were then fixed and sectioned at 10 μ to determine the effect of this force on the megasporocytes, daughter cells, and megaspores. In cases where centrifugal force passed exactly parallel to the long axes of the cells, the nuclei were moved to the end walls. Force from any other direction was totally ineffective in altering the position of the nuclei. Therefore, the cytoplasmic forces which hold the nuclei in their characteristic positions were weakest along the long axes of the cells.

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Some Insect Associates of Southern Pine Trees

L. A. Hetrick, *University of Florida*

The southern pine type of woodland extends from eastern Maryland and Virginia to the Gulf of Mexico and westward to Arkansas, Oklahoma, and eastern Texas. Insect associates of the trees are essentially the same species throughout this extensive geographical range. Southern pine beetle, black turpentine beetle, species of *Ips* bark beetles, pine weevils, ambrosia beetles, turpentine borer, cone moths, shoot moths, sawyers, defoliators, and subterranean termites are a few of the more important associates of the trees. Although frightening outbreaks of some insects do occur periodically, it is remarkable that more trouble does not result from such large numbers of pine trees growing on so many thousands of square miles of land area.

Mineral Requirements of Selected Species of Aquatic Hyphomycetes

D. W. Hickman and W. W. Scott,
Virginia Polytechnic Institute

Four species of aquatic Hyphomycetes were selected on the bases of rapidity and reproducibility of growth These were grown in liquid culture on a rotary shaker at constant temperature. The morphological responses and amounts of mycelium produced in media of different mineral compositions were determined. Glucose was the only organic constituent required. Macro-elements were varied from zero to concentrations in excess of those yielding maximum mycelial dry weight.

It was found that variation in mineral concentrations can significantly alter the apparent morphology and physiology of these organisms. Therefore such investigations are prerequisite not only to a reliable taxonomic study of these species, but to examinations of their organic nutrition as well.

Influence of Mysial Architecture on Pigment Cell Morphogenesis in the Mouse *

Joe G. Hollyfield and Willie M. Reams, Jr.,
Louisiana State University

Methods of autoplastic and homoplastic transplantation of melanoblastrich embryonic and newborn tissues into pigment cell deficient muscles of PET mice were employed to determine the role of the tissue structure in the morphogenesis of pigment cells. The data gathered from a study of the recovered graft sites indicate that the extent of invasion of musculature by melanoblasts is governed by the state of mysial differentiation. Furthermore, the greater the degree of mysial differentiation, the greater the density of the tissue fabric. Consequently, older mysial tissue resulted in a restriction of dendrite formation by the included pigment cells due to the resistance imposed upon the cells by the mechanical properties of the environment. Thus the morphology of melanocytes of a given genotype may serve as an index to the time of pigment cell morphogenesis in differentiating mouse muscles.

* Supported by N. S. F. Grant G-14153-GB271.

Accumulation of Radioactive Gold by Estuarine Animals

Donald E. Hoss, *Bureau of Commercial Fisheries, Biological Laboratory, Beaufort, North Carolina*

The accumulation of radioactive gold by estuarine animals was investigated in conjunction with a sediment tracing study conducted in the Cape Fear River, N. C. by the Corps of Engineers. Test animals, ineluding blue crabs (*Callinectes sapidus*), oysters (*Crassostrea virginica*), mummichogs (*Fundulus heteroclitus*), and croaker (*Micropogon undulatus*), were placed in cages at 6 stations in the river. Samples of animals, water, and sediments were taken 1, 17, 41, and 144 hours after the release of sediment, labeled with radioactive gold, into the river. All samples contained low levels of radioactivity, including those taken directly from the drop zone. Currents and wave action quickly dispersed labeled sediment particles from the area so that the only detectable radioaetivity associated with natural sediment occurred at station 2 in the drop zone. Oysters accumulated the most radioactivity followed by crabs and fish. No measurable amounts of activity were detected in the animals, sediment and water samples after

144 hours. It was concluded that the amount of radioactive gold used did not constitute a hazard to the marine community.

Nuclear Loss in the Ascospores of *Neurospora tetrasperma*

H. Branch Howe, Jr., *University of Georgia*

Genetic analysis using randomly selected normal size ascospores of *Neurospora tetrasperma* is subject to error, if one of the two nuclei initially present should fail to survive. The homokaryosis resulting could be incorrectly scored as having arisen from crossing over during ascus development. Using the mating type locus as a marker and comparing samples of randomly isolated normal size ascospores with samples from whole asci, an event interpretable as nuclear lethality was occasionally found. The loss seemed to be of sufficient frequency to warrant the use of properly located genetic markers to permit detection and exclusion of the event from experimental data.

Electron Microscopy of Human Skin

Funan Hu and Robert R. Cardell, Jr.,
Henry Ford Hospital and Edsel B. Ford Institute for Medical Research, Detroit 2, Michigan

Split thickness biopsies of human skin were obtained and fixed in 1% buffered osmium tetroxide for electron microscopy studies. The dermis of the skin is composed of bundles of collagen fibers randomly oriented and intimately related to fibroblasts. A basement membrane separates the dermis from the epidermis. The basement membrane is 35 μ thick and is adjacent to the plasma membrane of the epidermal basal cells.

The epidermis is composed of basal cells which are characterized by their palisading arrangement and the presence of melanin granules of varying size. The prickle cells have irregular and highly folded cell membranes and many desmosomes between adjacent cells. The granular cells are elongated with their long axis parallel to the surface of the skin, and have irregular shaped electron dense keratohyaline granules. The cells of the stratum corneum are highly modified, possessing neither nucleus nor the usual cytoplasmic constituents.

The Marine Algae of Virginia

Harold J. Humm, *Duke University*

The State of Virginia is still a complete hiatus with reference to our knowledge of the distribution of marine algae of the Atlantic coast of the United States. Neither of the two major compilations of the algae of this region mentions Virginia.

The writer began to make collections of marine algae along the coast of Virginia in 1942, and at infrequent intervals since that time. The opportunity to spend the summer of 1962 at the Virginia Institute of Marine Science as Visiting Scientist has brought the work to the point where a manuscript is now in preparation. Although many additions will be made to the list in the future, the present records include approximately 165 species distributed as follows: Cyanophyceae, 42; Rhodophyceae, 43; Phaeophyceae, 50; Chlorophyceae, 30. The paper will include keys, descriptions, and illustrations.

Megasporogenesis in *Dendrobium* (Orchidaceae)—an Electron Microscope Study

Herbert W. Israel, *University of Florida*

Four successive stages—nucellar phase, sporogenic phase, prophase, metaphase—of megasporogenesis in six hybrids of *Dendrobium* have been studied by electron microscopy. A megaspore mother cell is developed at the subapex of each papillar extension of the initially undifferentiated placenta following a 30-day mitotic period induced by pollination. Except for its distal position in the nucellar row, the potential megaspore mother cell exhibits no unique morphological properties. It is proposed that the marked multiplication of organelles accompanying cytoplasmic growth in the sporogenic phase is facilitated through macromolecular resorption of cytoplasm from surrounding cells by the megaspore mother cell. Evidence for this is presented by a concomitant loss of plasmodesmata and initiation of rhopheocytosis between the megaspore mother cell and its nucellar envelope; the eventual disappearance of the nucellar epidermis; and the marked decrease in ribosome concentration within the megaspore mother cell. The significance of the non-porous nature of the enlarged early prophase nuclear envelope remains obscure. Rudimentary Golgi-bodies within the prophase cytoplasm of the megaspore mother cell are assumed incapable of elaborating the extensive network seen in the endoplasm. The reappearance of pores in the early metaphase nuclear envelope marks the onset of its breakdown. It is proposed that the sharp decrease in organelles during the metaphase accounts for the increase in phragmosomes, which may readily be degraded forms of lysed organelles. It is finally suggested that the supporting tissues of the meiotic system examined may regulate both the initiation and maintenance of the developmental transformations observed.

Fluorescent Antibody Studies in Human Malaria

Geoffrey M. Jeffery and William E. Collins,
U. S. Public Health Service *

Using the indirect fluorescent antibody method, the production and persistence of specific antibody were demonstrated in patients inoculated with *Plasmodium malariae* and *Plasmodium falciparum*. Rapid development of significant antibody levels was seen in all cases. In *P. malariae* the persistence of high titers was associated with persistence of low parasitemias; termination of the infection produced a gradual decline in antibody levels, but detectable antibody remained for extended periods following the elimination of parasites. In *P. falciparum* development of antibody was usually somewhat slower than in *P. malariae*, and the antibody titers fluctuated considerably in relation to fluctuation of parasite densities. Significant and relatively stable antibody levels persisted for extended periods after the termination of the parasite infection.

* Department of Health, Education, and Welfare, Public Health Service, National Institute of Allergy and Infectious Diseases, Laboratory of Parasite Chemotherapy, Section on Epidemiology, P. O. Box 717, Columbia, South Carolina.

Correlation of Forest and "Prairie" with Soils in the Black Belt of Sumter County, Alabama, in 1832

Alice Simms Jones, *University of Alabama*

In this study, the field notes and plats of the original land survey of Sumter County, Alabama (1832) were used to reconstruct the vegetation of the 287,093 acres of Black Belt in this county. The Sumter County Black Belt in 1832 included 65,074 acres (23.4%) which supported no trees or less than 10 trees per acre and thus can be considered naturally open land. Four hundred twenty-four section corners were used as sampling points. When these points are located on a modern soil map, 257 are associated with acid soils, 167 with alkaline soils; 203 are located in loam or sand, 221 in

clay. A strong correlation exists between the sample points which had low tree density and the points which have alkaline soils and clay soils. The degree of affinity between the acid loam soils and high-density points is not as high. Thus for Sumter County, Alabama the patches of open land were associated with alkaline clay soils and were a distinctive part of the landscape. Tree densities were mostly below normal forest density at all sampling points.

Massive Polymorphism, Reflexive Selection, and the Toad, *Bufo typhonius*

DUVALL A. JONES, *Ferrum Junior College*

Extensive variation of color and form within populations of invertebrate species has been described and referred to as massive polymorphism. It was suggested that such polymorphism is an adaptation which decreases selection pressure by predators with color vision. The responsible mechanism was termed reflexive selection. Two genetic models were proposed to account for the sustained variation. One model is based on predator selection of the more frequent phenotypes; the other is based upon higher selection value of heterozygotes. The toad, *Bufo typhonius*, of the American tropics, exhibits a wide variety of color patterns. A series of fifty-one specimens collected from Barro Colorado Island, Canal Zone, displayed numerous combinations of body patterns and colors. Additional series from Panama, Colombia, and Brazil show wide pattern variation. This appears to be an example of massive polymorphism and possibly reflexive selection.

Studies in the Narrow Leaved *Vernonia* (Compositae) of the Southeast

SAMUEL B. JONES, JR., *University of Georgia*

The narrow leaved *Vernonia* species (*V. pulchella* Small, *V. recurva* Gleason, *V. scaberrima* Nutt., *V. angustifolia* Michx., *V. dissimilis* Gleason, *V. concinna* Gleason, and *V. blodgettii* Small) are especially characteristic of the sandy areas of the Coastal Plain from North Carolina to Florida and Mississippi. Field work, studies of literature, and of herbarium specimens indicate that these taxa are not well defined. In particular, there are many natural variants which cannot be classified with the present criteria given for these taxa. A solution to these and other problems is being attempted through transplant studies, determination of chromosome numbers, distributional studies, and an analysis of mass collections for evidence of introgression and other relationships. The results to date will be discussed.

Preliminary Investigation of Floral Color Variation in *Trillium* (Liliaceae)

YOSHIMICHI KOZUKA, *Vanderbilt University*

Six species of *Trillium*, including four Japanese and two American, were analyzed qualitatively by means of paper chromatography in an attempt to determine whether or not observed color variations were due to different anthocyanin pigments. The Rf values of anthocyanin extracts from petals and ovary walls revealed no significant differences among the species examined.

Infection of Commercial Shrimps with Spores of the Gregarine *Nematopsis* from Pelecypods *

DWAYNE N. KRUSE, *Northwestern State College*

Nematopsis spores from the gills of *Aequipectin irradians*, *Chione cancellata*, *Macrocallista nimbosa*, and *Cardita floridana* produced mature gregarines that encysted and formed infective gymnospores when fed to uninfected *Penaesus duorarum*. The same *Nematopsis* spores did not produce infective gymnspores when fed to the two other main species of commercial shrimps, *P. aztecus* and *P. setiferus*.

It was also shown by experiments in the field and laboratory that *P. duorarum* need not ingest the pelecypod tissues to become infected. The pelecypods are capable of shedding the *Nematopsis* spores and the spores may be carried into the marine environment via the mucous and fecal excrements. The shrimps ingest the excrements and thus become infected.

* This investigation was carried out at Florida State University during the tenure of a Predoctoral Fellowship from the Division of General Medical Sciences, United States Public Health Service.

Some Limnological Aspects of the Waters in Mammoth Cave, Kentucky

ROBERT A. KUEHNE, *University of Kentucky*

Mammoth Cave is still in the process of formation and alteration through water action. Two river systems, the Styx and Echo, lie at the deepest level, and small streams bringing surface waters downward are found at higher cave levels. Bodies of perched water, such as Crystal Lake, are also known. A detrital food chain of surprising complexity is present. Some of the physical, chemical and biological characteristics of these aquatic habitats are given, and a few initial interpretations are presented.

Spacing in Even-Aged Stands of Sand Pine Showing Maximal Competition

ALBERT M. LAESSLE, *University of Florida*

Thirteen stands that had regenerated naturally after crown fires were studied. Nearest neighbor distances were measured in stands varying from 12 to 65 years old and departures from random spacing calculated. In an aggregated stand, these distances were measured in the same sample strips both at ground level and at 1.5 m., giving very significantly different results due to the divergence of trunks away from the aggregation center. In 8 stands nearest neighbor distances were measured twice, once using all trees both dead and alive, again using only live trees. Live only samples showed consistently greater departures toward even spacing, demonstrating that the denser portions of the stands have the higher casualty rates. A marked difference in the density of ground cover in two parts of the same stand, is demonstrated by dead and live vs. live only studies, to be due to a much longer period of maximal pine competition in the portion having sparser undergrowth.

Thymidine "Pool" in Grasshopper Neuroblasts *

WILLIAM M. LEACH, *University of Tennessee*

Embryos of the grasshopper (*Chortophaga viridifasciata* (De Geer) were incubated in tritiated thymidine (H^3T) and successively rinsed in three solutions. Observation of living neuroblasts and reidentification of the same cells in autoradiograms revealed that (1) corresponding portions of sister chromatids were labeled in the first division following incubation in H^3T; (2) some sister chromatids were labeled in complementary portions and some were labeled in corresponding portions in the second division following incubation in H^3T; and (3) neuroblasts that were not in deoxyribonucleic acid (DNA) synthesis during incubation in H^3T incorporated H^3T into DNA during the succeeding DNA synthetic period. Results are interpreted as evidence of intra-

cellular persistence of thymidine derivatives between periods of DNA synthesis.

* This study was supported in part by the Atomic Energy Commission under Contract No. AT-(40-1)-2575.

Life Cycle and Seasonal Differences in Photoperiodic Response by Nymphs of *Tetragoneuria cynosura* (Odonata)

Paul E. Lutz, *Woman's College, University of North Carolina*

To determine the pattern of nymphal development, extensive collections were made throughout one complete year. Most nymphs had a life cycle of one year; by October the ultimate instar was reached and served as the overwintering stage. A small percentage of the population exhibited retarded growth and required two years to eomplete their development. Their first winter was spent in stages other than the final and their second winter in the final stage.

Striking differences occurred in seasonal responses to photoperiods of 11 and 14 hours. For nymphs collected in August and early September, final instar durations were much greater on the longer photoperiod. In subsequent collections, however, the longer photoperiod induced more rapid development. This abrupt reversal in response coincided with the fall equinox. Differences in rate of response by nymphs maintained on the two photoperiods became progressively less as time of emergenee approached.

Chimera in Maize

Te-Hsiu Ma, *Emory & Henry College*

A corn plant possessing chimerical branches on its tassel was studied. The normal diploid branches had $2n$ number 20 chromosomes. Chimerical branches were tetraploid, having 40 chromosomes in their pollen mother cells. A detailed meiotic study disclosed tetravalents in form of rings, chains, or figures-of-8; hexavalents, octavalents in form of chains. These multivalent formations indicated that a reciprocal translocation was involved. Morphological eomparison between this plant and its sister plants showed no pronounced difference, although the spikelets and florets of tetraploid branches were slightly larger than those of the diploid. Cytological study of 15 sister plants and 3 selfing progeny of this plant showed that all had $2n$ number 20 in their somatic cells.

Chromosome Number and Behaviour in *Gerardia* and *Aureolaria*

O. M. Mathen * and C. R. Bell

The present study deals with a cytological analysis of few species belonging to the genera *Gerardia* L. and *Aureolaria* Raf. of the family Scrophulariaceae. The basic haploid number of chromosomes of all the species of *Gerardia* and *Aureolaria* so far worked out is 13. However, in one population of *Gerardia purpurea* and in two populations of *Aureolaria virginica* the chromosome number was found to be higher than 13 due to the presence of supernumerary chromosomes. These were found to be smaller than the members of the regular set. The number of these supernumeraries varied from 1 to 3. Even within members of the same population the number was found to be differing. The sequence of events in the behaviour of these were observed at different stages of meiosis. They were seen at metaphase I, anaphase I, metaphase II and anaphase II of meiosis. At anaphase I the supernumeraries, instead of moving to the poles of the cell, remain at the equatorial plane and they occupy this position till the end of anaphase II. Presumably these singled chromosomes may degenerate before the tetrads are formed. The origin and the evolutionary implications of the supernumerary chromosomes is worth studying. The genetic effect of these if any is to be understood.

* Danforth Fellow from India at the University of North Carolina.

Ecotypic Differentiation in *Diamorpha cymosa* Nutt.

J. Frank McCormick, *Vanderbilt University*
Robert B. Platt, *Emory University*

In the winter of 1959 population samples of *Diamorpha* were transplanted from numerous granite and sandstone outcrops to a simulated outcrop in an experimental garden on the Emory University campus. Population samples from a centrally loeated outcrop were reciprocally transplanted to each outcrop visited. Phenological observations were recorded during the following three years and population samples of the second filial generation (1961) were subjected to analyses of comparative physiological tolerances and comparative morphology.

Population phenology varies in a northeast to southwest clinal pattern and coincides with moisture and temperature gradients. Population physiological tolerances also vary in a clinal pattern, but in a different direction. Marginal populations are most tolerant and centrally loeated populations are least tolerant to cnvironmental stresses. No significant morphological variations were resolved. The two discordant patterns of elinal variability indicate that *Diamorpha* is undergoing ecotypic differentiation. Each population is genetically adapted to the individually variable environments of the numerous well-isolated habitats.

Foliose and Fruticose Lichens of the Piedmont Upland of Alabama

Herbert A. McCullough, *Howard College*

Collections of foliose and fruticose lichens have been made during 1962 and 1963 in the counties occupying the Piedmont Upland of Alabama. In general, the lichen flora resembles that of the eastern deciduous forest area with the frequent presence of a few forms typical of the southern Coastal Plain. The most common genus is *Parmelia,* represented by a variety of species. Others frequently collected include species of *Cladonia, Anaptychia, Physcia, Pelligera, Usnea,* and less frequently a number of other forms.

Some Environmental Changes in Forest Stands Following Exposures to Radiation *

John T. McGinnis, *Emory University*

Observations were made on soil temperature, soil moisture and forest floor light intensities in oak-hickory-pine stands which surround the air-shielded reactor on the Air Force Plant 67 Reservation in north Georgia, as part of a long range study on radiation effects on forest productivity. Following a total accumulated exposure of 10,000 rads with a 43 per eent reduction in canopy cover, the average 6-inch depth soil temperature differed significantly from the control during the growing season by an increase of 2.1°F., while complete defoliation following exposures of 15,000 rads resulted in an increase of 3.1°F., significant at the .01 level. Soil moisture, on the other hand, showed little response due to change in canopy density. Forest floor light intensities differed at the .01 level from the non-irradiated stand by a ratio of 3.2 and 4.8 to one following exposures of 10,000 and 35,000 rads respectively.

* This project is supported in part by AEC Contract No. AT-(40-1)-2412.

Intra-Cellular Localization of the Pentose Phosphate Cycle in *Ustilago maydis* *

Richard D. McKinsey, *University of Virginia*

The relation of the operation of the pentose phosphate cycle to cellular particles of *Ustilago maydis* was investigated. Results obtained indicate that extracts from which all microscopically visible particles had been removed could oxidize glucose through the pentose phosphate cycle. By tracer techniques it was found that all or almost all released CO_2 was obtained from the number one carbon of glucose. Spectrophotometric studies demonstrated the presence of glucose-6-phosphate dehydrogenase and 6-phosphogluconic acid dehydrogenase. Radio chromatographic studies indicated the formation from glucose by extracts of glucose-6-phosphate, 6 phosphogluconic acid and possibly ribose-5-phosphate. Extracts treated so as to remove all microscopically visible particles could metabolise glucose with oxygen uptake. It was concluded that in this fungus the pentose phosphate cycle could operate with the uptake of 0_2 in the absence of mitochondria and possibly other known enzyme-containing electron-transporting particles.

* Partially supported by funds from American Cancer Society Institutional Grant.

Nature of Preferential Pairing in an Intergeneric Allotetraploid

Margaret Y. Menzel,
Agricultural Research Service, U.S.D.A.

Pollen mother cells in sterile F_1 hybrids of *Lycopersicon esculentum* × *Solanum lycopersicoides* showed virtually complete chromosome synapsis at pachytene and no visible differences between pairs of homologues except differences in length in 4 proximal heterochromatic regions, although evidence of partial chromosome nonhomology appeared at later stages of meiosis. In contrast, a colchicine-induced allotetraploid showed a very high degree of preferential pairing as evidenced by very low frequency of pairs with unequal regions at pachytene and absence of unequal pairs and low quadrivalent frequency at metaphase I. Preferential pairing is due to highly non-random *synapsis* rather than to preferential chiasma formation in this material.—*S. lycopersicoides* has a higher metaphase chiasma frequency than *L. esculentum*. The higher frequency is dominant in the allotetraploid, so that pairs of tomato chromosomes form more chiasmata in the allotetraploid than they do in the species.

Aquatic Phycomycetes of the Mountain Lake Region *

Charles E. Miller, *University of Maine*

Part of the last two summers have been spent at the Mountain Lake Biological Station, Virginia, surveying the lower aquatic Phycomycetes of that region. Sixty-six species in twenty-nine genera representing members of fifteen families and seven orders of the aquatic Phycomycetes are known from these studies. Seven taxa apparently new to science were found. These include species of *Rhizidium* and *Rhizophydium* saprophytic on pollen, chitin and snake skin, two species of *Chytridium* on sweet gum pollen, a very large *Lagenidium* in corn pollen, one *Lagenidium*-like parasite of a desmid, and an unidentified spiny chytrid on sweet gum pollen. Sexual reproduction in *Gonapodya polymorpha* Thaxter, the true nature of which was first described by Johns and Benjamin (*Mycologia* 46: p. 201, 1954) was confirmed during this survey.

* Supported by a National Science Foundation Grant-in-aid administered by the Mountain Lake Biological Station.

Parasitic Helminths of Mink *

Grover C. Miller and Reinard Harkema,
North Carolina State College

During the last three years a total of 115 mink, *Mustela vison*, from the coastal and piedmont areas of N. C. has been examined for helminth parasites. Most of the hosts were taken in the vicinity of Raleigh, N. C. The majority of parasites have been identified to species and grouped as follows: Trematoda—10 species; Cestoda—1 species; Nematoda—9 species; Acanthocephala—2 species. The presence of the trematodes, *Enhydridiplostomum alaroides*, *Baschkirovitrema incrassatum*, and *Procyotrema marsupiformis* constitute new host and new locality records. The common lungworm of mustelids, *Filaroides martis*, was the most prevalent parasite. The kidney worm, *Dioctophyma renale*, was found only in mink from the coastal areas. The mink from N. C. show a low incidence of infection.

* Supported in part by research grant E-3209 from the National Institutes of Health, U. S. Public Health Service.

Factors Affecting the Germination of Conidiospores of *Erysiphe cichoracearum*

Ralph M. Morrison,
The Women's College of the University of North Carolina

Several aspects of the physical environment were studied with reference to the germination of conidiospores of the powdery mildew, *Erysiphe cichoracearum*. It was found that unilateral illumination had no effect on the direction of growth of the conidial germ tubes. Light stimulated conidiospore germination at low temperatures. The highest percentages of conidial germination were obtained at 18 to 24 degrees centigrade. There was little germination of conidia below 10 degrees and no germination at 32 degrees centigrade. High relative humidities increased conidiospore germination when compared with lower germination percentages of spores maintained in dry atmospheres. *In situ* germination of conidia occurred in leaf disk culture.

Floral Modifications in *Oxalis Priceae*

David L. Mulcahy, *Vanderbilt University*

The genus *Oxalis* is largely tristylous. However, within some species and/or subspecies, one or two of the three flower forms may be missing. This paper represents an attempt to correlate changes in flower structure of *Oxalis Priceae* with the fact that the mid length style is absent from some subspecies.

A Monographic Study of *Stylisma* and a Revision of North American *Bonamia*, North of Mexico

Tin Myint, *University of Florida*

Stylisma, a small genus of the southeastern United States, is represented by six species and four subspecific entities. Its members have been commonly treated as belonging to *Breweria* or, recently, to *Bonamia*, a conserved name. The present problem concerning *Stylisma* is whether it is generically distinct from *Bonamia*, a pantropical genus of about 45 species and represented

in this country by two indigenous species. *Stylisma* has been drawn into *Bonamia* because of certain common features, especially the nature of styles which are free or partially fused. However, the present study has disclosed certain additional morphological features by which they may be distinctly separated. The most significant of the newly observed features are found in the cotyledons. In *Bonamia* the cotyledons are oval, oboval or broadly bilobed, frequently with emarginate apices. Those of *Stylisma* are invariably narrowly linear, deeply bifurcated and folded twice against their petioles. This character, supported by striking differences in texture of leaves, sizes of seeds and fruits, number of seeds per capsule, and number of flowers per inflorescence, strongly suggests that *Stylisma* is best treated as a distinct genus.

Energy Storage in Migrating Birds

Eugene P. Odum, Timothy Marples, and Shirley Marshall, *University of Georgia*

Slobodkin and Richman (*Nature* 191: 299, 1961) and Golley (*Ecology* 42: 581, 1961) have reviewed data on Calories/gm. ash-free dry weight in wild populations finding that animal biomass is consistently between 5.4 and 6.1, except where fat storage occurs as adaptation to special needs. The highest caloric values reported by the former authors approached 7 Cal/ash-free gm. in arthropods which go through fasting periods. Trans-Gulf migratory birds apparently store the maximum amount of fat possible in an active animal, but the actual whole body caloric value has not been previously determined. Two methods were used: (1) Entire specimens killed during southward migration at a Tallahassee, Florida TV tower were burned in a bomb calorimeter, and (2) the caloric value of fat and fat-free material were determined separately after extraction of the fat from such birds. Both methods gave similar results. Cal/ash-free dry gm. of trans-Gulf migrant thrushes and warblers at peak fat deposition was 7.4 and 8.1, indicating remarkable energy storage in individuals that must remain extremely active physically. (Research supported by Grants NIH H-4844 and NSF G-9955.)

Continuous Culture of *Protosiphon botryoides* in Ca- and Sr-Media with CO_2-Enriched Atmosphere

Joseph C. O'Kelley and Temd R. Deason, *University of Alabama*

Protosiphon botryoides Klebs was grown in continuous culture in an atmosphere enriched with CO_2 (5% in O_2), both in Ca-containing medium and in medium with a Sr replacement for Ca. A 10-liter culture with Ca gave a daily yield of 4.48 ml. algal cell volume and a 0.601 g. dry wt.; with Sr replacement the daily yield was 3.84 ml. cell volume and 0.452 g. dry wt. The ratio of yield in Ca over yield in Sr was essentially the same as yield ratios previously obtained in slower-growing standing liquid cultures not enriched with CO_2. The continuous culture apparatus was constructed of readily available and inexpensive parts, including the glassware.

A Phytotron for the Southeast

H. J. Oosting and Paul J. Kramer, *Duke University*

A study is in progress to determine the feasibility of constructing a two-unit phytotron for the southeastern states. The study is being made by a committee from Duke University and North Carolina State College with financial support from the National Science Foundation. If the plan materializes the unit at Duke University will concentrate on facilities for ecologieal or environmental physiology and the study of the effects of various environmental factors on specific physiological and biochemical processes. The unit at North Carolina State College will be developed for work in genetics, population dynamics, diseases and insect resistance, and mineral nutrition research.

Investigators who are interested in the use of controlled environment facilities are invited to discuss their needs with the chairman of the phytotron committee, Paul J. Kramer of Duke University.

Phosphatase Changes in Planarians

Paul J. Osborne, *Lynchburg College*
A. T. Miller, Jr., *University of North Carolina*

This represents a further attempt to determine the *in vivo* functions of acid and alkaline phosphatases. It is the first in a series of phylogenetic and ontogenetic studies which is currently under way. Planarians were initially selected because they introduce the organ-system level and can reconstitute any parts lost due to injury or starvation. Flatworms were fed, starved, pharyngectomized and transected. They were fixed at appropriate intervals, sectioned in a cryostat, and subjected to phosphate substrates according to the method of Gomori. Acid phosphatase activity was evident in phagocytic cells after a feeding, waning by the third day, and appeared in neoblasts of structures being either degraded or reconstituted. Alkaline phosphatase appeared under similar circumstances except that it lingered for nine to ten days in gut cells and persisted indefinitely in essential structures which themselves persisted, with no apparent change induced by starvation.

The Spontaneous Recovery of the Cricket *Gryllus assimilis* from Gregarine Infections

Fred K. Parrish, *Agnes Scott College*
Mary M. Andrew, *Agnes Scott College*
Joanna W. Parrish, *Emory University*

Parrish and Parrish, 1962, reported that populations of crickets cultured under certain conditions showed a several hundredfold increase in their gregarine populations. The number of gregarines present, as determined by the number of cysts in the crickets' fecal pellets, rises over a period of about 6 weeks until one finds about 4-10 cysts per fecal pellet. Then within about a week the number of gregarines diminishes until only an occasional cyst can be found. Populations of crickets that have undergone a gregarine population cycle appear to be resistant to immediate re-infection. The mechanisms for these phenomena are being studied.

Identification of Statoliths by X-Ray Diffraction

Jonathan Parsons and Robert R. Cardell, Jr., *Department of Physics, Edsel B. Ford Institute for Medical Research, Detroit 2, Michigan*

There is evidence that the crystalline bodies of vertebrate static organs exhibit variation in structure and composition. By techniques appropriate to x-ray powder diffraction the structure and composition of statoliths from the cat, rat, dog, chicken, pigeon, frog, turtle, salamander, fish, and selected invertebrates have been analyzed. Statoliths from the mammals and birds which were analyzed were composed of calcium carbonate in the crystalline form of calcite. Statoliths from the reptiles and amphibians were composed of calcium carbonate in the crystalline form of aragonite. X-ray powder diffraction patterns are presented as evidence for these conclusions.

Tentaculocysts from *Aurelia* were removed and analyzed by emission spectrography. Preliminary results indicate that there is a higher percentage of silicon in the tentaculocysts than in control samples. Statocysts from the crayfish were removed and analyzed by x-ray powder diffraction. The statoliths are composed of silicon dioxide in the form of quartz.

The Distribution of Lancelets Along the East and West Coasts of Florida

E. Lowe Pierce, *University of Florida*

Collections of lancelets were made in shallow water along the entire coast of Florida. Individuals in bottom samples were counted to determine their relative abundance. In areas of abundance environmental factors were measured in an attempt to define the optimum habitat. The west coast of Florida provides in many places suitable habitats for large populations of the lancelet, *Branchiostoma caribaeum*.

Morphological and Physiological Differences in Southeastern *Heterotheca* Grown under Uniform Conditions

Joseph N. Pinson, Jr., *Vanderbilt University*

Seed samples from five southeastern states were obtained in the fall of 1962. Disk and ray achenes were planted separately. Germination of the pappose, disk achenes occurred within three to six days. Epappose, ray achenes required from six to ten days for germination to occur. Time of flower initiation was found to vary markedly among the different population samples and to some extent within the samples. Based upon leaf shape, texture, and indument, three distinct morphological types were evident among the samples tested. This study furnishes information which suggests the need for several adjustments in the recent revision of *Heterotheca* by Wagenknecht, 1960, in respect to the taxonomic treatment of *Heterotheca subaxillaris* and *Heterotheca latifolia*.

Radioactive Fallout and Vegetation in the Georgia Piedmont

Gayther L. Plummer, *University of Georgia*

Various plant species in different habitats have been assayed by gamma spectrometry to determine the relative amounts of certain fallout radionuclides that are concurrent with each species. Fission products contaminate vegetation by direct deposition from airborne particles and by the physiological processes of bioaccumulation.

The net gamma spectrum differs for each species and for each micro-habitat within a mutual area. The abundance of one radionuclide may vary as much as 30 times from one plant to another. A radionuclide in conjunction with a plant species varies in abundance with the season. Fallout fission products are transported by runoff rain water from one micro-habitat to another, and bioaccumulation is indicative of the input or output in the respective habitats.

Gentiana, Section Pneumonanthae, in the Southeast

James S. Pringle, *University of Tennessee*

Eleven species of *Gentiana*, section Pneumonanthae, are native to the Southeast. *G. alba*, *G. andrewsii*, and *G. puberula* are prairie species, confined to a few relict colonies. *G. clausa* and *G. linearis* are northern species with their southern limits in the Blue Ridge. *G. villosa* and *G. saponaria* are of general distribution. *G. cherokeensis* is considered synonymous with *G. saponaria*. *G. decora* is endemic to the southern highlands. Occasional cases of introgression are encountered in some species. An undescribed variety of *G. clausa* in the Blue Ridge, now essentially breeding true, may thus have originated.

A Graduate Program in Plant Taxonomy

Albert E. Radford, *University of North Carolina*

A graduate program in plant taxonomy should include the floristic, experimental, and phylogenetic aspects with work in the field, herbarium, laboratory, garden and library as integral parts of the study. The problem approach should be basic to each major aspect so that the taxonomy student will have research experience in the major divisions of the field regardless of the dissertation subject.

Pigment Cell Maturation as Triggered by the Tissue Milieu *

Willie M. Reams, Jr., *Louisiana State University*

Pigment cells introduced into the relatively neutral environment of the coelomic lining of White Leghorn chick embryos can follow their intrinsic mode of maturation free of extrinsic influences until late in development. A comparative study has been made wherein melanoblast-laden embryonic tissues of the mouse and of Silver Campine fowl were grafted intracoelomically into three-day White Leghorn embryo hosts. Following recovery of the graft sites after day 13 of incubation, an analysis of the pigment cell forms was made. It was noted that the morphogenesis of a pigment cell in one tissue as compared to that of another tissue was not directly related to the arrival time of the migratory melanoblasts into the respective regions. Further, the onset of morphogenesis of a pigment cell is triggered by the basic capacity of the tissue community at a specific time in ontogeny. Pigment eells will continue to proliferate until their maturation of shape is initiated by the tissue milieu. Once triggered, although removed from the initiating site, the morphogenesis of a pigment cell proceeds to termination.

* Supported by N. S. F. grant G-14153-GB271.

Vegetative Characteristics of *Utricularia foliosa* (Lentibulariaceae)

Grady W. Reinert and R. K. Godfrey, *Florida State University*

Vegetative characteristics of Utricularias (bladderworts) are highly modified. Species occurring in eastern North America are distinguished by a few salient characters with emphasis on reproductive structures. Descriptions of vegetative characters are incomplete or almost lacking. Preliminary studies reveal constellations of vegetative characteristics for the several species sufficiently diagnostic as to be of much taxonomic value. This paper summarizes results of observations on detailed gross vegetative structures of *Utricularia foliosa* L., a large, handsome, submersed, non-attached aquatic species occurring from Florida to Louisiana and in the West Indies. It is particularly abundant in the Florida Everglades. The body of *U. foliosa* is comprised of five principal parts, the principal axes, two very different lateral, determinate, "foliar" branch systems (one is much more bladder-bearing than the other), an "air shoot," and an inflorescence branch. Conspicuous glands occur on surfaces of various of the parts and these secrete an abundance of colorless mucilage which envelops the submersed organs. A feature unique to *U. foliosa* is a conspicuously flattened axis.

Growth and Development of *Gloeodendron*, Korsh. (1916)

Russell G. Rhodes and Walter Herndon,
University of Tennessee

Studies of cultures of a freshwater chlorophycean alga from Nonnamessett Island, Mass., indicate that it is *Gloedendron*, previously unknown in this hemisphere. The mature thallus is a reticulum of palmelloid threads which arise from individual cells by longitudinal, transverse, and tetrasporine divisions. Vegetative cells are chlamydomonad, but lack flagella and frequently lack an eyespot. External to the thin cellulose wall is a broad pectinaceous stratified sheath; the stratifications are persistent and cell lineages within the reticulate segments may be traced. Reproduction is by fragmentation, zoospores and akinetes. Zoospores are surrounded by flexible eellulose walls and are spherical at quieseence. Initial studies indicate that, at 21°C. and 12-hour light/dark cycle, length of the motile period is a function of light intenisty; at an intensity of 10 ft. candles the zoospores do not produce a reticulate thallus but reproduce themselves; at 60 ft. candles intensity, the reticulate thallus is formed.

Some Characteristic Families of Flowering Plants of Southern Africa

Herbert P. Riley, *University of Kentucky*

Some of the interesting and typical families of flowering plants found south of the Zambezi River are described and illustrated. Among the more characteristic are the Caesalpiniaceae, Mimosaceae, Papilionaceae, Proteaceae, Bombacaceae, Euphorbiaceae, Asclepiadaceae, Ficoidaceae (Aizoaceae), Compositae, Geraniaceae, Strelitziaceae, Liliaceae (especially the Tribe Aloineae), Amaryllidaceae, Iridaceae, Restionaceae, and Gramineae. The various vegetation regions are pointed out and located geographically and the characteristic families of each are noted.

Velocity Profiles of Amoeboid Movement

Robert A. Rinaldi, *University of Tennessee*

Previously, a technique, "pictograph technique," was developed by this author to plot movements of granules in *Amoebe proteus*. One does not follow individual granules through consecutive frames of a motion picture film, but one takes a single, time-exposure photograph of an amoeba illuminated by darkfield microscopy. Those granules that are moving rapidly record as long streaks, some will appear as shorter streaks, and granules that are not moving will register as dots. One can obtain accurate velocity profiles of protoplasmic movement. These amoeba pictographs have revealed: (1) Regions of the gel are moving at different rates; (2) There exists greater granular movement at the anterior and posterior regions of the amoeba; (3) There exists a forward flow of protoplasmic granules through the interstices of the gel; (4) There is a uniform flow in the central region from tip to tail of the advancing amoeba.

The Respiration of Small Whole Fishes

Martin Roeder and Rachel H. Roeder,
The Woman's College of the University of North Carolina

The respiration of several types of small fishes has been measured in order to establish a base-line for comparison between normal and cancerous fishes. Data will be presented on measurements made on normal fishes before and after treatment with various minerals and biochemical additives. Comparison will be made between these data and those found in the literature, in view of the wide discrepancies between the present report and the literature. All data will be reported in terms of oxygen consumption per hour per milligram Kjeldahl nitrogen.

Augmentation of Interfollicular Melanocytes Induced by Trauma in Mouse Skin *

David T. Rovee and Willie M. Reams, Jr.,
Louisiana State University

Although melanocytes are limited to the hair follicles of adult belly skin of the mouse, they are found throughout the integument of the newborn. Trauma applied to the belly skin of newborn mice results in the maintenance of the melanocytes within the skin, even after the formation and growth of hair. The area immediately surrounding the site of trauma shows an increase in the number of melanocytes, undoubtedly due to the disruption of the developing follicles and the consequent release of their pigment cells to the skin. The significance of the maintenance and augmentation of melanocytes from the newborn into the adult as related to the U-V induction of melanocytes in adult mouse skin will be discussed.

* Supported by N. S. F. grant G-14153-GB271.

Cytological Studies of the Genus *Phalaenopsis* (Orchidaceae)

Yoneo Sagawa, *University of Florida*

Although the significance of chromosome numbers in hybridization and development of superior forms in such groups as *Cattleya, Paphiopedilum, Cymbidium, Dendrobium,* and *Vanda* have been well documented, only limited information is available on the genus *Phalaenopsis.*

Cytological studies of the genus *Phalaenopsis* indicate that most of the species are diploid with a chromosome number of 38 ($x = 19$). Hybrids derived by use of pink-flowered species only are generally diploid. The Euphalaenopsis section includes many polyploid forms. The exceptional modern white-flowered hybrids are mostly tetraploids or pentaploids. The results of use of pentaploids in further development of the modern white-flowered forms are still to be seen.

The information on chromosome numbers by other investigators is summarized together with data derived from this current study in order to establish the nature and degree of polyploidy extant in the genus.

Amino Acid Analyses in Male-Sterile Cottons

Patricia Sarvella and Borislav Stojanovic,
Mississippi State University

Descending two-way paper chromatography was used to determine differences in amino acids between normal and male-sterile cottons. One genetic male sterile, two partial genetic male steriles, and two cytoplasmic sterile stocks were used. Flowers, buds, and leaves were studied. Buds were collected five (M + 5) and ten (M + 10) days after meiosis. Most amino acids studied were present in all the papers. Leaves from stocks with complete sterility appeared not to have tyrosine and cysteine (or cystine) in the acid hydrolysis fraction. Valine, two unknowns, and a high concentration of gamma amino butyric acid were usually present in alcohol-soluble fraction. Amino acid differences between normal and sterile flowers and buds in various stages of devclopment were more quantitative instead of qualitative. Several amino acids were present in the mature flowers, sometimes in the M + 10 buds, and absent in the M + 5 buds.

Further Observations on Vascular Epiphytes in the Smoky Mountains

A. J. Sharp, *University of Tennessee*

Dryopteris marginalis (L.) Gray and *Heuchera villosa* Michx. have been found growing on a trunk of a large basswood, *Tilia heterophylla* Vent.

A Comparison of the Southeastern and Western Species of *Schoenolirion* (Liliaceae)

Harry L. Sherman, *Vanderbilt University*

Five taxonomic species comprise the genus *Schoenolirion* Durand, three native to the southeastern United States and two restricted to the mountainous region of northern California and southern Oregon.

Since the first of the western species was described by Durand in 1855, controversy has developed concerning the question of generic limits. Durand (1855), Torrey (1859), and Gray (1876) treated the two species groups as a single genus, although certain differences in floral characters were pointed out. In synoptical treatments by Watson (1879) and Gates (1918), the two groups were recognized as different genera, mainly on the basis of floral differences already known.

A more general comparison of the southeastern and western species, based upon results of recent cytological, morphological, and anatomical studies of both groups, suggests that the present taxonomic treatment of *Schoenolirion* may not be consistent with that afforded other genera within the tribe Chlorogalinae.

Combination Chemotherapy of Experimental Mouse Leukemia

J. Richard Thompson, Jack H. Moore, and Frank M. Schabel, Jr., *Southern Research Institute, Birmingham 5, Alabama*

An effort is being made to find combinations of anticancer drugs which are potentiating or synergistic in action against experimental neoplasms. In order to investigate combinations of drugs, we have considered the combination as a new drug and before concluding that the combination is better than either drug alone, we have demanded greater therapeutic activity by the combination of drugs than that which can be demonstrated by either drug alone, irrespective of dose, route or schedule.

Theoretical considerations, based on studies (1) of biochemical mechanism of action of active drugs and (2) on experimental neoplasms with acquired resistance to these agents, make it appear logical to conclude that a combination of agents which inhibit essential metabolic activity (separate or sequential) might be more effective than single-drug therapy. A further stimulus to the consideration of combination chemotherapy results from the fact that intensive empirical screening has turned up few new agents and these are not outstandingly active; hence the interest in improving known active agents. Synergism is often inferred where no therapeutic potentiation has been produced; this protocol will simplify execution and interpretation of combination chemotherapy trials.

A Chromatographic Comparison of Luminescing and Non-Luminescing Cultures of *Panus stypticus*

Joanne C. Tontz
Woman's College of the University of North Carolina

Surface grown cultures of the North American strain of *Panus stypticus* have the ability to luminesce. The same strain grown in a submerged culture lacks luminescence. Thin-layer chromatography was utilized to determine chemical differences between these two cultures. While the specific components of fungal luminescent systems remain enigmatic, it is hoped that this study will aid in understanding the origins of luminescing systems.

Fluorescing Compounds in Lichens *

Alma Toevs Walker, *University of Georgia*

Cladonia subtenuis and *Usnea strigosa* are fruticose lichens under study for fluorescing compounds. The dried lichens are homogenized in acetone or aqueous methanol and then successively extracted with petroleum ether, ethyl ether, and ethyl acetate at neutral and acid pH from water suspensions. The respective extracts undergo further separation by ascending paper chromatography using petroleum ether-methanol-water, n-propanol-ammonia-water, and n-butanol-pyridine-water solvents. Components are detected by distinctive fluorescence and location on the chromatogram under ultraviolet light. A magnesium acetate-methanol spray followed by heating intensifies some fluorescence. Aqueous ferric chloride–potassium ferricyanide identify phenolic compounds. A crystalline compound precipitating from petroleum ether and ethyl ether fractions is being purified to determine its composition. Color slides will illustrate the fungus-alga association, crystal formations, and chromatographic separations.

* This work is supported in part by a grant from the Elizabeth Thompson Science Fund of the American Academy of Arts and Sciences.

An Atypical Conjugation in *Tetrahymena pyriformis* *

Carolyn Wells, *Longwood College*

Members of the breeding system of the ciliate, *Tetrahymena pyriformis,* are usually micronucleate strains, since amicronucleate cells will not ordinarily unite with cells of other strains to form conjugating pairs. There are two exceptions to the observation that mating type strains are always micronucleate. One strain, 1/I am. is a radiation-produced amicronucleate strain of variety 1, mating type I; the other strain, EU 6525 (variety 6, mating type I) is also an amicronucleate product of irradiation. Cells of both of these strains will conjugate with cells of appropriate complementary mating types. Conjugation between micronucleate and amicronucleate cells could produce haploid progeny. If so, the system would be a useful method for the detection of recessive mutations in one generation. The reorganization of the micronucleus during conjugation between 1/I am. × 1/II (micronucleate) has been investigated cytologically. Nuclear divisions proceed normally through second prezygotic division; succeeding nuclear events are usually abnormal. The pattern of this atypical reorganization will be discussed.

* Research supported by USAEC Contract No. AT-(40-1)-2793.

Effects of *Helminthosporium victoriae* and Victorin upon Permeability

Harry Wheeler and Homer S. Black, *Louisiana State University*

Victorin, a potent toxin produced by *Helminthosporium victoriae,* eauses marked changes in respiration and cellular permeability in oat tissues susceptible to Victoria blight. This paper is concerned with the nature of the permeability changes and the possible relationship to changes in respiration. Victorin-treated and naturally

infected susceptible tissues lost electrolytes more rapidly than control tissues when bathed in distilled water. The rate of electrolyte loss from treated tissue had a low temperature coefficient typical of a physical process and was not dependent upon oxygen tension. Furthermore, electrolyte loss was induced with concentrations of the toxin 50-fold less than that required to produce significant respiratory increases and were detected within five minutes whereas respiratory changes were not clearly evident until after 30 minutes. These results indicate that if a causal relationship between these two phenomena exists, changes in permeability precede and are responsible for changes in respiratory activity.

Effect of a Current on Respiration and Mineral Uptake in Species of *Spirogyra* and *Oedogonium*

L. A. Whitford and G. J. Schumacher

All species tested respond to a current with increased respiration and mineral uptake, but lotic (current inhabiting species show a significantly greater response than do lenitic species. Response seems to be directly proportional to speed of current between 6 and 40 cm./sec. The experimental set-up is briefly described.

Primary Production on a Moisture Gradient

James E. Williams

During the summer of 1962, on the upper Coastal Plain of South Carolina, primary productivity was studied on an ectone between an upland old-field and a Carolina Bay. The ectone consisted of two terminal plant communities mixed. Net and gross production of the dominant species were determined in the field with an infrared gas analyzer. Experiments show that increases in standing crop can be predicted for points on the gradient from clip-quadrat and gas analysis data.

Effects of Light and Darkness on the Biosynthesis of Carotenoid Pigments in Wheat Seedlings

Frederick T. Wolf, *Vanderbilt University*

Carotenoid biosynthesis in higher plants can occur in total darkness, but is increased by light. The carotenoids of ungerminated wheat grains, and of dark grown and light grown wheat seedlings 7-10 days of age have been examined by a combination of spectrophotometric and paper chromatographic methods. Only lutein, lutein epoxide and carotenes are present in the grain; the total quantity of carotenoids averaged 4.2 μgm./gm. fresh weight. Dark grown seedlings contained 91.7 μgm./gm. of carotenoids, including lutein, an unidentified component, neoxanthin, lutein epoxide, neozeaxanthin, violaxanthin, and carotenes, with lutein as the principal component. Light grown seedlings of equal age contained 180.5 μgm./gm. of carotenoids. No change occurred in the levels of violaxanthin and the unidentified xanthophyll, while lutein and lutein epoxide doubled and the carotenes increased 9-fold on illumination. The significance of these findings in relation to the role of light (photochemical) and dark (enzymatic) reactions in carotenoid biosynthesis is discussed.

The Dispersal of the Planktonic Diatom *Rhizosolenia alata* Inferred from Cell-Diameter Frequency Distributions

Robert A. Woodmansee, *University of Southern Mississippi and Gulf Coast Research Laboratory*

The dispersal of *Rhizosolenia alata* is inferred by comparing the cell-diameter frequency distributions of populations sampled at various times in Biloxi Bay and Mississippi Sound during post-bloom conditions. The chi-square test is used as an objective means of determining whether or not two given cell-diameter frequency distributions represent samples taken from the same or from different populations. This approach indicates (1) that the diatoms are being transported toward the sea in the surface layer and toward the land in the bottom layer and (2) that the narrower cells are sinking more rapidly. Therefore, the wider cells tend to remain at the surface and to be transported seaward and the narrower cells tend to sink and be transported landward.

Taxonomic Status of *Unicola* (Gramineae)

Harris O. Yates, *Vanderbilt University*

Results of a comparative study of the North American species of the Linnean genus *Uniola* suggest that the group is composed of discordant taxonomic elements. Data obtained from analyses of epidermal pattern, chromosome number and size, embryo structure, form of seedling leaf and vascular anatomy are presented in support of this hypothesis.

(*Continued from page 16*—Mountain Lake)

Lichenology, Dr. William L. Culberson, Duke University

Invertebrate Zoology, Dr. Robert P. Higgins, Wake Forest College

Helminthology, Dr. Martin J. Ulmer, Iowa State University

A limited number of National Science Foundation scholarships are available for research and study: (1) Post-doctorate for research, stipend $900; (2) Pre-doctorate for supervised research, stipend $400; and (3) Post-graduate for training in field biology, stipend $300. Preference is given for studies coneerned with the biota of the region. Application blanks for these awards may be secured from Dr. James L. Riopel, Department of Biology, University of Virginia, and must be submitted before April 12, 1963.

(*Continued from page 16*—Instruction?)

Title underlined	1
Author's name all in capital letters	1
Author's name in parenthesis	1
Institutional affiliation omitted	3
Institutional affiliation, title, and author omitted	1
Institutional affiliation and author in wrong place	3
Institutional affiliation not italicized (underlined)	85

Now editorial instructions are not spelled out for the sheer perversity of telling people what to do, nor are they intended to demand conformity for the sake of conformity. They are there for the simple reason that without them chaos would exist in the editorial field just as it would on the highway were there no traffic regulations.—C.W.H., Jr.

Commercial Exhibits at the Gainesville Meeting

The Social Room of the Florida Union will be the site of the commercial exhibits. They will be open all day on Thursday and Friday and until noon on Saturday. All members are urged to visit the exhibits. Exhibitors will also be available during the smoker, on Thursday evening.

American Optical Company will have on demonstration a series of both compound and stereomicroscopes. These will range from student to advanced research models. Mr. James Lyon, Florida representative, will be present.

Bausch and Lomb Optical Company will show a range of microscopes which can be used in the elementary class as well as research models. Mr. Russell M. Smith, southeastern representative, will be present.

The Bendix Corporation offers three Bendix/Akashi Electron Microscopes which vary in both performance (10 Å to 20 Å resolution) and price ($14,900 to $26,000). However, they have one thing in common. Unique column design permits uncomplicated operation and greater reliability. A Bendix representative will be present to answer questions. Micrographs and literature will be displayed.

Cardinal Products, Inc. will have an array of scientific supplies and equipment. Items of interest will be microscopes, micro-projectors, and photomicrographic equipment.

W. H. Curtin & Company was founded in 1922 in Houston, Texas by Mr. W. H. Curtin. The company is one of the largest in the South and one of the major suppliers of scientific equipment and supplies. Thirteen locations to serve the scientific needs are located in Houston, Jacksonville, Miami, Atlanta, New Orleans, Birmingham, Memphis, Dallas, Corpus Christi, San Antonio, Tulsa, Albuquerque, and Mexico City. Resident sales personnel are strategically based in other locations to provide additional personal assistance to customers throughout the area served. One of these men, David W. Fouts, resides in Gainesville. "Curtin" carries comprehensive stocks of equipment and supplies in their seven warehouses and some representative supplies in most of their Sales Offices. "Curtin" publishes their own catalogs (general and specialty) and supplements these catalogs quarterly with their "Labnotes."

HALCO Scientific Instrument Company in Atlanta, Georgia, began selling and servicing optical equipment 13 years ago. Representatives from HALCO now make frequent calls on customers in all the Southeastern States, as far North as Washington, D. C., and as far West as Texas. This company is franchised dealer for Carl Zeiss, E. Leitz, Reichert, Wild-Heerbrugg, and Graf-Apsco microscopes; Photovolt and Labline equipment; the Sartorius Balances; and Brinkmann Instruments. Carl Heard, Assistant Manager at HALCO, will be at the exhibit booth to demonstrate: Bright-field Microscopy, Phase Microscopy, Photomicrography, and Micro-projection.

Holt, Rinehart and Winston, Inc. will feature the Modern Biology Series . . . a fresh and imaginative look at life science in ten beautifully written paperbacks: Loewy, *Cell Structure and Function;* Levine, *Genetics;* Ebert, *Development;* Savage, *Evolution;* Odum, *Ecology;* Sistrom, *Microbial Life;* Griffin, *Animal Structure;* Burnett, *Animal Adaptation;* Ray, *The Living Plant;* Wagner, *Plant Diversification.* Other titles to be featured: Fuller-Carothers: *The Plant World,* 4th ed.; Best-Taylor: *The Human Body,* 4th ed.; Jellinck: Boolootian-Heyneman: *An Illustrated Laboratory Text in Zoology.* The Biology Studies Series will also be featured: Carlquist: *Comparative Plant Anatomy;* Crafts: *Translocation of Solutes in Plants;* Slobodkin: *Growth and Regulation of Population;* Sutton: *Genes, Enzymes and Inherited Diseases.*

McGraw-Hill Book Company, Inc. will have on exhibit their complete line of books for instruction in Biology. Featured will be the second edition of Weisz's *The Science of Biology.* Mr. W. Kenneth Mathew, manager of the southern district, will be at the display.

Scientific Products will have on demonstration many of the new instruments and laboratory equipment which are essential items in any well-equipped laboratory. There will be a representative on hand to demonstrate.

D. Van Nostrand Company, Inc. will have on display their latest textbooks in the fields of Biology, Botany, Bacteriology and Zoology. There will be many books which ought to be considered by those looking for textbooks for fall classes.

Ward's Natural Science Establishment, Inc. will feature the latest in teaching aids in Biology. These will include plastic mounts, charts, and models which are essential in any modern biology laboratory. Mr. Jerome Schott, Florida representative, will be present at the booth.

Will Scientific, Inc. (Ga.) will feature the Bronwill Biosonik Cell Fracturing Apparatus as well as the latest Bioloid Biological Specialties. Other equipment will also be demonstrated by a representative.

News of Biology in the Southeast

About People

Robert E. L. Black of the School of Marine Science of the Virginia Institute of Marine Science, Gloucester Point, Virginia has received a National Science Foundation research grant in the amount of $28,200 for support of work entitled "Enzymes Systems in Marine Embryos." This grant will provide summer salaries and equipment for a continuation of the studies on the bio-chemistry of developing embryos. Dr. Black will use a part of this research money to undertake research at the Bermuda Biological Laboratory during part of the coming summer.

Morris L. Brehmer and **Dexter S. Haven** of the Virginia Institute of Marine Science, Gloucester Point, Virginia have received a third grant of $20,000 from the Atomic Energy Commission to continue studies on the accumulation of radionuclides and the deposition of these fission products by filter feeding organisms. In addition to the work on the AEC grant Haven will be testing molluskicides on Eastern Shore this summer.

Thomas L. Johnson of the University of Virginia has been obtaining specimens of male decapod crustaceans from the Crustaceaology Department of the Virginia Institute of Marine Science for the past two years. He is studying the histology of the male reproductive system of these decapods in his doctoral research.

Clayton R. Kyte from Antioch College is an exchange student working as an aide at the Institute for this term. He replaced **Thomas K. Newbury** from Antioch who worked the first term and has now returned to Antioch to class room studies during the winter term.

Bernard C. Patten, Head, Planktology Department of the Virginia Institute of Marine Science has recently received a grant from ONR for studying energetics and organization in plankton communities. He will employ two assistants, one at the Ph.D. and the other at the M.A. level to assist with this investigation.

James S. Sterling, Virginia Institute of Marine Science, left March 1, 1963, for the Indian Ocean where he will collect fish parasites during the next three months. He will be a member of the first cruise of the International Indian Ocean Expedition, which is being sponsored and coordinated by UNESCO. All expenses, including scientists' salaries, are being paid by the National Science Foundation. This is a project directed by William J. Hargis, Jr., Director of the Virginia Institute of Marine Science, furthering his world-wide studies of host-specificity of fish parasites.

Jesse C. Thompson, Jr., Hollins College, will leave April 15, 1963 to participate in the International Indian Ocean Expedition. He will spend ten weeks at Mandapam Camp in Southern India investigating the ciliated protozoa of the Indian Ocean. Dr. Thompson has accepted a professorship of Biology at Hampden-Sydney College and will occupy this position in September 1963.

Lyman Randlett Emmons, Assistant Professor of Biology, was awarded a John M. Glenn Grant-in-aid by Washington & Lee University to continue work in the field of human cytogenetics.

Howard J. Teas, Head of the Agricultural Bio-Sciences Division of the University of Puerto Rico Nuclear Center, is on leave to serve as Program Director for Metabolic Biology in the Division of Biological and Medical Sciences of the National Science Foundation.

Tulane University has appointed **Dr. Fred R. Cagle** as vice-president of the university. Dr. Cagle, who previously served as chairman of the department of zoology and coordinator of research, will be responsible for coordinating the expanding research activities of Tulane. Dr. Cagle joined the Tulane faculty in 1946. He received his bachelor's degree from Southern Illinois University, and his masters and doctor of philosophy degrees from the University of Michigan. As vice-president, Dr. Cagle will guide the expanding research activities of Tulane, and will coordinate such recently established projects as the International Center for Medical Research and Training in Colombia, the Biomedical Computer Center, the Center for Latin American Studies, the Inter-American Institute for Medical Research, and the Delta Regional Primate Researeh Center.

John J. Gallagher, Research Associate at Northeast Louisiana State College, edited the Rotifer section of the just published Needham & Needham "A Guide to the Study of Fresh-Water Biology," 5th Edition (Holden-Day, Inc., San Francisco, Calif., $2.25). This extremely well illustrated manual covers the field taxonomically from plankton algae to fishes and includes sections on methods.

Leta Jane Holman and **Billy S. Batts** are new additions to the biology staff at Longwood College. Dr. Holman holds the B.S. degree from Texas Technological College, M.S. from the University of Michigan and the Ph.D. from the University of Maryland. Her research interest is in the field of acarology. Mr. Batts did his undergraduate work at the University of North Carolina and has the M.S. degree from the University of Washington. Mr. Batt's research is in the field of taxonomy, ecology, and physiology of the cold-blood vertebrates.

Robert E. Black, Associate Professor of Biology at the College of William and Mary, has been awarded a renewal grant of $28,100 from the National Science Foundation to continue for two years his studies of the distribution and activity of enzymes in subcellular fractions obtained from eggs and early developmental stages of marine invertebrates. Dr. Black will spend the summer of 1963 at the Bermuda Biological Laboratory.

Lillian C. Thomsen, Professor of Biology at Mary Baldwin College, is retiring in June, 1963. After June her address will be 414 Boyce Ave., Farmington, Missouri.

Institutions and Organizations

A facility for use in the study of population physiology has been completed at the **College of William and Mary** and will be put into operation in April, 1963. The building will provide facilities for the work of **Dr. Bruce Welch,** Assistant Professor of Biology, one additional investigator, and graduate students.

The National Science Foundation has just published a guide to the scientific and technical literature of Albania, Bulgaria, Czechoslovakia, Hungary, Poland, Rumania, and Yugoslavia. It is intended for use by scientists, librarians, and students, and contains information of the announcement, availability, procurement, and translation of Eastern European publications in the physical, biological, and certain of the social sciences. Entitled "A Guide to the Scientific and Technical Literature of Eastern Europe," it is the first U. S. attempt to provide such a guide. Major chapter titles include, "How to Obtain East European Publications," and "East European Scientific Information Available in English." A 50-page appendix contains an annotated list, by scientific discipline, of 440 East European scientific and technical periodicals. The guide was compiled, with NSF support, by Battele Memorial Institute, and is available without cost from the Printing and Publications Office of the National Science Foundation, 1951 Constitution Avenue, Washington 25, D. C.

Tulane University has established a new program of graduate study leading to the doctor of philosophy degree in biostatistics. The doctoral program in biostatistics is designed to train students in the application of mathematics and statistics to the fields of biology, medicine, and public health. Tulane has offered the master's degree in biostatistics since 1956, and is one of the few universities in the country and the only one in the Deep South offering graduate level degrees in this field. The new graduate program will be headed by **Dr. Robert F. Lewis,** professor of biostatistics in the Tulane school of medicine.

The National Science Foundation announces the next series of closing dates for receipt of proposals for basic research in *Life Sciences*—May 15, 1963, *Social Sciences* May 1, 1963. Proposals received prior to these dates will be reviewed and notification of the Foundation's action will be made within four months. Proposals received after these dates will be reviewed following the fall closing dates (Life Sciences, September 15; Social Sciences, October 1; Graduate-level Research Facilities, August 1). Inquiries or proposals requesting support should be addressed to the National Science Foundation, Washington 25, D. C.

The Biology Department of **Old Dominion College,** Norfolk, Virginia, has received a matching National Science Foundation Equipment Grant. This $12,400 grant is for advanced equipment such as several constant temperature rooms, a Warburg respirometer, a spectrophotometer, microbalances, etc.

(*Continued from page 14*—Treasurer's Report)

EXPENDITURES:

Goethe Award mailing expenses ..		$ 2.24	
Wake Forest Convention expenses:			
Folders	$58.97		
Lettering Conven. Certificates	1.50	60.47	
Meritorious Award		100.00	
Bulletin labels		9.02	
April Bulletin		321.69	
		$ 493.41	$ 493.42
Balance			$ 431.86
Cashier's check to transfer account to new treasurer			$ 431.86

—Elsie Quarterman, *Treasurer*

Treasurer's Report, 15 May 1962-31 December 1962

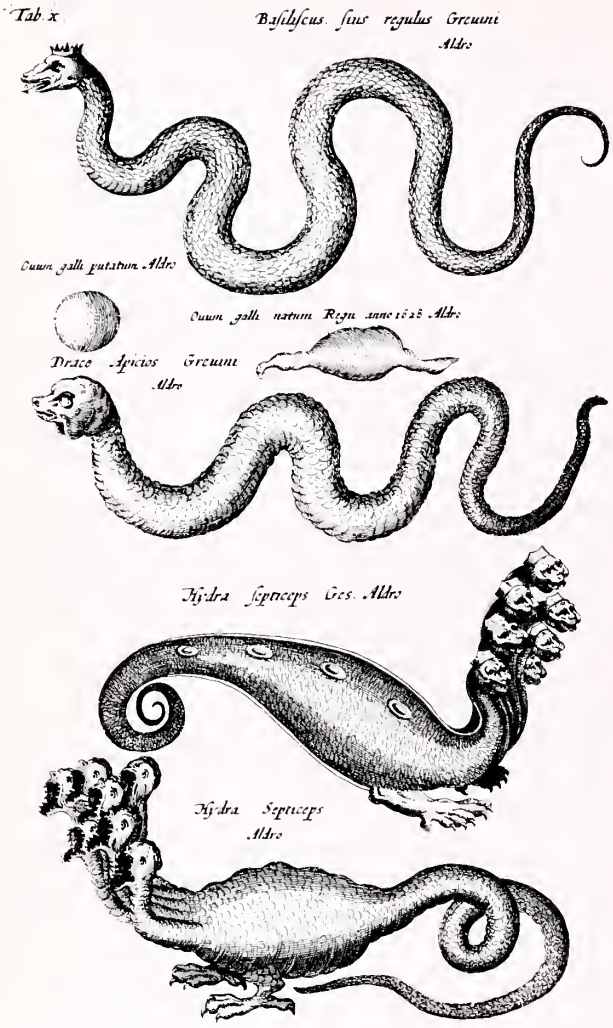
SAVINGS ACCOUNT:			
Balance on hand May 15, 1962 ...			$ 893.29
CHECKING ACCOUNT:			
Balance on hand May 15, 1962 ...		$ 431.86	
Receipts:			
Will Corp.—exhibition fee	$ 10.00		
C. M. Goethe for Goethe Travel Awards	250.00		
Dues and subscriptions	806.00		
		$1,066.00	
			$1,497.86

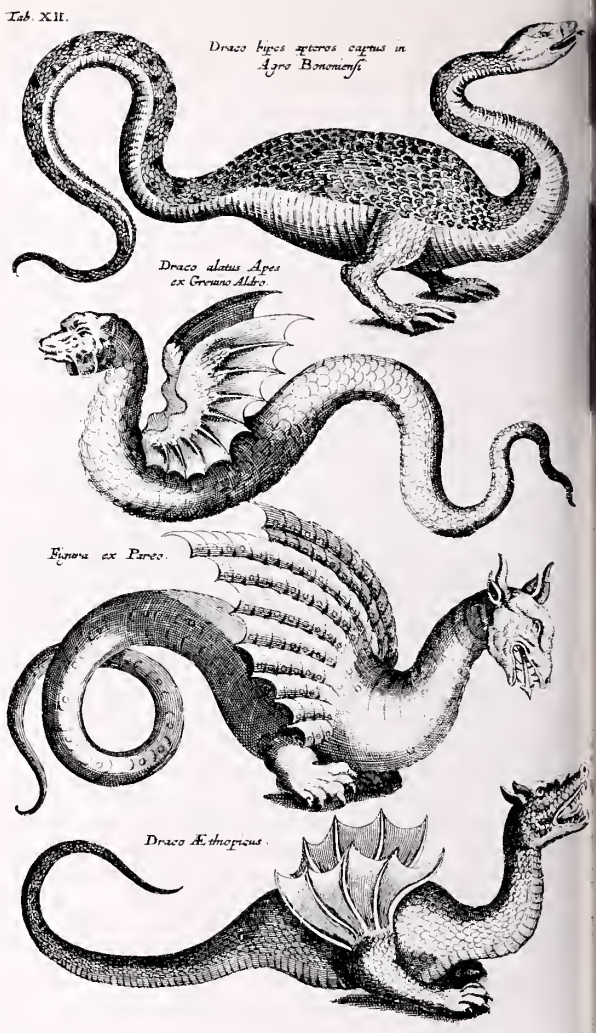
EXPENDITURES:

Bulletin:			
Mailing and printing, July and October	320.72		
Editor's miscellaneous	95.47		
		416.19	
Secretary:			
Membership maintenance and labels	33.65		
Travel to meeting (Winston-Salem)	119.35		
		153.00	
Treasurer:			
Postage	22.00		
Clerical assistance	10.00		
Treasurer's miscellaneous	4.48		
		36.48	
			605.67
Checkbook balance			$ 892.19
Outstanding checks			66.25
Bank balance			$ 958.44

—Leland Shanor, *Treasurer*

NOTES





The cover picture is from Joannes Jonstonus' *Historiae Naturalis de Quadrupedis,* published in Amsterdam in 1657. This magnificent griffin is one of many beasts illustrated in the volume—some reasonably true to life, some even more fanciful than this.

The illustrations above are from the same volume, in the *Historiae Naturalis de Serpentibus.* The drawing of the *Hydra Septiceps* Ges. Aldro. is apparently taken from the *Historia de Serpentibus* of Conradi Gesneri—published in 1587.

These illustrations are from the Pre-Linnean Book Collection of the Academy of Natural Sciences of Philadelphia, and were made available through the courtesy of Miss Margaret Greenwald, Librarian, Academy of Natural Sciences.—C. W. H., Jr.

The ASB BULLETIN

Volume 10, Number 3 July, 1963

J. VAN KESSEL (1626-1679): *Lo Studio di un Naturalista.* PITTI PALACE, FLORENCE. COURTESY OF THE GABINETTO FOTOGRAPHICO ALLA SOPRINTENDENZA, UFFIZI, FLORENCE. SEE *The Naturalist as an Art Critic, page 47.*

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 10, Number 3—July 1963

The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Subscription rate for nonmembers of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

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C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Betty Ursomarso, Assistant Editor
Leland Shanor, Business Manager

CONTENTS

ASSOCIATION AFFAIRS

BUSINESS MEETING
Room 208, Union Building
University of Florida
April 19, 1963

President Flory called the meeting to order at 11:45 A.M. and after his introductory remarks asked the Secretary, the Treasurer and the Auditing Committee for their reports.

Secretary's Report. The Secretary stated that the total active membership was 985 including 77 individuals who had joined the Association since the previous business meeting, and that 33 states and 7 foreign countries were represented by the membership. He then presented the names of Emeritus Members and asked the membership to assist him in compiling a more accurate roll of such members. He also reported that only one design had been submitted for the Association Seal and that the Executive Committee had recommended that the contest be continued for another year. A motion to accept the report was made, seconded and passed.

Treasurer's Report. The Treasurer presented an Interim Report and expressed his appreciation for the cooperation given him by the membership over the past year. A motion to accept the report was made, seconded and passed.

Auditor's Report. The Chairman of the Auditing Committee stated that the books of the Association had been audited and found to be in order. A motion to aeeept the report was made, seconded and passed.

President Flory then presented Dr. Frank S. Jamison who discussed the financial situation of AIBS and appealed to the ASB to give its support to AIBS. He reported that 4,000 AIBS members had contributed $114,000 to alleviate the situation and that the amount owed by AIBS to the National Science Foundation was $190,000 as revealed by the most recent audit. He assumed that subsequent audits would show that still more was due NSF. He concluded his remarks by stating that the blame for the financial condition in which AIBS finds itself rests on all the officers of AIBS and all affiliated organizations.

(*Continued on page 57*)

THE NATURALIST AS AN ART CRITIC *was presented as a Distinguished Scientists Lecture at the Annual Meeting of the Academy of Natural Sciences of Philadelphia on 29 April 1963 by Dr. G. Evelyn Hutchinson, Sterling Professor of Zoology at Yale University. The address is being printed simultaneously here and in the Proceedings of the Academy of Natural Sciences.*

The Naturalist As An Art Critic

BY G. EVELYN HUTCHINSON, Department of Biology, Yale University

DURING THE EARLY period of the formation of those large collections which ultimately became the bases of the public museums of Europe, such virtuosi and cognoscenti as collected objects of natural origin also usually collected human artifacts, both for their intrinsic value, beauty, and on account of their historic associations.

In the earliest inventory[1] of a great princely collection in Western Europe, that of the Duc de Berry, brother of Charles V of France, who was born in 1340 and died in 1416, there were a few odd natural history specimens mentioned, ostrich eggs, probably an elephant molar, tusks of wild boars, a bird's bone remarkable for its lightness, a porcupine quill and various pebbles which seem odd in a collection made up of an unbelievable number of precious stones, pearls, jewels, vessels and images of gold and silver and relics of the saints, almost all of which have disappeared, and of manuscripts, some of which are still among the glories of mediaeval French art.

Later collections, in the 16th century, were richer in natural history, and in fact almost exclusively biological collections were first made at that time. However, a number of the most famous were very mixed even at a much later date. The most striking examples are those of Elias Ashmole, actually largely assembled by his friend John Tradescant whom we commemorate in *Tradescantia,* which enriched the University of Oxford, and of Sir Hans Sloan, in part based on the cabinets of other collectors, which formed the basis of the British Museum in both its branches. Perhaps even in the 17th century such collections may have raised philosophical or moral problems. Jan van Kessel's painting (see cover) in Florence now called "Lo studio di un naturalista," though certainly amusing, must also have allegorical roots that I am not expert enough to excavate.[2] The naturalist whose study is depicted by van Kessel seems to have been interested in birds, caterpillars, strange and mythological plants such as the mandragora or mandrake, surveying instruments, telescopes, and coins. I would call your attention to the amount of jewellery that he amassed; this seems to have been one of the classes of object most favored by early collectors, partly no doubt as an investment as well as for its beauty.

Since we are celebrating the close of the hundred and fiftieth anniversary year of the oldest natural history museum in the United States, in a city that is also famous for its art collection, it has seemed appropriate to consider some aspects of the dichotomy between natural history and art museums, and to ask why some objects are put into one and some into the other. If at first the answers seem obvious, there will, I think, prove to be enough difficulties to lead us into interesting if obscure regions of the human mind.

Initially the objects in a collection were assembled to be looked at. They are to arouse admiration and pleasure in their beauty, wonder at their strangeness or history, envy or awe at their costliness or rarity. The simple reactions of the unlearned to the strange or marvellous give some idea of the primary reactions to objects in a collection, reactions which most of us have forgotten. A peasant woman enquires if the *pala d'oro,* the great gold and enamelled Byzantine altar frontal in San Marco in Venice, is really

[1] Guiffrey, J. 1894-6. Inventaires de Jean Duc de Berry (1401-1416). Paris. E. Leroux. I. (1894) CXCIV, 347 pp. II. (1896) 321 pp.

[2] In a very curious painting said to be the only known work of Giuseppe Crespi the younger, reproduced (Plate L) and discussed (p. 306-307) by H. W. Janson (*Apes and Ape Lore in the Middle Ages and the Renaissance,* London, Warburg Institute 1952, 384 pp.), a monkey is depicted holding what looks like a shell to his ear, surrounded by a fantastic assemblage of instruments, natural history specimens and antiquities. Janson connects this picture from the late 18th century with the *Tractatus secundus de Naturae Simia* of Robert Fludd, 1618. Ian van Kessel's painting perhaps belongs in the same obscure tradition, though he also painted less problematic *singeries.*

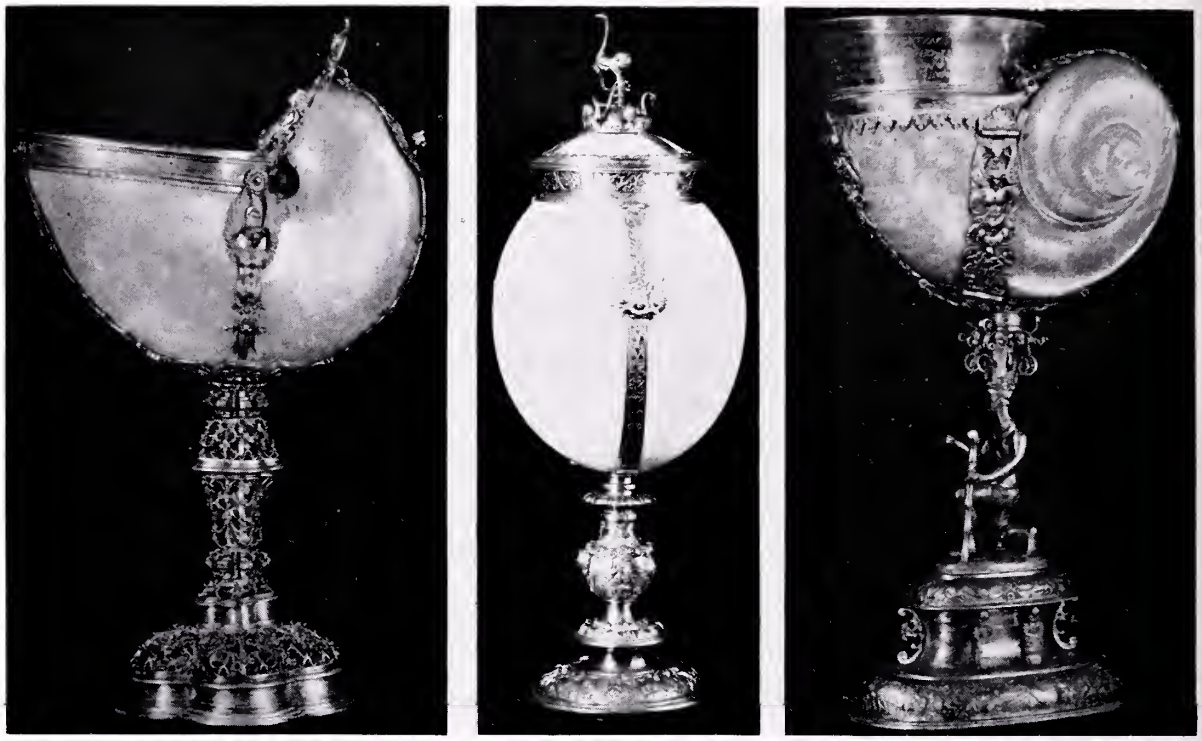


Figure 1. **Left:** *Nautilus* cup, Augsberg 17th century; **center:** Ostrich-egg goblet, Leipzig 1560-80; **right:** *Turbo marmoratus* cup, ?Nürnberg, 16th century (Vienna, Kunsthistorisches Museum no. 62, 95, and 116; E. Kris Publ. Kunsthist. Samml. Wien: Goldschmiedearbeiten I, Tafeln 5 and 67). By kind permission.

made of gold. Napoleon or his officials are said to have been persuaded that it was much too big to be really golden, and so left it unconfiscated and unmolested.

In the crypt of the Basilica of Sant' Ambrogio in Milan, the great Saint Ambrose lies between two somewhat undocumented martyrs, San Gervasio and San Protasio; another peasant woman exclaims "che nomi" at hearing the unfamiliar names attached to venerable skeletons in a sacred place. In a secular context many people entering a natural history museum for the first time must wonder, if only for a momen, whether a pterodactyl or a dinosaur really could have lived, and how they got their names.

We can begin to get some insight into our problem by considering a group of rare and strange objects, that achieved their greatest popularity during the period just about the time that collections were beginning to become differentiated, in which the properties of some natural object play a very great part in the decorative qualities of an *objet d'art*. Some of these composite objects, such as richly mounted bezoar stones or the nuts of the mysterious coco-de-mer *Lodoicea maldivica* (Gmelin) Pers, were treasured for their fancied alexipharmic properties. Most however are purely decorative and we can divide these into two more or less discrete classes. In the one which we will call *self-theorising objects* the natural structure that provides the decorative form, also displays, or would if we fully understood it, the deterministic laws by which it came into being. Here we have as examples of the effects of rotation during translation down the oviduct, in the form of an ostrich egg, mounted as a goblet (Figure 1, center). On a much smaller scale rotation of pearls against some more resistant part of a mollusk's foot or mantle can make an acorn pearl. This probably most often happens in mobile pearl-producing mollusks, such as the freshwater *Margaritifera* (Figure 2, top right). Crystals, which proclaim at least part of their atomic structure in their macroscopic shape, can be mounted in their natural condition to make jewels (Figure 2, top center). The banding of an agate, presumably exemplifying Liesegang phenomena of diffusion in a colloid, can be used in conjunction with the form of the bezel (Figure 2, below) of a ring or any other mount. The example illustrated, a ring dating from the 16th century, is of interest in that the concentrically circular agate was often regarded as a toadstone and as such protective or magical properties were ascribed to it; this ring moreover also came through Sir Francis Cook from the Marlborough Collection, which was largely formed from the jewellery of

the great 17th century Arundell collection. This identical ring may therefore have been in a cabinet of a great aristocratic virtuoso at the time when J. van Kessel painted the picture we have just examined. Horns, very early made into drinking vessels, exhibit a form clearly dependent on the mode of their growth, and shells of *Nautilus* (Figure 1, left) and *Turbo* (Figure 1, right), used to form magnificent cups, specifically display the logarithmic spiral characteristic of the growth processes of many mollusks and some other animals.

At least in the use of shells and possibly also of more perishable materials, the employment of actual organic objects for their decorative properties and of copies of them in various workable media must have grown up side by side giving the huge range of phytomorphic and zoomorphic forms known to art. At a more recent time wax flowers were doubtless valued for looking natural before they were valued for looking artificial.

In direct antithesis to the *self-theorising object*, may be set the *elegant ink blot,* the baroque pearl mounted to bring out its imagined resemblance to the torso of a mythological figure (Figure 3), or on a less princely scale the driftwood or other *objets trouvés* of the surrealists and some later schools. In these, stochastic processes dominate the form, the selection and appreciation of which obviously involves some sort of psychological projection.

In the recent history of museums the various attitudes expected to arise in the minds of the observers have been sorted out, purified or perhaps merely divided into categories convenient in administration. We see the mixed objects that I have just described primarily as artifacts; if we happen to be interested in the pure natural history of the natural part, the artificial part is regarded as an exeresence that gets in the way of scientific vision.

Today we enter an art gallery expecting to be delighted by the beauty of certain works of man; we enter a natural history museum expecting to be instructed in the workings of nature. There are also museums in which archaeological or ethnographical material is displayed to illustrate something about man that is akin to natural history, and indeed the same point of view is apparent in the grouping of works of art in any modern art gallery, where the pictures are placed by schools and periods, i.e. geographically and chronologically, just like fossils in a palaeontological collection. What seems often to be lacking, at least explicitly on the part of the intelligent public, is the realization that a number of objects in the natural history museum are of extraordinary natural beauty and that they should be valued quite simply as such, as well as for their scientific connotations. In practice in any good museum such as this one, the public displays are largely implicitly based on such aesthetic considerations. The question however of the nature of the beauty of the natural world and its relation to human art deserves more consideration than it is customarily given, and deserves such consideration quite specifically in the context of the natural history museum.

If we enquire why we make a distinction between the work of art and the object of natural beauty, which enquiry is a partial rephrasing of our original question, I suppose that at the present time the essential difference would usually be described in terms of communication or expression. What is valued in the work of art is supposedly not the sort of intrinsic beauty that we find in nature, but some evidence of a message from, or expression of, the personality of another human being, the artist who made the work. This concept however leads us into very considerable difficulties. The late Bernard Berenson said at the end of his life, of which seventy odd years had been largely spent in problems of attribution, that it did not matter who painted a picture as long as it was a real picture. This obvious truth, coming from him, carries non-obvious overtones. In the more limited modern vocabulary that we are using, it may be rephrased that it does not matter who painted a picture as long the picture is a genuine expression. In the light of such a statement let us look at an oil study of a mulatto lady (Figure 4)

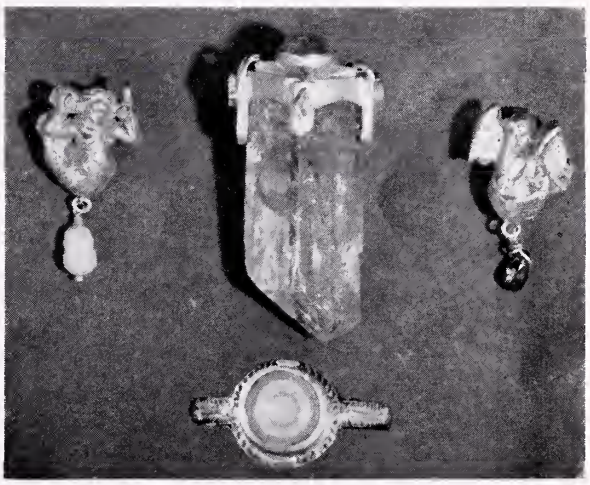


Figure 2. **Above:** Sah Oved: contemporary English; topaz crystal mounted as a pin, between earrings, Mermaid in her Vanity, and Pelican in her Piety, the former with acorn pearl. **Below:** Ring, 16th century (Yale Univ. Art Gallery 1959-43-24; *ex. coll.* Margaret Hutchinson, Sir Francis Cook, Marlborough and quite possibly Thomas Howard, 2nd Earl of Arundel, the greatest collector in 17th century England).

wearing only a red and green turban and holding a long bamboo cane, first deciding, without asking about its history, if it is a real picture genuinely expressing something to the observer.

The painting is known to have been among the effects of Eugène Delacroix, sold at auction in Paris in 1864.[3] It was apparently included in a miscellaneous lot of seventeen studies supposedly by the painter himself, which were not described individually in the sale catalogue. It passed into the Cheramy collection, and was sold, as by Delacroix, in 1908, though not listed as by him in the Cheramy catalogue published in that year. In 1954 it appeared, as by Delacroix, in an exhibition of 19th and 20th century French painting at the Lefèvre Gallery in London. At this time it evidently generated much excitement; it was reproduced in two art journals; the *Art News*, published in New York, wrote of it as "one of the chief pleasures" of the exhibition, "amazingly forceful though only 22 inches high." It was bought from the exhibition by a leading English museum, with a subvention from the National Art Collections Fund, and at the time of the purchase was hailed as of outstanding quality, and was praised for its distinction of vision and surety and sensitivity of handling. It evidently gave great satisfaction to all concerned, as it did to me when I saw it in 1958 and again in 1963. Later, however, the painting was regarded, as compared to certainly authenticated works of Delacroix's early years, "as mannered and timid in character and superficial in draughtsmanship and anatomical structure." It has indeed been suggested that it was probably the production of a dilettante called Jules-Robert Auguste, who for a time knew Delacroix; on at least one occasion they both worked from the same model. Auguste's known works, in pastel rather than oil paint, are said to possess a "preciosity of vision and metieulousness of style quite in conformity" with the picture we are considering. It is very hard to avoid the feeling that

[3] Goodison, J. W. and Denys Sutton, in Fitzwilliam Museum Catalogue of Paintings. Volume I. French, German and Spanish. pp. 172-174 for full discussion; also *Art News*, New York 53, p. 47, 1954; *Connoisseur*, London, 133, p. 260, 1954; *Fitzwilliam Museum Annual Report* 1954. Pl. IV, pp. 5-6, 1955. Mr. Goodison kindly writes that there can be little doubt that the attribution to Delacroix was mistaken, but that at present the evidence is quite insufficient that the painting is by Auguste.

Figure 3. **Left:** Mermaid; **right:** Triton, baroque pearls, jewelled and enamelled gold, Italian 16th century (Widener Coll. National Gallery of Art, Washington, D. C.). By kind permission.

great subjectivity is involved in the appreciation of sueh a work; so long as it comes from the brush of M. Delacroix its virtues arc emphasized, when his authorship is suspected all the faults suddenly become aparent, perhaps indeed overapparent. This leaves us in a very difficult, though admittedly honest, position in the face of the majority of the works of art in the world, whose makers are unknown. In the case of the painting we have been considering, without being able to express any real expert opinion, I have no difficulty in believing that it is not by Delacroix, but if, as seems rather unlikely, it is by a really weak painter, as Auguste seems to have been, he must have been so much under the influence of a better painter when he painted the work, that some of the virtues of the greater artist could be borrowed and incorporated into the work of the lesser man. It is worth noting that sometimes supposedly most characteristic works of major masters have turned out, as scholarship progresses, to be copies, studio pieces, or even works of fairly independent pupils. Since in some cases only the more obvious qualities of the master may be caught and transferred to the derivative work, the latter may become a sort of elementary introduction to the subtilties of the master, with an immediatc appeal leading in the right direction. The painting which first gave me insight into Zurburan, for instance, is a Santa Rufina now believed to emanate from his studio but not from his hand. At any rate all of us who have frequented art collections for any length of time must realize that we have almost certainly got what seems to be pleasure of the very highest order out of works of suspeet attribution. The exact origin of the message conveyed is perhaps of less importance than is often believed.

We may now as naturalists raise a still morc awkward problem, one that was adumbrated by the *singerie* painters of the 17th century,[4] the problem of the ape as artist. Unfortunately a certain amount of inevitable commereialism and humor has tended to obscure the extraordinary significance of the work that was started fifty years ago by Kohts in Russia and which has been reeently greatly developed by many workers, of whose studies Desmond Morris has provided an illuminating synthesis.[5]

The great apes and some other primates, notably capuchin monkeys, when put into an experimental environment in which they can exhibit it, have a sense of symmetry in design, which is most easily demonstrated by giving the animal a paper, blank except for a square set eccentrically. In a highly significant number of cases the animal will tend to mark the paper in such a way as to balance the design. Rensch moreover in experiments in which animals can make choiee of ready-made designs, finds that balanced patterns pleasing to ourselves also seem to please many other vertebrates. When the animal is given more elaborate opportunities for

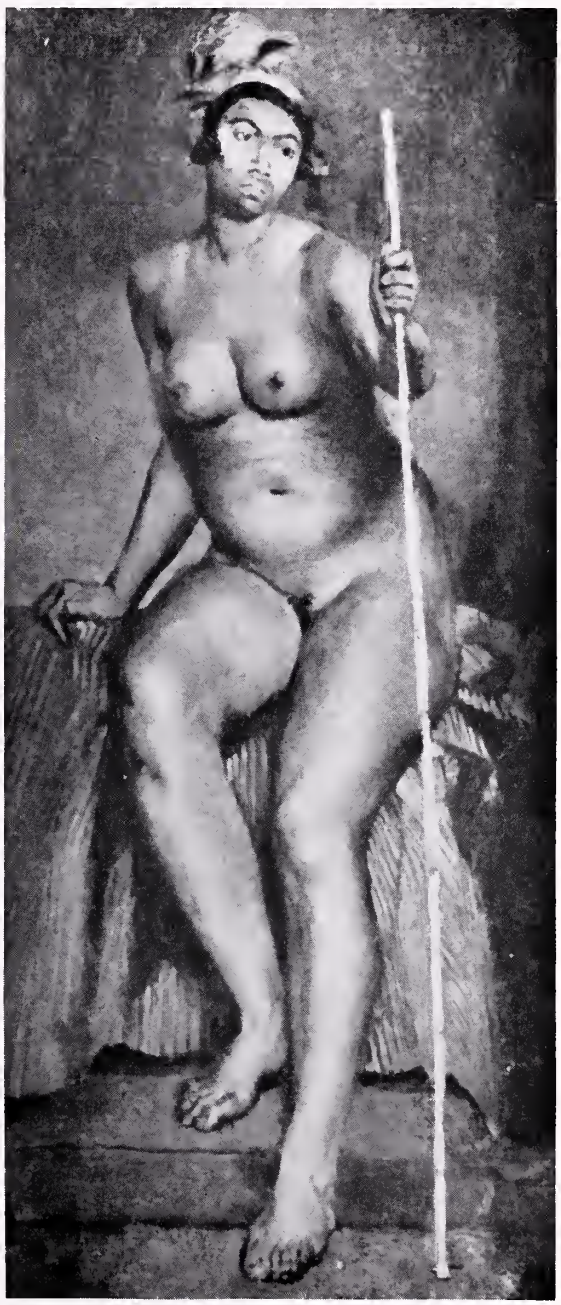


Figure 4. Study of a Mulatto Woman, French School 1820-25. (Fitzwilliam Museum, Cambridge.) By kind permission.

[4] For a series of 17th and 18th century satiric paintings of the ape as artist see H. W. Janson, *op. cit.*, chap. X.

[5] Morris, Desmond. The Biology of Art. 176 pp. London 1961.

artistic expression, Morris concludes that in all cases, there is, as well as compositional control of balance, an attempt at calligraphic differentiation of line; thematic variation within an individual style appears when paintings of the same animal are compared. There is also an attempt to achieve a degree of optimum heterogeneity giving a sense that a painting is complete. At least in young apes the activity is highly self-rewarding or autotelic. Any intrusion is resented more than if the animal had for instance been disturbed when eating. Providing the young apes with paints, brushes and canvas gives it, for the first time in its life, something very important to do.

The general level of achievement, though compared to action painting or abstract expressionism by some critics, appears to be that of a three year old child just prior to the development of diagrammatic representation of the human face.

What these studies show clearly is that the desire and capacity to engage in some sort of self-expressive autotelic activity exists in animals that have diverged from the human line many millions of years ago, and do not have the intellectual capacity to invent the mechanisms to provide the sort of satisfaction that is within their intellectual range.

Other examples of animals being able to gain satisfaction from far more complicated types of behavior than they can invent in nature could be multiplied, though none I think are more interesting than the artistic activities of primates. The capacity of seals to learn to perform on musical instruments and in some cases to get enjoyment from doing so, is perhaps another example; here we may suspect that an interest in the rhythmical sounds of breaking waves on the rocks or beaches of a shoreline has some initial adaptive value. It is evident that in a sense the more highly developed mammals are preadapted to inventions that for most of them have not become available.

It is reasonably certain that a large part of human intellectual evolution must have consisted in the rare invention of such activities, painting, dancing, music, games, counting and elaboration of language, which once they had been achieved accidentally or by exceptional insight of a genius, caught on with a large part of, if not the whole, population.

Whatever the expressiveness that is required to put an object in an art gallery may be, it is clearly not quite confined to the genus *Homo;* as the evolutionist would expect, it has a history and this history can be traced outside our own genus or family.

If we are prepared to grant that at least some of the qualities present in a human painting are also present in a very rudimentary form in those of the great apes, we may legitimately inquire about certain other kinds of animal activity which seem to us to have aesthetic properties. Most conspicuous are the songs and displays of many birds, the latter perhaps culminating in the extraordinary activities of bower birds in collecting and arranging decorative objects.

We may in the present state of knowledge make the following statements about such activities.

They are all parts of adaptive behavior directed to ends that are significant in the life of the animal, notably the holding of territory, retention of interest in a mate and the like. The significance always implies some sort of social interaction. Though usualy both innate and learnt behavior are involved, in many cases the behavior has a stereotyped innate component that is largely lacking when a human being sings, dances or paints, and for that matter when an ape is given the chance to do the last named. There is often a great discharge of neuromuscular activity which is reasonably regarded as comparable to what we know subjectively as emotion.

In a very large number of cases structures or activities used as social signals of a visual or auditory kind are found to be aesthetically significant to human beings. Apart from the fact that in many cases the aetivities involved are largely innate, which allies them perhaps more to elaborately grown structure than to learnt activity, the social and emotional aspects of animal display and the activities involved in the production of much so-called primitive art appear to be comparable. In both cases the aesthetic elements which we value are originally seeondary to the social functions subsumed by displays or rituals. If we compare the voice of a peacock with his tail we get a clear hint that what is needed to produce the secondary aesthetic effect, is a considerable degree of elaboration. In all structures used in display, the elaboration is no doubt correlated with the need for quite specific signals different from anything else. The greater the elaboration of two structures the less the probability that they will resemble each other. Moreover, if we look at all the organisms which we at first sight would regard as strikingly beautiful in a decorative rather than a purely functional way, or for that matter inanimate structures which give the same sort of impression, we find that nearly all the extraordinary cases are the product of some sort of differentiation in a relatively free environment, in water, or growing up into the air or at least moving about above the ground, rather than burrowing in sand or mud. I give no examples on the screen; being within a major natural history museum, *si exemplum vis, circumspice.* Wherever there is a

physical possibility of developing in a spacially unrestricted way in a context which either calls for or merely permits elaboration, we get natural beauty. Moreover in all cases we have more than a hint of what I initially referred to as a self-theorising property. The elaborate form tends to express deterministic laws that brought it into being, though often we may not know what they are but merely feel that the symmetry and elegance of the object before us implies a symmetry and elegance in the theory describing its genesis.

We have seen how the random irregularities of what I have called elegant ink blots are the vehicles for certain sorts of psychological projection, entirely irrelevant to the nature of the object, yet capable of giving considerable satisfaction under certain circumstances. We have seen also how in looking at an entirely conventional human work of art there can be an enormous subjective element in evaluation; a study of either forgeries or fashions in appreciation no less than over-enthusiastic attributions would lead to a comparable conclusion. We have to go out to meet the work of art on some ground between it and ourselves to receive its message; the place where we stand may make all the difference.

We have further seen that there is apparently a continuum from conscious human works of art, through immensely beautiful but in purpose only secondarily artistic works of primitive art, to animal activities and structures employed socially and then to those that are not so employed, and so finally to inanimate structures which we recognize as beautiful. As we get further from the human work, we find that what we see as beautiful comes into being largely as elaboration in a relatively unrestricted space, whatever the actual mechanisms of its development. This happens because there are orderly processes occurring in nature and when they get a chance to show what they can do, they produce elaborate works in which symmetry and elegance in the external world suggest that, even if we cannot explain the process yet, and we often can, the explanation would involve elegant theory, which it often does.

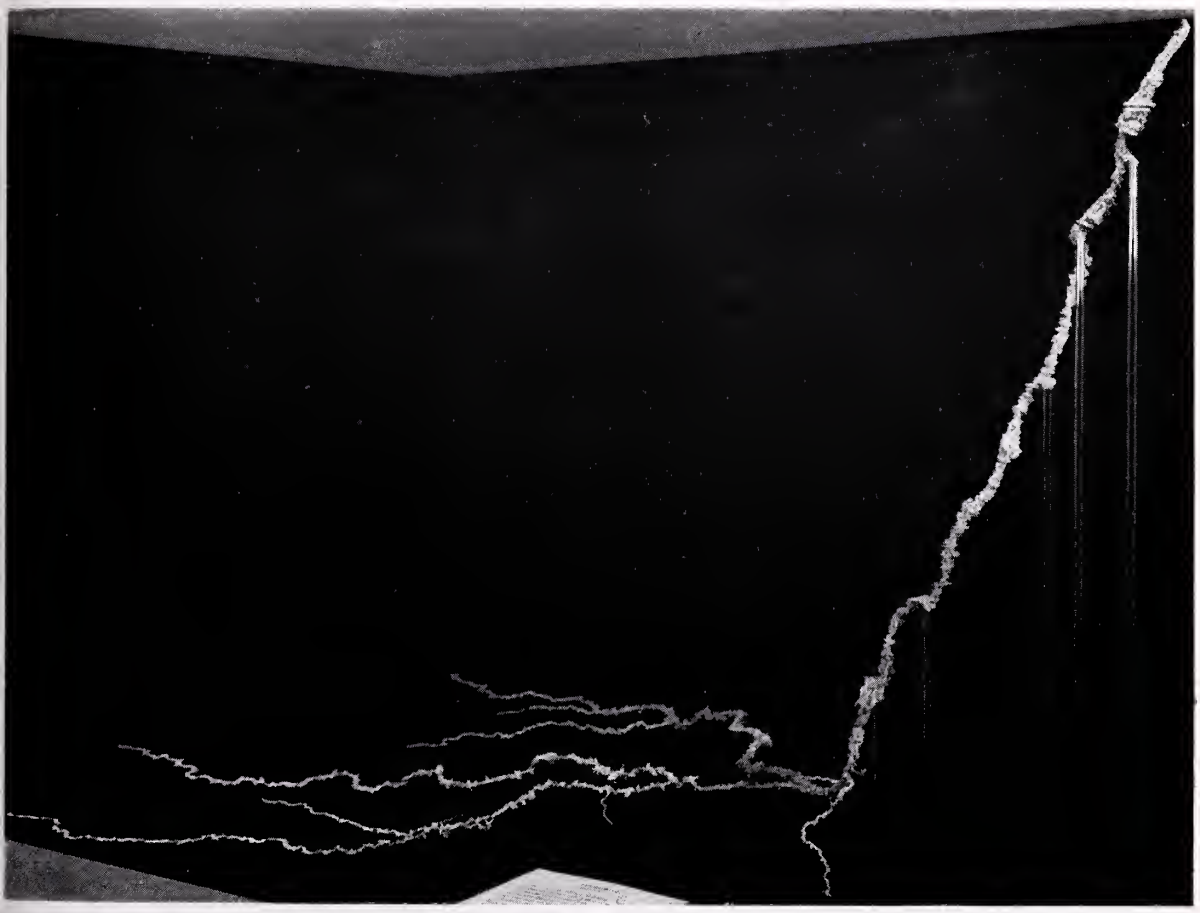


Figure 5. Fulgurite from Santa Rosa Island, near Fort Walton, Florida. (Academy of Natural Sciences, Philadelphia. Collected and mounted by Josephine Henry.)

Again as with human works, our viewpoint makes a considerable difference. An unforced feeling for how a form may arise can enhance its natural beauty. Some people may be willing to stop at this point, as every philosophical position, or lack of position, implies enormous difficulties. Others may want to go on further, feeling themselves in the presence of a message from nature or the external world which they go out to meet with their understanding. To be meaningful such a position would have, I think, to be theistic. It does not involve any logically compelling argument for the existence of God, but like each of the arguments on this matter, it makes its point if one is prepared to accept some of the others.

Meanwhile I think if the general trend of my line of thought makes at least partial sense, we can agree that in large measure the public exhibits in a good natural history museum are in some ways the modern counterparts of the nautilus cups and ostrich egg goblets of the Renaissance, constructed of both natural objects and a highly skilled kind of applied art. Yet they are far more important, because they are made to contain not wine, which anyway would be hard to drink from such objects, but scientific truths, made plain by the art with which the self-theorising properties of the specimens are exhibited. If the whole aspects of the work of a natural history museum is considered in this light, a taxonomically arranged set of diatom slides or drawer of insects, no less than a habitat group or your magnificent fulgurite (Figure 5), are seen to have some of the properties of works of arts. Although I think there are good reasons for separating art galleries and natural history museums, they still, even after more than a century and a half of autonomous development, may have much in common.

Acknowledgments. I am much indebted to the Soprintendenza alle Gallerie, Florence, to Dr. Erwin M. Auer, Director of the Kunsthistorisches Museum, Vienna, to Mr. J. W. Goodison of the Fitzwilliam Museum, Cambridge, and the Director of the National Gallery of Art, Washington, for permission to publish the photographs reproduced in figures 1, 2, 4 and 5; to Mr. Emiddio DeCusati and the Yale Art Gallery for figure 3, and to Dr. Ruth Patrick and the Philadelphia Academy for figure 6. I am most grateful to Mrs. Sah Oved and Professor Charles Seymour, Jr., for assistance and information about several objects discussed, to Miss Yemaiel Oved for one of the ideas that I have used, and to my wife for much help.

GEORGE HENRY PENN

1918-1963

Doctor George Henry Penn, Professor of Zoology at Tulane University and editor and founder of *Tulane Studies in Zoology* died after a short illness on May 10, 1963.

He was born on November 20, 1918, to George Henry Penn and Lydia Leroy Penn, in New Orleans, Louisiana. He attended Tulane University, earning his Bachelor of Science (major in zoology, minor in botany) and Master of Science (major in zoology, minor in parasitology) degrees in 1939 and 1941 respectively. His studies were interrupted by World War II in which he served in a U.S. Navy malaria control unit in the Southwest Pacific. He emerged from World War II as a Lieutenant. Upon his separation from the U.S. Navy he attended Cornell University where in 1947 he earned his Doctor of Philosophy degree in Medical Entomology with a minor in invertebrate zoology.

Professor Penn's interest in zoology was an early one cultivated by his tutor and beloved friend, a notable Louisiana naturalist, the late Percy Viosca. On many occasions he reminisced

George Henry Penn

of his early days as Percy's "assistant." Following his own background, he often gave encouragement to youngsters interested in animals. In his college days at Tulane he came under the able tutelage of such notable biologists as Professors E. S. Hathaway, and W. T. Penfound. His major professor at Cornell was Robert Matheson.

Upon his graduation from Cornell University, Doctor Penn was employed as Assistant Professor of Zoology at Tulane University. He rose to Associate Professor in 1952, and to Professor in 1957. At the time of his death he was Assistant Head of the Tulane University Department of Zoology, and had served as Acting Head during 1958-1959. His campus activities were wide and varied, having served on many important University committees. At the beginning of each academic year he and his wife were the gracious hosts to graduate students in the Department of Zoology, for he felt strongly about making personal social contact with all student in the department. Students were always welcome to discuss their problems with Professor Penn.

Doctor Penn published at least 68 authoritative papers on parasites, molluscs, branchiobdellids, crustaceans, porocephalids, mosquitoes, reptiles, and birds. He was probably best known for his work on fresh-water crustaceans, particularly the crawfishes. It has been said that he and his colleague and accomplice in his study of crawfishes, Doctor Horton Hobbs whom he regarded most highly, had divided the United States into two sectors for purposes of studying crawfishes! In spite of his interest in crawfishes, Professor Penn liked to regard himself as a general biologist rather than a specialist. He was a serious teacher who led scores of undergraduates into useful and productive careers in biology and medicine. His graduate students are many, and their theses are primarily on invertebrate animals.

Professor Penn was a member of 11 learned societies at the time of his death: Louisiana Academy of Sciences, Tennessee Academy of Sciences, Entomological Soeiety of America, American Society of Limnology and Oceanography, Society of Systematic Zoology, American Institute of Biological Sciences, Association of Southeastern Biologists, American Society of Zoologists, Ecological Society of America, American Association of the Advancement of Science, and the Society of the Sigma Xi. He is listed in *American Men of Science, Who's Who in the South and Southwest*, and *Leaders in American Sciences.*

Doctor Penn is survived by his wife, Mrs. Mary Elizabeth Harry Penn, a son George Hugh Penn, and a daughter Sylvia Celine Penn, who reside at 818 Fern Street, New Orleans, Louisiana.

The Association of Southeastern Biologists extends sympathy to his widow, daughter, son, and students.—FRANKLIN SOGANDARES-BERNAL

Patrick H. Yancey Receives ASB's Meritorious Teaching Award

The Meritorious Award Committee designated as Meritorious Teacher for 1963 Reverend Patrick H. Yancey of Spring Hill College, Mobile, Alabama. This award carries with it an honorarium of $100.00 from the Will Scientific Co.

Father Yancey was born in Tampa, Florida, and took his formal education at Gonzaga, Fordham, Barcelona, Woodstoek, and St. Louis, receiving his Ph.D. in biology in 1931.

He began and has continued his distinguished teaching career at Spring Hill College. His record of achievement in teaching is reflected in the *Mendelian,* a publication which he has moderated during the last 33 years, in the lists of medical teachers and practitioners, and especially in the professional biologists whom he has trained at Spring Hill and who are now teaching and doing research in all parts of the world.

Dr. Yancey has been a very active members of the Alabama Academy of Sciences, which he has served as president as well as a long standing representative of it on the Council of the AAAS. As regional Vice-President of Beta Beta Beta National Honorary Biological Society he has rendered great service to the cause of biology in our region during his tenure in office. Over a dozen new chapters were established in various colleges of the Southeast, and the high standards which he has exhibited in his own teaching at Spring Hill have been instilled into the various chapters of this region through his diligence and good example.

Martin Young Honored With Darling Foundation Medal And Honorary Degree From Emory University

For his outstanding contributions to research in malaria, Dr. Martin D. Young, Associate Director of the National Institute of Allergy and Infectious Diseases, received the Darling Foundation Medal and Prize at the plenary session of the 16th Annual Assembly of the World Health Organization in Geneva on May 9.

The bronze medal and the prize of 1,000 Swiss francs is awarded intermittently by WHO in memory of Dr. Samuel T. Darling, a U.S. member of the League of Nations Malaria Commission. Dr. Young is the second NIH scientist to receive the Darling Prize. Dr. G. Robert Coatney, Chief of the Laboratory of Parasite Chemotherapy, NIAID, received the award in 1954.

In accepting the prize Dr. Young said, "For a malariologist it (the Darling Prize) symbolizes the summit of professional recognition. I am aware that this award carries with it an extra measure of distinction and significance because it is administered by an international agency with the well-defined objective of attaining the highest possible level of health for people everywhere."

On June 10, Dr. Young was further honored with an honorary Doctor of Science degree from Emory University during the spring commencement exercises. The degree was awarded by University President Sidney W. Martin in recognition of Dr. Young's contribution to world health.

Dr. Young did most of his research on malaria at Columbia, S. C., where he was head of the field station of the Laboratory of Parasite Chemotherapy before coming to Bethesda in 1961. His research has been concerned with practically all phases of malaria, with particular emphasis on use of malaria parasites in the treatment of neurosyphilis, host-parasite relationships, biology and cytology of the parasites, chemotherapy, and the relative vectoral abilities of mosquitoes.

Most recently he has documented cases of resistance of certain strains of malaria parasites to two antimalarials, chloroquine and amodiaquine, which have been among the most effective drugs to suppress and cure malaria.

A native of Moreland, Georgia, Dr. Young has been an NIH staff member since 1937 and a member of the PHS Commissioned Corps since 1944. He holds an Sc.D. from Johns Hopkins and is a graduate of Emory University. In 1953 Dr. Young became the first NIH staff member to receive the Rockefeller Public Service Award. Dr. Young, his wife, and two children live at 5610 Durbin Road in Bethesda, Md.

Martin D. Young

The Duke University Marine Laboratory, Beaufort, North Carolina, is the site for a nine day conference on "The Biology of Estuarine Animals" to be held August 28 to September 5, 1963. The Conference, co-sponsored by the American Society of Zoologists and supported by the National Science Foundation, is designed to give college teachers of biology and zoology, actively engaged in teaching or research in this field, an opportunity to familiarize themselves with recent advances and exchange ideas with outstanding American and foreign workers. Inquiries on the details of the Conference should be directed to: Dr. F. J. Vernberg, Duke University Marine Laboratory, Beaufort, North Carolina.

(*Continued from page 46*)

President Flory then asked for reports from the Goethe Travel Awards Committee, The Constitution Committee, Committee on Meeting Places and The Nominating Committee.

Goethe Travel Awards. The Chairman reported that 16 applications for financial assistanee were received and that all were supported to some extent out of the $364.00 available. The Committee elected to support subsistence costs rather than those for travel. A motion to accept was made, seconded and passed.

Constitution Committee. The Chairman discussed the eonstitutional amendment presented at the 1962 Business Meeting, and as circulated in the Bulletin. He moved the adoption of the amendment, the motion received a second, and was passed by a show of hands.

He then presented a motion to modify the dues of the Association under Article 4, Section 1 of the By-Laws, with such modification to go into effect in 1964, as follows:

1. Undergraduate and Graduate dues	$ 2.00
2. Regular Members	3.50
3. Contributing Members	5.00
4. Sustaining Members	25.00

A motion was made and seconded to accept the modification. Dr. Robert W. Menzel proposed an amendment to the motion that would raise the dues of Regular Members to $4.00. The amendment was seconded and passed. The original motion was then brought to a vote and President Flory ruled that the necessary two-thirds vote in favor of the motion had been given and declared it approved by the Assoeiation.

The Chairman of the Constitution Committee then moved that the fiscal year of the Assoeiation be changed to January 1-December 31. The motion received a second and was passed by the Association.

Committee on Meeting Places. The Chairman reported that an invitation for the Association to hold its 1964 meeting at Emory University had been received from that University. A motion that the invitation be accepted was made, seconded and passed. The Chairman then reported that Dr. Shannon, President of the University of Virginia had invited the Association to meet at that University in 1965. A motion to accept the University of Virginia's invitation was made, seconded, and passed.

Nominating Committee. The Chairman of the Committee presented the recommendations of the Committee.

President Flory called for nominations from the floor and there being none he declared the nominations closed. Ballots were then distributed and Drs. Walter R. Herndon, Alvin V. Beatty and Robert W. Menzel were appointed as tellers. Dr. Herndon was appointed as Chairman of the Committe. President Flory announced that the results of the election, the report of the Meritorious Teaching Award Committee and that of the Resolutions Committee would be presented at the banquet.

Dr. Raymond L. Taylor, Associate Administrative Secretary, AAAS was introduced by President Flory and Dr. Taylor expressed his pleasure at being able to be present and extended the best wishes of the AAAS to the Assoeiation.

There being no further business President Flory declared the meeting adjourned at 12:45 P.M.

Submitted by:
Harry J. Bennett
Seeretary—ASB

REPORT OF THE RESOLUTIONS COMMITTEE

The committee presents the following resolutions:

Whereas, the Association of Southeastern Biologists, together with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Regional Section of Beta Beta Beta National Honorary Biological Society, and the Southeastern Division of the American Society of Ichthyologists and Herpetologists, is suecessfully holding meetings on the campus of the University of Florida, Gainesville, Florida, April 18-20, 1962;

and, Whereas, every possible convenience has been made available for our use, therefore:

Be it resolved,

first, that these groups express sincere appreciation to the President J. Wayne Reitz for the invitation to meet here, for the graeious welcome extended, and for the use of the university facilities for these meetings, and

second, that special thanks be expressed to Co-Chairman J. C. Dickinson and H. K. Wallaee and to each member of their committee on local arrangements, for the excellent provision of space, equipment and general comfort for all in attendance.

Whereas the Carolina Biological Supply Company has continued to contribute $100.00 each year as a research award; therefore

Be it resolved, that the sincere appreciation of the Association be expressed to Dr. Thomas E. Powell, President of the Company, for this contribution.

Whereas, the Will Corporation of Georgia has continued to contribute $100.00 each year as an award for meritorious teaching, now therefore

Be it resolved, that the genuine appreciation of the Assoeiation be expressed to Mr. Charles Waite of that corporation for this contribution.

Whereas, Mr. C. M. Goethe has continued to provide funds for the Mary Glide Goethe Travel Awards, and generously contributed an extra amount this year so that all applicants eould reeeive awards,

Be it resolved, that the sincere appreeiation of the Association be expressed to Mr. Goethe for his continuing interest and support.

Whereas, Dr. Royal E. Shanks was a long-standing member of the Association of Southeastern Biologists, serving it in many capacities and was its immediate past president at the time of his death on August 4, 1962; and

Whereas, through his broad training, wide interests, unusual abilities in teaching and research, his services were invaluable not only to the southeastern region of the United States but to the whole field of biological scienees,

Be it resolved, that the members of the Association of Southeastern

Biologists hereby express their grief at the loss of a beloved colleague, and instruct the Secretary of the association to convey their deep sympathy to his family.

Respectfully submitted,
E. C. Cocke
A. J. Sharpe
Alvin Beatty
Margaret Y. Menzel,
Chairman

EMERITUS MEMBERS

Baker, W. B.
Blomquist, Hugo L.
Boyd, George H.
Bradbury, Ora C.
Coker, Robert E.
Deacon, W. M.
Diviny, Ezda
Garver, D. L.
Harper, Roland
Hill, Benjamin H.
Hessler, L. R.
Kurz, Herman
Lewis, Ivey Foreman
McDougal, Mary
Shaftesbury, Archie D.
Sherman, Harley B.
Smith, Septima
Tingley, Alice
Totten, Henry B.
Wells, B. W.
White, Orland E.
Whiting, P. W.
Wolf, F. A.
Yancey, Father Patriek H.

RESUMÉ OF EXECUTIVE COMMITTEE MEETINGS

Items of General Interest

November 10, 1962.
Emory University

1. The Committee decided that the evening meeting, April 19, 1963, should be dedicated to the memory of Dr. Royal D. Shanks.
2. The Treasurer recommended that the membership be asked to approve an increase in dues at the 1963 Business Meeting.
3. The Committee approved the appointment of an Advisory Committee to assist the Editor in the establishing of policies relative to the Bulletin.
4. The Committee recommended the publication of the Constitutional Amendment relative to affiliates in the January, 1963 issue of the Bulletin.
5. Various types of membership were discussed with the discussion centering around the fact that the Association is now tax exempt and that this should make the obtaining of Patron Members much less difficult.

April 18 and 20, 1963.
University of Florida

1. It was decided that a permanent Advisory Committe should be appointed to assist the Editor on problems associated with the Bulletin.
2. The Treasurer reported that the response of the membership to dues notices had been excellent.
3. The Committee decided to submit a modification of Article IV, Section 1 of the Constitution calling for an increase in dues to the membership at the 1963 Business Meeting for its consideration.
4. The Committee decided that the membership should be asked to consider changing the fiscal year to January 1-December 31 at the 1963 Business Meeting.
5. The President suggested that the Constitution be published in the first issue of the Bulletin issued in each year divisible by 5. The suggestion was approved.
6. Dr. John M. Carpenter suggested that the Association should have a symposium of general interest as a part of its annual program. The suggestion was discussed at length but no action was taken.
7. The Editor recommended that the membership be sent a questionnaire asking what it would like to have appear in the Bulletin, and was of the opinion that more articles of general interest should be submitted for publication. The Committee agreed that the questionnaire should be sent and discussed ways and means of obtaining articles of interest for the Bulletin.
8. The Treasurer suggested that a central office to be managed by a Secretary-Treasurer should be established but the Committee was of the opinion that this should not be done at the present time.
9. The Secretary reported that only one design for an Association seal had been submitted and the Committee recommended that the contest be continued for another year.
10. The Secretary was instructed by the Committee to contact the membership to determine its interest in having a symposium as a part of its annual program and the most suitable time for it.

The National Science Foundation announces opportunities for U. S. scientists to participate in the Antarctic expeditions of foreign countries as Exchange Scientists from the U. S. Antarctic Research Program. Nations other than the United States with active Antarctic scientific programs include Argentina, Chile, France, New Zealand, the Union of South Africa, the United Kingdom, and the Soviet Union.

Research possibilities exist in the fields of atmospheric physics, biology, geology, glaciology, meteorology, and the marine sciences. The research program could be planned for a four-to-six month austral summer or for a fourteen-month period, including the Antarctic winter of 1964. Departure from the U. S. would probably be late in 1963.

Salary and expenses for travel, equipment, etc., associated with the exchange would be included in a grant to the investigator's institution. If necessary, assistance can be provided for acquiring a working proficiency in the appropriate foreign language before departure for the Antarctic.

Interested scientists are requested to transmit an outline of their proposed program with a specific foreign expedition to the Chief Scientist, Office of Antarctic Programs, National Science Foundation, Washington 25, D. C.

News of Biology in the Southeast

About People

Beginning with the 1963-1964 session, **Walter S. Flory** will be Mary Reynolds Babcock Professor of Botany at Wake Forest College. In addition to teaching duties he will be in charge of Reynolda Gardens. Dr. Flory will follow Dr. Paul B. Sears who has been the visiting Babcock Professor during the first year of its establishment. Since 1947 Flory has been Professor of Experimental Horticulture at the University of Virginia and Vice-Director and Manager of The Blandy Experimental Farm. In addition, since 1955, he has been Curator of The Orland E. White Research Arboretum. Dr. Sears is Professor Emeritus of Yale University, where he directed the Conservation Program before his retirement.

George W. Hunter, III (Ret.) has been in San Jose, Costa Rica since October, 1961. Dr. Hunter returns to the Department of Microbiology, College of Medicine and Biological Sciences, University College, University of Florida, Gainesville, in Otober, 1963. During his leave of absence he has served as Research Professor of Medical Parasitology of the Faculty of the LSU School of Medicine. He has been stationed with the LSU—International Center for Medical Research and Training (ICMRT) in San Jose where he has served as Resident Coordinator, Chief of the Administrative Section and Chief of the Section of Parasitology. Besides the administrative responsibilities that are inevitably associated with a new program Dr. Hunter has been active in research on various parasitological problems.

George K. Reid, Professor of Biology at Florida Presbyterian College, has been named president-elect of the Florida Academy of Sciences, and will assume his post next year. President of the Academy for the current year is **Alex G. Smith,** professor of physics at the University of Florida. Dr. Reid has recently received a grant from the Explorers Club of New York to go to Haiti to study the chemistry-temperature relationships and animal life of the island lakes. This is part of a larger project—a study of Florida lakes under the National Science Foundation which he received in 1961.

The Society of the Sigma Xi and its associated organization, the Scientific Research Society of America (RESA), announced today through the chairman of their Grants-in-Aid of Research Committee, Dr. Harlow Shapley, an award to **Francis M. Bush,** Department of Biology, Howard College, Birmingham, Alabama, to assist in his study of the plasma proteins on an ABO-like blood group in natural populations of *Passer domesticus domesticus.*

The National Science Foundation has awarded a $37,900 grant to Virginia Polytechnic Institute for a study of the functions of the striatum of the avian brain and its role in the stereotyped "instinctive" behavior characteristic of birds as a class. The long-time project will be under the direction of **Dr. Richard E. Phillips,** Assistant Professor of Zoology.

Harold A. Dundee, Assistant Professor of Zoology in the College of Arts and Sciences at Tulane University, has been elected president of the Southeastern section of the American Society of Icthyologists and Herpetologists. Presently serving as secretary-treasurer of the society, Dr. Dundee has been a Tulane faculty member since 1958.

James Rex Baird has accepted an instructorship in botany at Washington and Lee University. Mr. Baird is finishing his doctorate at the University of North Carolina.

Jaek S. Brown, Emory and Henry College, has accepted appointment as Professor of Biology, Parsons College, Fairfield, Iowa, effective in June, 1963.

John G. Mahan of the Lynchburg College biology staff has received a National Science Foundation fellowship for the summer institute in Marine Biology for college teachers at the Duke University Marine Laboratory at Beaufort, North Carolina.

Edward B. Cutler of the Lynchburg College biology staff has received a grant from the National Science Foundation for graduate work at the University of Washington Marine Laboratory at Friday Harbor for the first part of the summer, and from the Old Dominion Foundation for transportation to the Arctic Research Laboratory at Point Barrow, Alaska, for the second part of the summer. There he will work on the phylum Pogonophora with the English marine biologists, Drs. Alan and Eve Southward.

Warwick R. West and **William S. Wooleott,** Biology Department, University of Richmond, received a grant from the University of Richmond Research Fund to study the graduate research program offered by the Biology Department.

William S. Woolcott, Associate Professor of Biology at the University of Richmond, will teach a course in ichthyology at Mt. Lake Biological Station during the first term of the 1963 session.

Thomas M. Harris, Assistant Professor of Biology at the University of Richmond, received a grant from the University of Richmond Research Fund to complete his studies on certain phases of amphibian embryology.

William J. Hargis, Jr., Dean of the School of Marine Science attended a meeting of the Steering Committee of the Society of Exploration of the Atlantic Shelf in Miami on May 5, 1963.

Jesse C. Thompson, Jr., of Hollins College has named two new species of protozoa honoring William J. Hargis, Jr., and Marvin L. Wass of the Virginia Institute of Marine Science. One species is *Paratetrahymena hargisi* and *Paratetrahymena wassi*. Dr. Thompson discovered these two protozoa while working under a NSF-RPCT program at the Institute in 1961.

William J. Hargis, Jr., and **Bernard C. Patten** have recently been elected Fellows of the American Association for the Advancement of Science. Dr. Hargis efforts have been in parasites of marine fishes and marine ecology and Dr. Patten is concerned with marine productivity studies.

William J. Hargis, Jr., and **Marvin Wass** attended a short course and conference on Marine Borers and Fouling Organisms at the William C. Clapp Laboratory in Duxbury, Massachusetts on May 13-15.

C. Richard Terman has joined the staff of the College of William and Mary as an Assistant Professor of Biology. Dr. Terman received his Ph.D. degree from Michigan State University and completed two years as an N.I.H. Postdoctoral Fellow at the Penrose Zoological Laboratories. Dr. Terman has been awarded a three year grant of $35,000 from the N.I.H. to study early social experience and population asymptote in mammal populations.

Gustav W. Hall has joined the staff of the College of William and Mary as Assistant Professor of Biology. Hall will receive his Ph.D. degree in August from Indiana University.

Institutions and Organizations

Victor A. Greulach, chairman of the Department of Botany at the **University of North Carolina** at Chapel Hill, has announced that the department is now located in William C. Coker Hall, the new 68,000 square foot building constructed for exclusive occupancy by the department. The building is named in honor of Dr. W. C. Coker, who established the department in 1908, six years after he joined the faculty of the University, and who served as chairman between 1908 and 1944. Funds for the construction of the building were provided by the State of North Carolina, the National Institutes of Health, and the National Science Foundation. The building will be dedicated in the fall of 1963.

The first floor of the building is occupied by the plant physiology and ecology laboratories, the second floor (which is at ground level in the front) by lecture rooms and undergraduate laboratories, the third floor by mycology, microbial genetics and the departmental library, and the fourth floor by plant taxonomy, anatomy and cytology as well as the herbarium. A research greenhouse is attached to the building. A grenhouse has also recently been completed at the North Carolina Botanical Garden, which is operated under the supervision of the Department of Botany. This greenhouse was the gift of Mr. and Mrs. St. Pierre DuBose of Chapel Hill.

The National Science Foundation will accept, through October 7, 1963, applications for fellowships under the Senior Postdoctoral and Science Faculty Fellowship Programs.

Awards will be made in the mathematical, physical, medical, biological, and engineering sciences, and anthropology, geography, psychology (excluding clinical psychology), sociology (not including social work), economics (excluding business administration), and the history and philosophy of science. Also included are overlapping fields, such as oceanography, meteorology, biochemistry, biophysics, and geochemistry.

Applicants for Senior Postdoctoral Fellowships must be citizens or nationals of the United States, possess special aptitude for advanced training, and must have held the doctoral degree for at least 5 years or have equivalent education and experience. Senior Postdoctoral Fellows will be selected on the basis of ability as indicated by letters of recommendation and other evidence of scientific attainment. Applicants' qualifications will be evaluated by panels of scientists appointed by the National Academy of Sciences-National Research Council. Selection of approximately 100 Fellows will be made by the National Science Foundation.

Science Faculty Fellowships are for college teachers of science, mathematics, or engineering. Fellowships are open to citizens or nationals of the United States who hold a baccalaureate degree or its equivalent, have demonstrated ability and special aptitude for science teaching and advanced training, and who have taught at the college level as full-time faculty members for not less than three academic years and intend to continue teaching. Selection will be based on letters of recommendation, academic records, and other evidence of professional and scientific attainment and competence. Applicants' qualifications will be evaluated by panels appointed by the Association of American Colleges. Selection of approximately 400 Fellows will be made by the National Science Foundation.

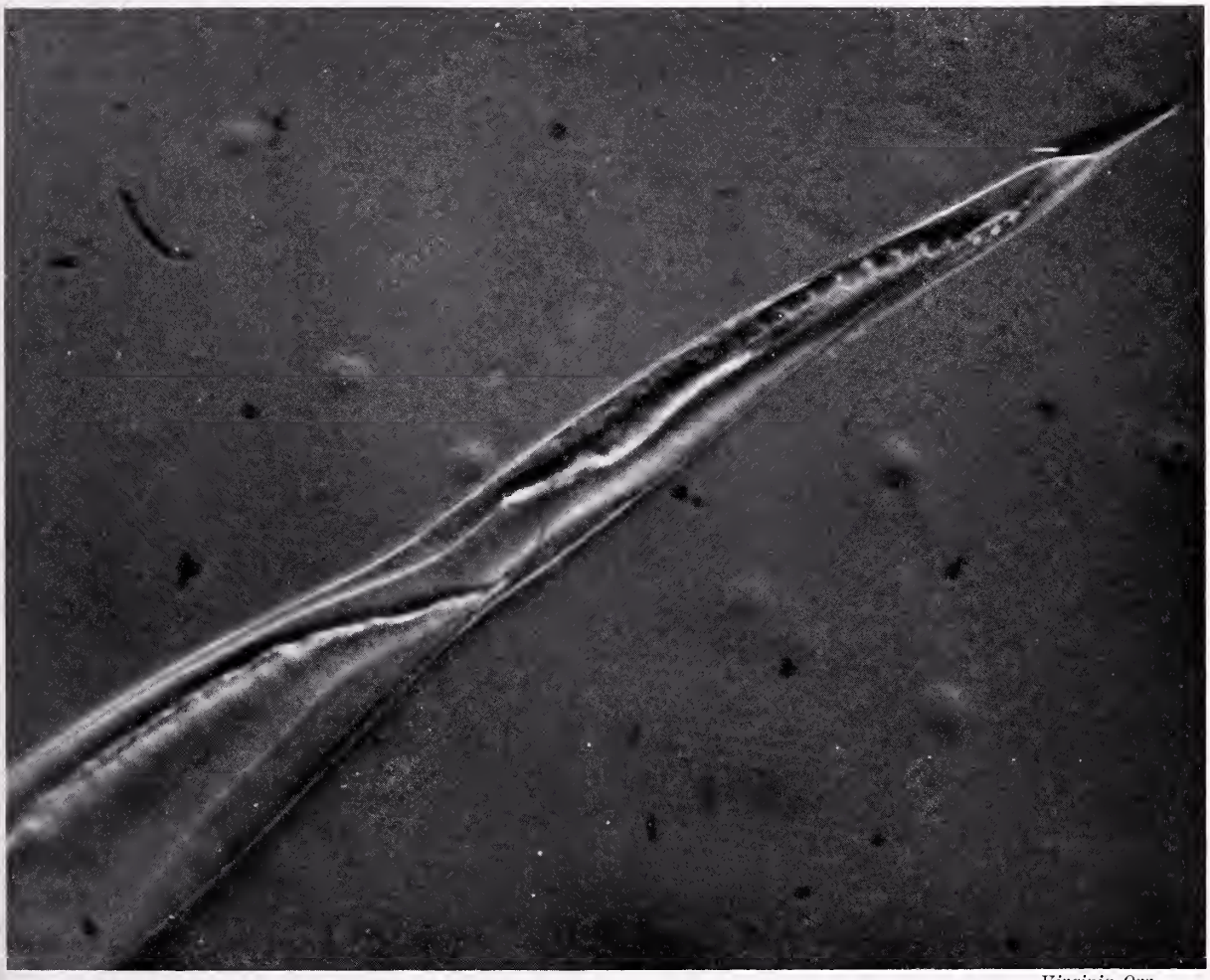
Stipends for successful applicants in both fellowship programs will be individually computed on a salary-matching basis, but the maximum support from the Foundation will be limited to $15,000.00 for a 12-month tenure.

Fellows may engage in study and/or research at any appropriate United States or foreign nonprofit institution. A limited travel allowance for Fellows and dependents will be available.

Application materials may be obtained from the Fellowships Section, Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D. C. Completed applications must be received not later than October 7, 1963. All applicants will be notified by letter on December 9, 1963, of the disposition of their applications.

The ASB BULLETIN

Volume 10, Number 4 October, 1963



RADULA TOOTH OF *Conus jaspideus* GMELIN *Virginia Orr*

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 10, Number 4—October 1963

The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Subscription rate for nonmembers of the ASB: $2.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

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C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Betty Ursomarso, Assistant Editor
Leland Shanor, Business Manager

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By ARNOLD GROBMAN

Last month the new biology curriculums developed over the past three years by research scientists and high school teachers became generally available to the schools. Here Arnold Grobman, director of the Biological Sciences Curriculum Study, which developed and tested these curriculums, offers a critique of past practices and indicates the changes that portend at every level from elementary school through college.

This article appeared in the Saturday Review *on 21 September 1963, and is reprinted here with the permission of the Saturday Review and the author.*

Biology Is Changing, Too

WITH some very striking exceptions, the present biology curriculum in American schools has fallen far behind the physical sciences in adapting to contemporary demands. Most of the school books make for dull, unexciting courses; although their illustrations are eolorful their texts are not. Too many teachers give courses with virtually no laboratory work or, at most, with a few demonstrations. This kind of biology becomes something the student reads about rather than something he does; it is not a study of science but rather a narrative about science.

Most children, when they start school, already know a good deal about living things. They are familiar with common plants and animals, have a rudimentary knowledge of anatomy and physiology, and understand something of the genetic relationships among animals. And they have a driving curiosity about living things.

Do our schools build on these spontaneous beginnings? Do they sustain and encourage natural curiosity about living things? Do they develop notions of scientific inquiry? Unfortunately, no.

At the elementary level (grades 1-6), with some exciting exceptions, biology teaching is uneven and disorganized. Seience instruction of all kinds rarely amounts to more than half an hour per day, and biology, of course, occupies only part of that time. Elementary science books do seem superior to those available for the higher grades and the growing number of well-written and well-illustrated supplementary books that can be obtained at low cost help to make the teaehing materials reasonably adequate.

But the elementary teacher in a self-contained classroom must, of necessity, be a generalist expected to teach the sciences in addition to reading, spelling, social studies, arithmetic, and other subjects and skills. He must work with youngsters possessing widely varying knowledge, aptitudes, and attitudes toward learning. Some of these children are notably sophisticated in science and, in many instances, have a fairly detailed knowledge in specific areas. Unfortunately the sciencc preparation of most of our teachers is sadly inadequate for effective work in such elassrooms.

In a few school systems specially prepared teachers, with a strong background in science, assist those classroom teachers who lack such a background. Cooperative arrangements of this kind deserve to be more widely introduced. Certainly it is reasonable for elementary schools, especially in the upper grades, to utilize specialized teachers in basic subject matter areas such as science, as well as in art, music, and physieal education, where they have been employed for many years.

But if science instruction in the elementary schools is uneven and disorganized, the junior high school program can only be characterized as hopelessly inadequate. It is my belief that, in general, American youngsters receive their poorest formal science education at the junior high level—and it is here also that their curiosity and interest in science largely disappear. The reasons are many.

The junior high years are particularly difficult ones for children. In addition, science classes at this level are frequently staffed by teachers with virtually no seience training who have "moved up" from the lower grades—or by teachers who are marking time until they can complete the course work that will certify them for senior high school positions.

Some educators feel that science in the junior high (grades 7-9) should, as in elementary school, be general science, including topics from both the physical and the life sciences. Also

current is the idea that general science in the junior high should touch upon *all* the sciences to some small degree (without offering an opportunity to develop any one in depth). These ideas, although popular with some observers and teachers, are not very intriguing to most students.

It would appear promising to experiment with a good stratified program for these grades. The sequence could be arranged in various ways; one possibility might be to offer the earth sciences in the seventh grade, life sciences (descriptive aspects of biology) in the eighth grade, and physical sciences (with special attention to matter and energy) in the ninth grade. With careful consideration of their backgrounds in science, followed by judicious assignment of teachers to the appropriate grade level, such a program could take better advantage of the academic strengths each teacher brings from his collegiate training. Such a curriculum would provide an effective transitional stage between the general elementary and departmentalized senior high school science programs. Unfortunately, modern textbooks for such a curriculum are not now available. I must hasten to add that within the framework of either a general science program or a stratified science program, a competent teacher with good materials can develop an excellent course of study for junior high students. But, given present conditions of departmentalized teacher training in our colleges, the stratified program would seem to offer competent teachers greater opportunities for success.

More broadly, two general observations may be made about both elementary and junior high teaching of the biological sciences. First, and of primary importance, most students are being exposed to courses *about* science rather than *in science*. They need far more opportunity to do field and laboratory work—and this does not simply mean going through routine motions with a laboratory workbook. Questions should be posed that form the starting points for experiments and observations that lead to analysis and interpretation. It is this total package of study and laboratory-related activities that comprises science education in the modern sense. And, as a dividend, many "slow" students with verbal problems will be found to do remarkably well in a laboratory atmosphere.

Second, science is too often equated with technology. Our present courses devote too much time to steam engines, radios, automobile motors, radar, hygiene, and other applications of science that are essentially utilitarian and environmental. Far too little emphasis is placed upon basic principles and concepts underlying these applications. Technology has an important role to play in education. But it would be disastrous for our society if our students were to regard science as the search for the design for a better refrigerator rather than as a continuing investigation into the behavior of gases under pressure.

Science in the schools should be concerned with the great ideas that contribute to our understanding of how the world functions: genetic continuity, evolution, and conservation of matter and energy, for example. True, an understanding of these principles leads to the production of better corn, better hogs, better fertilizer, and better refrigerators; but far more significant educationally is the fact that they lead to a conceptual knowledge of the biological and physical world that is our home.

At the high school level, again with a few encouraging exceptions, biology teaching is far from satisfactory. This is especially important because 80 per cent of our American high school students take biology and only a third of these ever complete another science course. For more than half of the nation's high school graduates, in fact, high school biology is the last formal study of science.

Most of the two dozen or so textbooks available today are dull and unexciting. They are usually "encyclopedic" in nature and place a premium on memorization of vocabulary. It has been estimated that in some biology courses the student must memorize more new "foreign" words than he does in a first-year French or German class. Very often in high school courses, as in the earlier grades, there is little or no laboratory work. Also, essential biological topics such as reproduction and evolution are often avoided to forestall the possible criticism of an occasional parent or school board member. In one state it is actually illegal for the teacher to discuss evolution if reference is made to human beings, and in some biology classes the study of reproduction is limited to plants.

Most of today's high school courses are organized around tissues and organs. That is, facts about the structure and function of stomachs, muscles, lungs, hearts, nerves, and kidneys are presented by the text and teacher and memorized by the student. The interesting cellular organization of these structures and exciting excursions into their molecular mechanics are underemphasized. Also rarely included are studies of animal and plant populations and communities and comparative considerations of animal behavior, both of which comprise fascinating and thought-provoking topics for teen-age students.

In a significant number of American high schools the laboratory and field program—when there is one—consists primarily in following a recipe in order to verify a relationship well known to both the student and teacher long be-

fore the exercise was begun. Too few teachers—in part because adequate instructional materials have not been available—bring discovery and open-ended investigations into the classroom laboratory. For too many of our students, biology is not the study of life but a deadly and monotonous routine.

About four years ago the American Institute of Biological Sciences, with financial support from the National Science Foundation, established the Biological Sciences Curriculum Study at the University of Colorado for the improvement of secondary-school biological education. Under the able chairmanship of Dr. Bentley Glass of Johns Hopkins University, and with the active participation of hundreds of high school biology teachers and hundreds of university biologists, the BSCS designed new high school biology courses and a wealth of supplementary materials. For three consecutive years, beginning in 1960-61, experimental editions of BSCS Biology courses have been extensively tested and evaluated in forty-six states, with the lively participation of 165,000 students and 1,000 teachers. These new courses have increasingly captured the imagination and enthusiasm of scientists, teachers, students, educators, and parents because they do several unique things:

1. They contain a wealth of interesting student laboratory exercises and experiments. Many of these investigations are "open-ended"; that is, they may lead the student into unexplored areas rather than direct him along time-worn traditional paths. Teachers involved in these new courses find themselves devoting proportionately more than twice as much class time to laboratory work as they had previously.

2. The major direction of these new courses is to emphasize science as a process of investigation or, to put it another way, to acquaint students with the art of scientific inquiry. Students not only learn to solve problems in biology; more important, they learn how to design experiments and interpret evidenee that will provide answers to questions in science. And they learn how to evaluate the answers they obtain.

3. The new biologies include suitable scientific and straight-forward information in the "sensitive" areas of reproduction and evolution.

4. There is some evidence (not complete, however) that the problem-solving ability that students develop in the BSCS Biology classroom carries over to problem-solving in the chemistry class. (It will take more time to learn whether this ability sustains itself in still other classes and, more important, in post-school life.)

5. The new courses are modern biology. They deal with topics recent and exciting enough to be in today's newspapers while developing the appropriate historical perspectives for these topics.

6. The several courses are quite flexible so that a teacher can modify the basic materials in order to tailor his own course to fit the local situation.

7. They demonstrate that average American high school youngsters are capable of far more sophisticated intellectual attainment in biology than educators had previously believed possible.

8. The courses have been thoroughly student-tested in classrooms throughout America. They have been designed eooperatively by experts (research biologists) who are at the frontiers of knowledge in their fields and by high school biology teachers who face the day-to-day responsibilities of working with students in the biology classrooms. Never before has so much productive effort by so many competent persons been brought to bear on a single high sehool course.

After three years of experimental development, the new BSCS courses will become generally available this month. They promise a revolution in biological education at the secondary school level. It is hoped that, in addition, these materials will serve as working models for others interested in designing still further improvements for high school biology.

Because of these current changes in high school biology programs, a tremendous upheaval is clearly anticipated for higher education. Even now, a number of universities and colleges (examples: MIT, Johns Hopkins, the University of California at Riverside, and the Kansas State Teachers College at Emporia) are eliminating or drastically altering their introductory biology courses for students who have successfully completed a modern biology course in high school. Many other colleges are also considering such moves and it seems obvious that there will be a considerable revision of undergraduate biology during the next decade. To provide models for the colleges during this transition period, the American Institute of Biological Sciences initiated the formation of a Commission on Undergraduate Education in the Biological Sciences with headquarters at Washington University (St. Louis).

At present there are two major types of introductory biology courses in American colleges and universities. One of these, a "general education" course, is designed for virtually all students in the institution regardless of their intended areas of specialization. Because of the wide diversity

of student objectives, and the fact that these general education courses are often compulsory, student motivation is frequently low. Unfortunately, also, the more talented members of the biology faculties often shun these courses. Since a great many students are involved, many universities attempt to adjust to this weight of numbers by offering these courses without laboratory instruction. Despite these difficult problems, the potentialities are promising for such general education courses to play a significant role in the education of non-science majors. The other major type is an introductory biology course (or, in some colleges, introductory botany and zoology courses) designed to be elected by students with more than a casual interest in the biological sciences. Presumably considerable attention will be given to both types of courses by the new commission.

In the 1870s the great British biologist, T. H. Huxley, introduced a zoology course that used a phylogenetic approach, that is, a description of the anatomy and physiology of animals, proceeding from the lower animals to the higher animals in a linear fashion along evolutionary lines. Although it is on the wane today, this phylogenetic type of course has been dominant for many years. At the University of Michigan during the 1920s, a course was developed that was devoted primarily to principles of zoology: a consideration of broad biological topics, using appropriate animals as examples of the particular principle under review. Biological "principles" courses of this nature have spread rapidly and now serve as the standard introductory courses in colleges today. Many of them, unfortunately, tend to be fundamentally descriptive; some of their protagonists do not seem to appreciate that the memorization of the formula for an organic chemical compound is no more experimental, and no less static, than the memorization of the names of the parts of the crayfish appendages.

A further problem facing college biology is that instructional modernization will have to accommodate the rapid expansion of biological knowledge, which is currently doubling about every ten years. It is obvious that selection of material will become more and more critical. Perhaps the direction of the next big change in our college biology programs will be toward an experimental approach to science in which students investigate questions of "why" and "how" rather than questions of "what."

For the colleges, the preparation of secondary school teachers is a difficult and special case. For the most part, potential high school biology teachers and junior high school teachers receive their biological training in the departments of biology in our colleges and universities. When we observe that their preparation in biology is less than adequate, we cannot simply castigate the education departments of the colleges, fashionable as such complaints are today. If we are to be honest in our criticisms, the finger should be pointed at the biology departments in the liberal arts colleges since 80 per cent of the teachers with a major in biology are the products of liberal arts colleges or universities—not of teachers' colleges or education departments. (This does not include the teachers in biology classrooms—about 50 per cent of those currently teaching—who have not been formally prepared for their present assignments and are in them by administrative fiat, rather than through choice and certification.)

The crux of the teacher training problem seems to be that the college biology departments are staffed by professional biologists whose bread-and-butter courses are designed for pre-medical students and future research biologists, the latter being the *alter egos* of the professors. When prospective secondary school teachers come to these departments and request programs planned for their own specific needs, the biology departments frequently reply that the teachers should take the "standard" courses and not ask for "watered-down" courses. But the opposite of "standard," obviously, need not necessarily be "watered-down." A more relevant consideration would seem to be that future secondary school teachers of biology will serve society primarily as *interpreters* of biological research rather than *users* or *producers* of biological research. The needs of such prospective interpreters might conceivably be better met with a quite different array of courses—courses that could be just as demanding, and with just as much "meat" as those designed for potential research men. Some of the smaller colleges seem to be more keenly aware of this situation than many of the larger universities.

The overall prognosis for biological education in the United States in the next decade is very exciting. During recent years a solid and productive cooperation has been developing between school people and subject-matter experts in biology, as well as in mathematics and other sciences, and this bodes well for American education. Without doubt the new secondary school biology courses will have an ever-increasing impact on biological education at all levels of instruction for years to come.

Robert W. Hull Named Department Head At Florida State University

Dr. Robert W. Hull, 39, of Northwestern University, assumed the chairmanship of Florida State University's Department of Biological Sciences on September 1.

Dr. Hull has worked in protozoology and in parasitology and is Secretary of the Society of Protozoologists. He has served as vice-president of the Chicago Academy of Science, and has been active in the National Science Foundation. He is on the Governing Board of the American Institute of Biological Sciences.

Dr. Hull's speaking sehedule this year includes talks at the Second Plenary Session of the International Conference on Parasitology at Rio de Janeiro, the Internation Zoology Congress in Washington, D. C., and American Institute of Biological Sciences.

The new FSU departmental head was born April 3, 1924, in LaCrosse, Indiana. He attended grammar and high schools in Illinois and took one year of electrical engineering at the University of Kansas before entering the Air Force in 1943. He received wartime recognition for developmental work in radio control systems at Wright Field, Ohio.

Dr. Hull received his bachelor of science degree from the University of Illinois in 1949, majoring in chemistry and minoring in zoology. In 1953 he was awarded the Ph.D. in zoology, biochemistry, and physiology by the university. Since that time he has served on the faeulty of Northwestern University and has received wide recognition in protozoology and parasitology and for his modern approaches to biology.

Bernie Studio of Evanston

ROBERT W. HULL

He is married to the former Marie Houf. They have three children, Bradford, 11, Sandra, 9, and Penna, 8.

Dr. Leland Shanor headed the department for several years until leaving a year ago to become dean of the division of advanced studies of the Florida Institute of Continuing University Studies. Dr. Robert Godfrey has served meanwhile as acting chairman.

Sam Aronoff Appointed Molecular Biology Program Director at NSF

Dr. Sam Aronoff has been appointed Program Direetor, Molecular Biology at the National Science Foundation. For the past fifteen years, Dr. Aronoff has been on the faculty at Iowa State University where he was Professor of Biochemistry and Biophysics. Prior to this assignment, he served at the Radiation Laboratory, University of California, 1946-48; research instructor at the University of Chicago, 1944-46; chemistry instructor at Boston University, 1943-44; research fellow at the University of California, Berkeley, 1942-43; and research assistant at the University of California, Los Angeles, 1938-42.

He was born in Brooklyn, New York on February 27, 1915. He received his A.B. in geology from the University of California in 1936 and was

awarded his Ph.D. in physico-chemical biology by the University of California, Berkeley in 1942. He was a National Science Foundation Senior Postdoctoral Fellow, 1957-58.

Dr. Aronoff has more than 60 publications to his credit. He is a member of the American Society of Biological Chemists, American Chemical Society, American Society of Plant Physiology, American Association for the Advancement of Seience, Sigma Xi, Gamma Alpha, and Phi Lambda Upsilon.

Dr. and Mrs. Aronoff, the former Edith E. Moyer, have two daughters, Zena and Elizabeth. His Washington address is 3040 Idaho Avenue, N.W.

AIBS Revises Constitution At Amherst Meeting

The following actions were taken by the AIBS Governing Board at its meeting on August 25th in Amherst, Massachusetts.

1. A revised Constitution and ByLaws were approved for submission to Member Societies for ratification. Approval is necessary by three-fourths (21 societies) vote of the Member Societies. As of September 16, 1963, ten societies had ratified the recommended revisions. For your information, I am enclosing a copy of the Amended Constitution and ByLaws.
2. As of January 1, 1964, there will no longer be Member and Affiliate Societies. Instead, there will be one class of membership for all biological societies which elect to join the AIBS. Under the new structure, each society will pay dues according to a sliding scale based upon the total membership of the society (see page 4, Article III(A) of the ByLaws). For such token membership dues, each Adherent Society will have a representative on the AIBS Governing Board and the society's membership list will be maintained by the AIBS.
3. Membership in an Adherent Society, beginning in 1964, will no longer convey automatic membership on an individual basis in the AIBS. Individuals must join as direct members of the Institute to derive any of the benefits from membership.
4. Member Societies for 1964 were asked to pay dues at the new sliding scale and also to contribute a sum, hopefully not less than the sum paid in 1963, to help establish a sound financial base for the Institute.

   The Ecological Society of America was the first society to contribute $2,000 to the Institute.
5. Direct members of the AIBS will be represented on the AIBS Governing Board by selection of members-at-large to the Board. Members-at-large will be elected by mail ballot on the basis of one member for every 1,000 direct members.
6. The following were elected as officers of the Institute for 1964.

   President—Dr. Paul Kramer, Duke University
   Vice President—Dr. Kenneth Thimann, Harvard University
   Secretary-Treasurer—Dr. Robert Krauss, University of Maryland

ASB To Institute New Placement Service For Ph.D. Candidates

The executive committee of the Association of Southeastern Biologists decided last spring to institute a further service to biologists throughout the southeast through the *ASB Bulletin*. Accordingly, in the January issue each year data concerning prospective Ph.D. candidates will be published. This will be devoted entirely to these people expecting their degrees *one year from the following June,* so that degree candidates and department heads who expect openings to develop a year or more from that time can meet and get to know one another at the April meetings.

Students expecting to receive Ph.D.'s in June of 1965 should therefore submit pertinent data to the editor of the *ASB Bulletin* no later than December 20, 1963. These data should include name, address, institution, permanent address, field of specialization, and whether he or she prefers teaching and/or research.

If it is felt that such a program will aid in the placement of those people expecting to receive master's degrees, comments and suggestions along these lines will be appreciated by the executive committee.

Early in November a reminder will be sent to those departments throughout the southeast that offer Ph.D. degrees. Cooperation from both department heads and students will be appreciated.

The AAAS Cleveland Meeting

DECEMBER 26-30, 1963

THE 130TH MEETING of the American Association for the Advancement of Science will include sessions of 20 AAAS sections and of some 80 participating organizations. Programs of particular interest to biologists are:

Moving Frontiers of Scienee II. One of two speakers the afternoon of Dec. 28 will be Vincent G. Dethier, whose topic will be "Microscopic Brains." Bentley Glass will preside.

Fourth George Sarton Memorial Lecture by Hudson Hoagland, with Chauncey D. Leake presiding, will immediately follow Dethier. Subject: "Science and the New Humanism."

AAAS and Science Council of Japan. During the three sessions on the Sciences in Japan, the afternoon of Dec. 26 and all day Dec. 27, there will be papers by eminent authorities in botany, chemistry, ecology, genetics, microbiology, and medicine. Two-channel simultaneous translation will facilitate discussions.

AAAS Committee on Meetings. A symposium, "Chemical Control of Inheritance," the morning of Dec. 27. A joint program with the Committee on Science and the Promotion of Human Welfare, arranged by Barry Commoner and David R. Goddard.

AAAS Committee on Desert and Arid Zones Research. A two-session symposium on problems of the arid lands of Latin America has been arranged by W. G. McGinnies for Dec. 27.

AAAS Committee on Science in the Promotion of Human Welfare. The report of the Air Conservation Commission is scheduled for the afternoon of Dec. 29.

AAAS Interdisciplinary Symposia. Three of the five interdisciplinary symposia, all on the morning of Dec. 28, are:

1. "Federal Government, Science, and the Universities," arranged by John T. Wilson. Speakers: A. Hunter Dupree, Delphis C. Goldberg, William D. Carey, and Paul M. Gross.
2. "Developmental Aspects of Immunity," arranged by David W. Bishop and Jonathan W. Uhr. Topics and speakers are: Introduction by James D. Ebert, who will preside; Sequential Nature of the Immune Response, Jonathan W. Uhr; The Relationship of the Thymus to the Development of Immunologic Responsiveness, J. F. A. P. Miller (Chester Beatty Research Institute, London); Phylogeny of the Immune Response, Robert A. Good; and Ontogeny of the Immune Response, Arthur M. Silverstein.
3. "Biological and Sociological Research on the Effects of Human Reproduction Control," arranged by Ithiel de Sola Pool and Kingsley Davis, will have as speakers M. Jean Bourgeois-Pinchat (Institut National d'Etudes Demographiques, Paris), W. Lee Hansen (University of California, Los Angeles), Christopher Tietze (National Committee on Maternal Health, New York), Arthur G. Steinberg (Western Reserve University), and Kingsley Davis (University of California, Berkeley).

AAAS Section F—Zoological Sciences. Zoologists' Dinner and vice presidential address by Dietrich Bodenstein, Dec. 29, evening, "Diffieulties in the Interpretation of Organ Multiplications in Insects."

AAAS Section G—Botanical Sciences. Sessions for contributed papers, Dec. 27. The two-session symposium "Plant Biology Today," Dec. 30, is a continuation of the three-year series of basie papers for teachers. Luncheon and vice presidential address by A. J. Sharp will be Dec. 30. His subject is "The Compleat Botanist."

AAAS Section N—Medical Sciences. Four-session symposium, "Chemical Suppression of Cellular Synthesis and Mitosis," arranged by Francis D. Moore and Oscar Touster (in collaboration with session chairmen), and cosponsored by Section F—Zoological Sciences, Dec. 29, 30. Topics and speakers are:

A. *Biochemical and Pharmacological Considerations. Part I*—December 29, morning, Thomas H. Jukes (California) presiding: Thomas H. Jukes (California); Vincent G. Allfrey (Rockefeller Institute); Ernest Borek (Columbia); Sheldon Penman (M.I.T.); Henry C. Pitot (Wisconsin).

B. *Biochemical and Pharmacological Considerations. Part II*—December 29, afternoon, Charles Heidelberger (Wisconsin) presiding: B. R. Baker (Buffalo); Charles Heidelberger (Wisconsin); Waclaw Szybalski (Wisconsin); Edward Reich (Rockefeller Institute); R. W. Brockman (Southern Research Institute).

C. *Cancer Chemotherapy*—December 30, morning, Arnold D. Welch (Yale) presiding: V. H. Reynolds (Vanderbilt); Paul Calabresi (Yale); J. P. Kriss (Stanford); Joseph Bertino (Yale); Roy Hertz (National Cancer Institute).

D. *Immunosuppression in Transplantation*—December 30, afternoon, Rupert E. Billingham (Wistar Institute) presiding: George H. Hitchings (Burroughs Wellcome & Co.); Robert S. Schwartz (Tufts); Joseph Murray (Harvard); E. D. Thomas (University of Washington).

Dr. Francis D. Moore (Harvard) will give the Section N vice-presidential address December 30, afternoon, on "New Surgical Problems in an Era of Nuclear Chemistry."

AAAS Section Nd—Dentistry. Four-session symposium, cosponsored by Section H—Anthropology, on "Growth and Development of the Face, Teeth, and Jaws," arranged by Stanley M. Garn, Dec. 26, 27. Speakers:

A. B. Holly Broadbent (Chm.), Stanley M. Garn, Albert A. Dahlberg, Richard Osborne, Coenraad F. A. Moorrees;
B. Carl J. Witkop (Chm.), Uwe Stave, M. Michael Cohen, Frederic N. Silverman, Arthur Lewis;
C. Seymour J. Kreshover (Chm.), Stanley M. Garn, Arthur Lewis, Robert Blizzard, Lawrence R. Fess, Robert J. Gorlin, Daris R. Schwindler;
D. Sholem Pearlman (Chm.), Richard C. Greulich, Harold Kalter, Wilton M. Krogman, Edward E. Hunt.

AAAS Section O—Agriculture. Four-session symposium, "Agricultural Sciences for the New Nations," cosponsored by the American Society for Microbiology, arranged by A. H. Moseman, Dec. 29, 30.

AAAS Section U—Statistics and Biometric Society ENAR. Two groups of jointly sponsored invited papers which include "Models in Biology," Dec. 29, morn., and "Microbiological Genetics," Dec. 29, aft.

Biologists' Smoker. The smoker, jointly sponsored by AAAS Sections F and G and all participating biological societies, will be at the Natural Science Museum (enlarged facilities on new site, since previous Cleveland meeting), University Circle. Buses will leave the Sheraton-Cleveland Hotel at 9 p.m., Dec. 27, immediately after the Galbraith lecture.

SOCIETAL PROGRAMS

American Association of Clinical Chemists. Contributed papers and symposia, Dec. 27, 28, arranged by Willard R. Faulkner.

American Astronautical Society. Two-session symposium on Bioastronautics, Dec. 30.

American Nature Study Society. Annual meeting. Whole period, Dec. 27-30, includes sessions on observing nature, recording nature, and "Ohio Landscapes."

American Physiological Society and Bioscience Programs, Office of Space Sciences, NASA. Two-session joint symposium on space biology and medicine, arranged by Robert E. Smith and Orr Reynolds, Dec. 29.

American Society of Naturalists. Annual meeting will include a two-session symposium, Dec. 27, and the presidential address, "Paramutation and the Control of Gene Action," of R. Alexander Brink and business meeting, Dec. 28. Speakers in the symposium, "The Time Measurement in Photoperiodic Phenomena," are Colin S. Pittendrigh (Princeton University), H. A. Borthwick (USDA, Beltsville, Md.), Karl Hamner (University of California, Los Angeles), W. F. Hillman (Brookhaven National Laboratory), D. S. Farner, (Washington State College), F. D. Beck (University of Wisconsin), P. L. Adkisson (Texas A & M University), and D. M. Minis (Princeton University).

American Society of Zoologists. The program of the national meeting of the Society, arranged by A. Glenn Richards, with more than 40 sessions, will have some 25 sessions for contributed papers sponsored by all six divisions of the Society; business meetings of the ASZ and of the divisions; three-session "Refresher Course: Genetics of Behavior," a series of symposia, notably Osmoregulation (3 sessions), Evolution of External Construction, Behavior of Arachnids, Evoution and Composition of Vertebrate Hard Tissues, and a two-session panel on Teaching Vertebrate Morphology.

Beta Beta Beta Biological Society. Biennial meeting, Dec. 27, 28, includes a business meeting and a luncheon and an address by John M. Allen (University of Michigan), "Cellular Structure and Function: A Modern Gordian Knot."

Biomedical Information-Processing Organization. Session on computers to aid biology and medicine, arranged by Robert S. Ledley, afternoon of Dec. 28.

Ecological Society of America. Program, arranged by Robert B. Platt, Dec. 26-30, includes seevral symposia, sessions for contributed papers on plant and animal ecology, and five-sessions jointly sponsored by the Section on Animal Behavior and Sociobiology and the Division of Animal Behavior and Sociobiology of the American Society of Zoologists. See below.

Herpetologists League. Two sessions for contributed papers and a business meeting, Dec. 27-29.

Mountain Lake Biological Station "Alumni." Annual breakfast for all persons who have been students, investigators, or staff members at the station, Dec. 29. Horton H. Hobbs will preside.

National Association of Biology Teachers. The annual national meeting, Dec. 26-29, will be a Silver Jubilee celebration. There will be consecutive sessions on Recent Developments in Cellular Biology, Organismal Biology and Ecosystems, as well as on teaching innovations and research. A reception, banquet and reunion, on the evening of Dec. 29, and a joint field trip with ANSS, Dec. 30, will conclude the week's events.

Sigma Delta Epsilon. National meeting, arranged by Ernestine Thurman, will include a luncheon for all women in science, Dec. 27, at which Prof. Agnes Hansen will speak on "A Study of the Atmospheric Pollen of the Minneapolis Area," and the annual society dinner meeting, Dec. 29.

Society of Systematic Zoology. Annual meeting, Dec. 27-30, will include sessions for contributed papers, a panel on "The Classification of Animals," a symposium, "Zoogeography of Invertebrates, Marine Forms," and the annual business meeting.

Soeiety of the Sigma Xi. Sixty-fourth annual convention, joint luncheon with the Scientific Research Society

of America and joint address with Phi Beta Kappa, by Paul B. Sears, Dec. 29. His title, "Telltale Dust."

The AAAS Exposition of Science and Industry—120 booths—and the **AAAS Science Theatre,** with recent foreign and domestic films, will be prominent features of the meeting. Coupons for sleeping accommodations and advance registration will be found in *Science* from July 19 on.

Symposium: The Evolution of External Constructions by Animals.

Program of the Section of Animal Behavior and Sociobiology of the Ecological Society of America, cosponsored by the American Society of Zoologists.

Arranged by NICHOLAS E. COLLIAS

Symposium: Recent Trends in Ecological Research in the Great Lakes.

Program of the Section of Animal Behavior and Sociobiology of the Ecological Society of America.

Arranged by CHARLES C. DAVIS and F. E. J. FRY, University of Toronto.

1. Backgrounds of Ecological Researeh in the Great Lakes. T. H. LANGLOIS, The Ohio State University.
2. Recent Discoveries on the Geology and Sediments of the Great Lakes. HOWARD J. PINCUS, The Ohio State University.
3. Recent Studies of Water Circulation in the Great Lakes. JOHN C. AYERS, University of Michigan.
4. The Physical and Chemieal Environment in the Great Lakes. D. W. ANDERSON and G. K. RODGERS, University of Toronto.
5. Recent Studies of the Bottom-Living Organisms in the Great Lakes. E. BENNETTE HENSON, U. S. Public Health Service, Cincinnati, Ohio.
6. Plankton Studies in the Great Lakes. CHARLES C. DAVIS, Western Reserve University.
7. Recent Studies of the Dynamics of Fish Populations in the Great Lakes. HENRY A. REGIER, Ontario Dept. of Lands and Forests, Maple, Ontario.
8. Great Lakes Studies of Primary Production. GEORGE W. SAUNDERS, University of Michigan.
9. The Direct Effects of Pollution in the Great Lakes. G. S. HUNT, University of Michigan.
10. The Eutrophication of the Great Lakes. ALFRED M. BEETON, U. S. Fish and Wildlife Service, University of Miehigan.
11. Forum on Future Needs and Plans.
    a. DAVID C. CHANDLER, University of Michigan.
    b. G. B. LANGFORD or R. E. DEANE, University of Toronto.
    c. THEODORE A. OLSON, University of Minnesota.
    d. LOREN PUTNAM or CHARLES A. DAMBACH, F. T. Stone Laboratory, Put-in-Bay, Ohio.
    e. J. W. MOFFETT, U. S. Fish and Wildlife Service, Ann Arbor, Michigan.
    f. An as yet un-named representative of the South Bay, Manitoulin Island Laboratory of the University of Toronto.
    g. G. F. M. SMITH, Fisheries Research Board of Canada, Biological Station, London, Ontario.

Field Trips

FRIDAY, DEC. 26—Field Trip to the Baldwin Filtration Plant and the Easterly Sewage Disposal Plant in Cleveland.

Dr. Charles C. Davis, Department of Biology, Western Reserve University, Cleveland 6, Ohio, is in charge of the arrangements for this trip. Inquiries and arrangements should be made with Dr. Davis before December 1, 1963.

SATURDAY, DEC. 28, 8:30 a.m.; Lobby, Sheraton-Cleveland—Field Trip to a Beech-Maple Climax Forest.

Reservations must be made by December 1 and must be accompanied by a check for $1.50 to cover cost of transportation. Checks will be returned in case the trip must be canceled for any reason. Send reservation and check to:

Dr. Lowell P. Orr
Department of Biological Sciences
Kent State University
Kent, Ohio.

Invited Papers: Cave Ecology.

1. The Fauna of Mammoth Cave. THOMAS C. BARR, JR., University of Kentucky.
2. Limnological Studies in Mammoth Cave. ROBERT A. KUEHNE, University of Kentucky.
3. Biology and Ecology of the Cave Cricket, *Hadenoecus subterraneus.* ORLANDO PARK, Northwestern University.
4. Experimental Analysis of Activity in the Cave Cricket, *Hadenoecus subterraneus.* DAVID REICHLE, Northwestern University.
5. Some Biological Effects of Basc-Level Fluctuation in the Mammoth Cave Region. THOMAS L. POULSON, Yale University, and PHILIP M. SMITH, Cave Research Foundation.
6. Molting and Reproductive Periods in a Cave Crayfish. THOMAS C. JEGIA, University of Minnesota, Morris.
7. Aspects of Bat Hibernation in the Mammoth Cave Region. JOHN S. HALL, Albright College.
8. Behavior of Bats at Carter Caves, Kentucky. WAYNE H. DAVIS, University of Kentucky.

Symposium: The Use of Morphological and Autecological Characteristics of Plants in Community Gradient Analysis.

Arranged by O. L. LOUCKS, University of Wisconsin.

G. COTTAM, Presiding

1. Coordinate Methods in Construction of Submodels of Minnesota Forest Ecosystems. EGOLFS V. BAKUZIS, University of Minnesota.

2. Gradient Analysis by Synecological Indices Compared with Synthetic Environmental Scalars. O. L. Loucks, University of Wisconsin.
3. A Physiological Approach to Alignment of Vegetation Along Environmental Gradients. R. H. Waring, Oregon State University.
4. An Analysis of Wisconsin Vegetation on the Basis of Plant Structure and Function. Dennis H. Knight, University of Wisconsin.
5. Some Patterns of Multidimensional Analysis in Plant Communities. Pierre Dansereau, New York Botanical Garden.

Books and Periodicals

The first of a series of papers designed to further the knowledge of the vascular flora of Florida by the presentation of keys, nomenclature, and distribution of those species native or naturalized with the state has been published in *Castanea* 28: 1-10, 1963. The series is being prepared by the staff and students of the Herbarium of the Agricultural Experiment Station and Department of Botany of the University of Florida, together with the cooperation of outside specialists. The first paper is on *Pinus*.

Florida Flora Newsletter is also published regularly by the Herbarium. It is edited by Dr. D. B. Ward, and is for communication among persons interested in the flora of Florida.

MOSSES OF FLORIDA. AN ILLUSTRATED MANUAL. vii-xliv, 1-134. 133 plates (all drawn by the author from Florida specimens). University of Florida Press, Gainesville, Fla., 1963. $8.50. Contains keys to and descriptions of all genera and species of Florida mosses.

FRESHWATER FISHES OF THE WORLD. By Günther Sterba. Translated and revised by Denys W. Tucker. The Viking Press, New York 22, N. Y. $17.50. Longacre Press, London. 3 pounds, 10 shillings.

Originally published in Leipzig, where Dr. Sterba is Director of the Zoological Institute of the University, as *Süsswasserfische aus aller Welt* in 1959, this exemplary aquarium book rapidly became the leader in its field in Germany, a country whose enthusiastic aquarists have a history of expertise and the best of aquarium journals. The English edition is fortunate to have Dr. Tucker, a respected ichthyologist formerly of the British Museum, as its translator. Besides a fine job of translation, Dr. Tucker has revised and updated (even in three years there are many changes in the actively expanding aquarium world!) much of the book, especially that on African fresh-water fishes, for which task he had the help of Dr. Trewavas and Dr. Greenwood, both of the British Museum and the most knowledgeable persons on that ichthyofauna. With such authoritative help, and with that of a few others, it is not surprising that Dr. Sterba's four-pound tome is one of the best on aquarium fishes, and perhaps the best.

Its 878 pages include brief descriptions of about 1300 species of freshwater fishes, with notes on behavior, breeding, and water condition preference when known. A general account is given for each of the approximately 70 families to which these fishes belong, along with a map of the distribution of each of the families. Accurate scientific names of the individual species are given, as is their distribution, and the authors have mostly avoided the temptation to invent "common" names for species not so endowed previously. Nearly all of the species are well illustrated, some by color photographs (102), others by black and white photographs (423) or stippled drawings (668).

An interesting feature not found in other aquarium books is the conclusion of each species description with the year in which the species was first imported into central Europe, for, in the vast majority of cases, this will be the year that the species first entered the aquarium trade anywhere, so voracious is the German appetite for new and unusual forms.

Especially since this work will undoubtedly become a standard of reference, it is unfortunate that Dr. Sterba did not follow the precedent set in Dr. Innes' now classic *Exotic Aquarium Fishes* of giving the phonetic pronunciation of scientific names and their meanings in English. Scientific names are so mispronounced even by professional ichthyologists that there seems to be little hope for the amateur without this aid. And how much more fun is the learning of scientific names of fishes when one knows, for instance, that *Anostomus* means turned up mouth, *Gasteropelecus* hatchet belly, *Gambusia* worthless, or the meaning of *Scatophagus*?

Considering the international flavor of the authorship, places of publication, and expected sales, it is surprising to find such a provincialism as "in our waters" (i.e., Europe's, especially Germany's) used distractingly often. Another discordant note along these lines is that the London publishers state that the printing was done in Leipzig, while the New York publishers state "Printed in East Germany, U.S.S.R. occupied." Except for this slight difference, the two editions are identical, and it is well worth the prospective buyer's mental effort to convert the shilling price for comparison with that in dollars.

With well over a thousand species (ineluding some, such as the lampreys, salmons, and trouts that are rarely mentioned in aquarium books) described, even the ad-

vanced aquarist is unlikely to see even half of them in a lifetime. But if it can be found in an aquarium shop, the odds are very much in favor of it being also found in Dr. Sterba's *magnum opus.*

James C. Tyler

GUIDE TO THE MANUSCRIPT COLLECTIONS IN THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA. By V. T. and M .E. Phillips. A.N.S.P. Special Publ. No. 5, XXVI, 553 pp. Litho. Edwards Bros., Ann Arbor, Mich. Bound. $7.50.

The Academy of Natural Sciences of Philadelphia in its 150 years of existence has, as any institution of like age, accumulated a mountainous mass of documents, letters, and manuscripts related to the institution and its personnel. Unless this type of material is systematically arranged, finding the papers relating to a particular person or event can approximate the proverbial search for the needle in the haystack. The excellent and painstaking work of the Phillips' in systematically arranging the material of the Academy as well as preparing the catalogue assures future workers that they will be able to find the documents listed and gives the first comprehensive pieture of the breadth and composition of the material available in the archives.

The book is concerned with listing the over 185,000 items in the Academy's archives. It consists of an alphabetical list of the 970 numbered collections, the listing and descriptions of the collections, a subject index to the information contained in the manuscript documents, and an author index of signers of letters and documents. This extensive indexing system greatly extends the usefulness of this work to bibliographie and biographic researchers.

Selwyn S. Roback

News of Biology in the Southeast

About People

J. Richard Thomson has been elected treasurer of the Alabama Academy of Science for 1963-1966. He was formerly chairman of the Biological Sciences Section and Vice-President.

Robert E. Wean, Chairman of the Biology Department at the University of Tampa, has been awarded a grant of $1,670 by the NSF. This fund plus a matching sum from the university will be used to purchase equipment for a course in physiology.

Carolyn P. Hutchins has accepted an appointment as Assistant Professor of Biology, Charlotte College, Charlotte, North Carolina. Miss Hutchins received her Ph.D. in Zoology in August from the University of Tennessee.

Aelita Pinter, a recent graduate of Tulane University, has received the 1963 award of the American Society of Mammalogists for outstanding research by a young mammalogist during the past year. Her work was directed by **Dr. Norman C. Negus.**

Scott M. Weathersby, Professor of Zoology, Louisiana Polytechnic Institute, has been elected Secretary of the Louisiana Academy of Sciences for a two-year term.

The Department of Plant Sciences, Texas A&M University, announces the appointments of **Dr. Howard G. Applegate** as Associate Professor of Plant Sciences and **Dr. Robert D. Powell** as Associate Professor of Plant Physiology. Dr. Applegate was formerly with the University of Arizona, and Dr. Powell was with the University of Florida.

James A. Miller, Chairman of the Department of Anatomy of Tulane University, has just been awarded a supplement of $36,949 a year to the Training Grant which the department has from the National Institutes of Health. The department presently has nineteen Ph.D. candidates in its program.

John E. Pauly, formerly of the Chicago Medical College, has joined the Department of Anatomy of Tulane University at the rank of Associate Professor.

Howard L. Hamilton, who has been serving as Visiting Professor of Biology at the University of Virginia, has been appointed Professor of Biology effective September, 1963.

DeForest Mellon, Jr., Robert L. Searls, and **David S. Smith** are new additions to the biology department at the University of Virginia. Dr. Mellon received his undergraduate training at Yale University and his doctorate from John Hopkins University. His research interest is in electrophysiological studies on invertebrate nervous systems. Dr. Searls received his undergraduate training at the University of Wisconsin and his doctorate at the University of California, Berkeley. He is doing research on metabolic control of development. Dr. Smith received his undergraduate training and doctorate at the University of Cambridge, England. His research interest is in structure development and function of striated muscles.

Richard E. Garth is on a leave of absence from Northwestern State College, Natchitoches, Louisiana and is working for the National Science Foundation as Assistant Program Director of Secondary School Programs. His particular area responsibility deals with the State Academies of Science programs.

Jack W. Clark, William N. Pafford, and **David J. Moore** have joined the staff of the Department of Biology at Radford College. Mr. Clark has a B.A. from Los

Angeles State College and an M.A. from San Fernando State College. He attended the University of Maryland on an NSF fellowship in entomology. Mr. Pafford received his B.S. and M.S. from Peabody College. He has done some graduate work in radiation biology. Mr. Moore received his B.S.Ed. from Clarion State Teachers College and his M.S. from Ohio State University. His research involves the study of minimum energy requirements in the green pheasant.

L. H. Flint retired on 30 June and plans to work on the freshwater red algae of North America. He will welcome any assistance in conjunction with this project.

Sherwood M. Reichard, Assistant Professor, Department of Biological Science, Florida State University, was elected a Fellow of the AAAS in June, 1963. Dr. Reichard was granted $150,000 by the NSF and the AEC over the past four years to hold a Radiation Biology Institute during the summer months. He is also the recipient of a $50,000 grant for a three-year study on the Reticuloendothelial System.

Lloyd M. Beidler, Professor, Biological Sciences, Florida State University, spent the summer at Stanford University attending a writing conference of the AAAS, designed toward selection of equipment and the training of children in experimental science in the grade schools.

Lutz Wiese, University of Tübingen, Tübingen, Germany, will work with **Dr. Charles Metz,** Institute for Space Biosciences, Florida State University, for the next two years as a visiting investigator. Dr. Wiese will carry on a program of research on *Chlamydomonas*. His wife, Woltrand Wiese, will work as his assistant. Dr. Wiese received his Ph.D. in Biology at the University of Tübingen in 1952 and has been a Research Associate in the Department of Biology at Princeton University since 1961.

Dexter M. Easton, Associate Professor, Biological Science, Florida State University, was elected a Fellow of the AAAS in June, 1963.

Robert H. Reeve has joined the staff of Florida State University as Instructor in the General Biology program. Mr. Reeve will receive his Ph.D. in Science Education in December, 1963. He received a B.S. in pre-medical sciences from Maryville College, Maryville, Tennessee and an M.S. in bacteriology from Lehigh University, Bethlehem, Penna. Mr. Reeve has conducted three In-Service Institutes, sponsored by the NSF, for the Department of Science Education during the past two years.

John D. McCrone, Assistant Professor of Biology, Florida Presbyterian College, has received a two-year NIH grant of $24,533 to support his research on the comparative biochemistry and toxicology of *Latrodectus* venoms. Dr. McCrone also has received a one-year grant of $4500 from the Florida Heart Association for this research.

John C. Ferguson has joined the faculty of Florida Presbyterian College as Assistant Professor of Biology. Dr. Ferguson recently received his Ph.D. from Cornell University. His research interests are in echinoderm biology and physiology.

C. W. Hart, Jr., Editor of the *ASB Bulletin*, has received a two-year NSF grant of $13,400 to support research on the entocytherid ostracods of North America. Mr. Hart also received a grant of $650 from Sigma Xi to support an ecological study of the cave shrimp, *Palaemonias ganteri*, in Mammoth Cave, Kentucky.

Jesse C. Thompson, Jr., has resigned as Associate Professor of Biology at Hollins College and is now Professor of Biology at Hampden-Sydney College.

Marilyn S. Darling has accepted the position of Instructor of Biology at Hollins College. Her husband is Instructor of Biology at Roanoke College. They are graduates of the Departments of Botany and Zoology at Duke University.

Burton J. Bogitsh, Professor of Biology at Georgia Southern College has been granted a one-year leave of absence to assume a position with the Institutes Section of the NSF in Washington, D. C.

Grace T. Wiltshire is retiring as Associate Professor of Biology at Randolph-Macon Woman's College. She has been a member of the faculty since 1928. Mrs. Wiltshire has been active in many professional organizations, particularly the Virginia Academy of Sciences, and is the current president of the Virginia Society of Ornithology.

Dorothy Fry of Mt. Holyoke College has been appointed Assistant Professor of Biology at Randolph-Macon for the current year.

James E. Perham, Assistant Professor of Biology at Randolph-Macon attended the meeting of the International Genetics Congress at The Hague, Netherlands.

Dorothy L. Crandall, Associate Professor of Biology at Randolph-Macon attended the annual meeting of the AIBS at the University of Massachusetts. She presented a paper on the ferns of Rhode Island.

James L. Chamberlain, Assistant Professor of Biology at Randolph-Macon Woman's College, attended the NSF Institute for College Teachers held at Williams College.

Willis A. Eggler, Newcomb College of Tulane University, will be on leave-of-absence for the year 1963-64 to continue studies of the manner of invasion of volcanic deposits by plants, in Mexico, Guatemala, and El Salvador.

W. Jackson Davis and **Dean P. Owens** have been added to the staff at the Virginia Institute of Marine Science. Dr. Davis will work on fish larvae and fishery research with **Edwin B. Joseph, John Norcross** and **C. E. Richards.** Mr. Owens will work in the Microbiology-Pathology Department.

Bernard C. Patten, Frank Wojcik, Willard A. Van Engel, and **William J. Davis** of the Virginia Institute of Marine Science attended meetings of the AIBS at the University of Massachusetts this summer. Dr. Patten presented a paper on "Some Experimental Characteristics of Dark and Light Bottles" and Dr. Davis a paper on "Reliability of Fish Sampling Methods."

Alan D. Conger, Professor of Radiation Biology at the University of Florida, is currently serving as chairman of the project site visit committee for radiation biology for the U. S. Department of Health, Education and Welfare, Public Health Service. He has also recently been elected to the Counеil of the Radiation Research Society.

Some grant projects currently in progress in the Botany Department, **University of Florida,** include:

Metabolism of molecular oxygen by plants (AEC), **Dr. G. S. Fritz**

Effects of ionizing radiation on ovule development (AEC), **Dr. Y. Sagawa**

Studies in plant material of radiation after effects and long-lived free radicals (AEC), **Dr. A. D. Conger**

Absorption of sugars by corn scutellom slices (NIH), **Dr. T. J. Humphreys**

Genetical basis of heterothallism in *Dictyomorpha* (NIH), **Dr. T. J. Mullins**

Compositional relationships between broadleaf evergreen and deciduous forests (NSF), **Dr. C. D. Monk**

Plant community dynamics (NSF), **Dr. C. D. Monk**

Anatomy and histogenesis in conifers (NSF), **Dr. M. M. Griffith**

Studies in the Orehidaceae (AOS, SFOS), **Dr. Y. Sagawa**

Plant growth facilities for radiation botany and biology (NSF), **Dr. A. D. Conger**

Asa G. Sims, Jr., Department of Biology, Southern University, Baton Rouge, Louisiana, has received a $20,000 NIH grant to study pectic enzymes and toxins of *Pellicularia filamentosa.*

Leon Roddy, Department of Biology, Southern University, Baton Rouge, Louisiana, has received a $9,000 NSF grant to study the spider family Clupeonidae.

Institutions and Organizations

The Department of Anatomy of **Tulane University** will soon move into its new quarters on the downtown campus. The new facilities will be located on the third floor of a nine-story building which is nearing completion.

The Departments of Biology and Psychology are occupying the new Life Scienees Building at the **University of Virginia.** Formal opening exercises will be held at a later date.

The Biology Department of **Radford College,** Woman's Division of **Virginia Polytechnic Institute,** has received a matching NSF equipment grant under the direction of **Dr. Floyd E. Jarvis, Jr.,** Chairman. The $16,000 will be used to completely equip a controlled temperature genetics instructional and research laboratory. In addition, a number of calculators will be purchased for a small statistical laboratory to be used jointly with the Department of Mathematies in support of the genetics program.

The Training Branch of the Office of Resource Development, U. S. Public Health Service, has awarded a training grant to the zoology department of **Tulane University.** The award of $142,431 will support the training of graduate students in environmental biology for a five-year period. Sites in the states of Florida, Louisiana, Texas, and New Mexico were visited during the first summer's work. **Dr. Royal D. Suttkus** is directing the program.

The **Tulane Zoology Seminar** for fall, 1963, will include the following speakers: Oct. 15, Dr. M. C. Niu (Temple University); Oct. 22, Dr. Oliver P. Pearson (University of California, Berkeley); Nov. 5, Dr. Dietrich Bodenstein (University of Virginia); Nov. 19, Dr. Walter Auffenberg (University of Florida); Dec. 3, Dr. James Kezer (University of Oregon); Jan. 7, Dr. James Layne (Cornell University).

The death of the founding editor of *Tulane Studies in Zoology,* has resulted in changes in the editorial staff. **Dr. George H. Penn**'s successor as editor is **Dr. Harold A. Dundee,** with **Dr. Gerald E. Gunning** serving as Associate Editor.

The Department of Biological Science, **Florida State University,** has received renewal of an NIH Training Grant in Physiology for the third straight year.

Beginning September, 1964, the Botany Department of **Tulane University** will offer work leading to the Ph.D. degree. The department has had a graduate program offering the M.S. degree since 1917.

The NSF sponsored three programs this summer at the **Virginia Institute of Marine Science.** Students under the Research Participation for College Teachers program worked on individual research for twelve weeks and students and staff members worked for eight weeks on the Undergraduate Science Education program. Conducted

for the first time this summer was a Cooperative College–School Science program at Norview High School, Norfolk, Virginia. Fifteen high ability students and three teachers participated.

The Botany Department, **University of Florida,** is sponsoring at three (3) off-campus centers (Jacksonville, Deland, Sebring) a course for teachers to instruct the BSCS Biology Course. **Dr. G. Ray Noggle** and **Dr. W. Selser** are directing the program which is supported by the National Science Foundation. This is the third year for this program, which has previously been offered at centers in Melbourne, Orlando, Tampa, Jacksonville, and Gainesville.

New laboratory facilities for the Radiation Biology Program, **University of Florida,** will be completed in the winter of 1963. These will be located in the Nuclear Science Building. Various radiation sources as well as greenhouses and controlled environment chambers will be some of the new facilities available.

A $200,000 Health Researeh wing has been completed at **Southern University,** Baton Rouge, La. This 2-story building houses 13 research laboratories plus rooms for equipment and supplies and washing and autoclaving glassware. Money for this building was provided by NIH and matching funds from the State of Louisiana.

The ASB Bulletin

Geoffrey M. Jeffery, Editor, Volumes 6-7
C. Willard Hart, Jr., Editor, Volumes 8-10

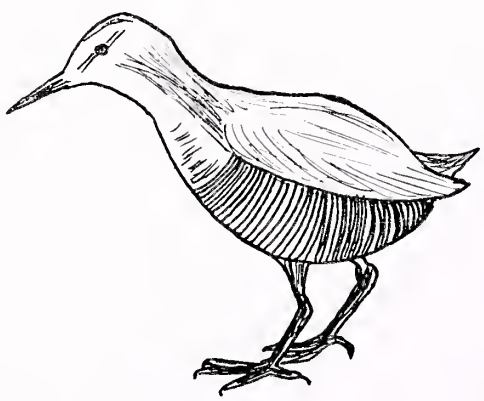
Published by
The Association of Southeastern Biologists

Index to Volumes 6-10, 1959-1963

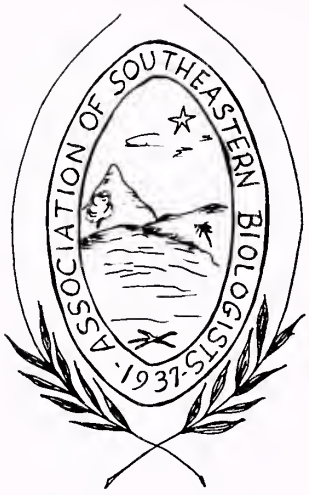
This is the second of a series of five-year indices planned for the *ASB Bulletin*. The author index includes authors of abstracts and articles, but the subject index does not include abstract titles or subjects. Those who plan to bind the *Bulletin* should note that this index can be removed and bound at the end of the volume without disturbing the sequence of pages.

Subject Index

Author Index



On the next page are six designs that have been submitted in the ASB's competition for a seal. As the competition is still open, additional designs or comments on the ones shown here are welcome. Please communicate with Dr. Harry Bennett, Dept. of Biology, Louisiana State University, Baton Rouge, Louisiana.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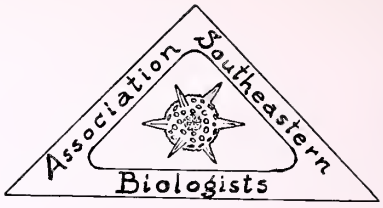
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THE ASSOCIATION OF SOUTHEASTERN BIOLOGISTS
1938


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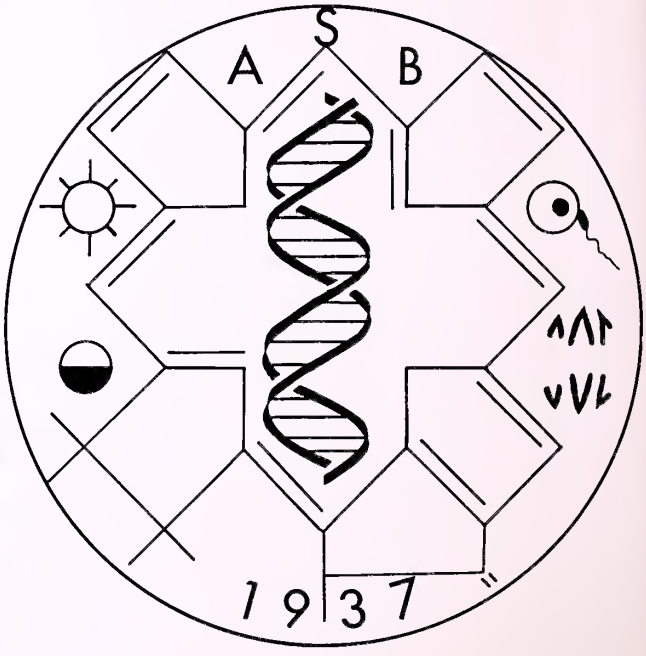
ASSOCIATION OF SOUTHEASTERN BIOLOGISTS ·1937·


FELIX QUI POTUIT
RERUM COGNOSCERE
CAUSAS
ASSOCIATION OF SOUTHEASTERN BIOLOGISTS ·1937·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The ASB BULLETIN

Volume 11, Number 1 January, 1964

MAMMOTH CAVE BAT (*See page 2*)

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 11, Number 1—January 1964

The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Harry J. Bennett, Department of Zoology, Louisiana State University, Baton Rouge, La. Subscription orders from libraries and other institutions should he sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Suhscription rate for nonmembers of the ASB: $4.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

Second-class postage paid at Philadelphia, Pennsylvania.

C. Willard Hart, Jr.
Editor

Harry J. Bennett, Associate Editor
Betty Ursomarso, Assistant Editor
Leland Shanor, Business Manager

CONTENTS

The cover photo of a little brown bat (*Myotis lucifugus*) was taken during a netting operation at Mammoth Cave National Park, Kentucky. This study, which involved the capture and banding of over 12,000 migrating bats during August and September, 1963, is one of several projects going on at the recently established Institute of Speleology at the University of Kentucky.

Other work with bats includes studies of homing, migration patterns, sex ratios, and winter waking cycles at Carter Cave State Park, Ky. Faculty and graduate students involved with these projects include Dr. Wayne H. Davis, Dr. Roger W. Barbour, Marion D. Hassell, Charles L. Rippy, and Raymond McAdams.

ASSOCIATION AFFAIRS

INTERIM EXECUTIVE COMMITTEE MEETING

Emory University

October 5, 1963

The meeting was called to order by President Jones at 9:00 A.M. Present were: President E. Ruffin Jones, President-Elect William D. Burbanck, Retiring President Walter L. Flory, Treasurer Leland Shanor, Editor C. Willard Hart, Jr., Executive Committee members Walter R. Herndon, Patrick H. Yancey, John H. Carpenter, Wilbur H. Duncan, C. Ritchie Bell and Secretary Harry J. Bennett.

The minutes of the meeting of the Executive Committee for April 20, 1963 were approved.

President Jones called for a number of reports:

Secretary's Report: The Secretary reported that the results of a questionnaire sent to the membership indicated that the third week-end in April was the preferred time for the annual meeting in 1964. The replies as to the type of program preferred on Thursday evening showed that the majority thought that a symposium should be substituted for a single speaker. He submitted a let-

(*continued on page 21*)

Fig. 1. Experimental cage. Overall view with plexiglass cover in place. Instead of this cover we also used chicken wire painted with flat black. At its lower end each pedal is supported by a lever which is adjustable by a spring and connected to a microcounter. The cage measures on top 35 inches in diameter.

Orientation In Animals [1]

by

E. G. FRANZ SAUER

University of Florida

For any organism continuously exposed to changing environmental influenees, oriented locomotion is the behavioral act that ultimately deeides success or failure of the individual or, at a higher level, the survival or extinction of the species.

The *taxis,* that is the orienting movement of an animal capable of free locomotion, is one element of complex behavior patterns. The analysis of the complex organie structures and functions that underlie a given taxis has become a matter of increasingly sophisticated research.

Animals are oriented toward or away from environmental stimuli, or at certain angles to them. The orienting act may consist of instinctive patterns, that is species-specific behavior, and adjusted instinctively to specific environmental signals, that is without being learned. Or it may be manifest as an individual-specific act entirely learned. Intermediate forms exist between these two extremes where instinct and experience combine in various degrees. Learning itself may be established in that special form called "imprinting," which indeed seems to be different from any associative learning. This old and controversial ethological point of view is supported by recent biochemical analyses.

In general, orienting movements have an enormous adaptive value and are thus of great biological significance. We can be sure that in most organisms that have uniformly selected, specifically oriented locomotion instead of random movement, the selective pressure must have been severe.

Structural and functional differentiations, anatomical, morphological, neurological changes, and modifications of biochemical systems for greater and better efficiencies account for the development and the evolutionary success of adaptive orientation. The development and the secular shifts of the universe, accompanied by the radiation of the animal kingdom, the occupancy of new ecological niches, and the struggle for existence between competitors, the differen-

[1] This paper was presented as the invitational address at the Gainesville, Florida, meeting of the ASB in April 1963.

tiation and destruction, maturation and aging of the individual, the social community, and the many species are only a few of the many external and internal factors that continuously challenge the organisms to orientate for better adjustments and survival. Exposed to such severe selection pressure, it is not at all surprising that animals are known to orient instinctively to supernormal or supernatural stimuli, thereby disregarding the natural specific releasers of their normal intra- and interspecific environments. From a phylogenetical point of view this must be the most desirable condition, which means that the orienting mechanisms of organisms are "open to one side," enabling the animal not only to meet severe selection pressure but to escape it and to aim for a new evolutionary level. For the same reason it has been formulated from philosophical viewpoints that animals have a potential knowledge of "supernatural ideas." For us this fact is of enormous importance when we design an experiment to let the animal orient to an artificial model of the natural stimulus.

The forms and functions of short- and long-range orientation are manifold. With respect to the peripheral afference, every available sensory system is utilized for orientation, including chemo-, mechano-, electro-, optical and ultra-optical receptors. For instance, thresholds for olfactory orientation in the eel *Anguilla anguilla* range into dilutions of $(1 : 2.8) \cdot 10^{-18}$. Rhinolophid bats can locate with their sonar system, from distances up to about 10 metres, echoes of their own supersonic sounds reflected by nylon strings only 100 microns in diameter.

Individual animals are oriented with respect to their own bodies, to the substrate they live on, to water and food sources, to social partners and to enemies. Orientation to a "home" means shelter, to a territory existence, and during expansions of their home ranges animals orient to the unknown extraterritorial space.

In the course of evolution the "home" of a species may have become split into summer and winter residences. We have solid evidence that during the Pleistocene glaciations many animals ventured into the unknown to establish new homes where they survived and further evolved, but yet maintained some contact with their ancestral homes. Bound to the new and the old homes by instinct and successful learning, some species retained their drives to migrate between these seasonal goals over pathways leading in their extremes nearly from one end of the globe to the other. Other species may have become nomads and migrants without exposure to glacial forces, simply as a result of population pressure and their continuous search for new sources of food. Many of these are no less astounding with respect to the distances they travel.

Studies of American sea turtles by A. Carr brought direct proof that these reptiles cross the oceans of the world, goal-directed and not at random.

Bird migration has fascinated mankind ever since ancient times. The flight pattern of the Arctic Tern, *Sterna paradisea*, remains the favored example of the ornithologists the world over. This bird covers about 20,000 miles per year, migrating along subspecifically different routes from as far as 82°N to as far as 66°S and back again.

Even among heterothermic invertebrates we find long-distance migrants of remarkable abilities. The Monarch Butterfly, *Danaus plexippus*, travels between its seasonal goals located north in the North American Arctic and south in California, Mexico, and eastward to Florida. This butterfly migrates close to 3,000 miles to survive for a winter and to return to its original home, just to reproduce and then to die.

It is this topic of space orientation over long distances with which I want to conclude this invitational address, and I want to refer to one kind of long distance migration in which celestial bodies are used by animals as reference system. It was only in 1911 that the Italian zoologist F. Santschi discovered celestial orientation in the animal kingdom through his observations and studies of sun-orientation in ants. During the past decades it became established that many animals use the sun, moon, and stars instead of topographical features for reference systems of orientation. K. v. Frisch and the late G. Kramer are the two outstanding scientists who pioneered in the field of sun-orientation in honey-bees and in birds. F. Papi discovered the

moon-orientation in a small amphipod crustacean. F. Sauer and E. Sauer found stellar orientation in nocturnally migrating birds. Most impressive has been the discovery that animals utilize their endogenous circadian and annual rhythms as time measuring devices to account for the relative movements of the celestial bodies across the sky and for the seasonal shifts.

Our recent subject is the Siberian Golden Plover, *Pluvialis dominica fulva*. This bird, which migrates across the vast Pacific Ocean, has provided us with new information and insight on how a migrant can master a goal-directed flight lasting continuously for days and nights across a vast hostile area of some 3,000 to 5,000 miles. We raised 10 birds by hand on St. Lawrence Island, Bering Sea, a location as close as possible to the Siberian ancestral home of the Golden Plovers. Now three years of age, these ten birds have shown migration restlessness, reproductive activities, and molt in natural sequence. The experimental work has been greatly favored by their tameness; they readily display their motivation-specific behaviors with a minimum amount of disturbing activation. One can rely, therefore, on the quality of their migration restlessness much more than on that of wild-caught adult birds in a similar experiment. The latter often display fear and escape tendencies which interfere with their migratory activity, and this can condemn an experiment to failure. The second reason for using hand-raised birds is the need for a clear experimental situation. These ten birds had never experienced natural migration. Thus, if learning were involved in their migration, one could test this by experimental geographical displacements or by an experimental arbitrary setting of their internal clocks, provided that these exist, that they could be shifted, and that they were used for migration orientation. At their birthplace, Boxer Bay on St. Lawrence Island, the birds were exposed to the natural sky, and one could cxpeet that their internal clocks were in phase with the loeal time. Before they had reached their first migratory period, they were flown by airplane to Madison, Wisconsin; during their travels the birds were prevented from seeing the sky. The birds stayed in Madison from the end of August 1960 to Fcbruary 1961; then they were flown out to San Francisco.

For the purpose of a comparative study 6 of the birds (in San Francisco, 4) were kept in light-controlled rooms with and without climatic controls. The daily light cycles acting upon these birds were kept in phase with those that would have influenced the birds during the corresponding seasons at Boxer Bay, during their migration across the Pacific Ocean, and at Honolulu, Hawaii. The 4 remaining birds (in San Francisco, 6) were exposed to the local conditions of Madison, and later of San Francisco, and could see at least part of the sky during day and night.

During their migratory periods the birds were tested individually in a circular cage designed to record the migration restlessness and directional tendencies of these non-perching waders (Fig. 1). Aecording to the 16 meehanically pressure-sensitized, radially arranged recording pedals, the birds themselves counted their take-offs and landings in 16 compass sectors. These counts are shown in the diagrams. Since Golden Plovers normally migrate in flocks and give flight notes, a loudspeaker was installed in the center underneath the cage through which we played flight notes of migrating Golden Plovers. As a result of this acoustical stimulation, the individual bird in the experimental cage showed increased migratory activity.

A few typical examples of the 1961 test series, including 159 experiments with a total recording time of $249^{h}\ 52^{m}$, may be given here. Not knowing what flight courses the birds would take from San Francisco, we selected as our reference system the great circle tracks that connect Boxer Bay, Madison, San Francisco, and Honolulu (Fig. 2).

The internal clocks of the birds of the first experimental group were, to various degrees, as much as $3^{h}\ 16^{m}\ 40^{s}$ slow compared to San Francisco local time. Despite these various time shifts, the modes of their undisturbed spring migration oricntation approached the initial bearing of the great circle route from San Francisco to Boxer Bay (Fig. 2 a). This mean was

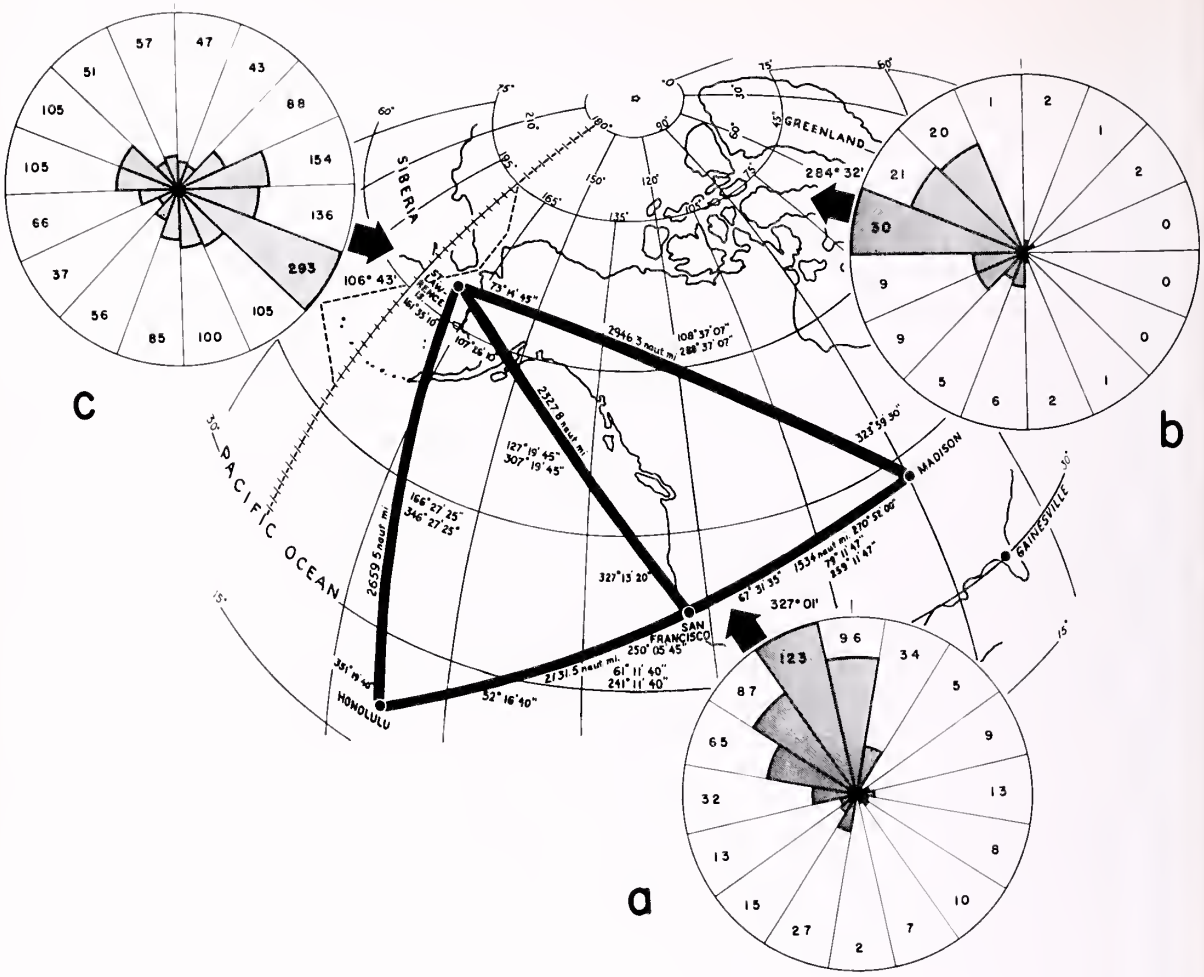


Fig. 2. Great Circle tracks Boxer Bay (St. Lawrence Island), Madison, San Francisco, Honolulu, Gainesville. Three examples of spring (a, b) and fall migration (c) at San Francisco in 1961. Explanations: Time in San Francisco Local Mean Time. C = recorded counts; TC = total counts; dt– = difference of the setting of the internal clocks lagging behind Local Mean Time. Clouds: ACu = altocumulus; Ci = cirrus; CiCu = cirrocumulus; Cu = cumulus; St = stratus; cloud cover from 1/10 to 10/10; compass bearings mark directions of wind; wind speed is indicated in knots; occ. = occasionally.

(a) LD ♂ 7 June, 0815-0945; C: 112; clear, 4/10 St Cu; W 5-8, occ. 10-20.
8 June, 1040-1217; C: 411; clear, 4/10 Cu, later CiCu, W-NW 10-14, occ. 25.
9 June, 0825-0955; C: 23; clear, SW 2-3. TC: 546, dt– 2^h 50^m (42° 30′).

(b) RB ♂ 13 May, 1535-1745; C: 56; clear, high Ci; W 10.
15 May, 1440-1650; C: 53; clear, W 2-10. TC: 109.

(c) LD ♂ 14 Sept., 1324-1453; C: 504; clear, 1/10-3/10 St, SW 10-14, 18, W 2-5.
19 Sept., 1155-1328; C: 357; clear, W 1-3, S, occ. SW, 2-4.
25 Sept., 0920-1050; C: 189; clear, W 1-3.
26 Sept., 0845-1015; C: 93; clear, N 2-4.
29 Sept., 1036-1206; C: 190; clear, W 3-6.
30 Sept., 1348-1524; C: 58; clear, W 2-3.
2 Oct., 1521-1625; C: 137; 1/10-5/10 Ci and low St, W-SW 4-6.
TC: 1528, dt– 3^h 16^m 40^s (49° 10′).

also maintained under complete overcast that left the position of the sun invisible. Winds exceeding 22 knots from W to NW frequently blew birds off their course in the apparatus. The birds compensated for this drift and maintained a close approximation of the typical mean course. Only under heavily overcast skies the birds were disoriented and then interrupted their migration restlessness. Under an increased cloudy sky that obscured the sun to such an extent that a human observer could at best only roughly estimate its approximate position, the birds of this group lost their initial orientation toward their seasonal goal. Their bearings indicated an orientation based on an assumed azimuth position of the sun according to the setting of the birds' internal clocks, that is, the birds drifted clockwise according to the degree of the time difference between the setting of their internal clocks and local time of San Francisco. The birds obviously showed that they failed to navigate in this situation, i.e., were unable to perform bi-coordinate celestial orientation. One can interpret their reaction as an azimuth orientation in which they neglected the altitudinal eomponent of the veiled sun.

The birds of the second group, which were exposed to the Madison sky in the fall and winter of 1960, had their internal clocks in phase with San Francisco local time. Their spring orientation at San Francisco approached the great circle track leading from Madison rather than from San Francisco to Boxer Bay (Fig. 2 b). This indicates that these birds had not compensated for their geographical displacement from Madison to San Francisco, or that they were no longer able to compensate for it since their internal clock had been adjusted to San Francisco time. Further, these experiments demonstrate that the birds hand-raised at Boxer Bay must have gone through two sensitive phases during which they had learned the geographical position of their prospective breeding area (in this case identical with their birth place) in relation to the geographical position of their first reached wintering grounds (Madison, Wisconsin). That they established by learning a definite pattern of migration related to these two positions is suggested by their display of it after their displacement to San Francisco. The fall experiments in San Francisco showed, however, that the birds were not irreversibly imprinted on this experimentally determined course. Their learned pattern was influenced by their time spent in San Francisco. While some of the birds in fall showed a preference for a course which would have brought them from Boxer Bay to San Francisco (Fig. 2 c), others selected a direction toward Madison or oscillated between these two goals, and there was no correlation between these decisions and the grouping of the birds into two experimental units.

Comparable results were obtained in tests under the natural night sky and in the planetarium.

The results indicate that the Golden Plovers do not possess an "inborn" knowledge of their birthplace nor a mystical inertial ability for homing under any condition. Nor is it reasonable to think that they would have a rigid, genetically fixed flight pattern between their breeding and wintering grounds. These patterns are more likely learned during sensitive periods prior to their migratory periods and after their migrations. It is most probable that under natural conditions a genetically determined, species-specific migratory range is individually modified and conditioned by external environmental influences. As small as the hereditarily determined range for possible modifications may be, it seems to be a factor of enormous adaptive value in these transoceanic migrants.

To summarize the facts of celestial orientation in the Golden Plover, obtained from these initial experiments, we can say: The birds are able to migrate both day and night by means of visual cclestial orientation, the information obtained from the visible sun and the stars. Their internal clocks enable them to compensate for the relative movement of the celestial bodies and to compensate for geographical displacements, provided the birds can detect a difference in time between the setting of their internal clocks and the local time. As long as the celestial bodies are clearly visible or their positions

can be accurately located under an overcast, the birds navigate, i.e., refer to a bi-coordinate celestial grid. When the sun is veiled to a certain degree, the birds do not navigate but fall back to a mere azimuth orientation, thereby neglecting the altitudinal component of the sun. When the celestial bodies are invisible, the birds fail to display their seasonal migration orientations, they are disoriented and, under the experimental conditions, interrupt their migration restlessness.

Our 10 Golden Plovers have gone through two sensitive periods during their first year of life during which they became imprinted on their breeding and wintering areas. They show an ability to modify their species-specific pattern of migration by individual learning, thereby reaching a level of efficiency beyond that of pure instinct. The biological significance of this is its great adaptive value, and it is probably the evolutionary key to the birds' mastery of their marvelous flight across the vast, trackless Pacific Ocean.

ASB's January Placement Service

In the October 1963 ASB Bulletin, a new placement service for biologists in the southeast was announced. This service, to be included in each *January* ASB Bulletin, is aimed primarily at those people who expect to receive their doctorates *one year from the following June.* Other candidates are welcome, however.

In response to this announcement, five resumes were received—and these are printed below. Reactions to this program, whether favorable or not, will be welcomed by the ASB Bulletin.

Name.—**Gary Eugene Dillard**
Address.—McKimmon Village, Apt. F-21; Raleigh, North Carolina.
Institution.—N. C. State of the University of North Carolina at Raleigh.
Permanent address.—McKimmon Village, Apt. F-21; Raleigh, North Carolina.
Specialization.—Phycology-Ecology.
Occupational preference.—Teaching and research.

Name.—**Paul Wheeler Kirk, Jr.**
Mailing address.—820 Louise Circle, Durham, N. C.
Institutions and specialization.—B.S. in Chemistry, University of Richmond, Va.; M.S. in Biology, University of Richmond, Va.; Ph.D. in Botany, specialization in mycology, Duke University.

I wish to develop courses in bacteriology and mycology and to conduct research in the general areas of pure and applied microbiology; in particular, the ecology of salt water or estuarine fungi.

Age and status.—32, married, one child, military service completed.
Practical experience.—5 years as medical laboratory technician and public health bacteriologist; 2 years as high shool biology and general science teacher; one semester as general botany instructor at Duke University; several graduate teaching assistantships for courses in general botany, general and medical bacteriology, and general mycology; 3 years of experience in researches on salt water fungi, including work at a marine station.

Name.—**John A. Martin**
Address.—Department of Botany, University of Tennessee, Knoxville, Tennessee 37916.
Institution.—Department of Botany, University of Tennessee, Knoxville, Tennessee 37916.
Permanent address.—Locust Hill Road, Albany, New York 12203.
Field.—Theoretical and Mathematical Aspects of Ecology; Silvies and Silviculture.
Degree expected.—Ph.D. in Botany.
Preference.—1) Teaching and research, 2) Research.

Name.—**Brent B. Nickol**
Permanent address.—2551 Northland Street, Cuyahoga Falls, Ohio.
Present address.—P.O. Box 5870 University Station, Baton Rouge 3, Louisiana.
Present institution.—Louisiana State University at Baton Rouge.
Field of specialization.—Invertebrate zoology. Particular interest in parasitology. M.S. and Ph.D. research done on Acanthocephala.
Degrees.—B.A. from the College of Wooster, 1962; M.S. from L.S.U., 1963; Ph.D. from L.S.U., hopefully 1965.
Preference.—Teaching and research.

Name.—**James Doyle Stidham**
Address.—1730 White Avenue, Knoxville, Tennessee.
Institution.—Department of Zoology and Entomology, University of Tennessee, Knoxville.
Permanent address.—576 Dogwood Drive, Kingsport, Tenn.
Specialization.—Invertebrate Zoology.
Preference.—Teaching and research.

A Study Of The Graduate Program In Biology At The University Of Richmond [1]

WARWICK R. WEST, JR. and WILLIAM S. WOOLCOTT
University of Richmond

The University of Richmond is a private institution of medium size located in Richmond, Virginia, with the primary purpose of providing undergraduate training in the liberal arts. Since 1920 the graduate program has provided training for a large number of students in several departments. In the training of graduate students in biology the contributions made by large graduate schools are obvious; however, those of biology departments in the small and intermediate-sized liberal arts colleges are often overlooked. To this date there has not been a serious evaluation of the graduate program at the University of Richmond. It is the objective of this paper to show how the program at Richmond contributes to the graduate study of biology; to the training of graduate students; and how it contributes to the over-all program of the University.

Data used in this study were collected from permanent record files of students who received Master's Degrees between 1940 and 1962 from the University of Richmond. Additional information came from questionnaires that were returned by these same graduates. Response was exceptionally good as approximately 75% were returned and many of these contained unsolicited comments that were of special interest to this study.

In order to maintain the proper perspective it should be kept in mind that the organization of the Department of Biology is primarily for the training of undergraduate students and that the graduate program is relegated to a secondary role. During the period represented in this study the staff has grown from 3 to 7 full time teachers, each of whom carries 3 four-credit hour classes of teaching responsibility (18 contact hours). The participation of all the staff members in a senior-graduate student seminar each week increases the contact load to 19 hours. Research courses and thesis direction for graduate students involves from 3 to 10 additional hours a week on the part of the faculty members involved. At present all full-time members of the staff hold the Ph.D. Degree, are graduates of six different graduate schools, and represent seven different areas of interest.

Further, it should be considered that the academic average of many of the graduate students would not have allowed them to qualify for finaneial support in larger institutions, or their undergraduate program was inadequate to qualify them for more specialized work. In some cases the general immaturity of the students directed them to a smaller institution. Many of the better students have been those who came back into fundamental biology after being exposed to a period of training in medical school.

It should be mentioned that the University does offer financial assistance, but it is not competitive with the support offered by larger institutions. For example, many fellowships are not large enough to cover tuition charges, and the largest has never exceeded $1,200.00. Students who do not qualify for fellowships are able to defray some of their costs by working on an hourly basis in the Biology Department.

The Master's Degree in Biology has been awarded to 34 people during the period covered by this study. Half of these obtained their undergraduate degrees at the University of Richmond, while the remainder were graduates of ten other institutions (Table 1). The basic policy for admission at present is determined by a majority vote of the staff, while in the past the selection was primarily the responsibility of the departmental chairman. Criteria for admission are flexible but are essentially based on the student meeting the requirements for an undergraduate major in the Biology Department and with some good evidence of potential as a graduate student. Quite often personal reeommendations have been of major importance in the acceptance of students for graduate study. Although the over-all academic average is given consideration, more significance is attached to grades in biology and to the senior average. The over-all grade range of accepted applicants has been from C– to B+ with the average C+.

[1] This work was supported by a Faculty Research Grant from the University of Richmond.

Table 1. Institutions that have contributed to the education of University of Richmond master's graduates in biology (1940-1962) with the number of individuals indicated after the name of the institution

UNDERGRADUATE SCHOOL		GRADUATE SCHOOL	
Bridgewater College	1	Cornell University	2
Georgetown University	1	Duke University	1
Juniata College	3	University of Florida	1
Maryville College	1	Florida State University	1
Randolph-Macon College	2	Harvard University	1
University of Richmond	17	University of Illinois	1
Roanoke College	1	University of Maryland	1
University of Virginia	2	University of Mexico *	1
Wake Forest College	1	University of Michigan	1
Washington and Lee University	1	New York University *	1
College of William and Mary	3	University of North Carolina	1
		University of Pennsylvania	1
		Purdue University	1
		Rutgers University	2
		University of Tennessee	1
		Medical College of Virginia *	10
		University of Virginia	4
		Vanderbilt University	1
		Virginia Polytechnic Institute	3

* Medicine.

The last year average is B– with the range from a very low D+ to A. In biology the range was from C– to A– with the average B– (Table 2). Selection of students as degree candidates is not made until after they have completed one or not more than two successful semesters of graduate work. The usual time required for the completion of the degree is four semesters with the accumulation of a minimum of 32 semester hours of graduate biology, including the preparation and defense of a thesis.

As stated above, the areas of subject interest of the faculty are varied and this has allowed the research of the graduate students to be directed into a variety of fields. Although each research problem has been unique, by lumping them into general categories there are nine areas represented, with physiology and ecology leading the list (Table 3). The influence of the training received at Richmond has carried over into the post-master's work of the Richmond graduates. This is especially evident since 1952, as 13 of 16 students who have sought advanced degrees continued in fundamental biology, while prior to that date most who obtained advanced degrees did so in the field of medicine (Table 4). Students who have entered the area of medicine trained at only four schools while those entering basic biology have attended 14 different institutions (Table 1). Admission to these schools has been influenced by the improvement of academic performance while at Richmond (Table 2).

A summary of the present professional status of the Richmond graduates shows that 11 are practicing medicine, three are in biological research, six are teaching biology, two are in biological administrative work, one is a missionary, eight are students working toward the Ph.D. degree, and one is seeking the D.M.V. degree. Only one is unaccounted for in this survey as his present status could not be determined.

Table 2. Academic record for students taking masters program in biology at the University of Richmond (1940-1962). Based on 4.0 system

	UNDERGRADUATE POINT AVERAGE			GRADUATE POINT AVERAGE
	Over-all	Last year	Biology	Biology
Low	1.64	1.22	1.57	2.00
High	3.10	4.00	3.55	4.00
Average	2.30	2.62	2.81	3.58

Twelve of these Richmond graduates have contributed over 125 scientific publications, many of which are significant in their field. In some instances the publications were direct outgrowths of research done while at Richmond.

Obviously the master's graduates have benefited professionally by their experience at Richmond, and in their own words have expressed various items of evaluation of their training with most of their comments favorable. Special mention of the following points was made with the frequency as indicated by percentages: personal attention (74%); breadth of background (52%); application of biology to living (40%); training more

Table 3. Number of Richmond graduates (1940-1962) in the various subject areas of biology at the master's and post-master's levels

SUBJECT AREA	MASTER'S	POST-MASTER'S
Bacteriology	2	2
Cytology	1	–
Ecology	7	4
Histology	2	–
Morphology	6	1
Parasitology	6	3
Physiology	7	6
Protozoology	1	–
Taxonomy	2	3
Medicine	–	12

Table 4. A comparison of the professional direction of students who received Master's Degrees in Biology from Richmond before and after 1953

DATES	MEDICINE	PH.D.	TERMINAL	UNKNOWN
1940-1952	9 (69%)	4 (31%)	2	1
1953-1962	3 (19%)	13 (81%)	2	–

than adequate (32%); and freedom of investigation (32%). In addition, several were impressed by the ability of the staff to motivate. Not all comments were favorable as some criticized the inability of the University to offer more financial assistance and several felt handicapped that the curriculum at Richmond did not include courses in the areas of biophysics, biochemistry and molecular biology.

A graduate program in biology of such small magnitude as that at Richmond would not be worth the effort were it not for the impact it has on other areas of the school. The first and most important area influenced by the graduate program is in the training of undergraduates, as the level of performance and leadership of graduate students in classes stimulates the undergraduates to improve the quality of their work. This same influence can be seen in the presentation of papers in the senior-graduate seminar, in undergraduate research and in the use of the library. Undergraduates have an opportunity to develop a realistic concept of graduate study through their contact with graduate students, and many are influenced through this association to enter graduate work. Last but not least of the influences of the graduate student on the undergraduate student is the personal contact that allows for scholarly exchange and enables the Richmond undergraduate to compare his training with that of other schools.

The interest of the faculty in the role of the graduate program in biology is evidenced by the undertaking of this study; for, to put it bluntly, the graduate program is their main outlet for creative research. This contact with research not only helps to keep the faculty abreast of the literature in their own fields but also makes them aware of progress in other areas. The heavy teaching load and numerous extracurricular responsibilities so limit the research time that independent work of any significance cannot be carried on during the regular school year. However, through close supervision by the staff the graduate students profit as their master's research is usually far more extensive than that required by larger institutions. More up to date equipment and better library facilities are maintained for faculty use because of the special needs of the graduate research programs. The mechanics of running the department are facilitated by the graduates, thus freeing the staff of some of their many menial tasks. This figures prominently in enabling the staff to plan and present up to date material in their classes. Even after these graduates leave Richmond, they serve as a means of communication between Richmond and the schools that they attend for further study. This program is a source of professional pride for the biology staff at Richmond and is one avenue through which the rewards of teaching are directly felt.

It can be concluded that a graduate program not only adds prestige, it is essential to a modern university of any size. Without it qualified faculty members are difficult to attract and retain. This is especially true of the younger people in science who have studied in the more research-oriented institutions. Therefore, if the smaller schools are to compete for capable faculty and offer realistic programs in biology, certain requirements have to be met. These include an adequate fellowship program, more funds for up to date equipment and library, more support of faculty research, smaller teaching loads, and more space for research.

American Society of Plant Taxonomists Elects New Officers and Gives Cooley Award for Work on Southeastern Flora

Mildred E. Mathias of the University of California, Los Angeles has been elected President of the American Society of Plant Taxonomists for 1964 and **Richard S. Cowan** of the Smithsonian Institution, Washington, D. C. has been elected to serve a seven-year term on the Council of the Society.

Other officers appointed by the Council are: Charles B. Heiser, Jr. (Indiana University), Chairman of the Council; Lawrence R. Heckard (University of California, Berkeley), Secretary; Richard W. Pohl (Iowa State University), Treasurer.

Other appointments made by the Council are: **Peter H. Raven** (Stanford University), Editor-in-Chief of *Brittonia;* **Mason E. Hale** (Smithsonian Institution) and **James W. Hardin** (North Carolina State College) to serve on the editorial board of *Brittonia;* **Henry J. Thompson** (University of California, Los Angeles), Representative of the Society on the Editorial Board of the *American Journal of Botany;* **Robert B. Channell** (Vanderbilt University) and **Robert K. Godfrey** (Florida State University), Representatives of the Society on the Council of the American

Association for the Advancement of Scienee; **Reed C. Rollins** (Harvard University), Representative of the Society on the Governing Board of the American Institute of Biological Sciences; **David D. Keck** (National Seience Foundation), Representative of the Society on the National Research Council.

The George R. Cooley Award for the best paper presented at the annual meeting of the American Society of Plant Taxonomists at the University of Massachusetts, Amherst, in August, went to the authors of three papers: to Willard W. Payne, University of Michigan, Ann Arbor, for his research, "A re-evaluation of the genus *Ambrosia* (Compositae)"; to Henry J. Thompson, University of California, Los Angeles and Wallace R. Ernst, Harvard University, Cambridge, for their paper, "Contrasting patterns of variation in *Eucnide* and *Sympetaleia* (Loasaceae)"; to Dale M. Smith and Donald A. Levin, University of Illinois, Urbana for their work, "A chromatographic study of reticulate evolution in the Appalachian *Asplenium* complex."

The Cooley Award for meritorious work published on the flora of the Southeastern United States was made to two authors. Preston Adams, DePauw University, Greencastle, Indiana was presented $500 for his 1962 paper, "Studies in the Guttiferae. I. A synopsis of *Hypericum* sect. *Myriandra*. James A. Duke, United States Department of Agriculture, Beltsville, Maryland was awarded $500 for his 1961 paper, "The psammophytes of the Carolina fall-line sandhills."

Cooperative Project Between Cape Haze And Riverview High School Laboratories Sponsored By NSF

The National Science Foundation recently announced the grant of $11,765 for a eooperative project between the Cape Haze Marine Laboratory and the Riverview High Sehool Marine Laboratory, Sarasota Board of Public Instruction, during the summer of 1964. This is to be a special program for high ability high sehool students and biology teachers who are interested in teaching Marine Biology and Oceanography.

Participants who are to be seleeted from all parts of the United States will work with instructors and scientists at both laboratories for a period of eight weeks. They will center their activities around specially selected marine subjects, field trips and research projects, some of which are presently supported by the National Science Foundation and the Office of Naval Research. They will devote a full day and some evenings, at least five days a week to this special program.

Named by the National Scienee Foundation as Director of the special program was John D. Woolever, Riverview biology teacher and Educational Assoeiate of the Cape Haze Laboratory. Participant selection will be made by a committee which will include Dr. Eugenie Clark, Director, Cape Haze Laboratory representing the C.H. Laboratory, and Dr. Russel Wiley, Superintendent of Sarasota Public Schools.

A key figure in the instructional program will be Dr. Harold J. Humm, Botany Department, Duke University. Dr. Humm is an internationally known botanist and researeher specializing in marine algae. Dr. Humm is a former Director of the Duke University Marine Laboratory and the Florida Oceanographic Institute. He has had wide experience with both teachers and high school students. Some of his research has been done at the Cape Haze Laboratory in the field of marine algae.

The cosponsoring institutions are to supplement the financial grant by supplying certain equipment, laboratory facilities and some personnel services including transportation on field trips. Some of these trips will be made aboard the newly constructed boat which the National Science Foundation acquired for the Cape Haze Laboratory. The C.H. Laboratory is well known for its cooperative educational and research services to exceptional students. The Riverview laboratory was recently featured in a leading illustrated article published by the National Seience Teachers Association which devoted a special issue to unique laboratory facilities in modern science edueation in the United States.

Personnel members of this program are exceptionally well pleased over the news of the grant inasmuch as very few grants of this nature are made. Usually they are made to large universities and research institutes.

Inquiries are to be made at the Cape Haze Laboratory regarding program participation. Deadline for formal applications will be about April 1, 1964. Details will be announced in a special brochure published by the National Science Foundation.

Emory University Campus. (1) Biology Building; (2) Alumni Memorial Building; (3) Cox Hall; and (4) Lullwater Field Biology Laboratory.

About The Atlanta Meeting

The Association of Southeastern Biologists will hold its 25th annual meeting April 16-18, 1964 at Emory University, Atlanta, Georgia. Meeting with ASB this year will be five other organizations: The Southern Appalachian Botanical Club, the Southeastern Section of Beta Beta Beta, the Southeastern Section of the Botanical Society of America, a regional group of National Association of Biology Teachers, and the Southern Section of the American Society of Plant Physiologists. The meeting will commence on Thursday afternoon, April 16 with a meeting of the Executive Committee at 1:00 o'clock in Room 216 of the Biology Building. Activities will be centered in the Alumni Memorial Building (student center)—registration, exhibits, and smoker; the Biology Building—evening programs and some paper sessions; and Cox Hall—food services. Other paper sessions will be scheduled in near-by buildings.

Registration will be from 4:00 P.M. until 7:15 P.M. on Thursday, and from 8:00 A.M. until 11:00 A.M. Friday in the lobby of the Alumni Memorial Building. The program Thursday evening will begin at 7:30 in the auditorium of the Biology Building, to be followed by the smoker to be held in the lobby of the Alumni Memorial Building. Exhibits will be on display in an adjoining wing of the same building. Paper sessions and the annual business meeting will occupy Friday. Friday night activities include a banquet, the retiring President's address, and presentation of awards.

GENERAL INFORMATION AND ACCOMMODATIONS

Atlanta is in the foothills of the southern Appalachian Mountains on the Chattahoochee River about 950 to 1200 feet above sea level. Cool winters alternate with mild summers, the daily summer maximum for the most part being in the high eighties or low nineties. April weather is usually delightful, with flowering trees and shrubs at the height of bloom. Druid Hills, the residential area in which the University is located, is widely known for its massed flowers of dogwood and azaleas. Information on Atlanta and its various attractions, especially for wives and families, will be distributed at time of registration.

Emory University is located in a "dry" county, DeKalb. Most of metropolitan Atlanta, however, is in adjoining Fulton County, which is "wet."

Travel to Atlanta

Those not familiar with Atlanta may find it helpful to secure a city map from a service station on entering the city, if arriving by car. All of the major gasoline companies provide maps of metropolitan Atlanta. The Druid Hills residential section and Emory University are six miles northeast of downtown Atlanta. None of the major highways pass the campus.

Plane connections into Atlanta are excellent. The airport is south of the city, and is a 30 to 45 minute drive from the campus. Limousine service is provided to the downtown area at $1.35. Taxi fare from downtown Atlanta to the campus is approximately $3.00. Those desiring to come directly from the airport to the Emory University campus should take a cab directly, the fixed fare being $5.15. Bus and rail terminals are in downtown Atlanta, with the exception of a Bus Station at Decatur, some three miles from the campus, which provides service to the east.

Parking

Parking on the Emory University campus will be difficult, since normal use overtaxes the facilities. Special parking arrangements will be made by the campus Security Office, and these arrangements will be publicized at the time of registration. Permits to park in restricted areas on the campus will not be required but an ASB sign, to be provided at the time of registration, should be clearly visible.

Dining

Members of the Association and their guests will find it convenient to use the main cafeteria in Cox Hall. However, student rush hours should be avoided.

A number of modest dining facilities immediately adjoin the University. Atlanta boasts a large number of excellent restaurants and clubs. These are all located at some distance from the campus.

Field Trips

Plans are being made for a Saturday morning field trip to the granite outcrops to examine their unique flora and fauna. Opportunity will also be provided for visiting the Lullwater Biology Field Station and the Cesium^{137} Radiation Field, both located on the campus.

Registration

Registration will begin Thursday, April 16 and continue through Friday morning in the main lobby of the Alumni Memorial Building (Student Union). A $1.00 registration fee will be charged.

Local Arrangements Committee

Co-Chairman	W. D. Burbanck
Co-Chairman	R. B. Platt
Housing	R. B. Platt
Finance	Raymond Damian
Registration	A. A. Humphries
Food Service	A. C. Clement
Smoker	C. G. Goodchild
Exhibits	W. E. Brillhart
Field Trips	W. H. Murdy
	M. P. Burbanck
Program	Burbanck and Platt
Meeting Rooms	Charles Ray
Audio-Visual	A. V. Beatty

Regarding Integration

Hotels and motels in Atlanta are predominantly segregated. Three, however, which are integrated, are so marked in those listed under "Accommodations" below. The facilities of Emory University are available to all members and guests of the Association, as are any of the cafeterias on campus. Many of the eating establishments adjacent to the campus are also integrated.

Accommodations

Sixteen rooms are available on campus, 9 being in the Alumni Memorial Building, and 6 in an adjacent dormitory. Details on these are given below. Send requests for any of these rooms to: Robert B. Platt, Department of Biology, Emory University, Atlanta 22, Georgia, indicating if a connecting bath would be acceptable. Four have private baths, and twelve have connecting baths.

ALUMNI MEMORIAL BUILDING:	Single	Double
Suite (Room 203)	$8	$10
Private Bath (2)	$6	$ 8
Connecting Bath (6)	$5	$ 7
WESLEY HALL:		
Private Bath (1)	$5	$ 7
Connecting Bath (6)	$4	$ 6

Plus 3% sales tax.

There are no hotels and motels near the campus, the nearest being two to three miles away, and downtown ones to five to seven miles away. The Chamber of Commerce lists 43 hotels and 73 motels for Metropolitan Atlanta. Those nearest the campus, and some representative ones in town are listed below. It is advisable to make reservations before the end of March. Although no large conventions have been scheduled to date in Atlanta for this week, April traditionally is a busy month for the hotels and motels in the city, and accommodations could be limited.

Please write direct to hotels and motels for reservations.

HOTELS

THE HOTEL CANDLER, 150 East Ponce De Leon Avenue, Decatur, Georgia, DR 7-6491. Can accommodate at least 50. Single $3.61; double, $5.15-9.00. Most private baths; some connecting. Parking facilities provided. Reservations should be made several days in advance. Two miles from campus.

THE BRAIRCLIFF HOTEL, 1050 Ponce De Leon Avenue, N. E., TR 4-9711. 35-40 rooms available Thursday night; up to 100 Friday night. Ample parking facilities. Reservations should be made by April 14. Single $7.00-8.00; double, $10.00; twin, $12.00. Three miles from campus.

THE ATLANTA AMERICANA, 160 Spring Street, N. W., 688-8600. Motor Hotel, free underground parking for all guests. Two restaurants within hotel; also barber shop, beauty shop, etc. Single, $11; double or twin, $14-16, suite, $32. Reservations should be made in advance. Downtown.

PEACHTREE ON PEACHTREE, 176 Peachtree Street, N. W., JA 5-1561. Single, $6, $6.50, $7; double, $8.50, $9.50, $10 and $10.50; twin, $9.50, $10, $10.50, and $11.50; suite, single, $11; double, $16. Charge of 50 cents for 24-hour storage of vehicles. Reservations should be made through William H. Martin, manager, in advance. Downtown.

THE DINKLER-PLAZA, 98 Forsyth Street, N. W., JA 4-2461. Single, $7.00, $8.00, $9.00, $10.00, and $12.50; double, $10.00, $11.00, $12.50, and $13.00; twin, $15.00, $16.00, $17.00, and $18.00. Free parking. Reservations should be made two to three weeks in advance. Downtown.

THE PIEDMONT HOTEL, 108 Peachtree Street, N. W., JA 4-2431. Single, $6.50-$10.50; double, $10.50-$13.50; twin, $12.50-$16.00. No charge for children under 14; $3 per person over 14. Free parking. Reservations should be made in advance. Downtown.

THE PEACHTREE MANOR HOTEL, 826 Peachtree Street, N. E. 874-2791. 125 rooms. Single, $6.00-$8.00; double, $9.00-$12.00; twin, $9.00-$12.00; suites, $14.00-$18.00. Five miles from Emory Campus. (Integrated.)

MOTELS

HOWARD JOHNSON MOTOR LODGE, Northeast Expressway, 7 mi. NE of downtown at Druid Hills Road entrance; three miles from campus. Phone 636-8631. Single, from $10 up; double $14.42 up. Restaurant adjacent to motel. Free parking. Reservations should be made in advance through Mr. Myers, manager.

HOWARD JOHNSON MOTOR LODGE SOUTH, 759 Washington St., S. W., 688-8665. Seven miles from campus; one mile from downtown Atlanta. Single, $9.00-$12.00; double, $11.00-$14.00; twin, $12.00-$15.00. (Integrated.)

THE HILTON INN, 1031 Virginia Avenue, Hapeville, at the Airport. Phone 767-0281. Single, $9.50-$16.00; double, $12.50-$19.00; twin, $12.50-$19.00. (Integrated.)

THE HEART OF ATLANTA MOTEL, 255 Courtland, N. E., MU 8-1682. Single, $12.36; double, $14.42; twin (two double beds), $16.48. Charge of $1 per extra person. Reservations should be made in advance through Miss Sturges, Reservation Clerk. Downtown.

HOLIDAY INN, 175 Piedmont Avenue, N. E., 688-7420. 253 rooms, $10.00 up. Downtown.

THE HOWELL HOUSE, 710 Peachtree Street., N. E., 873-4321. All rooms have been converted from apartments and have connecting kitchens. The electric stoves in these kitchens are not connected for cooking, but all other appliances including refrigerators, are connected. Free parking for all guests. Single, $8.00, $9.00, $10.00, $11.00, and $12.00; double, $12.00, $13.00, $14.00, $15.00, and $16.00. Suites also available. Reservations should be made in advance. No charge for children under 12 years of age; charge of $3 per person for those over 12. Three mi. from downtown, 5 mi. from campus.

Meritorious Award Nominations

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)
1961. Dr. Warren Deacon (Vanderbilt)
1962. Dr. Septima C. Smith (Univ. of Alabama)
1963. Father Patrick H. Yancey (Spring Hill College)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting materials to *Dr. Harry E. Wheeler, Dept. of Botany, Louisiana State University, Baton Rouge*, La., by 1 April 1964.

COMMITTEE

W. E. Brillhart
A. J. Sharp
Harry Wheeler, *Chairman*

Mary Glide Goethe Travel Awards

For the seventh year there will be funds available through the generosity of Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year at Emory University, Atlanta, Georgia. It is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in ears with staff members. Some travel allowances may be awarded by the committee to those living most distant from Atlanta.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe Committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1964 meeting of the Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Indieate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.
2. Give information as to whether or not a paper is being presented by the applicant.
3. In a paragraph, give a brief history of your education to date, of how many years you have been–and plan to be–in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.
4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.
5. Have your major professor or departmental head write a letter supporting your application.
6. Applications and supporting letters, both in triplicate, should be in the hands of Elton C. Cocke, Department of Biology, Wake Forest College, Winston-Salem, North Carolina by March 1, 1964. Applicants will be notified of the decision of the Committee during March.

COMMITTEE

Richard E. Garth
Margaret Menzel
Elton C. Cocke, Chairman

Association Research Prize

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.
2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.
3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.
4. Judges will be eminent biologists outside the Southeast. They will set their own criteria, and may withhold the award if no paper is judged to have sufficient merit.
5. Papers must be submitted *in triplicate* and in their entirety not later than March 1, 1964, to *Dr. S. Gordon Carlson, Dept. of Zoology, University of Tennessee, Knoxville 16, Tenn.* One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.
6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Phipps and Bird Research Fellowship

A Research Fellowship of $150.00 for summer research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and especially in the case of younger workers, by references and educational data. Applications should be sent to *Dr. J. Gordon Carlson, Dept. of Zoology, University of Tennessee, Knoxville 16, Tenn.*, not later than April 1, 1963. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE

Raymond T. Damian
Burton J. Bogitsh
J. Gordon Carlson, *Chairman*

Books and Periodicals

SYSTEMATICS AND LIFE HISTORY OF THE GREAT BARRACUDA *SPHYRAENA BARRACUDA* (WALBAUM). By Donald P. de Sylva. Studies in Tropical Oceanography, Miami, 1: viii + 179 pp., 32 Tables, 36 Figs., October, 1963. Paper. $2.50.

"The Systematics and Life History of the Great Barracuda," by Dr. Donald P. de Sylva, is the subject of the first in a new series of publications to be issued by the Institute of Marine Science, University of Miami, under the title "Studies in Tropical Oceanography." The series will inelude reports or papers which are too lengthy and comprehensive for publication in regular scientific journals. It is designed for research covering the biology, chemistry, physics, and geology of tropical seas, their organisms and their interrelationships. Subsequent numbers of the series will deal with fishes of the Florida Keys, marine fungi, and stomatopod crustaceans of the western North Atlantic, the physical oceanography of the Florida Straits, and other subjects.

Dr. de Sylva's technical report on the barracuda is based on eight years of research and study, during which he examined thousands of specimens (in the field and in the laboratory) and, while skin diving, observed barracuda behavior and habits.

The barracuda report includes a key to identification of various species; data on their spawning periods, early growth, and feeding habits; a discussion of known attacks by barracudas upon humans; tables listing known cases of humans being poisoned by eating the flesh of barracuda, and a table showing the geographical areas where barracuda-poisoning appears most frequent.

The book can be ordered from: *Publications Office, Institute of Marine Science, University of Miami, Miami, Florida 33149.*

TISSUE RESPIRATION IN INVERTEBRATES. Dorothy E. Bliss and Dorothy M. Skinner. The American Museum of Natural History, New York, 1963.

The authors have set out to summarize the data on invertebrate tissue respiration for the period 1929 through 1959 and it must be said at the outset that they have done an excellent job. The book's nine sections are prefaced by notes setting down reasons for the selection and omission of material as well as the ground rules for the

sections that follow. This preface is a very helpful aid to the understanding of the rest of the book and the reader should not pass it over.

A short history of the study of invertebrate tissue respiration over the past thirty years serves as an introduction to the book's central theme. Several figures showing the distribution of respiratory studies among the invertebrate groups and the shifting interests over the years, e.g., continuing interest in the Crustacea and Pelecypoda, recent interest in the Insecta, sparse interest in the other groups, are very helpful in understanding the direction taken in the later sections on analysis and discussion of the data. The authors also trace the influence of various techniques on the progress of tissue respiration studies.

The second and by far the most valuable section consists of thirty-two double page tables summarizing the pertinent tissue respiration data for the thirty-year period prior to 1960. The tables are arranged in order of phyla and include both species and common name of each organism. Each entry includes the technique used and the conditions that prevailed during the study, the form and the amount of tissue used, the presence of substrates and/or inhibitors, and the oxygen uptake or enzyme activity. Footnotes provide additional information and in all cases references are given.

Section three, Analysis of Data, brings together in brief form the data appropriate to each of several variables in tissue respiration, e.g., all the references to cyanide inhibition of endogenous respiration are collected together. Several variables are considered and although this section is short it serves as a valuable cross reference to the extensive tabular listing in Section two.

A discussion section follows in which the authors attempt to present "the broader implications . . . and suggest some conclusions regarding invertebrate tissue respiration that may be drawn from them." This is in fact a discussion of tissue respiration in the molluscs and arthropods with only brief reference to the other forms. To account for this apparent disproportionate emphasis, one need only return to Section one and see that 97 of the 114 studies included in this survey are devoted to these two phyla. But even among these two phyla, tissue respiration has been studied under such diverse conditions and there are so few studies directed toward any one area that broad implications are hard to come by. The authors are to be commended for the effort and it may be hoped that the unsatisfactory state of affairs apparent in the discussion will stimulate more effort in the area of invertebrate tissue metabolism.

Sections five and six are devoted to abbreviations and a glossary for the reader's convenience. Section eight is an extensive bibliography including 308 listings, many with multiple entries, while Section seven is a guide to the literature and acts as an index to the bibliography. The ninth and final section is a thorough-going index including separate indexes for systematic group, for author, and for subject. These sections greatly increase the usefulness of the book so that the reader should have no trouble finding data relevant to his interests.

The authors' reticence to consider specific enzymes is unfortunate. This effectively eliminated material relevant to the early stages of tissue respiration, a noticeable deficiency, albeit admitted by the authors. Some of the time spent making the book convenient to use might profitably have been spent including selected data for the early stages of energy metabolism. However, it is too easy to criticize on the basis that more material should have been included. This volume is still a valuable and welcome summary for those interested in invertebrate physiology.

S. P. Maroney, Jr.
Department of Biology
University of Virginia
Charlottesville, Virginia

The DIRECTORY OF ZOOLOGICAL TAXONOMISTS, 1961, prepared under the auspices of the Society of Systematic Zoology, has now been made available to all interested biologists for $2.00, postpaid. Previously, non-members of the Society were charged $10.00. This Directory, hardbound in a blue cover, contains the names, addresses, and zoological specialization of nearly 10,000 taxonomists throughout the world. The Directory includes both an alphabetical listing of the specialists, and a zoological listing by specialization. Orders accompanied by a check for $2.00, should be sent to: *Southern Illinois University Press, Carbondale, Illinois, U. S. A.*

Books received recently

The following books have been recently received by the ASB. Should any member of the ASB wish to review one of these books in return for the review copy, please write to *Mrs. Betty Ursomarso, Assistant Editor, Academy of Natural Sciences, 19th & The Parkway, Philadelphia 3, Penna.*

NEEDHAM, JAMES G. AND PAUL R. NEEDHAM. 1962. *A Guide to the Study of Fresh-Water Biology.* Holden-Day, Inc., San Francisco, Calif. 107 pp.

RUSSELL, F. S. (ed.). 1963. *Advances in Marine Biology, Vol. I.* Academic Press, New York. 410 pp.

BOYER, SAMUEL H., IV (ed.). 1963. *Papers on Human Genetics.* Prentice-Hall, Inc., Englewood Cliffs, N. J. 305 pp.

WARING, H. 1963. *Color Change Mechanisms of Cold-Blooded Vertebrates.* Academic Press, New York. 266 pp.

O'KELLEY, JOSEPH C. O., WALTER R. HERNDON, E. GIBBES PATTON, JOAB L. THOMAS AND TEMD R. DEASON. 1963. *Plant Biology Laboratory Exercises, Second Edition.* Burgess Publishing Company, Minneapolis, Minn. 89 pp.

ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT. 1963. *Catalogue of Main Marine Fouling Organisms, Vol. 1, Barnacles.* 45 pp.

DOWLING, PAUL BRUCE (Dir.). 1963. *College Natural Areas as Research and Teaching Facilities.* The Nature Conservancy (Publ. No. 1), Washington, D. C. 28 pp.

News of Biology in the Southeast

About People

William W. Scott, a member of the Department of Biology at Virginia Polytechnic Institute since 1955, has been promoted to Professor of Botany. Dr. Scott received his B.S. and M.S. degrees at the University of Vermont and doctorate at the University of Michigan.

Edward A. Crawford, Jr. has recently joined the faculty at Hampden-Sydney College as Assistant Professor of Biology.

Bruce M. Eberhart, Professor and Head of the Biology Department of the University of North Carolina at Greensboro, has received a grant of $5,000 from the Brown-Hazen Fund for a study of cellulases in neurospora. **Ralph Morrison,** Assistant Professor, has received a grant from the American Philosophical Society of $900 for his investigation on the cytology of the powdery mildews. He will teach an NSF Institute for in-service teachers in genetics this spring. **Martin Roeder,** Associate Professor, has received a grant of $19,000 from the NSF for an investigation into the effects of iron and other minerals on fish growth. This fall he taught an NSF Institute in Cellular Physiology for in-service teachers. **Edmund Berkeley,** Associate Professor, spent the summer editing the scientific writings of the Reverend John Clayton. Earlier, Dr. Berkeley published a biography of John Clayton.

Harry J. Bennett, Department of Zoology, Louisiana State University, has received a 3-year grant from the U.S. Public Health Service for a study of the effects of pesticides on fish. He will be assisted by **Bobby F. Dowden.**

Robert P. Higgins, Assistant Professor of Biology at Wake Forest, will leave for four months participation in the International Indian Ocean Expedition February 1, 1964. Dr. Higgins will be engaged in research on the Kinorhyncha and associated interstitial fauna of the coastal regions of India and Madagasgar. While traveling to and from the Indian Ocean, Dr. Higgins will visit various marine laboratories of the Mediterranean and North European coasts.

Claude S. Chadwick, formerly Professor and Head of Biology at George Peabody College, became Professor and Head of the Biology Department at Emory & Henry College.

New faculty members at High Point College, Department of Biology, are **Elizabeth Conner,** Assistant Professor in Zoology; **Halsey Miller,** Associate Professor in Zoology and Geology; and **Kay Phillips,** Instructor of Botany and Bacteriology. **William Lazaruk,** Head of the Department, was awarded a research grant by the Piedmont University Center for a study of fresh-water algae in North Carolina. The grant of $400 will be matched by the college.

Gordon P. DeWolf, Jr., Associate Professor of Biology, Georgia Southern College, has been named the recipient of a NSF Grant for $26,600 to support his research in relationships of *Ficus* and *Dorstenia* (Moraceae).

James L. Chamberlain, Assistant Professor at Randolph-Macon Woman's College, will be on sabbatical leave the second semester to work at Duke University. He is President-elect of the Virginia Society of Herpetology. **Franklin F. Flint,** Associate Professor and Chairman of the Biology Department is currently Chairman of the Biology Section of the Virginia Academy of Science.

At the University of Southwestern Louisiana, **Matt E. Dakin, Jr.** has returned to the Biology Department after a year at Auburn University to continue his doctoral studies on the orthoptera of Alabama. **William Reese** and **John Thieret** are conducting a study of the vegetation of five salt domes in south-central Louisiana with the aid of a grant from the NSF. The Biology Department is conducting an investigation of larval shrimp in Vermilion Bay under a one-year contract from the U.S. Bureau of Commercial Fisheries.

A $17,250 NIH research grant for a joint study on plasma proteolytic behavior in response to injuries has been awarded to **E. Letitia Beard,** Assistant Professor in the Department of Biological Seiences, Loyola University, and **John K. Hampton,** Associate Professor, Tulane University Medical School. **J. J. Cooney,** Assistant Professor of Bacteriology at Loyola, will investigate pigment formation in *Micrococcus roseus* under a grant of $20,000 by the NIH. The Edward G. Schlieder Education Foundation has awarded a grant of $10,400 to **Edward J. Feeley** to study the effects of selected substances against the damage caused by the EMC virus in mice. The South Central Branch of the American Society for Microbiology held its fall meeting at Loyola University. Dr. **J. J. Cooney** was general chairman. Approximately 145 microbiologists from a three-state area attended.

Recent additions to the staff at Northeast Louisiana State College are: **Wm. C. Mobberly, Jr.** (Ph.D., Tulane); **Neil H. Douglas** (Ph.D., Oklahoma State Univ.); **Rollin Reimer** (M.S., Univ. of Arkansas); and **James Culpepper** (M.S., North Texas State). **Elton Barrett** was granted leave this past summer to work on fungi in northern Louisiana. **Edward Whatley** has a year's leave of absence to work on his doctorate at Mississippi State University. **Aaron P. Seamster** has taken a year's leave to serve as Director of the Education Programs Division of NASA.

Donald E. Stone is Assistant Professor in the field of biosystematics at Duke University. He received the doctoral degree at the University of California, and for several years was on the staff at Tulane University. **Richard A. White** is Assistant Professor in anatomy-morphology. He received the doctoral degree at the University of Michigan, and spent a postdoctoral year at Manchester, England, before coming to Duke. **Jane Philpott,** Associate Professor of Botany, is Associate Dean of Undergraduate Instruction, Woman's College of Duke University. She retains teaching and research responsibilities in the department. **Paul J. Kramer,** James B. Duke Professor of Botany, is President, AIBS, 1964-65. **Robert L. Wilbur,** promoted to Associate Professor, is on sabbatical leave from Duke University. He has recently published a book on the leguminous plants of North Carolina. Staff members invited to participate in the 10th International Botanical Congress, Edinburgh, in 1964, include Professors **Billings, W. L. Culberson,** and **T. W. Johnson, Jr. Chicita Culberson,** research associate in Lichenology, will also present an invited paper. Dr. **Ralph Slayter,** CSIRO, Australia, holds a Senior Foreign Scientist Postdoctoral position in botany (plant physiology) for 1963-64. Dr. **Jan Kohlmeyer,** Botanical Museum, Berlin-Dahlem, is research associate in mycology for the same period at Duke. Three Duke University undergraduate majors in botany, **William R. Anderson, Marshall Crosby,** and **E. Lloyd Dunn,** hold NSF independent study grants for 1963-64. Mr. Anderson and Mr. Crosby are conducting taxonomic-morphologic investigations of filmy ferns; Mr. Dunn is studying bacterial leaf nodules of tropical shrubs.

Gene B. Newcomb has joined the staff of the Department of Botany, Tulane University, as Assistant Professor. He received his doctorate from the University of California and taught at the University of Nevada. Dr. Newcomb's interests are biosystematics, genetics, and cytology.

A team of two from the Biology Department of Old Dominion College, **Jacques S. Zaneveld,** Chairman, and **Willard Simmonds,** student, will take part in the U.S. Antarctic Research Project, Deep-Freeze, 1964. They will study the benthic marine algal vegetation of McMurdo Sound in the Ross Sea. Dr. Zaneveld and two students, **Robert Phillips** and **Charles Rhyne,** continued studies of algae along the Atlantic Coast from Cape May to Cape Hatteras with the renewal of an NSF Grant. An Undergraduate Science Education Grant, also from the NSF was renewed. **Harry West, Willard Simmonds, William Barnes,** and **James Curtis** continued their work on this grant during the summer and on a part-time basis during the current academic year. **Daniel E. Sonenshine** received a grant from the Department of the U.S. Army for his study on the ecology of Rocky Mountain Spotted Fever in the Eastern United States. Two new members of the Biology Department at Old Dominion College are **Harold G. Marshall** and **Robert L. Puyear.** Dr. Marshall came from Western Reserve and is interested in limnology and ecology and plankton. Mr. Puyear comes from Oregon State University and is interested in cellular physiology. The Supplementary Chair Gift sponsored by the Suburban Woman's Club of Norfolk was awarded to Dr. **Zaneveld** who is the first recipient.

Richard E. Garth, Associate Professor of Biology, Northwestern State College, has been granted a leave of absence to act as Assistant Director of the Undergraduate Science Education, Scientific Personnel and Education Division, of the NSF. **Ralph M. Combs,** Associate Professor, spent part of last summer at the Gulf Coast Research Laboratory pursuing studies of the histology of the cephalic sensory lines of the large scale menhaden. **George Ware,** Professor of Biology, taught a course in plant ecology at the University of Oklahoma Biological Station at Lake Texoma during the summer. He also worked with participants of NSF-sponsored research programs, studying coastal plain plant communities in that region. **Hugh C. Land,** Assistant Professor, led an ornithological expedition to the Pacific slope of Guatemala. Students from Northwestern State College and Marshall University in West Virginia collected bird specimens and gathered ecological information. Dr. Land plans to use the data obtained, along with information from two previous trips, in a forthcoming monograph on the birds of Guatemala. **Earle Cross,** Assistant Professor, attended the First International Conference on Acarology at Fort Collins, Colorado, in September. **Roy Buckley** has accepted a temporary appointment as Assistant Professor and **Mary Lee Gibson** is acting as temporary part-time instructor in the Biology Department.

Elinor H. Behre, Emeritus, Louisiana State University, presented a paper with several outstanding high school students, at the North Carolina Academy annual meeting in May, 1963. Last winter Dr. Behre worked in the West Indies on her climatic studies on crabs under a grant from the American Academy of Arts and Sciences.

Harold E. Pattee has been appointed Assistant Professor of Botany at North Carolina State. Dr. Pattee formerly held a post-doctoral fellowship in plant biochemistry at U.C.L.A. **Kenneth A. Nicely** received his Ph.D. in Botany in August 1963 and is now an Assistant Professor and Curator at Virginia Polytechnic Institute. **H. T. Scofield,** Professor of Botany, is on a two-year leave of absence to Universidad Agraria, La Molina, Peru. The Highlands Biological Station's new President is **James W. Hardin,** Associate Professor of Botany, at North Carolina State. **Carl S. Keener,** Assistant Professor of Biology, Eastern Mennonite College, received an NSF Fellowship to work here on his Ph.D. under Dr. Hardin. **Arthur W. Cooper,** Associate Professor of Botany, North Carolina State, has begun work on a grant from the National Park Service to determine effects of habitat manipulation on salt marsh vegetation in the Cape Hatteras National Seashore Recreation Area. The project extends work done with **Dr. D. A. Adams** under sponsorship of the ONR on the southern North Carolina coast. Other research projects here involve work in hardwood forest ecology with special reference to soils, and in dune ecol-

ogy with attention directed toward dune stabilization.

In a letter to the Editor, **Herbert P. Riley,** Professor and Head of the Botany Department at the University of Kentucky, tells of his travels in Kenya, Tanganyika, Mozambique, and South Africa, studying, collecting, and photographing plants. He attended the Golden Jubilee of the National Botanic Gardens of South Africa, in Kirstenbosch, a suburb of Cape Town, as one of 45 visiting foreign botanists from 21 different countries. After two weeks of lectures and short day trips from Cape Town, they took a 30-day tour of the Republic of South Africa, visiting the Transkei native territories, Durban, the Hlukluwe Game Reserve, Zululand, the Kruger National Park, Pretoria, Johannesburg, the eastern Orange Free State, and the Karoo. "Botanically, it was an amazing trip," he writes. While there he gave several lectures at Cape Town, and Rhodes University in Grahamstown. Dr. Riley has been interested in African plants for some time, and the University of Kentueky Press has just released his book, *Families of Flowering Plants of Southern Africa.*

New staff members in the Department of Biology at East Carolina College are: **Calvin C. Kuehner,** mycology; **John S. Laurie,** parasitology; **Thomas C. Rutherford,** mycology and marine biology; and **James R. Wells,** plant taxonomy. **Everett Simpson,** Dept. of Biology, East Carolina College, has an academic year NSF grant of $2,000 to work on the effects of estrogens, progesterone, vassopression, and relaxin within the ovarian bursa of pseudopregnant rats. **Joseph G. Boyette** has an academic year NSF grant of $2,000 to work on pine mouse behavior.

Institutions and Organizations

The newest building on the **Virginia Intermont College** campus is a Science Hall, completed and put into use during the spring of 1963. The structure houses the latest available equipment for the departments of Biology, Chemistry, Botany, Physics, Secretarial Science and Home Economics, as well as a lecture hall with elevated seats, demonstration facilities and a projection room.

The **North Carolina Academy of Science** is presently conducting a study of tenth grade high school biology in North Carolina under the auspices of an NSF Grant. A committee of more than 60 biologists in the Academy will make recommendations for improvement of high school biology teaching in final reports which are scheduled for the summer of 1964. **Dr. John A. Yarbrough,** Professor of Biology, Meredith College, Raleigh, N. C. is director of the project.

The Department of Biology of the **Richmond Professional Institute** has moved into its quarters on the second floor of the new Science Building. Construction of an additional wing, to be ready for next year, will complete this building. The new Science Building houses the departments of Biology, Chemistry, Engineering, Nursing, Physics, and Psychology.

Mississippi State College for Women has received a matching NSF Equipment Grant for $9,070 for advanced equipment, and an AEC Grant for $6,000 for equipment to be used in a new course in radiation biology.

T. T. Earle, Chairman of the Department of Botany in **Tulane University** announces that the Department will offer for the first time in 1964-65 a program leading to the Ph.D. degree. Fields of emphasis presently offered include anatomy and morphology, taxonomy, ecology, and mycology, with collateral training in physiology, cytology, genetics, and biosystematics. Assistantships, fellowships, and scholarships are available in the Graduate School of Tulane University.

A Conference on Estuaries will be held at Jekyll Island, Georgia, March 31 to April 4, 1964. The program is based on a series of plenary sessions and concurrent symposia dealing with estuarine processes; all contributions will be presented by invited foreign and U.S. participants. The Conference is being sponsored by several regional and national organizations. Pre-registration materials and program information can be obtained from **G. H. Lauff,** Sapelo Island Research Laboratory, Sapelo Island, Georgia.

The Department of Biology, **East Carolina College,** has received an $8,000 equipment grant from the AEC. Two new courses, *Fundamentals of Radiobiology* and *Isotopic Tracers in Biology* have been added.

(*continued from page 2*)

ter from Dr. John R. Olive, Executive Director, AIBS, requesting that ASB address envelopes to members of ASB in support of AIBS' campaign for membership. The Executive Committee approved the request. He reported that ASB now has 700 members in good standing; that 76 had paid dues for 1962, and that there were 28 institutional members. He displayed designs for the official seal of ASB that had been submitted in the competition. He stated that he had attended the inauguration of Dr. Foster Jay Taylor as President of Louisiana Polytechnic Institute on May 4, 1963 at the request of President Jones. A motion to accept the Seeretary's report was made, seconded and passed by the Committee.

President Jones brought up a number of details relative to the 1964 annual meeting for discussion. He stated that he had invited Dr. Dietrich Bodenstein of the University of Virginia to send a representative to the present meeting so that he could become familiar with details relative to arrangements for the annual meeting of ASB at the University of Virginia in 1965.

It was moved that Dr. James Dent of the University of Virginia be asked to serve as Chairman of the Local Arrangements Committee for 1965. The motion passed.

The President made the following committee appointments:

Research: Drs. Burton Bogitsh,

Raymond T. Damian, J. Gordon Carlson, Chairman

Nominations: Drs. Horton H. Hobbs, Jr., Elon C. Byrd, Walter L. Flory, Chairman

Meetings: Drs. Grover C. Miller, Raymond O. Flagg, Donald C. Scott, Chairman

Constitution and By-Laws: Dr. Dolores S. Dundee, Howard J. Teas, Victor L. Greulach, Chairman

Meritorious Award: Drs. A. J. Sharp, 1965, W. E. Brillhart, 1966, Harry E. Wheeler, 1964, Chairman

Goethe Awards: Drs. Margaret Menzel, 1965, Richard E. Garth, 1966, E. C. Cocke, 1964, Chairman

Local Arrangements: Drs. William D. Burbanck and Robert B. Platt, Co-chairmen.

See *About the Atlanta Meeting* for other committee members.

President Jones mentioned the desirability of having a Program Committee. After some discussion it was moved by Father Yancey and seconded by Dr. Flory that such a committee be established. The motion was passed.

President Jones suggested that official action be taken with respect to the date of the annual meeting for 1964. Dr. Burbanck moved and Dr. Herndon seconded the motion that the annual meeting for 1964 be held on April 16-18. The motion was passed.

President Jones then discussed the need for a definite policy with respect to the date of the annual meeting. He suggested that a committee should be appointed to study the matter and report to the next meeting of the Executive Committee on April 16, 1964. Father Yancey moved that the President appoint a committee to make recommendations to the Executive Committee on April 16, 1964 with respect to the date of the annual meeting of ASB. The motion was seconded by Dr. Burbanck and it was approved by the Committee.

President Jones brought up the matter of the geographic distribution of ASB membership. He was of the opinion that individuals and groups should be admitted to membership in ASB regardless of their geographic distribution. The Committee concurred in this opinion but no formal action was taken.

Treasurer's Report: The Treasurer's report covering the period January 1 to September 27, 1963 was submitted. Dr. Bell moved the acceptance of the Treasurer's report. The motion was seconded by Father Yancey and it was passed by the Committee.

President Elect's Report: Dr. Burbanck raised the question as to whether we were sufficiently active in seeking membership in our area. Because of the scientific growth within it he thought that there was a possibility of increasing our membership three-fold. Dr. Duncan suggested that because of the increase in the number of scientific societies and the fractioning of others that it would be desirable to actively encourage individuals in our smaller four-year Junior colleges to join the Association. Dr. Shanor thought that it would be of value to emphasize to Biology Departments that our meetings provided an excellent opportunity for their graduate students to present papers. Dr. Burbanck was of the opinion that the interdisciplinary nature of our meetings should be emphasized and that like AIBS the Association could readily arrange for other groups to meet with it. Dr. Bell suggested that many members of affiliated societies would be eligible for membership and that they should be encouraged to join the Association.

Dr. Burbanck suggested in view of the wishes of the membership with respect to a symposium that a symposium on the opportunities in estuarine biology would be timely. The Committee agreed with his viewpoint and authorized him to arrange such a symposium.

A motion was made to accept the President Elect's report. The motion received a second and is was passed by the Committee.

Editor's Report: The Editor stated that he would issue a call for papers in the Bulletin as in the past. He stressed again the need for articles of general interest. He brought up for diseussion the desire to advertise in the Bulletin on the part of some of the companies that have an exhibit at our annual meetings. He was opposed to such advertising because it would adversely affect certain mailing privileges now enjoyed by the Bulletin. He was of the opinion, however, that articles on the specialties of the companies would be acceptable, and that these would not affect mailing privileges.

Dr. Herndon as Chairman of a committee appointed to assist the Editor with problems relating to the Bulletin asked how the committee could be of greatest value to the Editor. President Jones suggested that the Editor compile a list of items that needed consideration and submit them to Dr. Herndon for transmissal to the members of the committee. Comment on these could be made through correspondence and the committee could discuss these items in more detail at the time of the annual meeting. Dr. Carpenter was of the opinion that the activities of members should be given more stress in the Bulletin and that requests for such information should be sent to the membership at least four times each year. Dr. Burbanck suggested that a copy of the Bulletin in which non-members were mentioned should be sent to them.

A motion was made to send a copy of the Bulletin to non-members in which they were mentioned. The motion received a second and it was passed by the Committee.

A motion to accept the Editor's report was made and seconded. The motion was passed by the Committee.

President Jones brought up for discussion the affiliation of societies with ASB and proposed a number of points with respect to such affiliation. He was of the opinion that societies interested in affiliation with ASB would like to know in some detail as to how affiliation might be accomplished. After considerable discussion the following points were agreed upon as a basis for the affiliation of societies with the Association.

1. Purposes of Affiliation
   a. To stimulate communication between societies with common interests.

b. To arrange for combined meetings.

2. Arrangements for Annual Meetings
   a. Each affiliate would have a standing invitation to meet with ASB but would be under no obligation to do so.
   b. Notification of an affiliate's wish to meet with ASB should be sent to the Secretary of ASB approximately one year in advance of the meeting date.
   c. Each affiliate would be represented on the Local Arrangements Committee.
3. Program
   a. Each affiliate could hold a separate, concurrent meeting for presentation of its papers or its program could be presented as a part of a joint program with the appropriate section(s) of ASB.
   b. Papers may be presented by non-members of ASB and/or affiliated societies provided that they are introduced by a member of ASB or the affiliate.
   c. The program of each affiliate may be published in the ASB Bulletin on a prorated cost basis.
4. Bulletin
   a. Special numbers of the ASB Bulletin may be made available to members of affiliated societies, by special arrangement with the Editor, but annual subscriptions are available only to those who have paid the appropriate fee for membership in ASB.
   b. The cost of abstracts will be paid by each affiliated society or by individual members of such societies.
   c. Reprints of all articles and abstracts may be had upon suitable notice to the Editor. The costs for these will be borne by the individuals requesting them.
   d. News items of interest to biologists in the Southeast are welcomed by the Bulletin whether they concern members or non-members and regardless of who may submit them.
   e. Dues notices and other similar items may be published in the Bulletin at cost for affiliated societies.
5. Registration at Meetings
   a. A registration fee must be paid by all participants to help defray the cost of the annual meetings.
   b. The current registration fee is $1.00.
6. Executive Committee
   a. Each affiliated society may be represented on the Executive Committee of ASB.
   b. The representatives must be members of ASB as well as of the affiliated society they represent.
   c. Representatives of affiliated societies may not exceed 40% of the membership of the Executive Committee.

A motion was made, seconded and passed by the Committee to the effect that all participants in an annual meeting of ASB pay the current registration fee.

Father Yancey moved that the By-Laws of the Association be amended to permit each affiliated society to have a representative on the Executive Committee. The motion was seconded by Dr. Bell. Dr. Duncan proposed an amendment which would limit such representation to 40% of the membership of the Executive Committee. The amended motion was acceptable to Father Yancey and Dr. Bell and it was passed by the Committee.

Dr. Bell moved that the President be empowered to handle details relative to the affiliation of societies with ASB on a pro tem basis. The motion was seconded by Dr. Flory. The motion passed.

President Jones brought up for discussion the change in status of ASB and other organizations affiliated with AIBS. Under the change ASB would become an ADHERENT of AIBS and the annual dues based on current membership would be $400. After lengthy discussion Dr. Herndon moved that ASB support AIBS in every way possible including the payment of the $400 dues as an ADHERENT in 1964. The motion was seconded by Dr. Bell. After further discussion Dr. Shanor amended the previous motion as follows: That the Executive Committee recommend to the membership of ASB at the 1964 meeting that the Association become an ADHERENT of AIBS. The amended motion was acceptable to Dr. Herndon and Bell and it was passed by the Committee.

Dr. Shanor suggested that some compensation for his secretary for the time she spent on ASB business was in order. He moved that his secretary be paid a total of $100 for her work in 1963 and 1964. The motion was seconded by Dr. Carpenter and it was passed by the Committee.

Editor Hart stated that his expenses to meetings of the Executive Committee and to annual meetings had been partially defrayed by the Philadelphia Academy of Sciences and that the Academy could no longer afford to do so. He asked that the Association assist him with these expenses. Father Yancey moved that the Association contribute $100 toward the Editor's expenses incurred through attendance of Executive Committee meetings in 1963. The motion was seconded by Dr. Burbanck and it was passed by the Committee.

There being no further business the meeting was adjourned at 3:15 P.M.

Respectfully submitted:

HARRY J. BENNETT
Secretary, ASB
Zoology Department
Louisiana State University
Baton Rouge, Louisiana

LETTERS

AT THE RISK of seeming to be a bit caustic, isn't it a bit unusual to list a book in the book section without naming the author?

Ruth S. Breen

Note: The Editor wishes to apologize for a *lapsus calami* which occurred in the last issue of the ASB Bulletin. In the note on *Mosses of Florida. An Illustrated Manual,* the author's name, Dr. Ruth S. Breen, was omitted.

NOMINATIONS FOR OFFICERS

The nominating committee seeks the help of the membership in setting up a slate of officers from which elections will be made at the 1964 meeting of the Association. Nominations for persons to fill the following positions should be made at this time: President-Elect, Vice-president, Secretary, and two Executive Committee members. Please mail your nominations, as early as possible, to Dr. Walter S. Flory, Department of Biology, Wake Forest College, Winston-Salem, N. C. 27106.

IMPORTANT DEADLINES

January 31—Suggestions for nominations for ASB officers and executive committee members.

February 14—Titles and abstracts of papers to be presented at the Atlanta meeting.

March 2—Applications for Goethe Awards to graduate students.

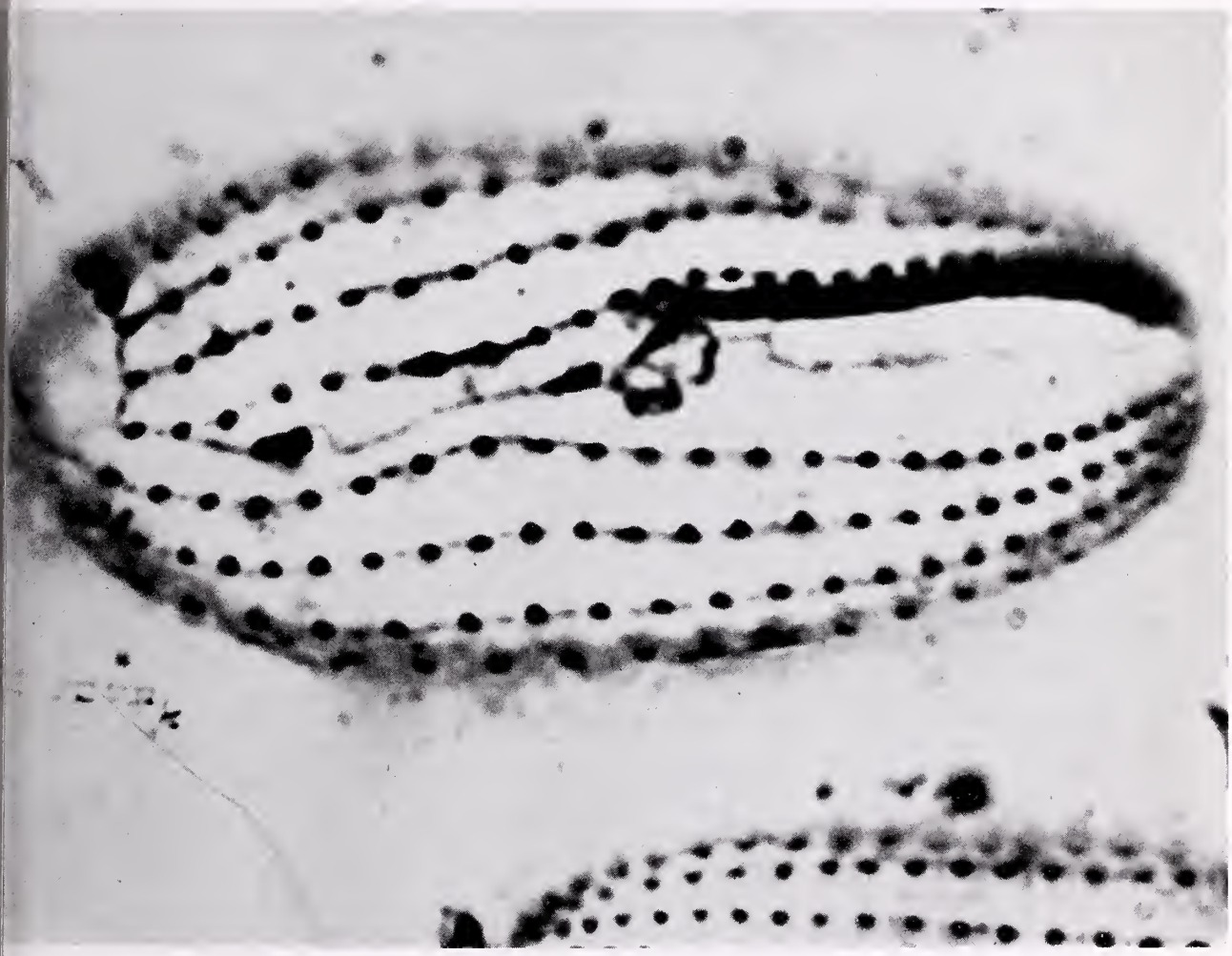
March 2—Papers to be considered for the Association Research Prize.

April 1—Applications for Phipps and Bird Research Fellowship at Mountain Lake.

April 1—Nomination letters for the Meritorious Award for Teaching.

The ASB BULLETIN

Volume 11, Number 2 April, 1964



INFRACILIATURE OF *Pseudocohnilembus hargisi* THOMPSON *Jesse Thompson*

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 11, Number 2—April 1964

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C. WILLARD HART, JR.
EDITOR

HARRY J. BENNETT, Associate Editor
BETTY URSOMARSO, Assistant Editor
LELAND SHANOR, Business Manager

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The cover photograph (ca. 3000×) is of *Pseudocohnilembus hargisi*, a ciliate protozoan from Gloucester Point, Virginia. The stain technique used in this preparation was the Chatton-Lwoff silver impregnation technique—a stain which reveals such structures as basal granules or kinetosomes of the somatic and buccal cilia, cytoprocts, contractile vacuole pores, and often complex fibril networks. Dr. Thompson likes to refer to this technique as "protozoan fingerprinting."

ASSOCIATION AFFAIRS

Treasurer's Report January 1, 1963–December 31, 1963

SAVINGS ACCOUNT			
Balance Dec. 31, 1962			
Regular Savings Acct. #90 856 6	$ 909.01		
Interest earned Jan. thru Dec. 1963 ..	30.09		
Transferred from Checking Acct.	250.00		
		$1,189.10	
To establish new Contingency Savings Acct. #91 375 6			
From Checking Acct. by transfer	300.00		
Deposited in account from Checking Account receipts	100.00		
Interest earned Aug. thru Dec. 1963 .	4.01		
		404.01	
Balance as of December 31, 1963			$1,593.11
CHECKING ACCOUNT			
Balance on hand January 1, 1963		$ 892.19	
Receipts:			
Exhibition fees	$ 650.00		
Reprints	134.50		
C. M. Goethe Award	239.50		
Carolina Biological Supply Research Award	100.00		
Will Scientific Corporation Meritorious Teaching Award	100.00		

(Continued on page 60)

The Phoenix emblem of the XVIth International Congress of Zoology—symbolizing the reunion of zoology from its separate specialties.

The Anatomy of the Phoenix[1]

BY

Perry C. Holt

Virginia Agricultural Experiment Station and Virginia Polytechnic Institute

The emblem of the XVIth International Congress of Zoology was the *Phoenix*, symbolizing "the reunion of zoology from its separate specialties." Presumably, the adoption of this symbol was not intended to imply that zoology has been reduced to a heap of ashes. It is no secret, nonetheless, that there are currently divisive forces at work in zoology: if the bird has not been dismembered yet, the feathers, at least, are becoming disarranged.

As a taxonomist I have an interest in zoogeography; as a zoologist I have a general interest in any study of animals. The emblem and motto of the Congress started me to wondering about how to relate zoogeography to the helically coiled master molecule. Pursuing this puzzle, I want, then, to consider the *relevance*, *status* and *prospects* as a scientific endeavor of zoogeography as a zoological speciality.

The temptation is great to discuss once more the nature of science and the scientific nature of zoology, particularly that despised portion of zoology known as natural history. But this has been done before, most notably recently by Simpson. We know what science is. We know, also, what questions are nontrivial: they are those that interest us because their answers would increase our familiarity with what, after all, is a rather strange world. If a man otherwise regarded as sane is interested in answering such questions, these questions are a part of science. The only practical consideration that is applicable is whether the answering of a question makes it possible to ask other empirically answerable questions or suggests means of answering other questions already asked.

It is hardly necessary to consider the past importance of the specialty that provided the basis for the asking of questions and much evidence for the development of the most important, from my viewpoint, at least, of all scientific generalizations, the Wallacian-Darwinian theories of evolution. It is important to eonsider whether there is any point in continuing to accumulate data and invent hypotheses in this field.

To look at the relationships as a zoological specialty, of zoogeography (see Fig., p. 29): in this diagram, somewhat lightly entitled "The Anatomy of the Phoenix," I have attempted to show the relationships of the reeognized divisions of zoogeography to other zoological, and some nonzoological, disciplines. The first point of interest is that this diagram represents a three-dimensional network. The nodes of the network are scientific specialties considered here with reference to their relationships with zoogeography.

[1] Talk presented at the November, 1963, meeting of the Tennessee Academy of Science.

The apparent slighting of some important specialties of zoology is done simply to reduce the chart to understandable simplicity while retaining the significance of zoogeography. The semifacetious reference to the Phoenix expresses, quite seriously, a firm eonviction that biology is an organic whole that can no more be dismembered than a living animal can without destroying the unity of the whole, the unity that in an animal we call life.

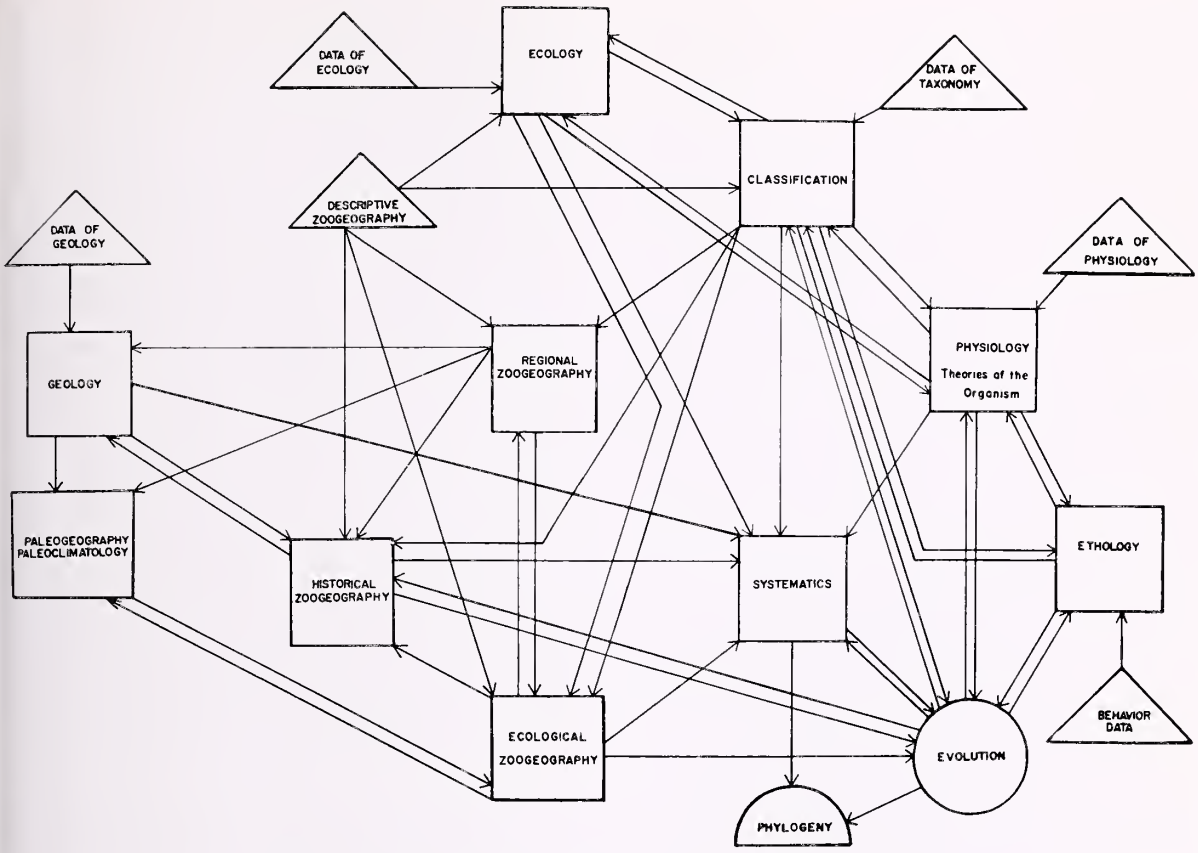
The concept of homeostasis has added immeasurably to our understanding of the organism. Regarding the seience of biology in an analogical sense as having some of the homeostatic properties of an organism, feedback loops are indicated (see Fig., p. 29). The flow indicated by the arrows is the flow of data. The generalizations developed and tested in one specialty of a scienee, or one science, become data for another. The use of theories first developed in one field, as data for the developing of theories in another, theories which in turn can be used as confirmatory evidence for the generalizations of the first field of study, has an aspect of circularity. Some are startled by this admission—simple-minded circularity is rightly condemned—but the interplay of data and data and theory and theory, though circular, is far from a vicious circle. It is analogous to the citric acid cycle in which there is a constant input and output. Whitehead clearly recognized the ultimate circular nature of scientific definitions; I am extending that insight to the whole body of scientific generalizations to emphasize the interdependence of the whole. That physical theory may be data for the development of generalizations in biology, however, does not mean that the biological theory is physics. Instead of reducing biology to physics, the theoretical scheme of physics is regarded as data for the development of biological theory.

Examining the network more closely, there are several sources of "raw data" (indicated by triangles), including, of course, the protocols of experiments, where experimentation is appropriate. The diagram does not, it must be noted, indicate all possible sources of data and the "feed-back" use of these data, but, rather, it is intended to show the general nature of such relationships.

For zoogeography these sources of data are primarily the faunal lists and the distribution maps that record what animals are found where. The first-order sorting of these data, incorporating the identification and arrangements of classification which is the first-order sorting of the data of taxonomy, leads to regional zoogeography. Regional zoogeography, if left at this stage, tells us nothing more significant than that kangaroos are found in Australia. It tells us with greater or lesser precision such observational facts as that each geographical area, a large island, a continent, a major continental area separated from contiguous land masses by barriers, possesses a characteristic fauna. But these are still only data, sorted, and not even zoological data, but geographical data.

But more significant questions immediately are raised by this sorting of the data of faunal lists and classification. These questions are basically of three types: what does animal distribution tell us of former geological and geographical conditions? What do these distributional patterns tell us of the conditions of life for various animal groups or species? And, finally, what can we infer as to the past history and origin of animal groups? The answers to these questions can be considered as parts of other specialties.

The data of regional zoogeography is important to students of the past history of the earth, paleogeographers, paleoclimatologists, geologists. Much speculation and many theories concerning the former relationships of land masses to each other have been proposed. Here belong all the ideas about shifting continents, stemming from the views of Wegenr, DuToit and others. Here are the earlier hypotheses about land bridges of which Darwin complained. Any such proposals of geologists must take cognizanee of the faets of animal distribution. But the data of regional zoogeography can only be used to suggest questions in this field and as second order tests of hypotheses advanced on the basis of the data of geology proper. This procedure, it may be noted, can be used at a more local level than the grand romantic one of



THE ANATOMY OF THE PHOENIX

intercontinental connections. The geologists who study the development of land forms and stream drainage patterns of the Southeastern United States want to know what the taxonomist has to say about the loeal distribution and evolution of such groups as fishes and freshwater mollusks. To reiterate, data that, though about animals, are primarily geographical in nature are fed into a conceptual scheme that is not a biological, but a physical, that is, geological one. We may note this and pass on.

The sorted data that are arrived at in regional zoogeography have traditionally been used in zoology proper in two ways. One may ask what conditions of the environment influence animal distribution and arrive at ecological zoogeography. Data here may come not only from regional zoogeography as the basic data, but also ecology, climatology, classification (taxonomy), and through the nodes representing other zoological specialties all the sources of data relevant to biology. In turn, the conclusions arrived at become data for systematics, evolution, the second of the main lines of zoogeographical studies (historical zoogeography), and, in a feedback relationship, for regional zoogeography itself: that is, the sorting of distributional data is often done on an ecological basis (biomes).

The connection of ecological zoogeography to ecology proper, through physiological ecology to physiology and directly, in the study of adaptations, to evolutionary studies is too well established to require further comment, other than to say that ecological zoogeography is in fact ecology.

It is the more traditional field of historical zoogeography which is in danger of amputation from the body of the Phoenix.

Historical zoogeography consists of a set of explanatory statements if it is a science. Wallacian regional zoogeography, masterfully sum-

marized by Darlington, serves as a basis for many of these generalizations. Darlington's conclusion that the major groups of vertebrates originated in and radiated from the Old World tropics is an important example of a hypothesis which I believe to be a well established one, based primarily on such data. Through feedbacks from systematics and evolution, historical zoogeography is a specialty which seeks such explanations in terms of historical causes. It must use the data of geology, as well as those of classification and regional and ecological zoogeography. When the data are primarily those of geology and regional zoogeography, we may think of historical zoogeography as a quasi-zoological specialty: the example taken from Darlington's work illustrates this aspect of the subject. In this sense zoogeography uses as data evolutionary theory and the findings of systematics to solve what after all are geographical problems: the patterns of animal distribution.

Historical zoogeography should, to a large extent, draw directly on distributional data. Thinking in terms of the Wallacian regions may result in a biased approach. These regions have been based on the study of two (birds and mammals) out of all the classes of animals. The contributions have been great, but the whole subject of the distribution of invertebrate animals has been much neglected. And the focus should be shifted from that on the entire fauna of continents or Wallacian regions to one on the evolution of animal groups, most profitably, I believe, groups of family size or less. *Zoogeography is important in zoology as a part of the data of systematics and evolution.* Viewed in this way it is related in the origin of its data from and in the importance, in a feed-back relationship, of its data, to all the biological sciences, if not to all sciences. Some Ionian pre-scientific philosopher must have said, "Everything influences everything; the All fuses into the One." Historical zoogeography is the story of the ebb and flow in space and time of that somewhat remarkable chemical, deoxyribose nucleic acid.

One final comment about the diagram, "The Anatomy of the Phoenix." That it may not be entirely without merit is indicated by the fact that others have attempted to explain the relationship of the biological specialties to each other. Most of these have been attempts to arrange the specialties in a hierarchic order, to reduce all of biology to one of them, or, even, to reduce all of biology to physics. Blackwelder would make taxonomy the basis for zoology; Sewall Wright seems to think that there is no biology other than genetics. I shall not pause to mention those who would reduce biology to physics, but will only say that Simpson has mentioned them several times with telling effect. My analysis, presented visually here as the "Anatomy of the Phoenix," is a truer indication, I think, of the fact that science is one, that the circularity of definition and the use of the theories of one science as the data for another, as a sort of abstract cybernetic mechanism, welds all science into an organic whole. Simpson, in a somewhat different fashion, made this point when he said recently that biology unifies all science in its use of the theories and data of all science. The diagram of the anatomy of the Phoenix is an elaboration of this viewpoint.

To turn to the final point: Do the present status and future prospects of zoogeography as a source of data for systematics and evolution offer promise? Writing along these lines recently, Earl Hanson regretted the ignorance of some of the younger riders of bandwagons who think the road they are travelling is the only way to intellectual salvation, but rightly pointed out the importance of bandwagon movements or glamor fields in the winning of new knowledge and insight. The answer to these wild young riders is not anger or withdrawal on the part of invertebrate zoologists and systematists, but a return by the representatives of "classical" specialties to their anvils and the hammering out of solid achievements in their own fields. What, at the present, are the more promising types of research in zoogeography?

The program of the XVIth Congress included two specialized symposia and a session of contributed papers devoted to zoogeography: a total of twenty-seven out of approximately seven hundred papers. In addition, at least seventeen other papers presented at other sessions were based primarily upon or dealt with zoogeograph-

ical data. Not a bad representation. Many of these papers were in the classical tradition and their interest was primarily geographical or geological. This is not to be lightly dismissed. In recent years, for instance, there has been a revival of interest in the geological problems revolving around the question of whether the continents, the poles, or both have changed position in geological times. As an illustration, J. A. Wallwork's studies of the oribatid mites of Antaretica strongly suggest that there have been recent connections between the southern continents. But such studies are only a part, as we've seen, of work that in essence is geological.

The contributions of geographical studies as a part of zoology, however, are to systematics and evolution. As a minor example, A. W. F. Benfield, by recognizing six subspecies of North American caribou and drawing on the data of Pleistoeene geology offered what appeared to be a satisfactory explanation of the distribution and recent evolution of these animals in Canada and Greenland. Such work done in depth for larger taxa than species: genera or even in some cases, families, offers promise of much real insight.

But in the past, as even unto this day, most of this sort of work has dealt with birds or mammals. H. H. Ross, who did not contribute to the Congress program, has, however, done much of this type of thing with aquatie inseets. In his recent book, *A Synthesis of Evolutionary Theory,* fifty-three of the 146 illustrations are based on maps. That there is promise of an increasing interest in invertebrates is indicated, also, by the fact that sixteen of the forty-four papers presented at the Congress were devoted to invertebrates other than insects and by the symposia on invertebrate zoogeography being arranged by the Society of Systematic Zoology.

A second type of contribution that is afforded by geographical data lies more nearly in the area of theory. One of the more rabid little brawls in biology today is between the Neo-Adansonians, or numerical taxonomists, and the "new" systematists. S. G. Kiriakoff pointed out the fatal error the Neo-Adansonians make in ignoring the factors of time and space in systematics. The spatial distribution of animals cannot be ignored, as the Neo-Adansonians do, in systematics. Many examples of parallelisms and convergencies can be cited, Kiriakoff cited two, that cannot be understood without reference to the distribution of the organisms involved.

The main outlines of evolutionary theory are established. At least no one can foresee any great "breakthrough" comparable to the rapprochement of genetics, paleontology, and systematics of thirty years ago that has led to the "modern synthesis." Yet many important problems within the main body of theory remain: problems whose solution depends upon geographical data. By comparing taxonomic analysis of related taxa from different regions, the only data possible, in the absence of a good fossil record, are obtained that enables us to estimate the actual rates of evolution. Similar data are essential in the study of the importance of convergence in evolution. Isolating mechanisms are crucial in evolution and the only possible study of them involves geographical considerations.

More importantly, at least for those of us who find our chief source of delight in biology our belief that the story of life is the most interesting of all histories, is the task of completing a sound systematic account of the animal kingdom and the construction of a phylogeny that really does outline the history of life. We believe that the organic wholeness of the Phoenix requires this; that a biology without an account of the history of life, without consideration of the factors of time and space, is incomplete. There is very much indeed for systematists and zoogeographers to do.

The schematic drawings have been completed by the architects for the first unit of a Science Complex for the **University of Miami.** This unit will house the Zoology and Chemistry Departments. Biology courses will be taught here as well as a few of the Botany courses. Later other units will be built for Botany and Physics.

The **University of Virginia** announces that eight graduate courses emphasizing field biology will be given at the **Mountain Lake Biological Station** this summer. Three types of National Science Foundation awards are available for research and study at the Station: (1) Post-doctorate for research, stipend $900; (2) Pre-doctorate for supervised research, stipend $400; and (3) Post-graduate for training in field biology, stipend $300. Preference is given for studies concerned with the biota of the region. Application blanks for these awards may be secured from *Dr. J. J. Murray, Jr., Department of Biology, University of Virginia,* and must be submitted before April 12, 1964.

Program of the 25th Annual Meeting of the Association of Southeastern Biologists

A Joint Meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Southern Section of the American Society of Plant Physiologists, the Regional Section of the National Association of Biology Teachers, and the Southeastern Region of Beta Beta Beta National Honorary Biological Society.

THURSDAY, APRIL 16

8:00 a.m. **Paper Session, Southern Section, American Society of Plant Physiologists.** Auditorium, Church School Building.

10.30 a.m. **Business Meeting, Southern Section, American Society of Plant Physiologists.** Auditorium, Church School Building.

1:00 p.m. **Executive Committee Meeting, Association of Southeastern Biologists.** Room 216, Biology Building.

2:00 p.m. **Symposium:** Absorption and Translocation of Organic Substances in Plants. Southern Section, American Society of Plant Physiologists. Auditorium, Church School Building.

4:00-7:45 p.m. **Registration:** Lobby, Alumni Memorial Building.

7:30 p.m. **General Session:** Auditorium (Room 106) Biology Building, E. Ruffin Jones, Presiding.
Address of Welcome: Dr. Sanford S. Atwood, President, Emory University.
Response: E. Ruffin Jones, President, the Association of Southeastern Biologists.
Invitational Symposium: *An Appraisal of the Present Status and Future of Estuarine-Oceanographic Laboratories of the Southeast.* W. D. Burbanck, Presiding.
Introduction: W. D. Burbanck, Emory University.
Private Laboratories: Lawrence B. Pomeroy, University of Georgia.
State Laboratories: Albert W. Collier, Florida State University.
Federal Laboratories: Theodore R. Rice, Bureau of Commercial Fisheries, Beaufort, North Carolina.

Smoker and Exhibits: The symposium will be followed by a smoker, to be held in the lobby of the Alumni Memorial Building. Refreshments will be served. The exhibits will be on display in the West Wing of the same building.

FRIDAY, APRIL 17

MORNING

8:00 a.m.-11:00 a.m. **Registration:** Lobby, Alumni Memorial Building.

8:00 a.m.-12:00 noon. **Exhibits:** Alumni Memorial Building, West Wing.

8:30 a.m.-11:32 a.m. **Paper Sessions:**
Plant Physiology—Auditorium, Church School Building.
Systematic Botany—Room 105, Biology Building.
Cryptogamic Botany and Plant Morphogenesis—Room 1, Psychology Building.
Animal Ecology—Room 205, Geology Building.
Animal Physiology—Room 106, Biology Building.

11:45 a.m.-12:30 p.m. **Business Meeting: Association of Southeastern Biologists,** Auditorium (Room 106), Biology Building.

1:00 p.m. **Luncheon Meeting, National Association of Biology Teachers,** Blue Room, Cox Hall, followed by an address by Dr. Walter Auffenberg, Chairman, National Science Division, Florida State Museum, on "Courtship Patterns in Land Tortoises." Tickets available in advance at the Registration Desk. All are invited.

AFTERNOON

1:00 p.m.-5:00 p.m. **Exhibits:** Alumni Memorial Building, West Wing.

1:30 p.m. **Informal Meeting, Southern Appalachian Botanical Club,** Room 105, Biology Building.
(*followed by*)

1:45 p.m. **Business Meeting, Southeastern Section, Botanical Society of America.** (*same room*)

2:00 p.m.-4:36 p.m. **Paper Sessions:**
Plant Physiology—Auditorium, Church School Building.
Plant Ecology—Room 105, Biology Building.
Invertebrate Zoology and Parasitology—Room 205, Geology Building.
Cytology and Cytogenetics—Room 106, Biology Building.

2:00 p.m.-5:00 p.m. **Registration, Beta Beta Beta:** Room 108, Biology Building.

4:00 p.m.-6:00 p.m. **Open House:** Lullwater Field Biology Laboratory and Gamma Radiation Field, Lullwater Estate. Information and transportation, if needed, available at Registration Desk, Lobby, Alumni Memorial Building.

EVENING

7:00 p.m. **Banquet:** Blue Room, Cox Hall.
ASB Evening Program: Banquet Hall.
Presentation of Awards and Prizes:
Mt. Lake Biological Station Fellowship.
Sponsored by Phipps and Bird, Inc.
Association Research Prize.
Sponsored by Carolina Biological Supply Company.
Meritorious Teaching Award.
Sponsored by Will Scientific, Inc. (Ga.).
Past President's Address: Dr. Walter S. Flory, Wake Forest College—"Today's Biology."

SATURDAY, APRIL 18

8:15 a.m. **Breakfast, Southern Section, American Society of Plant Physiologists:** Gold Room, Cox Hall.
Speaker: Dr. C. C. McCreedy, University of Oxford, England. "Transport of Organic Molecules in Plants."

8:30 a.m. **Field Trip:** Plant ecology and taxonomy field trip to granite outcrops, Mt. Arabia. Drs. W. M. Murdy and M. P. Burbanck in charge. Details at Registration Desk.

8:30 a.m.-12:00 noon. **Beta Beta Beta General Meeting and Paper Sessions:** Rooms 105 and 106, Biology Building.

9:00 a.m. **Executive Committee Meeting, Association of Southeastern Biologists:** Room 216, Biology Building.

SCHEDULE OF PAPER SESSIONS

THURSDAY MORNING—APRIL 16, 8:00 A.M.

The Southern Section of the American Society of Plant Physiologists have arranged Thursday morning, Thursday afternoon and Saturday morning sessions. Their Friday paper sessions have been incorporated with the Plant Physiology sections of ASB.

Plant Physiology

Auditorium, Church School Building
Presiding, Dr. R. E. Burns, CRD, ARD, USDA, Experiment, Georgia

8:30 1. Hacskaylo, Joseph (Texas A & M University). The Effect of Certain Inhibitors on Root Uptake of Di-syston by Cotton Seedlings.

8:43 2. Standifer, L. C., J. B. Baker, W. C. Normand and H. S. Webert (Louisiana State University). The Use of Excised Roots for Studies of Mechanisms of Herbicidal Action.

8:56 3. Biswas, Prosanto Kumar (Tuskegee Institute). Effects of Growth Regulators on the Absorption of C^{14}-Labeled s-Triazine Herbicides by Tea Leaves.

9:09 4. McBee, George G., J. V. Amin, L. S. Bird and H. E. Joham (Texas A & M University). Influence of Molybdenum Nutrition on the Bacterial Blight Disease of Three Varieties of Cotton.

9:22 5. Aboul-Ela, Mohamed M. and Charles S. Miller (Texas A & M University). Comparison of Techniques Used in the Study of Absorption of Chemicals by Leaves.

9:35 6. Miller, Charles S. and Mohamed M. Aboul-Ela (Texas A & M University). A Photographic Study of the Absorption of a Cotton Defoliant.

9:48 7. Singh, R. P. and S. H. West (University of Florida). The Effect of 2-Chloro-4,6-bis-(Ethylamino)-S-Triazine (Simazine) on the Ribonucleic Acid and Protein Content of Oat Seedlings.

10:01 8. Ware, G. and B. I. Sahai Srivastava (Tuskegee Institute). Investigations on the Possible Occurrence of Kinins in Nucleic Acids of Coconuts.

10:14 9. Yeliger, M. B. and Gordon E. Hunt (The University of Tennessee). The Effect of Atrazine on the Rate of Transpiration and the Concurrent Uptake and Relative Distribution of Radioactive Phosphorus in *Phaseolus vulgaris* L.

10:27 10. Ashworth, L. J., Jr. and J. V. Amin (Texas A & M University). Some Factors Affecting the Tolerance of *Aspergillus niger* to Mercury.

10:40 11. Pallas, James E., Jr. (Southern Piedmont Conservation Field Station). Research in Plant Transpiration.

THURSDAY AFTERNOON—APRIL 16, 2:00 P.M.

Symposium, Southern Section, American Society of Plant Physiologists: Absorption and Translocation of Organic Substances in Plants.

Auditorium, Church School Building
Presiding, Joseph Hacskaylo, Texas A & M University

Mechanism of Root Absorption of Organic Molecules, C. L. Foy, University of California, Davis
Free Space in Relation to Absorption of Organic Molecules, Joseph A. Sacher, Los Angeles College
Mechanisms of Foliar Penetration of Organic Molecules, Herbert M. Hull, CRD, ARS, USDA, Tucson, Arizona
The Entry of Solutes into Leaves by Means of Ectodesmata, Wolfgang Franke, University of Bonn, West Germany

FRIDAY MORNING—APRIL 17, 8:30 A.M.

Plant Physiology

Auditorium, Church School Building
Presiding, F. T. Wolf, Vanderbilt University

8:30 12. Beatty, A. V. and J. W. Beatty (Emory University). Role of ATP, Proline and Histidine in Radiation Recovery.

8:43 13. Parchman, L. Gerald (Emory University). The Culture of Stamen Hairs of *Tradescantia paludosa.*

8:56 14. Davis, Herbert L., Jr. (Emory University). The Influence of Cupferron on the Frequency of X-Ray-Induced Chromosomal Aberrations in *Tradescantia paludosa.*

9:09 15. Taylor, M. Kenneth (Emory University). Histidine Effects on Radiation Recovery in *Tradescantia paludosa.*

9:22 16. Ghosh, Debabrata and Howard E. Joham (Texas A & M University). Factors Associated with the High Level Synthesis of the Cotton Leaf Anthocyanin.

9:35 17. Holton, Raymond W. (University of Tennessee). Water-Soluble Cytochromes from the Blue-Green Alga, *Anacystis*.

9:48 18. Purcell, Albert E. (U. S. Fruit & Vegetable Products Laboratory). The Source of Precursors of Carotenes in Colored Grapefruit. I. Fixation of Carbon Dioxide.

10:01 19. Engleman, E. Mark (Seed Protein Pioneering Research Laboratory). Ontogeny of Protein Bodies in Cotton Cotyledon.

10:14 20. Collins, Henry A. (Tuskegee Institute). A Preliminary Study of the Absorption of Iodine by Several Plant Species and Its Subsequent Fate.

10:27 21. Wise, Byron H. (University of Florida). Acid-Soluble Phosphorus Compounds of Corn Roots.

10:40 22. Mayberry, B. D. and R. H. Dhillon (Tuskegee Institute). The Source of Photosynthates for the Developing Seed in *Prunus*.

10:53 23. Pappelis, A. J. and R. A. Katsanos (Southern Illinois University). An Approach to the Study of the Physiology of Senescence and Parasitism in Sugar Cane.

11:06 24. Langston, Ruble (Texas A & M University). Effect of Ionizing Radiation on Cotton at Various Stages of Development.

11:19 25. Ragsdale, Harvey L., Russell G. Rhodes and Gordon E. Hunt (The University of Tennessee). A New Method for the Initial Application of a Sample to Paper in Running Paper Partition Chromatograms.

FRIDAY MORNING—APRIL 17, 8:30 A.M.

Systematic Botany

Room, 105, Biology Building
Presiding, William H. Murdy, Emory University

8:30 26. Thorne, Francis M. (University of Georgia). Aspects of the Taxonomy of *Nolina* in the Southeast.

8:43 27. Garoni, Linda W. and William H. Murdy (Oglethorpe University and Emory University). Systematic Relationship of the Granite Outcrop Endemic *Cyperus granitophilus* (McVaugh) to *Cyperus inflexus* (Muhl.)

8:56 28. Mulcahy, David L. (University of Georgia). The Interpretation of Crossing Diagrams.

9:09 29. Burk, C. John (Smith College). Three Generations of × *Quercus rudkini* Britt. (*Q. marilandica* Muenchh. × *Q. phellos* L.).

9:22 30. Jones, Samuel B., Jr. (University of Georgia). Experimental Hybridization in *Vernonia* (Compositae).

9:35 31. Pullen, Thomas M. (University of Mississippi). The *Cassia fasciculata* Complex (Leguminosae) in the United States.

9:48 32. Rogers, J. Lee (University of North Carolina). A Preliminary Report on the Biosystematics of Three Species of *Cuscuta*.

10:01 33. Ellis, William H. (Austin Peay State College). Revision of Section Rubra of *Acer* in Eastern North America, excluding *Acer saccharinum* L.

10:14 34. Ramsey, Gwynn W. (The University of Tennessee). Status and Distribution of *Cimicifuga rubifolia* Kearney.

10:27 35. Riley, Herbert P. (University of Kentucky). Some Interesting Plants from the South African Karroo.

10:40 36. Browne, Edward T., Jr. (University of Kentucky). A Floristic Study of Kentucky Point, Kentucky.

10:53 37. Guhardja, Edi and E. T. Browne, Jr. (University of Kentucky). Bourbon County, Kentucky and Its Vegetation.

11:06 38. Gentry, Johnnie L., Jr. and E. T. Browne, Jr. (University of Kentucky). Vascular Plants of Henry County, Kentucky.

11:19 39. Crutchfield, Philip J. (University of North Carolina). A Historical Account of the Flora of Roanoke Island.

Cryptogamic Botany and Plant Morphogenesis

Room 1, Psychology Building
Presiding, Leonard Doerpinghaus, Agnes Scott College

8:30 40. Lowy, B. (Louisiana State University). A New Genus of the Tulasnellaceae and Its Phylogenetic Significance.

8:43 41. McGuire, Robert F. and Walter Herndon (University of Tennessee). Attributes of *Chlorococcum* species: A Statistical Analysis.

8:56 42. Koch, William J. (University of North Carolina). Observations of Two Olpidiaceous Aquatic Phycomycetes Parasitic in Algae.

9:09 43. Williams, Constance M. and Lafayette Frederick (Atlanta University). Studies on Genera of Clathraceous Fungi.

9:22 44. Umphlett, Clyde J. and John N. Couch (University of North Carolina). *Coelomomyces* in North Carolina.

9:35 45. Green, John H. and Walter Herndon (University of Tennessee). Phycobionts of *Clavaria*.

9:48 46. Krivanek, Jerome O. (Biology Division, Oak Ridge National Laboratory; and University of South Florida). Nucleic Acids in the Developing Slime Mold, *Dictyostelium discoideum*.

10:01 47. Welden, A. L. (Tulane University). Morphological Studies in *Vararia*.

10:14 48. Caponetti, James D. (The University of Tennessee). Morphogenetic Studies on Excised Leaves of *Osmunda cinnamomea* L.

10:27 49. Whittier, Dean P. (Virginia Polytechnic Institute). Studies on Induced Apogamy in *Pteridium* Gametophytes.

10:40 50. Reynolds, John D. (University of South Carolina). The Evolutionary Significance of Ovule Structure in Diapensiaceae.

10:53 51. Riopel, James L. (University of Virginia). Studies on the Origin and Potentiality of Lateral Root Meristems.

11:06 51. Richardson, F. C. and Lafayette Frederick (Atlanta University). A Comparative Study of the Nodal Anatomy of *Ulmus americana* and *U. pumila*.

11:19 53. Griffith, Mildred M. (University of Florida). Ontogeny of Foliar Sclereids in *Osmanthus fragrans*.

Animal Ecology

Room 205, Geology Building
Presiding, John B. Withers, Clark College

8:30 54. Tanner, James T. (University of Tennessee and Oak Ridge National Laboratory). Changes in Animal Populations Related to Population Density.

8:43 55. Harvey, Michael J. and Roger W. Barbour (University of Kentucky). An Improved Method for Determining Home Range.

8:56 56. Hassell, Marion D. and Michael J. Harvey (University of Kentucky). Ability of *Myotis sodalis* to Home from Different Directions.

9:09 57. Barbour, Roger W. and Michael J. Harvey (University of Kentucky). Winter Activity of the Prairie Mole, *Scalopus aquaticus machrinus* (Rafinesque).

9:22 58. Spooner, John D. (University of Florida). Sound Communication in Phaneropterine Katydids.

9:35 59. Talmage, Sylvia S. and John M. Carpenter (University of Kentucky). Interspecific Competition in Cage Experiments with *Drosophila.*

9:48 60. Styron, Clarence Edward, Jr. (Emory University). Observations on the Ecology of a Granite Outcrop Isopod, *Lirceus fontinalis* Raf., with Emphasis on Ionizing Radiation Effects.

10:01 61. Grimm, James K. (Madison College). A Population Study of Land Arthropods in a Heath Bald and Minor Ecological Observations.

10:14 62. Whitford, L. A., G. E. Dillard and G. J. Schumacher (North Carolina State College, University of North Carolina, New York State University). An Artificial Stream Apparatus for the Study of Lotic Organisms.

10:27 63. Schelske, Claire L., William D. C. Smith and Jo-Ann Lewis (Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina). Environmental Radioactivity in Molluscs.

10:40 64. Baptist, John P. (Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina). Retention of Radionuclides by the Atlantic Croaker, *Micropogon undulatus.*

10:53 65. Batson, Jackie (University of Kentucky). Preliminary Studies on Tracing Movements of *Ambystoma texanum* Tagged with Radioactive Cobalt-60.

11:06 66. Golley, Frank B. and John B. Gentry (University of Georgia Institute of Radiation Ecology). Response of Wild Rodents to Acute Gamma Radiation.

11:19 67. Welch, Bruce L. (College of William and Mary). Sociophysiological Differentiation.

Animal Physiology

Room 106, Biology Building
Presiding, J. M. Branham, Oglethorpe University

8:30 68. Lutz, Paul E. (University of North Carolina at Greensboro). Some Physiological Aspects of Photoperiodic Responses in Nymphs of *Tetragoneuria cynosura* (Odonata).

8:43 69. Kent, George C., Jr., John G. Turnbull and Albert C. Kirby (Louisiana State University). A Daily Rhythm in Prolactin Secretion or Release in Hamsters.

8:56 70. Smith, Michael H. and Wayne E. Criss (University of Florida). Effects of Sex and Ambient Temperature on the Endogenous Diel Body Temperature Cycle of *Peromyscus polionotus.*

9:09 71. Fairbanks, Gilbert W. (University of South Carolina). Lipid Alterations in Rat Testes Subjected to Above Normal Temperatures.

9:22 72. Ford, Lee (Mississippi State College for Women). Initial Birth Rate, Percentage Gain and Adult Size in an English and American Line of Collie Dogs.

9:35 73. Roeder, Martin and Rachel H. Roeder (University of North Carolina at Greensboro). The Effect of Methylene Blue on the Respiration of Small Whole Fishes.

9:48 74. Hess, W. N. and John A. Freeman (Winthrop College). Excretion of Sodium and Chloride Ions via Gills and Skin in the Toadfish.

10:01 75. Henderson, Vernon. Observations on the Inductive Effect of Bone During Regeneration in Catfish.

10:14 76. Wynn, Robert A. and George R. Bernard (Medical College of Georgia). Composition of the Plasma, Pericardial Fluid and Perivisceral Fluid of a Stingray.

10:27 77. Williams, Luther S. (Atlanta University). *In Vitro* Studies on the Effects of Pituitary Digestion and Somatotrophin on the Growth Rate of Cells of Sarcoma-180 from Crocker Albino Mice.

10:40 78. Bush, Francis M. (Howard College). Physiochemical Variation in ABO Blood Types and Plasma Proteins of *Passer domesticus.*

10:53 79. Thompson, J. Richard and Gail Yerby (Southern Research Institute). Applications of Cryobiology in the Biomedical Sciences and Cancer Research.

11:06 80. Mengebier, William L. (Madison College). Succinoxidase Activity of Homogenates of *Dugesia dorotocephala.*

11:19 81. Dowden, Bobby F. and Harry J. Bennett (Louisiana State University). Some Effects of a Chlorinated Hydrocarbon Insecticide on the Respiration of *Procambarus clarkii.*

FRIDAY AFTERNOON—APRIL 17, 2:00 P.M.

Plant Physiology

Auditorium, Church School Building
Presiding, H. E. Joham, Texas A & M University

2:00 82. Norris, W. E., Jr. and Beatrice Brotzman (Southwest Texas State College). Effect of Gibberellic Acid and Malformin on Elongation and Geotropically Induced Curvature of *Avena* Coleoptiles.

2:13 83. Henderson, James H. M. and Reginald H. Walter (Tuskegee Institute). The Influence of the Interaction of IAA and Phenolic Acids on *Avena* Straight Growth.

2:26 84. Scarbrough, Emanuel and J. H. M. Henderson (Tuskegee Institute). Identity of the Biologically Active Breakdown Products of Indolpyruvic Acid.

2:39 85. Taylor, D. M., P. W. Morgan, J. V. Amin and H. E. Joham (Texas A & M University). Effects of Manganese Nutrition on the IAA-Oxidase System of Cotton.

2:52 86. Morgan, Page W., Howard E. Joham and J. V. Amin (Texas A & M University). Implication of the IAA-Oxidase System of Cotton in Manganese Toxicity.

3:05 87. Van Fleet, D. S. (University of Georgia). Control of Differentiation and Function by Distribution of Enzymes in a Lipid-Bound System.

3:18 88. De Jong, Donald (University of Georgia). The Significance of Enzyme Localization in Plant Roots.

3:31 89. Morrison, Ralph M. (University of North Carolina at Greensboro). Effects of Growth Promoting Substances on Isolated Stem Sections.

3:44 90. Myles, Marion R. (Grambling College). The Effect of Drugs and Hormones on Growth and Mitosis, Using Root Tips of the Horsebean, *Vicia faba*.

3:57 91. Powell, Robert D. (Texas A & M University). Color Complexes Formed by Indole Type Auxin.

4:10 92. O'Kelley, J. C. and T. E. Denton (University of Alabama). Differences in Composition Between *Protosiphon botryoides* Cells Grown in a Ca- and Cells Grown in Sr-Replacement Medium.

4:23 93. Yarbrough, J. D., J. C. O'Kelley and A. F. Findeis (University of Alabama). Liquid Scintillation Determination of Radioisotopes in *Chlamydomonas reinhardti*.

Plant Ecology

Room 105, Biology Building
Presiding, M. P. Burbanck, Emory University

2:00 94. Williams, Richard B. (U. S. Bureau of Commercial Fisheries). Phytoplankton Productivity at Beaufort, North Carolina.

2:13 95. Cowley, G. T. (University of South Carolina). A Soil Microfungal Population Analysis of Fifteen Stands on the Savannah River Plant.

2:26 96. DeSelm, H. R. (University of Tennessee). Plant Calcium Concentrations in Relation to Altitude and Latitude.

2:39 97. Edmisten, Joe A. (University of Georgia). Alkylbenzene Sulfonate in the Lentic Ecosystem.

2:52 98. Ashby, William Clark (Southern Illinois University). Seasonal Trends in Internal Water Balance Related to Habitat.

3:05 99. McCormick, J. Frank (University of Georgia). Effects of Ionizing Radiation and Other Environmental Stresses upon *Pinus elliottii*.

3:18 100. McGinnis, J. T. and R. B. Platt (Emory University). Recovery of Hardwood Forests Stands from Short-Term Exposures of Ionizing Radiation.

3:31 101. Monk, Carl D. (University of Florida). The Southern Mixed Hardwood Forest of North Central Florida.

3:44 102. Bruhn, Mary Ellen and Edward E. C. Clebsch (University of Tennessee). A Successional Study of the Grassy Balds.

3:57 103. Cooper, Arthur W. (North Carolina State). Saltmarsh Studies on the North Carolina Outer Banks.

4:10 104. Bostick, Peter E. (University of North Carolina). A Geobotanical Investigation of Chandler Mountain, St. Clair County, Alabama.

4:23 105. Bozeman, John R. (University of North Carolina). Correlation of the Vascular Flora to Edaphic Factors on the Altamaha River Sand Ridge.

Invertebrate Zoology and Parasitology

Room 205, Geology Building
Presiding, E. Dwain Porter, Georgia Institute of Technology

2:00 106. Fitzpatrick, J. F. Jr. (University of Virginia). The Propinquus Group of the Crawfish Genus *Orconectes*.

2:13 107. Thompson, Jesse C., Jr. (Hampden-Sydney). A Hymenostome Ciliate from the Antarctica.

2:26 108. Wells, Carolyn and Jeanne W. Clabough (Longwood College). An Improved Method for Removing Media from a Protozoan Population.

2:39 109. Martin, Virginia L. and W. D. Burbanck (Emory University). Time Required for the Loss of Kappa from *Paramecium aurelia*, Syngen 4, Stock 51.7, Grown in Non-Living Media.

2:52 110. Williams, Donald B. and Robert C. Ramger (Vassar College and Maryville College). Differences in Sensitivity to Ultraviolet Light During the Cell Growth Cycle of the Ciliate *Spathidium spathula*.

3:05 111. Gaisser, Rosemary (The University of Tennessee). Acanthocephala from the Falcon, *Falco tinnunculus,* of Egypt.

3:18 112. Tan, Bian Djoen (The University of Tennessee). A Method of Irradiating *Hymenolepis microstoma,* the Bile Duct Tapeworm of Mice, *in Vitro,* with Subsequent Survival and Growth.

3:31 113. Miller, Grover C. (North Carolina State). Report on a New Strigeoid Trematode from the Red-Shouldered Hawk.

3:44 114. Harris, Alva Howard (North Carolina State). Observations on the Larval Stages of *Pharyngostomoides procyonis,* Harkema, 1942 (Trematoda: Diplostomidae).

3:57 115. Hammer, Ruth (University of Tennessee). An Analysis of Linear Measurements of the Gregarines from Random Samples of *Gibbium psylloides.*

4:10 116. Holliman, Rhodes B. and Frank J. Etges (Virginia Polytechnic Institute and University of Cincinnati). Studies on Trematode Cercariae from Virginia.

4:23 117. Holliman, Rhodes B. (Virginia Polytechnic Institute). Studies on a New Trypanosome in the Rabbit, *Sylvilagus floridanus,* in Virginia.

Cytology and Cytogenetics

Room 106, Biology Building

Presiding, R. H. Fetner, Georgia Institute of Technology

2:00 118. Bell, Sandra and Sheldon Wolff (University of Tennessee, Oak Ridge National Laboratory). Studies on the Mechanism of the Effect of FUdR on Chromosomes.

2:13 119. Howe, H. Branch, Jr. (University of Georgia). Sources of Error in Genetic Analysis in *Neurospora tetrasperma.*

2:26 120. Ballal, S. K. (University of Tennessee). A Method of Studying Chromosomes in Some Species of *Poria.*

2:39 121. Murdy, William H. and John R. Laughnan (Emory University and University of Illinois). Chromosome Duplication as a Faetor in the Evolution of Maize.

2:52 122. Applegate, Arthur L. (Emory University). The Cytochemistry of Oogenesis in the Marine Snail, *Ilyanassa obsoleta.*

3:05 123. Bernard, George R. and Gail G. Wynn (Medical College of Georgia). Formaldehyde Fixation: Gravimetric Responses of Tissue Slices and Gels.

3:18 124. Meisner, Herman M. (Emory University). Factors Affecting Mitotic Recovery in X-Irradiated Grasshopper Neuroblasts.

3:31 125. Schiff, Stefan O. (University of Tennessee). Tritiated Uridine Incorporation in Grasshapper Neuroblasts.

3:44 126. Sagawa, Yoneo (University of Florida). Self-Incompatibility Among Easter Lillies.

3:57 127. Alvarez, Marvin Ray (University of Florida). A Histochemical Study of Embryo Development in *Vanda* (Orchidaceae).

4:10 128. Rinaldi, R. A., Iris Snider and Margaret Dozier (University of Tennessee). "Flow-Charts" of Amoeboid Movement.

4:23 129. Rinaldi, Robert A. (University of Tennessee). Plasmasol-Plasmagel Conversion in the Hyaline Cap of *Chaos chaos.*

Project LOCO Completes First Phase Off Jamaica

Scientists from the Institute of Marine Science, University of Miami, have succeeded in drilling 186 feet into the ocean floor at a depth of 2,000 feet at a Caribbean site southwest of Jamaica. Working from the 174-foot vessel *Submarex,* owned and operated by a California firm, Global Marine, and aided by the Institute of Marine Science Research Vessel *Gerda,* the investigators anchored in deep water and obtained deep-sea sediments dating back some 20 million years. The operation constitutes the first phase of Project LOCO (LOng COres). Planned and directed by the Institute of Marine Science, with the cooperation of Global Marine and the financial support of the National Seience Foundation, the Miami investigators hope eventually to obtain continuous core samples of up to ½ mile in length from the ocean floor.

Sediment in deep-sea cores is dated by radioactive methods and by identifying tiny fossil shells embedded in it. About half the ocean floor is covered with a mud containing the empty shells of Foraminifera, tiny protozoans that live near the ocean surface. As the organisms die and sink, they contribute to the bottom sediment, known as Globigerina ooze, which accumulates at a rate of about one inch in a thousand years. When major changes occur at the earth's surface —such as when a large mountain range is created, an oceanic current shifts its course, or a major glaciation causes a lowering of temperatures—the character of the sediment and the types of shells buried in it ehange. Thus deep-sea sediments contain a unique record of the past history of the earth.

Global Marine Exploration Company, of Los Angeles, acquired considerable experience in drilling through the deep ocean floor when it conducted, more than two years ago, the first phase of the MOHO Project off the coast of southern California. The purpose of this project is essentially to sample the upper mantle, which underlies the crust of the earth at a depth of 3 to 4 miles below the ocean floor. The purpose of the Institute of Marine Science's LOCO Project, on the other hand, is to sample in continuity the sediments of the deep-sea floor, which are 1,000 to 3,000 feet thick, and to thus gain an insight into the past history of the earth.

Abstracts of Papers Presented at the 25th Annual Meeting of the Association of Southeastern Biologists

Comparison of Techniques Used in the Study of Absorption of Chemicals by Leaves

MOHAMED M. ABOUL-ELA AND CHARLES S. MILLER,
Texas A & M University

Radioactively-labeled chemicals were applied and their absorption by cotton leaves was measured using different techniques. A gross radioautographic method employing the usual X-ray film and storage at – 20°C. for comparatively long exposures was used on surface-washed and unwashed plant material treated with ethylene, aminotriazole, arsenic acid, pentochlorophenol, 2,4-D, and S,S,S-tributylphosphorotrithioate. Semi-microradioautographic techniques using leaf discs exposed to photographic emulsions were tried for distributive studies. Photographic plates were used in conjunction with densitometric determinations for quantitative studies. Direct radioassay of leaf discs showed promise in quantitative determinations of absorption by resistant selection and susceptible variety of cotton. An adapted strip-counter was also employed for determinations of petiole absorption and translocation.

A Histochemical Study of Embryo Development in *Vanda* (Orchidaceae) *

MARVIN RAY ALVAREZ, *University of Florida*

An investigation of the changes in distribution and concentration of insoluble polysaccharides, total proteins, ribonucleic acid (RNA), and histones throughout the development of the embryo sac and embryo of *Vanda* was made. The primary megaspore wall is richer in insoluble polysaccharides than other megasporangial cell walls. A protein concentration gradient exists in the megasporangium, decreasing toward the basal end. The synergid cells are high in protein and insoluble polysaccharides and may serve to nurture the egg. A high concentration of protein appears at the chalazal limits of the embryo sac shortly after fertilization, disappearing gradually as the embryo enlarges. This activity appears to be associated with the antipodal cells. The embryo initial exhibits a higher protein and RNA concentration than the suspensor initial as early as the two-cell stage. In the protocorm, differentiation of a meristematic cell into a parenchymatous cell involves a volume increase due to water uptake and to protein synthesis occurring at a rate sufficient to maintain a constant protein concentration. The cell walls of the meristematic cells contain greater amounts of pectin than those of the parenchymatous cells. The major non-pectic wall components are the hemicelluloses. An increase in ploidy and histone concentration occurs in the nuclei of the parenchymatous region prior to the necrosis of this region.

* Research supported in part by Atomic Energy Commission Contract AT-(40-1)-3088 to Dr. Y. Sagawa.

The Cytochemistry of Oogenesis in the Marine Snail, *Ilyanassa obsoleta*

A. L. APPLEGATE, *Emory University*

The cytoplasm of previtellogenic oocytes in *Ilyanassa* contains a high concentration of RNA and glycogen. The chromosomes of the young oocytes go through a preleptotene, bouquet, and a pachytene stage; then, from the onset of vitellogenesis the pachytene stage is retained until yolk formation is virtually completed at which time the chromosomes have reaehed the late diplotene stage. The nucleolus becomes evident at early pachytene and shows drastic changes in morphology and RNA content through midvitellogenesis. During late vitellogenesis the nucleolus is large, spherical, and stains weakly for RNA. The first cytoplasmic indication of yolk formation is the appearance of small lipid and RNA bodies which is followed by the formation of small yolk platelets composed of protein and polysaccharide. Early polarity is not discernible; however, in the later stages of vitellogenesis the free end of the oocyte may be recognized as the animal pole region, whereas the attached end is characteristic of the vegetal pole plasm.

Seasonal Trends in Internal Water Balance Related to Habitat

WILLIAM CLARK ASHBY, *Southern Illinois University*

Poison ivy was used as a test species to compare four forest habitats. Leaves from each habitat were collected, frozen, the sap expressed, and the osmotic pressure determined by depression of the freezing point and by refractive index. During a late summer drought leaf coloration developed, and the osmotic pressure rose to approximately 15 atmospheres prior to severe wilting and leaf fall. The measured moisture stress developed first on black oak ridges, and then successively on white oak slopes, red oak ravines, and sweet gum bottomlands. Leaf size, stem diameter, and climatic data were related to habitat, and to moisture stress.

Some Factors Affecting the Tolerance of *Aspergillus niger* to Mercury

L. J. ASHWORTH, JR. AND J. V. AMIN,
Texas A & M University

Mercury-tolerant isolates of *Aspergillus niger* van Tiegh. (mycelia but not conidia) have been previously reported. Results of these studies indicate that non-selected mycelium of the fungus is either sensitive or tolerant of Hg depending upon colony age and the nature of its substrate. Mycelium grown on potato-dextrose agar (PDA) quickly acquired the ability to survive on agar containing 4 ppm Hg equivalent of methyl mercury dicyandiamide. Fifty per cent of 24-hour- and 90% of 48-hour-old inoculum grew. All 5- and 25-day-old inoculum survived and also had higher growth rates than younger inocula. Thirty- and 40-day-old inocula had the same percentage survival and growth rate as 24-hour-old inoculum. A 4-salt synthetic medium conferred less tolerance to the fungus than PDA; 24- and 72-hour-old inocula grew only at 1 and 1.5 ppm Hg respectively.

A Method of Studying Chromosomes in Some Species of *Poria*

S. K. BALLAL, *University of Tennessee*

The somatic and meiotic divisions in the higher basidiomycetes are difficult to study because of the problems involved in staining. The investigations on the behavior of nuclei in growing hyphae in this group are not many.

A fairly satisfactory way of staining the chromosomes in some species of *Poria* is described below.

The cultures were started from spore prints on agar slants and maintained on malt agar medium. Bits of hymenial tissue and mycelium are fixed in Newcomer's fluid. The fixative is changed after one hour and fixing is continued for 12 hours. The next step is the hydrolysing and mordanting of the material with I N HCl and 2% alum-iodic acid. After washing with three changes of distilled water the fungal tissue is stained with iron-aceto-hematoxylin for 2-4 hours depending on the consistency of the substance under investigation. A small piece of tissue is transferred to a slide with a drop of dye and the squash preparation obtained is usually satisfactory when examined under high resolution.

Retention of Radionuclides by the Atlantic Croaker, *Micropogon undulatus*

John P. Baptist, *Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, N. C.*

Whole-body retention of strontium-85, niobium-95, iron-59, cobalt-60, zinc-65, and indium-114 by croakers was determined following oral administration or intraperitoneal injeetion of each radioisotope. Retention of cobalt-60 was expressed as a single rate function representing a biological half-life of 31 days. Retention of the other radionuclide tested was expressed as multiple rate functions consisting of two components. The long-lived component of strontium-85 had a biological half-life of 138 days; niobium-95, 465 days; iron-59, 215 days; zinc-65, 138 days; and indium-114, 224 days. Comparisons were made between the biological half-life and the effective half-life of each radionuclide.

Winter Activity of the Prairie Mole, *Scalopus aquaticus machrinus* (Rafinesque)

Roger W. Barbour and Michael J. Harvey, *University of Kentucky*

A prairie mole was tagged with a piece of alloy wire containing 55 microcuries of Co^{60}. The nest was located using a survey meter and scintillation probe. The meter was encased in a plastic bag, placed over the nest, and the audio output eonnected to a 1-MA strip chart recorder. In 16 days of record in January, one female mole spent 33 periods in the nest, and made as many trips out. Trips ranged from 25 minutes to 13 hours 40 minutes, averaging 8 hours 7 minutes. Periods in the nest varied from 15 minutes to 6 hours 15 minutes, averaging 3 hours 48 minutes. No correlation was found between trips out of the nest and the daily cycle of light and dark. Excavation of known nests revealed that the mole took over and converted to her own use a winter nest of a prairie vole, *Microtus ochrogaster.*

Preliminary Studies on Tracing Movements of *Ambystoma texanum* Tagged with Radioactive Cobalt-60

Jackie Batson, *University of Kentucky*

This preliminary research represents studies on tracing the movements of *Ambystoma texanum,* specimens of which have been tagged with Cobalt-60. The problem has been in progress for one and one-half years in an area located 15 miles from the university campus. Forty-three specimens have been made radioactive. Data have been accumulated concerning their movements. Some have never been detected since the initial tagging. Others have been detected a varying number of times ranging from one to thirty-five.

Included in the discussion is some information on how these salamanders can achieve their movement from one position to another. No apparent "pattern of movement" seems to be characteristic of the species. These studies will be continued during this year.

Role of ATP, Proline, and Histidine in Radiation Recovery

A. V. Beatty and J. W. Beatty, *Emory University*

X-ray-induced chromosomal aberrations of the ring and dicentric type in the first microspore division of *Tradescantia paludosa* were used to measure radiation recovery as enhanced by treatment with ATP, proline, or histidine. Delineated were the results of: (1) various concentrations of the chemicals, (2) length of treatment for maximum effect, (3) duration of effects after removal from the chemical solutions. Material treated with proline and histidine exhibited a threshold effect associated both with concentration of solution and with length of treatment. The threshold was more pronounced following use of histidine, while ATP exhibited a linear relationship with regard to both concentrations and length of treatment. The disappearance of the chemical effect after the material was removed from the solutions (before irradiation) was gradual with ATP and proline but rapid with histidine.

Studies on the Mechanism of the Effect of FUdR on Chromosomes

Sandra Bell and Sheldon Wolff, *University of Tennessee and Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee*

Fluorodeoxyuridine (FUdR) has been found to break chromosomes of the broadbean, *Vicia faba.* Since FUdR had previously been found to inhibit DNA synthesis in virus-infected *E. coli,* and since the time required for the appearance of chromosome breaks in FUdR-treated cells was equal to the length of the post-synthetic (G_2) portion of the cell cycle in untreated cells, it was originally postulated that the chromosomes were broken only in the latter portion of the DNA synthesis (S) period. This has recently been shown to be incorrect. The chromosomes can be broken in all stages of the cell cycle and not only in the S period. Since FUdR had never been shown to affect DNA synthesis in *Vicia faba,* or in any other higher plant, it was decided to see if there was an effect on DNA synthesis. Experiments designed to elucidate this problem have shown that: 1) FUdR does affect DNA synthesis in *Vicia,* and 2) the effect of FUdR on DNA synthesis is reversed by the addition of a concentration of exogenous thymidine equal to the concentration of FUdR, but the chromosome-breaking effect of FUdR is independent of DNA synthesis and is reversed only by the addition of much greater concentrations of thymidine.

Formaldehyde Fixation: Gravimetric Responses of Tissue Slices and Gels *

George R. Bernard and Gail G. Wynn, *Medical College of Georgia*

Thin slices of rat liver, kidney and rectus femoris muscle and thin, flat pieces of albumin-gelatin gel (made up with distilled water or 0.9% saline) were immersed in the following formalin solutions: 10%, 20%, 30%, neutral buffered 10%, 10% in 0.7% saline, 10% in 0.9% saline, 10% in 1.1% saline, and 10% in 1.5% saline. The slices or pieces of gel were quickly weighed before immersion and at 5-, 15-, 30-, 60-, 240-, and 1200-minute intervals post

immersion. With the exception of the neutral buffered formalin curve, three families of unmistakably related response curves were obtained for the three tissues. More variability of response was seen with the muscle slices. Weight gain was inversely proportional to solute concentration, but the formaldehyde particles apparently are not involved osmotically. The response of the membraneless gel systems to the fixatives, although quantitatively greater, was qualitatively the same as the tissue slice response.

* Supported by USPHS Grant RG 9347.

Effects of Growth Regulators on the Absorption of C^{14}-labeled s-Triazine Herbicides by Tea Leaves

Prosanto Kumar Biswas, *Tuskegee Institute*

The main object of this present investigation was to study the effects of growth regulators, such as gibberellic acid (GA_3) and indole acetic acid (IAA), on the absorption of C^{14}-labeled 2-chloro-4,6-bis(isopropylamino)-s-triazine (Propazine) by the upper and lower surfaces of the tea (*Camellia sinensis*) leaves. It was noted that the upper surface of detached whole leaves absorbed only 3.5 ppm of propazine, whereas the lower surface absorbed 15.0 ppm from a water-agar solution containing propazine. The addition of GA_3 and IAA to the agar solution significantly increased the absorption by the upper surface, but had very little effect on absorption by the lower surface.

A Geobotanical Investigation of Chandler Mountain, St. Clair County, Alabama

P. E. Bostick, *University of North Carolina*

Collections of vascular plants in the vicinity of Chandler Mountain, St. Clair County, Alabama, in the Valley and Ridge Province were made during parts of the growing seasons of 1962 and 1963. An attempt was made to correlate the members of the flora with geological substrates, of which seven were studied. Out of a total of 506 taxa represented in the collections, 293 or 58% were found on single substrates. Of the 293 "primary indicators," 212 or 72% were found on either the Pottsville sandstone or on the Hamblen alluvium. The highly indicative nature of this flora is tentatively aseribed to soil moisture and chemistry, combined with topographic and biotic influences.

Correlation of the Vascular Flora to Edaphic Factors on the Altamaha River Sand Ridge

John R. Bozeman, *University of North Carolina*

A floristic study based on collections made over two growing seasons on this sand ridge shows certain correlations between: (1) the plant associations and soils, (2) individual species distribution and soils, and (3) morphological variation of species and soils. An attempt has been made to clarify certain aspects of plant and soil-moisture relationships. Analysis of the field capacity, permanent-wilting percentage and organic content of the different soils has elucidated some of the problems which exist. This excessively drained sand ridge parallel to the Altamaha River is very similar in vegetation and geology to sand ridges that parallel most of the rivers and large streams on the Coastal Plain of Georgia, South Carolina, and North Carolina. This ridge is unique in having certain features in common with the Fall-Line Sandhills and with the Sand-Pine Scrub and Hammocks of Florida.

A Successional Study of the Grassy Balds

Mary Ellen Bruhn and Edward E. C. Clebsch, *University of Tennessee*

A study of the vegetation of three grassy balds in the Great Smoky Mountains—Andrews Bald, Gregory Bald, and Spence Field—was made. The sampling data obtained were compared with those of two previous investigators. Maps showing the encroachment of woody vegetation over a period of some twenty years have been prepared, and first approximations of the rate of encroachment have been made.

A Floristic Study of Kentucky Point, Kentucky

E. T. Browne, Jr., *University of Kentucky*

Kentucky Point is an area at the extreme western end of the state. It is isolated from the remainder of the state by an inverted U-shaped bend of the Mississippi River, and access by car is only through Tennessee. Until about 20 years ago, a highway from St. Louis to Memphis traversed the area, but silting caused discontinuance of the ferry, and today a distance of one mile exists between the former ferry landing and the south bank of the river. The vegetation is unlike that of other sections of the state with species occurring here which are unknown or are quite limited elsewhere in Kentucky. This area is situated in the Mississippi Embayment region of the Gulf Coastal Plain, and many species are found of a predominantly southern distribution. The topography is flat to gently rolling with elevations from 270 to 305 feet, and the soils are alluvial in origin.

Three Generations of × *Quercus rudkini* Britton (*Q. marilandica* Muenchh. × *Q. phellos* L.)

C. John Burk, *Smith College*

Specimens representing three generations descended from an initial hybridization of *Quercus marilandica* Muenchh. with *Q. phellos* L. were analyzed and compared by means of Anderson's hybrid index method. Some plants approximating the parental types were encountered in the F_2 generation. The offspring of these latter F_2 specimens were often morphologically intermediate between the original parental types. Hybrid vigor was apparent in some F_3 progenies while other F_3 progenies were stunted and deformed with very low percentages of acorn germination. Markedly different patterns of variation were observed in offspring of a single F_2 plant in two successive years. The role of progeny studies in oak biosystematics is discussed.

Physiochemical Variation in ABO Blood Types and Plasma Proteins of *Passer domesticus*

Francis M. Bush, *Howard College*

House Sparrows, introduced into N.A. since 1850, show geographic variation in bodily characters. These structural changes are believed to have adaptive significance and suggest that this species has undergone considerable evolution since occupancy. Such differenees encourage one to search for chemical variation basic to morphological change. The present study utilizes the blood to assess the physiochemical variation.

Erythrocytes typed with human antisera show fledglings 31-49 days post-hatching develop antigen-A and by 80 days, antigen-B with enough potency to produce agglutinations. By 80 days, ABO blood types are fixed; however, the reactive strength of agglutinations increases to 181-221 days. Tests of samples from five localities show antigenic polymorphism; type O is more common

in southeastern and types A and AB in midwestern populations.

Starch gel electrophoresis of plasma proteins shows a minimum of 14 fractions. Migration patterns reveal a prealbumin, albumins, post albumins, and globulins when stained with Amido Swartz. Histochemical staining wtih alpha naphthyl acetate shows four aromatic esterases; one fast and three slow migrating fractions. At least one haptoglobin is identified using benzidine-H_2O_2. Autoradiography with Fe^{59}-labeled plasma shows one transferrin that migrates slowly when compared with human plasma. Such results represent an initial separation of plasma proteins of wild birds using this technique. Six more fraetions are present than identified previously in the plasma of domestic fowl.

Similarly aged birds from five localities differ both qualitatively and quantitatively in post albumins, esterases, and possibly haptoglobins. For each fraction the heterogeneity is minor, but considered altogether provides subtle evidence of biochemical evolution. (Supported by Grant # PW, 695, Society of Sigma Xi.)

Morphogenetic Studies on Excised Leaves of *Osmunda cinnamomea* L.

James D. Caponetti, *University of Tennessee*

Experimental studies on the fern *Osmunda cinnamomea* L. have shown that leaf primordia at various stages of development within the apical bud will develop into mature leaves when excised and placed in a sterile agar medium of inorganic salts plus 2% sucrose. Morphogenetic studies on natural leaves and on certain cultured leaves have demonstrated that the growth pattern in excised leaves is qualitatively normal and similar to that in natural leaves. However, there are significant quantitative differences. Meristematic activity is drastically reduced in the developing crozier of cultured leaves. The result is a mature leaf which is very much smaller than the natural leaf, and has a reduced number of pinnae pairs. Sucrose concentrations up to 6% evoke an increment in final leaf height, and sucrose concentrations up to 10% amplify the number of pinnae pairs. Parallel experiments using mannitol in place of the sucrose have shown that the sucrose effect is not an osmotic one.

Comparative Cytology of Three Types of Cells Synthesizing Different Proteins

Robert R. Cardell, Jr., Funan Hu, and Robert S. Knighton, *Edsel B. Ford Institute for Medical Research and Henry Ford Hospital, Detroit, Michigan*

Cells from the salamander pituitary gland, a mouse melanoma, and a human pituitary tumor were obtained, fixed in osmium tetroxide, embedded in Vestopal W, sectioned on an ultramicrotome, and examined in an electron microscope. These cells were actively synthesizing proteins and it is the purpose of this paper to describe their cytology during this process.

The mouse melanoma cells were synthesizing melanin; the salamander pituitary cells were synthesizing thyrotrophin; and the human pituitary tumor cells were synthesizing somatrophin. The similarity of the cytology of these cells implies that the process of protein synthesis may be identical in these different cells. The most striking observation is the hypertrophy of the Golgi complex and involvement of this organelle with the formation of specific protein structures within these cells. The Golgi was more prominent in the pituitary than in the mouse melanoma cells; however, the Golgi complex of the mouse melanoma cells was also enlarged. The rough endoplasmic reticulum of all three types of cells was abundant and occurred in the form of small vesicles or flat lamellar cisternae. Mitochondria were found in all cells.

A Preliminary Study of the Absorption of Iodine by Several Plant Species and Its Subsequent Fate

Henry A. Collins, *Tuskegee Institute*

In a study designed to determine the rapidity with which iodine was absorbed and translocated by pea (*Pisum sativum*) and corn (*Zea mays*) plants, radioactive I^{131} applied to the rooting zone was distributed throughout shoot tissue within six hours after application. Autoradiograms of kidney bean (*Phaseolus vulgaris*), spinach (*Spinacia oleracea*) and tomato (*Lycopersicon esculentum*) plants, in addition to corn and pea plants, revealed iodine to be uniformly distributed between leaf and stem tissues. Within leaves, however, iodine was more concentrated in vascular than nonvascular tissue.

Paper chromatograms of extracts from pea plants treated with the stable form of elemental iodine revealed two distinct spots upon reacting with a reagent containing ferric chloride, sodium arsenite and potassium ferricyanide. This suggests that iodine is incorporated into some compound. Paper chromatograms containing extracts from several species of plants fed I^{131} have been exposed to x-ray film to positively establish the position of iodine on the chromatograms.

Saltmarsh Studies on the North Carolina Outer Banks

Arthur W. Cooper, *North Carolina State*

A study of high saltmarsh vegetation has been initiated in conjunction with a program of mosquito control on Bodie Island in the Cape Hatteras National Seashore, North Carolina. Mosquito control is being attempted by means of impoundments and one immediate aim of the research is to determine the nature of vegetational changes, if any, which occur in response to changes in marsh water levels. The primary study area is a marsh approximately 1½ miles long and 1 mile wide, located just north of Bodie Island lighthouse. This will be supplemented by control areas located in marshes just to the north. The first stages of the project have consisted of determinations of species associations, mapping of these, and an estimate of the standing crop of major marsh species. Subsequent work will be devoted to studies of environmental factors and to the functional ecology of the marshes.

A Soil Microfungal Population Analysis of Ffteen Stands on the Savannah River Plant *

Gerald T. Cowley, *University of South Carolina* †

The soil microfungal populations of three abandoned fields, four pine forests, three oak forests, and five mixed hardwood forests were isolated and compared. Of the 354 separate entities detected, 54 were considered abundant (frequency of 50% or more) in one or more stands. The populations from the abandoned fields were most distinctive, in that 21 of their 25 abundant entities were isolated rarely or not at all from the forest soils. Among the forest stands, the oak and pine forest populations were most similar. Two particularly striking contrasts could be made between different habitats. Aspergilli were abundant in the abandoned fields (35% of the isolates) while they were rare in the forests (less than 1% of the isolates). *Mortierella ramanianna* was isolated from all of the oak and pine stands (17 and 11% of the

isolates), while it was isolated from 60% of the mixed hardwood stands and comprised only 1% of the isolates.

* The information contained in this article was developed during the course of work under contract AT(07-2)-1 with the U. S. Atomic Energy Commission.

† Work performed while the author was ORINS Research participant at the Savannah River Laboratory, Aiken, S. C.

A Historical Account of the Flora of Roanoke Island

Philip J. Crutchfield, *University of North Carolina*

During a floristic study of Roanoke Island, North Carolina, 831 taxa were collected. This island is situated between the Dare County mainland and the adjacent part of the "Outer Banks" known as Bodie Island. It supports a maritime flora of unusual diversity although occupying a relatively small area. An effort is made to account for this diversity by a discussion of the geological, ecological, and cultural history.

The Influence of Cupferron on the Frequency of X-ray-Induced Chromosomal Aberrations in *Tradescantia paludosa*

Herbert L. Davis, Jr., *Emory University*

Cupferron (the ammonium salt of nitrosophenylhydroxylamine) has been reported to inhibit respiration. In this study cupferron was used as a pre- and post-treatment agent prior to or after irradiation in helium. *Tradescantia paludosa* inflorescences were pre-treated in varying concentrations of cupferron for varying periods of time and were then given 400 r. of x-radiation in helium. Control inflorescences were given 400 r. in helium. Experiments using cupferron as a post-treatment agent were carried out to determine if the cupferron effect was on chromosome breakage or recovery. Examination of the microspores for chromosomal aberrations of the ring and dicentric types showed that the frequency of aberrations was lower in the cupferron treated microspores than in those which received no cupferron.

The Significance of Enzyme Localization in Plant Roots

Donald W. De Jong, *University of Georgia*

Histochemical and cytochemical determinations were made of the components of root tissues in order to establish the role of the cortex as a functional symplast. Peroxidase has a characteristic cytoplasmic distribution in the hypodermis, endodermis and phloem in early stages of root development. With differentiation, the localization pattern shifts to the walls and membranes of the cells and a distinct polarity was found at the intracellular level. Other enzymes investigated, succinic dehydrogenase, ethanol dehydrogenase, acid phospatase, non-specific esterase, and aryl sulfatase, were also found to have a polar and asymmetrical distribution. In addition to enzymes, tests were made for structural constituents of the cells, particularly proteins, amino and sulfhydryl bound groups, lipid materials, and callose. The primary objective in the research was to use histochemical methods toward a resolution of the problems of redox potentials, osmotic and electrochemical gradients.

Plant Calcium Concentrations in Relation To Altitude and Latitude

H. R. DeSelm, *University of Tennessee*

Collections of leaves of *Acer rubrum, Betula alleghaniensis, Hydrangea arborescens* and *Impatiens capensis* were made in the Great Smoky Mountains, and some also enroute to La Tuqe, P. Q. Royal Shanks collected *Pinus contorta, Populus* sp., *P. balsamifera* and *Picea glauca* between Fairbanks, Alaska, and Montana.

Mean calcium levels vary from 3,000 ppm to about 18,000 ppm in pine and hydrangea. Hardwood levels exceed softwood by $\times 2$ or $\times 3$, and limestone doubles concentrations. Changes with latitude vary from no effect (aspen to -600 ppm per degree (maple) and -130 to -170 ppm per degree (pine, spruce). Change with elevation ranges from about -820 (jewelweed) to $-2{,}000$ per 1,000 feet (hydrangea). Maple collected on both sequences showed -600 ppm per degree and $-1{,}200$ ppm per 1,000 feet. Equating elevation to latitude (1,000 feet = 2° 45′), the 1,200 ppm figure is somewhat low.

Some Effects of a Chlorinated Hydrocarbon Insecticide on the Respiration of *Procambarus clarkii*

Bobby F. Dowden and Harry J. Bennett, *Louisiana State University*

The respiration of adult swamp crawfish, *Procambarus clarkii*, was measured with a respirometer employing Winkler determinations of dissolved oxygen concentrations before and after exposure of the animal. Test solution concentrations of 1, 2, 4, and 8 parts per million of Chlordane were compared to a normal curve which is defined herein as the animal's respiration in a solution without Chlordane. Generally, Chlordane heightened the oxygen consumption of the animals; however, some concentrations caused an initial lowering of oxygen consumption followed by a greatly heightened oxygen consumption. Tests are being conducted to test the hypothesis that the chlorinated hydrocarbon causes loss of control of muscle activity thereby increasing this activity until death of the animal.

Alkylbenzene Sulfonate in the Lentic Ecosystem

Joe A. Edmisten, *University of Georgia*

Preliminary experiments are being conducted to test the effect of 3 concentrations of ABS in the lentic habitat. The design consists of 4 treatments with 3 replications. The producer organisms in each treatment consist of *Typha, Sagittaria, Scirpus, Elodea, Lemna, Azolla, Spirogyra, Hydrodictyon, Zygnema, Nitella, Anabaena, Navicula, Closteriam.* Consumers include *Pelomyxa, Paramecium, Stentor, Vorticella, Hydra, Planaria,* pond snails, *Daphnia,* dragonfly nymphs, crayfish, and *Gambusia.* Three tank ecosystems will have no added surfactant, 3 will have 5 ppm, 3 will have 10 ppm and 3 will have 20 ppm of a leading solid detergent. Environmental factors to be checked during the experiment include pH, hardness of water, dissolved oxygen, detergent degradation levels, surface tension, and diurnal variations in pH and O_2. The organisms will be checked for quantitative and qualitative changes associated with treatments. Preliminary tests have shown *Ameoba, Paramecium,* and *Daphnia* are killed in 5 ppm of ABS.

Revision of Section Rubra of *Acer* in Eastern North America excluding *Acer saccharinum* L.

William H. Ellis, *Austin Peay State College*

The various taxa of Section Rubra of *Acer* in eastern North America, excluding *Acer saccharinum* and its biotypes, were studied and certain inferences were made using ecological, geographical, cytotaxonomical, biochemical, anatomieal, and morphological data. The results of the study indicate that this complex is represented by three natural taxa within the entire range. Those taxa have been analyzed and placed in the taxonomic ranks which seemed to best satisfy the modern requirements of biosystematy. The respective entities are *Acer rubrum* var. *rubrum*, *Acer rubrum* var. *tridens*, and *Acer Drummondii*. Inferences drawn from the data obtained indicate that *Acer rubrum* var. *rubrum* might be the ancestral stock which gave rise to both its variety *tridens* and *Acer Drummondii*. It appears that the evolution of the variety *tridens* was sympatric with the typical variety and that an isolated segment of the ancestral population possibly gave rise to *Acer Drummondii*.

Ontogeny of Protein Bodies in Cotton Cotyledon

E. Mark Engleman, *Seed Protein Pioneering Research Laboratory, New Orleans, La.*

Parenchyma cells of the cotyledon of the mature embryo of *Gossypium hirsutum* contain protein bodies 4-8 μ in diameter. Examination of embryos as small as 1 mm. long shows that the protein bodies arise in irregular spaces derived from the cisternae of endoplasmic reticulum. The bodies retain their single membrane boundary into advanced stages.

Lipid Alterations in Rat Testes Subjected to Above Normal Temperatures *

Gilbert W. Fairbanks,† *University of South Carolina*

Descended testes of anesthetized rats were immersed in a 45°C. water bath for 24 min. After 4 days, testes were removed from animals, extracted with 2:1 chloroform-methanol, and lipid separated into individual classes by thin-layer chromatography. Six to eight non-polar lipid fractions were separated by hexane-ether-HAc (90:10:1), while 8 polar lipid separations were made using a chloroform-methanol-water (65:25:4) solvent system. Quantitative tests for cholesterol, phosphorus, glycerol and ester linkages were made on each separated fraetion. Fatty acids were analyzed using gas chromatography with a diethylene glycol succinate column run at 190°C. Major lipids identified were cholesterol esters, triglycerides, unesterified fatty acids, cholesterol, cephalin and leeithin. Temperature-treated testes showed a higher cholesterol ester content having a greater concentration of fatty acids with high retention times than did normal testes. The most abundant fatty acids in the testes were those having relative retention volumes of 1.00 (palmitic), 1.17 (palmitoleic), 1.74 (stearic), 2.00 (oleic), 2.50 linoleic), 5.80, 10.00, and 11.30. As eompared with normals, the heated testes tended to show a relative decrease in the amount of palmitic acid in the cephalin and lecithin fractions. In the cephalin fraction there was a corresponding increase in isopalmitic acid.

* Supported in part by NSF Grant #GB-926.
† NDEA Fellow in Physiology.

The Propinquus Group of the Crawfish Genus *Orconectes*

J. F. Fitzpatrick, Jr., *University of Virginia*

Because of marked similiarities in the morphology of the usual taxonomic characters, the interspecific relationships of the several taxa assigned to the Propinquus Group of the Crawfish genus *Orconectes* have been poorly known. These taxa were reevaluated using statistical analysis of morphological variation, and several interesting relationships were revealed. There are two distinct sub-Group assemblages of species, and most of the taxa merit specific rank. There are no apparent clines in any taxon, but the groupings indicated by statistical analyses seem to be related to the historical zoogeography of the animals.

Initial Birth Rate, Percentage Gain and Adult Size in an English and American Line of Collie Dogs

Lee Ford, *Mississippi State College for Women*

A comparative study of (1) thirty-seven pups, American-English linebred collie dogs, descendants of one male (he the result of a half-brother-sister mating) with five related linebred females, and (2) forty-five pups, linebred descendants of two American collies, the matings involving three males and four females. Pedigrees included of both lines. Tables of each line by sexes showing: (1) birth weight and weekly weight for six weeks, (2) percentage gain per week over previous week, (3) monthly gains for twelve months, (4) percentage gain per month over previous month, (5) correlation of height, weight, and chest circumference.

Acanthocephala from the Falcon, *Falco tinnunculus*, of Egypt

Rosemary Gaisser, *University of Tennessee*

Three species of Acanthocephala described are part of a collection from Egypt. These Acanthocephala are from the falcon, *Falco tinnunculus*. Two of the species have been previously described, *Centrorhynchus milvus* Ward, 1956, and *Centrorhynchus galliardi* Golvan, 1956. Variations from and amplifications of these descriptions are presented. One undetermined species of the genus *Mediorhynchus* is described.

Systematic Relationship of the Granite Outcrop Endemic *Cyperus granitophilus* (McVaugh) to *Cyperus inflexus* (Muhl.)

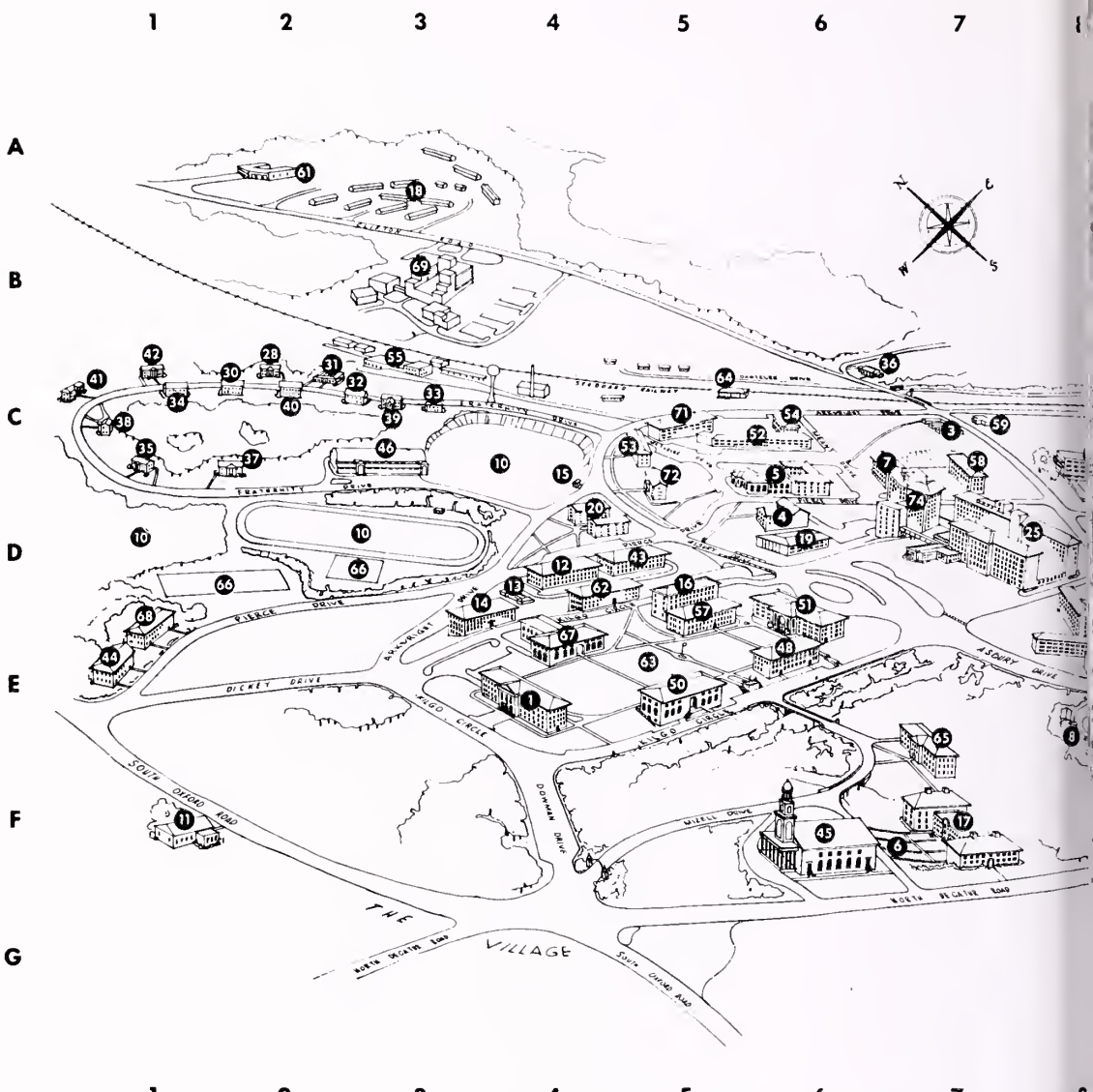
Linda Wynne Garoni, *Oglethorpe University*
William H. Murdy, *Emory University*

Morphological analysis of random samples from several outcrop populations of *Cyperus inflexus* (Muhl.) and *Cyperus granitophilus* (McVaugh) revealed that most characters serving to separate the two species are quantitative. Furthermore, population analyses revealed continuous gradation of plant types from *C. inflexus* to *C. granitophilus*, although the latter was the predominant form on all outcrops studied. Chromosome counts of somatic tissue show *C. granitophilus* plants to be of a higher ploidy level ($2n$ = c. 80, 88, 96) than *C. inflexus* plants ($2n$ = c. 48, 56, 64). Evidence in hand indicates that *C. granitophilus* is not a distinct species, but an ecotype derived from *C. inflexus*. It is suggested that the differences between the two could be explained on the basis of a difference in ploidy level and that the origin of *C. granitophilus* from *C. inflexus* may have involved selection for plants of a higher ploidy level. Further investigation into this subject is underway.

Vascular Plants of Henry County, Kentucky

Johnnie L. Gentry, Jr., and E. T. Browne, Jr., *University of Kentucky*

Henry County is situated to the north of the central portion of the state in the Blue-grass region. It has an



PERSPECTIVE MAP OF THE EMORY UNIVERSITY CAMPU

— A —

1. Administration Building E-4
2. Aidmore Children's Hospital C-9
3. Air Force R.O.T.C. C-7
4. Alabama Hall C-6
5. Alumni Memorial Building C-6
6. Amphitheater F-7
7. Anatomy Building (John P. Scott) C-7
8. Annex B (temporary building) E-8
9. Annex C (temporary building) F-9
10. Athletic Fields D-1, D-2, and C-4

— B —

11. Baptist Student Union F-1
12. Biology Building D-4
13. Biology Greenhouse D-4
14. Bishops Hall D-3
15. Bus Stop Shelter D-4

— C —

16. Chemistry Building D-5
    Child Psychiatry E-10
    1317 Clifton Road
17. Church School Building F-7
18. Clifton Court Apartments A-3
19. Cox Hall (Cafeteria) D-6

— D —

19. Dining Hall Service D-6
20. Dobbs (Samuel Candler) Hall D-4

— E —

21. Egleston (Henrietta) Children's Hospital C-8
22. Emory Court Apartments E-11
23. Emory Park Apartments D-9
24. Emory University Clinic D-8
25. Emory University Hospital D-8

— F —

26. Fishburne (C. L.) Building E-9
27. Fishburne Annex E-8

FRATERNITY HOUSES

28. Alpha Epsilon Pi C-2
29. Alpha Kappa Kappa (medical) F-11
30. Alpha Tau Omega C-2
31. Beta Theta Pi C-2
32. Chi Phi C-3
33. Delta Tau Delta C-3
34. Kappa Alpha C-1
35. Phi Delta Theta C-1
36. Phi Chi (medical) C-6
37. Pi Kappa Alpha C-1
38. Sigma Alpha Epsilon C-1
39. Sigma Chi C-3
40. Sigma Nu C-2
41.
42. Tau Epsilon Phi C-1

— G —

43. Geology Building D-5
44. Gilbert (Ruel B.) Hall E-1
45. Glenn (Wilbur Fiske) Memorial Churc
46. Gymnasium and Swimming Pool C-3

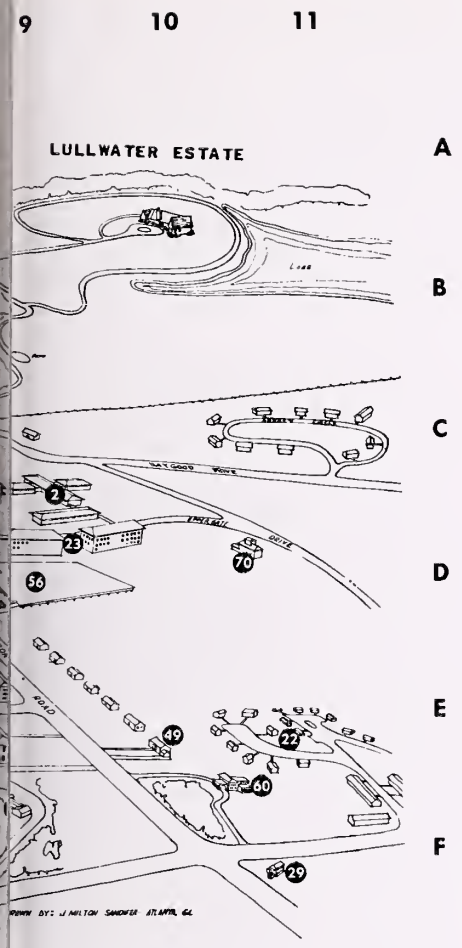
— H —

47. Harris (Florence Candler) Hall D-8
48. History Building E-6

49. See Panhellenic House

— L —

50. Law Building (L. Q. C. Lamar School of Law) E-5
51. Library Building (Asa Griggs Candler Memorial) D-6
52. Longstreet (Augustus Baldwin) Hall C



LANTA, GEORGIA

— M —

cTyeire (Holland Nimmons) Holl C-5
eons (Alexander) Holl C-6

— O —

perations Department and Shops C-3

— P —

anhellenic House (49) E-10
arking Deck for Public D-9
hysics Building D-5
hysiology (T. T. Fichburne) Building C-7
ost Office C-7
resident's Home E-11
rotestant Radio and Television Center A-2
sychology Building (Old Basic Science uilding) D-4

— Q —

uadrangle E-5

— R —

64. Railroad Station C-5
65. Rich Memorial Building E-7

— T —

66. Tennis Courts D-2 and D-3
67. Theology, Candler School of, Building E-4
68. Thomson (William D.) Hall E-1

— U —

69. U. S. Dept. of Public Health Communicable Disease Center B-3
70. Uppergate House D-11

— W —

71. Wesley Holl C-5
72. Winship (George) Holl C-5
73. Women's New Residence Halls E-8
74. Woodruff (Ernest) Memorial Building D-7

undulating topography and an area of 290.26 square miles. Geologically the county is mostly Ordovician limestone, shale and siltstone, but a few exposures of the Silurian appear along the western boundary. The whole surface of the county is well drained. In the western part of the major soil association is Outer Blue-grass, with the eastern part being Hills of the Blue-grass. A total of 586 species and varieties were collected. Ten families were represented by nine or more genera: Gramineae 25, Liliaceae 14, Ranunculaceae 11, Cruciferae 14, Rosaceae 10, Leguminosae 12, Umbelliferae 10, Labiatae 17, Scrophulariaceae 9, and Compositae 37. Nine genera were represented by six or more species: Panicum 6, Carex 9, Quercus 11, Polygonum 9, Viola 8, Aster 11, Bidens 7, Eupatorium 6, and Lactuca 6.

Factors Associated With the High Level Synthesis of the Cotton Leaf Anthocyanin

DEBABRATA GHOSH AND HOWARD E. JOHAM,
Texas A&M University

Factors controlling the high level synthesis of cotton leaf anthocyanin under magnesium and nitrogen deficient conditions were investigated using two varieties of cotton, Empire WR and Red Empire. Magnesium deficient leaves of plants grown outside were found to produce higher levels of leaf anthocyanin than identical leaves grown in the greenhouse. Shaded (cheesecloth, one thickness) plants outside behaved similar to plants grown in the greenhouse, i.e., nitrogen-deficient leaves produced higher amounts under shade or greenhouse conditions but this production was far less than that found with magnesium deficiency in open sunlight. In the greenhouse where seven 30-watt blacklight tubes were used as supplemental light, magnesium-deficient leaves produced, for the first time, anthocyanin purpling typical of magnesium-deficient leaves grown under open sunlight. From the data obtained, it is concluded that a critical step in the high-level synthesis of the cotton leaf anthocyanin is a high-energy photochemical reaction.

Response of Wild Rodents to Acute Gamma Radiation *

FRANK B. GOLLEY AND JOHN B. GENTRY,
University of Georgia Institute of Radiation Ecology

Four species of adult mice, *Peromyscus polionotus, P. gossypinus, Reithrodontomys humulis,* and *Mus musculus,* native to the AEC Savannah River Plant area were subjected to an acute whole body dose of gamma radiation from a 100-curie Co^{60} source giving a dose rate of 27 r./min. The $LD_{50/30}$ of the two species of *Peromyscus* and *Reithrodontomys* was between 1,000 and 1,300 roentgens, about double that of *Mus musculus* which received the same experimental treatment and dose. The effect of domestication on radiation sensitivity was tested by comparing wild-trapped *Mus musculus* with laboratory white mice and wild *P. polionotus* with second-generation laboratory *P. polionotus.* In neither species were significant differences in response to irradiation by wild and domestic mice observed.

* Supported by a contract between the AEC and the University of Georgia, AT(38-1)-310.

Phycobionts of *Clavaria*

JOHN H. GREEN AND WALTER HERNDON,
University of Tennessee

The phycobionts of *Clavaria mucida* Pers. and one undetermined *Clavaria* species collected in Canada, Virginia and Tennessee have been isolated into cultures and

studied comparatively over a period of one year. Several alga genera were found in loose association but only one major type occurred in intimate association with the hyphae in four collections. This spherical unicellular type is similar in many respects to *Trebouxia* but the plastid is parietal. Unlike *Trebouxia* the alga will grow on an inorganic media. Asexual reproduction is by aplanospores and in at least one isolate by both aplanospores and zoospores. Zoospores are the *Protosiphon* type. The alga is most immediately referable to *Neochloris* but differs in pyrenoid structure. Four strains from the four different localities are similar in generic attributes but differ from one another in specific characters.

Ontogeny of Foliar Sclereids in *Osmanthus fragrans*

Mildred M. Griffith, *University of Florida*

The most distinctive feature of the leaves of *Osmanthus fragrans* Lour. is the presence of large branched sclereids. These thick-walled lignified cells extend through the mesophyll and are in contact with the epidermal cells of both surfaces. Initials of the sclereids are first observed when the leaf is about one-third of its mature length. At this stage the palisade and spongy mesophyll and the vascular bundles can be recognized. Initials occur only in the palisade layer and are identified by their vacuolate cytoplasm and prominent nuclei. The growth of the sclereid is rapid, and it reaches full size by the time leaf expansion ceases. Both symplastic and intrusive growth occur. The thick lignified walls of the sclereids develop after the leaf has reached its full size.

A Population Study of Land Arthropods in a Heath Bald and Minor Ecological Observations

James K. Grimm, *Madison College*

Brushy Mountain heath bald, located at Brushy Mountain, Sevier County, Tennessee, was chosen as the study area. The objective of the study was to examine sample microclimate plots in the area over a period of one year and to collect litter-borne arthropods from these plots. Litter samples were collected monthly from four selected areas within the heath bald. The litter samples were separated and quantitative and qualitative analyses were made of the fauna taken. Air temperatures, litter temperatures, soil moistures, relative humidities, pH of soil and litter moisture contents were recorded as accurately as possible and were correlated in tabular with the population data. The data accumulated were tested statistically by an analysis of variance of population counts—two-criteria design, to determine the effect of the collective elements of the microclimate upon arthropod distribution. An analysis of the data collected during the investigation showed significant variances between collecting dates and between sampling plots for each group of arthropod. The analysis of the data also revealed that the microenvironment of heath bald litter is a complexity of physical and biological factors which influence not only the population density, but also the species composition of the populations.

Bourbon County, Kentucky and Its Vegetation

Edi Guhardja and E. T. Browne, Jr., *University of Kentucky*

In the midst of the "Blue-grass" region of Kentucky lies Bourbon County. The favorable climate and soil of the region makes intensive agricultural practice possible. Natural vegetation is limited largely to the steep slopes of hill-ridges and rivers. There is some tendency for these species to escape to abandoned fields, neglected roadsides, little-used railroad-track rights of way, and other undisturbed places. Four typical habitats can be recognized, which are dry open places, wet open ones, dry woods, and humid woods. Each situation has more or less characteristic vegetation. On the dry open places members of Caryophyllaceae, Compositae, Cruciferae, Euphorbiaceae, Gramineae, Luguminosae, Scrophulariaceae, Solanaceae, and Umbelliferae are abundant. On the wet open places Asclepiadaceae, Caprifoliaceae, Convolvulaceae, Labiatae, Onagraceae, Typhaceae, and Violaceae are to be found and in the dry woods Fagaceae, Juglandaceae, Oleaceae, Pinaceae, and Rosaceae. In the humid woods Aceraceae, Liliaceae, Moraceae, Salicaceae, Ulmaceae, and Urticaceae are well represented.

The Effect of Certain Inhibitors on Root Uptake of Di-syston by Cotton Seedlings

Joseph Hacskaylo, *CRD, ARS, USDA, Texas A & M University*

Uptake of Di-syston, a systemic insecticide, by cotton seedlings was greater when the roots were exposed to the insecticide plus the inhibitors NaCN, NaN_3, or 2,4-DNP than when the roots were exposed to the insecticide alone. The greatest uptake occurred in seedlings treated with DNP. Excised cotton roots grown in aseptic culture and exposed to the same treatments gave similar results. On the other hand uptake of sulfate by roots of seedlings was least when seedlings were treated with DNP. Azide at 10^{-4} M concentration appeared to be the only treatment that increased uptake of sulfate by the seedlings. The others, with few exceptions, were inhibitory. The possible mechanism involved in the accelerated uptake of Di-syston in the presence of the inhibitors will be discussed.

An Analysis of Linear Measurements of the Gregarines from Random Samples of *Gibbium psylloides*

Ruth Hammer, *University of Tennessee*

An examination of the beetle, *Gibbium psylloides*, has revealed that a high percentage is parasitized by a cephaline gregarine inhabiting the mid-gut. In an effort to identify the parasite an analysis of linear measurements of the gregarines from random samples of the host was executed. The observed infectivity ranged from 5 to 108 gregarines per beetle. The total length varied from 10 microns to 435 microns with a mean of 149.5 microns. Graphing the total lengths which had been grouped into 44 classes showed two distinct peaks in the right-skewed curve. These peaks were at the 81-90 micron class and the 161-170 micron class. The chi square test for goodness of fit was used to test the hypothesis that the measurements were normally distributed. The results of this test demonstrated that the disparity between the actual and expected frequencies is too large to be ascribable to chance.

Observations on the Larval Stages of *Pharyngostomoides procyonis* Harkema, 1942 (Trematoda: Diplostomidae) *

Alva Howard Harris, *North Carolina State College of the University of North Carolina at Raleigh*

Eggs of *P. procyonis* were obtained from the feces of naturally infected raccoons. Miracidia begin to hatch normally in two weeks at room temperatures. Rate of hatching can be induced and controlled by periodic stimuli in the form of temperature and light changes. The miracidium contains 2 pairs of flame cells, 2 prominent eyespots, and 4 tiers of epidermal plates with a 6:8:4:3 pattern. The miracidia remain active enough to penetrate a planorbid snail for 2 hours after hatching.

Typical strigeoid cercariae begin to emerge 3 weeks after penetration of the snail. The cercariae remain active up to 24 hours after emergence and exhibit a nocturnal emergence pattern.

* Supported, in part, by a research grant (AI-05927-01) from the National Institutes of Health, U. S. Public Health Service.

An Improved Method for Determining Home Range

Michael J. Harvey and Roger W. Barbour,
University of Kentucky

Radioisotopic tagging techniques were used in determining home ranges of six *Microtus ochrogaster*. A .7 × 2.5 mm. piece of alloy wire containing approximately 55 microcuries of Co^{60} was inserted subcutaneously into each animal. A survey meter equipped with a scintillation probe mounted at the end of a 10-foot length of ½-inch conduit comprised the detection apparatus. A modified minimum area method of delineating home range was devised, using one-fourth of the range length as a standard to determine whether outside points in the range were to be connected direetly. This was compared to the minimum area method. Home ranges as determined by the new method varied from .05 to .18 (averaging .11) acres for five males. A single female had a range of .02 acres. These figures are on the order of 50 per cent of the range size determined by treating the data by the minimum area method. Overlapping of home ranges occurred. A marked shift in home range of one individual was observed.

Ability of *Myotis sodalis* to Home from Different Directions

Marion D. Hassell and Michael J. Harvey,
University of Kentucky

Myotis sodalis used in this study were taken from those in hibernation in Bat Cave, Carter Caves State Park, Carter County, Kentucky, on October 4, 1963. One hundred were banded and released in the cave as a control. Three groups of 500+ each were caged and transported directly to the release sites; each 200 air miles from Bat Cave. Five hundred bats were banded with red anodized bands and released near Ballville, Ohio, beside the Sandusky River; 500 near Morgantown, North Carolina, beside the Catawba River and 472 beside the Ohio River near Cloverport, Kentucky. All bats were banded and released individually between 11:00 p.m. E.S.T., October 4 and 2:00 a.m. E.S.T., October 5, 1963. After a period of three months 66.4% from Ohio, 26% from North Carolina, 13.6% from Kentucky, and 83% of the controls had been recovered in Bat Cave.

The Influence of the Interaction of IAA and Phenolic Acids on *Avena* Straight Growth

James H. M. Henderson and Reginald H. Walter,
Tuskegee Institute

The demonstration that in the presence of certain of the phenolic acids (chlorogenic, caffeic, coumaric, etc.) and IAA the growth of *Avena* sections is either accelerated or inhibited, raises the question of the role of these acids in auxin metabolism. Previously, it had been shown that these responses were due to influence on an auxin destruction system in the first internode sections. The question of whether an accelerating or inhibiting substance resulted from the metabolic reaction of the acid and IAA was raised (a complex or combination of the two). In these experiments attempts were made to make metabolically active complexes or combinations of IAA and the acids. The media were extracted and chromatographed and then tested biologically for activity. In no case was a new compound found chromatographically which differed from the original reactants. The results would indicate that the previous mechanism involving interference with the auxin destruction system is the operational one.

Observations on the Inductive Effect of Bone During Regeneration in Catfish *

Vernon Henderson, *Grambling, Louisiana*

In a series of experimental studies on regeneration in catfish, it was noted that there was some relationship between the amount of bone restored and the amputated stump. First, the fins of the catfish, *Ictalurus punctatus*, were amputated mid-distance between the base and apex. Fish were sacrificed at specific time intervals and longitudinal histological sections were prepared. Specimens were studied up through 12 weeks. Measurements of the bony elements of the segmented and nonsegmented rays were made. There was a direct relationship between the surface area of the stump and the regenerating bony elemcnts. No statistical tests were used because of the striking relationship. The observations suggested the presence of an inductor factor. This factor travels in a linear fashion and only induces ostogenesis in those cells which form strips adjacent to the cut surface of the stump. The factor which provides the information for osteogenesis can alter the basic architectural design of the regenerating elements of the system if errors of omission are committed through a naturally occurring mishap.

* This study was supported by the National Science Foundation grant number GB 616.

Excretion of Sodium and Chloride Ions via Gills and Skin in the Toadfish

W. N. Hess and John A. Freeman,
Winthrop College

Excretion of monovalent inorganic ions in marine fishes is generally considered to be almost exclusively through the gills with the kidneys playing a negligible role. Excretion of Na^{22} and Cl^{36} into chambers surrounding the anterior and posterior parts of the body of toadfish (*Opsanus tau*) has been studied using standard radiotracer technics and estimates of excretion via gills and skin have been made. There is great variation in the proportions of the ions excreted by the two pathways, with media of 47% of Cl^{36} and 11% of Na^{22} being excreted through the skin and the remainder through the gills. It appears that the skin is a significant route of excretion of these ions in this fish.

Studies on a New Trypanosome in the Rabbit, *Sylvilagus floridanus, in Virginia*

Rhodes B. Holliman, *Virginia Polytechnic Institute*

A new species of trypanosome resembling *Trypanosoma lewisi* has been found in approximately 20% of the wild rabbits (*Sylvilagus floridanus*) on the campus of

Virginia Polytechnic Institute. Blood smears collected from 150 *S. floridanus* and 7 *S. palustris* at Hog Island in coastal Virginia were negative for trypanosomes.

The parasite has a free flagellum 6 microns long and a cell length of 18 microns. Little variability was noted in measurements. The small kinetoplast is located 5 microns from the pointed posterior end. The nucleus is located in the anterior half of the cell. No other cellular inclusions were noted. Sections of heart, spleen, liver, brain, and skeletal muscle have not demonstrated leishman bodies or other intermediate forms. Attempts to infect domestic rabbits, rats and mice by direct blood inoculation from infected wild hosts has been unsuccessful.

Studies on Trematode Cercariae from Virginia

Rhodes B. Holliman, *Virginia Polytechnic Institute*
Frank J. Etges, *University of Cincinnati*

In a survey of mollusks for schistosomatoid cercariae, 14 other cercarial forms have been identified. Eight species of gastropods, encompassing 4924 individuals, have been isolated, examined and dissected for this study.

Cercariae studied include: two strigeids, one microcercous opecoelid, one cotylocercous opecoelid, one spirorchiid, one virgulate xiphidiocercaria, one cotylocercous xiphidiocercaria, three leptocercous xiphidiocercariae, one plagiorchioid, one echinostome, cercaria of *Notocotylus* sp., cercaria of *Zygocotyle* sp. (*lunata* ?). Adults of *Notocotylus* sp. were recovered from the large intestine of chicks and mice 9 days after feeding metacercarial cysts. Immature *Zygocotyle* sp. were recovered from the cecum of chicks 90 hours after feeding metacercarial cysts.

Two species of leptocercous xiphidiocercariae have been observed to penetrate larval insects; one into a damselfly naiad and the other into a dragonfly naiad. The point of penetration in both cases was through the membranes of proximal leg joints. Metacercarial cysts were recovered from thoracic muscles of the naiads.

Water-Soluble Cytochromes from the Blue-Green Alga, *Anacystis*

Raymond W. Holton, *University of Tennessee*

Extraction of lyophilized *Anacystis* cells with water removes a number of pigments including phycocyanin, pteridines, some chlorophyll, and several water-soluble cytochromes. Column chromatography on DEAE-cellulose permits separation of three cytochrome fractions. By further column chromatography, ammonium sulfate fractionation, and in one ease, electrophoresis on polyacrylamide gel, it has been possible to highly purify the two cytochromes present in highest concentrations. The cytochromes are all of the c- or f-type and are denoted by their reduced α-absorption bands. Cytochrome-554 greatly resembles in redox potential and spectral characteristics the cytochrome f previously isolated from higher plants and other algae. On the other hand, cytochrome-549 is present in significantly higher concentration and has several atypical properties for a c-type cytochrome. For example, its redox potential is -0.26 volts. The properties of these cytochromes will be discussed with reference to current schemes of electron transport in photosynthesis and the results of preliminary experiments with these cytochromes in cell-free enzyme systems will be presented.

Sources of Error in Genetic Analysis in Neurospora Tetrasperma

H. Branch Howe, Jr., *University of Georgia*

Tetrad analysis in *Neurospora tetrasperma* has revealed, with varying degrees of certainty, exceptional events which would, if undetected, bias genetic studies by manifesting crossing over when none had actually occurred. These events are nuclear loss, presumably owing to nuclear lethality; production of dwarf ascospores which are uninucleate instead of binucleate; and nuclear misarrangements during ascus development. Nuclear loss and dwarf ascospores are the two more frequent anomalies, occurring in about five per cent of asci and comprising about eight per cent of ascospores, respectively. Both may be excluded from experimental data by restricting analyses to ascospores whose derived mycelia show self-fertility. Nuclear misarrangements were found to be rare enough to be ignored in routine work but should be detectable in critical studies, if desired, by use of the mating type locus and additional centromere markers.

Experimental Hybridization in *Vernonia* (Compositae)

Samuel B. Jones, Jr., *University of Georgia*

Vernonia is one of the many genera of the Angiosperms in which traditional taxonomic methods have been unsatisfactory in delimiting species. The present study is part of a biosystematic evaluation of the taxa of the Sections Angustifoliae and Scaberrimae. The need for this approach was supported by field and herbarium observations which indicated the occurrence of hybridization and introgression. Crosses were made between all taxa and selected F_2 generations obtained. Appropriate backcrosses were also made. The resulting seed were germinated and most of the seedlings grown to maturity. Tests of pollen stainability were made and voucher specimens collected from the progeny for comparison with the parents. Data indicate that all taxa of this study are cross-fertile.

A Daily Rhythm in Prolactin Secretion or Release in Hamsters

George C. Kent, Jr., John G. Turnbull and Albert C. Kirby, *Louisiana State University*

Pituitary prolactin levels in adult female hamsters killed daily during the 4-day estrous cycle were consistently higher at 8:00 P.M. (40 glands) than at 8:00 A.M. (40 glands) in both January and August, and January levels were higher than August levels. Pituitary prolactin levels of males in January were higher at 4:00 P.M. (20 glands) than at 6:00 A.M. (20 glands) and higher at 8:00 P.M. (5 glands) than at 8:00 A.M. (5 glands). August glands were collected in 1962, January glands in 1963 and 1964. The crop sac proliferation method of assay was employed. It is clear that there is a daily rhythm in the secretion or release of pituitary prolactin in hamsters of both sexes. (Prolactin for standard solutions courtesy Endocrinology Study Section, N. I. H.)

Observations of Two Olpidiaceous Aquatic Phycomycetes Parasitic in Algae

William J. Koch, *University of North Carolina* *

Olpidium saccatum Sorokin, growing in a desmid, *Staurastrum*, is reported for the second time from the Americas. Its unusual method of forming resting spores (sporangia) and some features of motile cell activity are described. Also, a new species, representing an undescribed genus, is reported. It is a parasite of the gametangia of the filamentous desmid, *Hyalotheca*, and it does not grow in the vegetative cells or in the zygotes of the host. The zoosporangia and zoospores of this parasite

are similar to those of *Olpidium*, but its method of cytogamy (plasmogamy) is new to the Olpidiaceae. The contents of a small, walled thallus (male gametangium) pass through a short tube into a larger receptive thallus (female gametangium). In this species the entire receptive thallus then matures into a spiny-walled resting sporangium (spore), to which adheres the empty male gametangium. Method of cytogamy as a taxonomic criterion is discussed.

* This and related studies are supported by a grant from the National Science Foundation (GB-573).

Nucleic Acids in the Developing Slime Mold, *Dictyostelium discoideum*

Jerome O. Krivanek,

University of South Florida, Tampa; Biology Division, Oak Ridge National Laboratory

Quantitative determinations of RNA and DNA were made on several stages of the life cycle of the slime mold, *Dictyostelium discoideum*. The microcolorimetric technique of Ceriotti as modified by Keck was used to determine DNA. The technique of Ceriotti was used for RNA determinations. Analyses were made on the myxamoebae, migrating pseudoplasmodia ("slugs"), preculmination stage, and the mature sorocarp. There appear to be no definite differences in DNA content between the several stages of development. However, noticeable quantitative differences in RNA appear between the stages. There is about a four-fold increase in RNA as development progresses from the myxamoebae to the slug. From the latter stage to the mature sorocarp, there occurs a gradual decrement in RNA concentration so that the values of RNA are essentially the same for myxamoebae and mature sorocarps. It is suggested that the changes in RNA concentration may be correlated with synthetic activities occurring in the slime mold.

Effect of Ionizing Radiation on Cotton at Various Stages of Development

Ruble Langston, *Texas A & M University*

Cotton, in the dry seed, imbibed seed, germinated, and at various seedling stages were subjected to acute dosages of ionizing radiations from a cobalt-60 source. The morphological effects were recorded photographically illustrating the effects of varying dosages. Other pertinent data, including plant weight, height, leaf thickness, color will be discussed.

A New Genus of the Tremellales and Its Phylogenetic Significance

B. Lowy, *Louisiana State University*

Among the Heterobasidiomyeetidae, the Tremellales constitute a group of fungi characterized by great variation in basidial morphology while the Homobasidiomycetidae include fungi with aseptate basidia having a relatively stable morphology. The evolutionary line leading from the Tremellaceae to the Ceratobasidiaceae has been elucidated by Linder and others but the phylogenetic position of the Tulasnellaceae has remained somewhat enigmatic. The new genus, *Pseudotulasnella*, found by the author in Guatemala, because of its *partially septate basidia*, is considered to be clearly intermediate between the Tremellaceae and the Tulasnellaceae and provides additional evidence that evolution in this group has taken place in the direction of the loss of basidial septation. The only other genus of Tremellales known to have partially septate basidia is *Metabourdotia*, described from Tahiti. This genus is reinterpreted as belonging to the Tremellaceae and when so considered, provides a significant link between the sebacinoid basidium and the tulasnelloid, through *Pseudotulasnella*.

Some Physiological Aspects of Photoperiodic Responses in Nymphs of *Tetragoneuria cynosura* (Odonata)

Paul E. Lutz, *University of North Carolina at Greensboro*

Oxygen consumption determinations made on final instar nymphs taken directly from nature indicated a seasonal increase in metabolic rate. An abrupt increase in respiratory rate occurred prior to emergence. Similar results were obtained on nymphs maintained in the laboratory on photoperiods of 11 and 14 hours. The dramatic increase in metabolic rate was displaced temporally for nymphs subjected to the shorter photoperiod. The degree of displacement became less as emergence approached. Oxygen consumption determinations were made at various times during the last four instars of nymphs reared in the laboratory. For each instar the pattern of respiratory rate was one of a U-shaped curve. Immediate differences in rates of feeding, oxygen consumption, and weight changes were noted in animals subjected to photoperiods of 11 and 14 hours. The longer photoperiod promoted higher rates in all three measurements.

Influence of Molybdenum Nutrition on the Bacterial Blight Disease of Three Varieties of Cotton

George G. McBee, J. V. Amin, L. S. Bird and H. E. Joham, *Texas A & M University*

Three varieties of cotton (Austin, Empire and 101-102B) were grown in purified, complete nutrient solutions employing high and low substrate molybdenum. The levels of molybdenum were adjusted to 1.0 and <0.001 ppm. The cotton varieties were inoculated with three different races of *Xanthomonas malvacearum* (Races 1, 2 and Variant 4) and resistance measured. Empire is susceptible to all three races; Austin susceptible to Race 2 and Variant 4; and 101-102B resistant to all three races. Results of disease grading show that in two harvests out of three, a significant response in susceptibility as a result of different molybdenum levels was obtained at the 0.05 level. The plants were slightly more susceptible to the disease when grown under the higher level of molybdenum.

The possible relationships of carbohydrates and nitrogen fractions to disease resistance will be explored.

Effects of Ionizing Radiation and Other Environmental Stresses upon *Pinus elliottii*

J. Frank McCormick, *University of Georgia*

Seeds, seedlings, and one-year-old trees were exposed to gamma radiation ranging from 100 to 10,000 r. Germination, growth, survival, and physiological tolerances to environmental stresses usually varied inversely with the radiation dose received. Radiation doses of 300 r. and below were beneficial to plant growth and survival under certain environmental conditions. Radiation tolerances of seeds and seedlings were modified by applications of gibberellic acid. Concentrations of 150 mg./l. increased radiation tolerances of the plants.

Results of these studies indicate that ionizing radiation can be a useful analytical tool in ecological studies, and that the beneficial effects of irradiation may have useful applications in agriculture.

Attributes of *Chlorococcum* species: A Statistical Analysis

Robert F. McGuire and Walter Herndon,
University of Tennessee

From published data, seventy-three attributes of seventeen species of *Chlorococcum* (excluding *C. infusionum*) were compiled. The frequency for each attribute was calculated. The characteristics of highest frequency were used to describe a "typical" *Chlorococcum* species. Each characteristic was given the value of its frequency; tables and graphs were made and compared on a percentage of likeness basis. All of the species had a relatively high correlation when compared with the data for the calculated "typical" and a relatively low correlation when compared to *C. tetrasporum*. When the data for the "typical" species were compared to each of the species, three groups were evident. *C. tetrasporum* was in a group by itself suggesting that it might be properly placed in a separate sub-genus or another genus. The remaining species fell into two sub-groups, less sharply defined, separating *C. scabellum, C. oleofaciens* and *C. macrostigmaticum* from the others.

Time Required for the Loss of Kappa from *Paramecium aurelia*, Syngen 4, Stock 51.7, Grown in Non-Living Media

Virginia L. Martin and W. D. Burbanck,
Emory University

Cultures of *Paramecium aurelia*, Syngen 4, stock 51, mating type VII, were rendered bacteria-free by exposure to an antibiotic mixture of streptomycin and penicillin-G or by Parpart's washing technique. The length of time for losing kappa from washed or antibiotic-treated paramecia was tested on a predetermined schedule. Kappa was apparently lost or inactivated within 48 hours after subjecting the animals to antibiotics, since they did live on the axenic medium and since, by that time, the killing assay was negative. In washed animals the presence of kappa was not evident after 14-17 days culture in non-living media. While the killer animals did not survive when transferred *directly* from a bacteria-containing medium to an axenic medium of boiled lettuce, yeast autolysate, and dextrose, they did live after antibiotic treatment in the axenic medium. On the other hand, washed killers lived axenically only after several daily transfers through cultures of axenic medium containing autoclaved *Aerobacter*.

The Source of Photosynthates for the Developing Seed in *Prunus*

B. D. Mayberry and R. H. Dhillon,
Tuskegee Institute

An experiment was conducted for the purpose of determining whether the seed of the peach derived its photosynthates from the placenta (fruit), or directly from the leaves by way of the vascular tissue. Heavily fruited branches were selected, ringed and the foliage subjected to radioactive $C^{14}O_2$ for two hours during each stage of growth and development. Subsequently, the fruits were divided into the following groups. (1) Harvested after 24 hours, separated into ovule, endocarp and fleshy pericarp, then dried under heat lamps immediately. (2) Harvested after 24 hours, placed in an onion bag and left tied to the tree for seven days. Subsequently, this group was separated and dried as in the case of the first group. (3) Fruits left on ringed and defoliated branches for seven days, then harvested, separated and dried as above. The ovules, endocarps, and fleshy pericarps were assayed in each case to determine the extent of movement of radioactive photosynthates into the ovule under these diverse circumstances.

The following conclusions were made from the data obtained in this investigation. (1) Photosynthates, under normal conditions, move direct to the ovule by way of vascular tissue. (2) There was some evidence of movement to the ovule from harvested fruits, but the increase was not significant. (3) Significant quantities of the photosynthates move into the ovule during all stages of development.

Factors Affecting Mitotic Recovery in X-Irradiated Grasshopper Neuroblasts

Herman M. Meisner, *Emory University*

A study was initiated to determine the effects of tonicity and pH on mitotic recovery from X-radiation in rapidly dividing neuroblast cells of the grasshopper, *Chortophaga viridifasciata*. Hanging drop preparations of neuroblasts were cultured with or without egg yolk in media of different tonicity and pH, and exposed to 25 or 50 r. of X-rays. Addition of egg yolk to the culture medium at pH 7.0 enhanced the mitotic ratio of irradiated/non-irradiated neuroblasts, the effect becoming less pronouneed as tonicity was increased. The mitotic ratio of neuroblasts cultured at pH 7.0 without yolk was found to be markedly reduced by a 5-10% decrease in osmotic pressure. Lowering the pH to 6.3 completely abolished the effect of tonicity, resulting in a uniformly maximal recovery from radiation damage.

Succinoxidase Activity of Homogenates of *Dugesia dorotocephala*

William L. Mengebier, *Madison College*

Whole planarians, fed for twenty-four hours prior to each experiment, were homogenized and assayed for succinoxidase activity utilizing the Warburg method. Maximum succinoxidase QO_2 values were recorded at 25°C. and at a pH of 8.3. This pH value differs markedly from the optimum value of 7.2–7.4 quoted for vertebrate tissues. Animals placed in a medium above or below their normal pH rapidly restored their environment to a mean value of 8.0 ± 0.2. Optimum pH values for succinoxidase activity showed a transitory shift which lagged behind environmental changes by approximately twenty-four hours. Characteristic responses of succinoxidase activity were noted to increased homogenate concentration and to the addition of KCN and urethane.

A Photographic Study of the Absorption of A Cotton Defoliant

Charles S. Miller and Mohamed M. Aboul-Ela,
Texas A & M University

Preliminary indications are that time-lapse photography may be a suitable method for the study of the factors which influence penetration or absorption of different chemicals into the leaves. Indirect evidence of the mode of transport may also be obtained through a microscopic study of the resultant damage. In this study, a Deltapine 15 variety and a resistant selection (G-272) were used in an effort to determine the mechanism of resistance of the latter to S,S,S,-tributylphosphorotrithioate (DEF). The greenhouse-grown plants were transported to the laboratory and an attached leaf placed on a microscope stage for the subsequent observations of the drying of individual droplets of the spray solution as well as the disappearance of the chemical.

An unusual stomatal action was observed while photographing the drying of a droplet.

Report on a New Strigeoid Trematode from the Red-Shouldered Hawk *

GROVER C. MILLER, *North Carolina State College of the University of North Carolina at Raleigh*

The recent examination of a red-shouldered hawk, *Buteo lineatus,* has resulted in the recovery of several hundred specimens of an apparently new strigeoid trematode parasite. The typical body morphology and the characteristic holdfast organ identifies this helminth as a member of the family Strigeidae, subfamily Strigeinae, and probably of the genus *Parastrigea.* The most closely related species appear to be *Parastrigea campanula* Dubois and Rausch, 1950 and *Parastrigea ogchnocephala* Dubois and Rausch, 1950. Preliminary observations on the life history included the hatching of eggs and exposure of five species of snails to the miracidia.

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The Southern Mixed Hardwood Forest of Northcentral Florida

CARL D. MONK, *Botany Department, University of Florida*

The southern mixed hardwood forest of Northcentral Florida exhibits considerable floristic diversity. Within an eight-county area more than 70 tree species contribute to its physiognomic structure. Much of the compositional variation is expressed in three major ways. The number of tree species comprising a given stand may range from 8 to 35 while the deciduous-evergreen nature of the community may range from 7 to 100 per cent. Superimposed on these and partially related is the level of importance of each species. Environmental factors which are associated with the observed changes in vegetational composition are related to edaphic factors, particularly certain physical and chemical soil properties and to geographic location.

Implication of the IAA-Oxidase System of Cotton in Manganese Toxicity

PAGE W. MORGAN, HOWARD E. JOHAM AND J. V. AMIN, *Texas A & M University*

Cotton plants grown 126 days with toxic levels of nutrient manganese are stunted. They lose apical dominance and yield extracts with abnormally high IAA-oxidase activity (Morgan *et al,.* Plant Physiol. suppl. 38: xvii). These plants, in contrast to controls, destroyed IAA without added $MnCl_2$ and had as much activity in young as in old leaves. In subsequent seedling studies, stimulation of IAA-oxidase activity was associated with the early stages of manganese toxicity. The degree of stimulation and severity of visible symptoms were directly correlated. More recently, IAA-oxidase activity was found to increase in apical leaves before response to toxic levels of nutrient manganese was visible. Later, toxic symptoms appeared and the stimulation of IAA-oxidase activity over controls increased. Since the symptoms of manganese toxicity indicate altered auxin metabolism, the enzymatic findings suggest both a mechanism for manganese toxicity and evidence for the existence of a functional IAA-oxidase system in cotton.

Effects of Growth-Promoting Substances on Isolated Stem Sections *

RALPH M. MORRISON, *University of North Carolina at Greensboro*

A bio-assay was performed using isolated stem sections from the uppermost nodes of *Helianthus annuus, Nicotiana tabacum* and *Zinnia elegans.* These stem sections were cultured on various combinations of kinetin, indole-3-acetic acid and coconut milk. Calluses of various sizes, weights and consistencies were obtained from all three taxa with kinetin in combination with one or both of the other substances. Adventitious roots appeared on the *H. annuus* sections cultured on nearly all combinations of the three substances tested. *Nicotiana tabacum* produced leaves and stems on kinetin combined with coconut milk. While *Z. elegans* produced roots on the kinetin, indole-3-acetic acid, coconut milk combination. The implications of these results in terms of plant growth and differentiation will be discussed.

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The Interpretation of Crossing Diagrams

DAVID L. MULCAHY, *University of Georgia*

Interspecific crosses and their graphic representation in crossing diagrams represent a valuable means of determining taxonomic affinities. The interpretation of such data may be biased by several factors, such as differences in breeding systems and selection pressure, a knowledge of which will allow accurate estimations of their significance.

Chromosome Duplication as a Factor in the Evolution of Maize

WILLIAM H. MURDY, *Emory University*
JOHN R. LAUGHNAN, *University of Illinois*

Suggestive evidence that the 10 chromosomes of maize include duplicate sectors derives from the following facts: many known cases of duplicate factor genes, non-homologous synapsis in monosomics, and disproportionate distribution of mutant gene loci. Cytological confirmation of duplicate sectors would strengthen the hypothesis of an ancient, amphidiploid origin for maize. It is notable in this regard that *Coix aquatica* of the *Maydeae* has 5 chromosomes and in the closely related Andropogoneae the base chromosome number is 5.

Work is in progress to identify duplicate sectors by analyzing translocations which occur among the progeny of hypoploids as a result of crossing-over in "illegitimately" paired regions. Hypoploids for various chromosome sectors differ both in the yield of interchanged progeny and in the way plant development is affected by the lack of a specific chromosome segment. Observed, non-random involvement of interchanged chromosomes is providing data necessary to locate specific duplications.

The Effect of Drugs and Hormones on Growth and Mitosis, Using Root Tips of the Horsebean, *Vicia faba*

MARION R. MYLES,
Grambling College, Grambling, Louisiana

The writer has been investigating the possibility of using the root tip of *Vicia faba* as a simple system for drug testing, and especially as a system for aiding in the interpretation of the reaction of cancer drugs. Among the drugs of special interest are 6-mercaptopurine, 6-azouracil, and 5-iodouracil. The data represent the effect of these drugs on the respective phases of mitosis and on the mitotic index of *Vicia faba* when plants with roots 6-8 centimeters in length are treated with drug concentrations 6.3 ppm, 12.5 ppm, 25 ppm, and 50 ppm while suspended in specially devised plastic holders over

1000-ml. beakers of solution. With controls for comparison, time intervals involved were: 0 hour, 8 hours, 16 hours, 24 hours, 36 hours, and 48 hours. Generally speaking, 6-mercaptopurine appeared to stimulate mitosis, as noted at all concentrations; and there was a relationship between the stimulatory effect and total average increase in root elongation.

The Use of Excised Roots for Studies of Mechanisms of Herbicidal Action

L. C. Standifer, J. B. Baker, W. C. Normand, and H. S. Webert, *Louisiana State University*

The mechanism of action of herbicides of the acylanilide group has been studied by comparison of the effects of the herbicides and a series of their analogs on excised corn roots grown on White's medium. Preliminary work with the herbicide *trifluralin* (α,α,α-trifluoro-2,6-dinitro-N,N-dipropyl-*p*-toluidine) points to the possibility that this chemical retards the differentiation of vascular tissue in cotton and morning glory (*Ipomoea* spp.). Possible auxin-kinetin interactions are being studied.

Advantages and disadvantages of the use of excised roots for such a study are discussed.

Effect of Gibberellic Acid and Malformin on Elongation and Geotropically Induced Curvature of *Avena* Coleoptiles

W. E. Norris, Jr. and Beatrice Brotzman, *Southwest Texas State College*

Employing the floating section technique and the second five-millimeter segment of the deleafed oat coleoptile (measuring from the apex) elongation was determined after twenty-four hours. As compared to control values obtained in distilled water, gibberellic acid at a concentration of 0.1 ppm significantly stimulated section elongation. Concentrations of gibberellic acid above 1 ppm were not much more effective than the weaker concentrations. Values were determined for indole-acetic-acid (IAA) at a control concentration of 0.1 mg./liter. Maintaining the concentration of IAA constant, a series of concentrations of gibberellic acid were tried without effect. Thus no synergistic effect as a result of interaction of IAA and gibberellic acid was apparent, even though each stimulated elongation independently. These results indicate that gibberellic acid can replace IAA as a growth stimulator up to a point, at least under the experimental conditions employed.

Gibberellic acid at a concentration of 1 ppm significantly increased the amount of geotropically induced curvature resulting after stimulation for a 90-minute period. Malformin appears to be inhibitory to both elongation and geotropically induced curvature.

Differences in Composition between *Protosiphon botryoides* Cells Grown in Ca and Cells Grown in a Sr-Replacement Medium

J. C. O'Kelley and T. E. Denton, *University of Alabama*

Ash and other analyses have been made of *Protosiphon botryoides* Klebs, cells and compositional differences occur between cells grown in Ca and cells in a Sr-replacement. Total uronic acid content of the cells in Ca is more than double that of the Sr-replacement cells. In contrast, iron content of Sr-replacement cells is approximately 50% higher than that of Ca-cells. Differences in quantities of other cell constituents so far determined are of lower magnitude. (This study is supported in part by grant AMO-03680-04 by the National Institute of Arthritis and Metabolic Diseases.)

Research in Plant Transpiration

James E. Pallas, Jr., *Southern Piedmont Conservation Field Station, Watkinsville, Georgia*

An understanding of the transpiration of land plants from the micrometeorological to the molecular level may eventually lead to transpiration control. Toward this end, an approach already involving several years experimentation has resolved itself into three distinct areas: (1) effects of environment, (2) certain chemicals on transpiration, and (3) understanding the mechanism of guard cell action. Examples of controlled environment, cellular, and antitranspirant studies will be described and discussed.

An Approach to the Study of the Physiology of Senescence and Parasitism in Sugar Cane

A. J. Pappelis and R. A. Katsanos, *Southern Illinois University*

The common method of expressing physiological data is as a per cent of dry weight. In greenhouse-grown sugar cane, the 15 internodes above the uppermost shoot roots were removed for study. Internodal ground parenchyma and vascular tissue was removed using a 1.2-cm. diameter cork borer. Fresh and dry weights of these internodal cores (about 5 cm. in length) were expressed on a volume basis. Fresh weights per cc. of tissue generally were about 0.90 g. and in a few cases were as low as 0.65 g. Dry matter content, calculated as mg. per cc. of internode tissue in variety C.P. 52-68 decreased slowly from about 172 mg. in the lower internode to about 57 mg. in the upper internode. In variety Co. 290, the dry matter content decreased slowly from about 112 mg. per cc. of tissue in the lower internode to about 54 mg. in the upper internode. The amount and distribution of dead cells in the stalk tissue were rated using a pith condition rating system employed in corn and sorghum studies. Death of internodal parenchyma was not related to dry matter content but it appeared to be well related to changes in fresh weight per cc. of tissue. Although dead cells in leaf tissue, especially in midribs, were noted, no system of rating was applied to these observations. Expression of data in the study of senescence and parasitism in sugar-cane stalk tissue should be done on a volume rather than dry-weight basis.

The Culture of Stamen Hairs of *Tradescantia paludosa*

L. Gerald Parchman, *Emory University*

The living stamen hair cells of *T. paludosa* were studied in hanging-drop culture and attempts were made to keep the cells in a mitotic condition by the addition of growth hormones, vitamins, amino acids, and nucleosides to White's culture medium. The hair cells would not survive if separated from the stamen, but lived for several weeks if left attached to the excised stamen. The microscopical light source had to be filtered through a 5% $CuSO_4$ solution in order to remove infra-red radiation, which inhibited the earlier prophase stages. Only those cells which were at least in very early prophase at the time of excision were able to continue the mitotic process, and no *de novo* divisions occurred. Instead, the stamen hairs tended to "differentiate" like epidermal cells. Results of studies on wounding the young buds *in situ* indicated that the changes that took place at the wound surface, especially the exudation of a mucilagi-

nous fluid containing calcium oxalate crystals, may have interfered with the uptake and translocation of the nutrients by the stamen.

Recovery of Hardwood Forest Stands from Short Term Exposures of Ionizing Radiation

J. T. McGinnis and R. B. Platt, *Emory University*

Eighty per cent of the radiation released into the hardwood forest stands surrounding the reactor at Air Force Plant 67 near Dawsonville, Georgia occurred at two ecologically significant times of the year, one in June, 1959, and the other in August, 1960. The mixed gamma-neutron exposures to experimental forest stands for each of these irradiations ranged from 12,000-15,000 rads at 500 feet to background levels at about 2,000 feet from the reactor. This paper is concerned with recovery of stands receiving sufficient radiation to kill or severely damage all of the above-ground woody parts. Some conclusions are that (1) ionizing radiation must be considered as an ecological stress; (2) ecosystems begin recovery immediately following the termination of this stress; (3) these effects vary according to conditions, but in general the ecosystem is set back to an earlier stage of development, from which recovery begins; and (4) those underground seeds, perennating plant organs, and microorganisms which survive because of soil shielding have a particularly important role in recovery.

Color Complexes Formed by Indole Type Auxin

Robert D. Powell, *Texas A & M University*

The Salkowski test for indoles has been used as a qualitative and quantitative assay of indoleacetic acid (IAA) and related growth regulators. This method involves the formation of an iron complex with IAA in a strong mineral acid. Other metals will also form colored addition-complexes. A second type of test for indole compounds including IAA involves the condensation of an aldehyde with the indole ring. The Ehrlich test uses *p*-dimethylaminobenzaldehyde. This compound as well as several other aldehydes gives color tests that can be used to assay for IAA. The spectral characteristics of both metallic and aldehyde addition complexes with IAA and related growth substances will be discussed.

The *Cassia fasciculata* Complex (Leguminosae) in the United States

Thomas M. Pullen, *University of Mississippi*

A study was made of the 14 species of section Fasciculatae *sensu* Britton and Rose as well as *C. ferrisiae* and *C. deeringiana*. Investigation was based on field work, mass collections, greenhouse and field plot studies, cytology, anatomy, and observation of over 3,000 borrowed herbarium specimens. Morphological characters were evaluated by use of 43 measurements, scores, and ratios. Greenhouse and field plot studies revealed no significant environmental effect on expression of characters with the exception of branching habit. Chromosome counts were made for 11 of the taxa, seven of which were first reports. All counts were: $n = 8$. In the systematic treatment valid species and varieties were designated after critical study of type specimens and data accruing from the study. Five species are recognized within the *C. fasciculata* complex. These are: *C. deeringiana*, *C. fasciculata*, *C. leptadenia*, *C. aspera*, and *C. nictitans*. Eight varieties are recognized within the species of *C. fasciculata* and three varieties within *C. nictitans*. One new varietal combination was made and four former taxa were reduced to synonymy.

The Source of Precursors of Carotenes in Colored Grapefruit. I. Fixation of Carbon Dioxide

Albert E. Purcell,
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Red grapefruit originated by mutation of white grapefruit. The genetic difference is carried by the budwood but the altered chemistry which results in lycopene accumulation appears to be only in the fruit. By use of $C^{14}O_2$ it has been established that red grapefruit can synthesize lycopene from CO_2 both in the light and in the dark. It appears that green grapefruit fix more carbon by photosynthesis than is translocated into the fruit from the tree. In the dark, diffusion of CO_2 through the peel and fixation by the carpels is about as fast as translocation of CO_2 photosynthetically fixed in the peel.

A New Method for the Initial Application of a Sample to Paper in Running Paper Partition Chromatograms

Harvey L. Ragsdale, Russell G. Rhodes and Gordon E. Hunt, *The University of Tennessee*

A new method has been developed for the application of a sample to the paper for separation by conventional methods of paper partition chromatography. The method consists of punching a circular hole in the Whatman No. 1 chromatograph paper in the appropriate beginning position. The punch out is replaced with similar sized Whatman No. 1 3-mm. disk to which the sample has already been applied and dried. For $22'' \times 18''$ papers the punch diameter is $\frac{1}{4}''$ and for $7''$ square papers, 2 mm. The disk with the sample may be fixed in position by pressing with a spatula or spoon between two layers of clean waxed paper; with careful treatment they rarely drop out. Specially designed apparatus simplifies the preparation and handling of both sample and standard disks.

The advantage of the method is: one, in decreasing the time required to prepare sheets for chromatography and, two, in confining the original area of the spots thereby increasing the final resolution of the mixture separation.

The Status and Distribution of *Cimicifuga rubifolia* Kearney

Gwynn W. Ramsey, *The University of Tennessee*

Recent investigations show that *Cimicifuga cordifolia* Pursh and *Cimicifuga racemosa* (L.) Nutt. var. *cordifolia* (Pursh) Gray have not been well understood. They have been confused with *C. rubifolia*. *C. cordifolia* Pursh appears to be a biotype of *C. americana* Michx. and *C. rubifolia* is a good species. The distribution of *C. rubifolia* has been extended beyond its previously published range.

The Evolutionary Significance of Ovule Structure in Diapensiaeeae

John D. Reynolds, *University of South Carolina*

Studies of ovule development in three members of the Diapensiaceae have revealed certain departures from the normal developmental pattern. *Pyxidanthera barbulata* Michx., *P. brevifolia* Wells, and *Galax aphylla* L. were occasionally found to contain more than one archesporial cell. In *G. aphylla* an ovule composed of two distinct nucelli surrounded by a single integument was noted. Enlarged one- and two-nucleate nucellar cells, apparently beginning to form adventitious embryo sacs, were found lateral to the two-nucelate embryo sac in *P. brevi-*

folia. Three instances of a two-nucleate embryo sac derived from an integumentary cell located at the chalazal end of the ovule were also noted in *P. brevifolia*. In no case, however, did adventitious embryo sac development progress beyond the two-nucleate stage. Each was found only in conjunction with a two-nucleate embryo sac derived from one of the megaspores. These observations support the postulate that the ovule is a synangium which could have evolved in the following manner: Two or more naked sporangia of a fertile telome fuse; the integuments are formed by the partial sterilization of the outer spore-forming cells of the fused sporangia. In the case of the fusion of more than two sporangia, the integuments are formed by the partial sterilization of the whole of the lateral sporangia.

A Comparative Study of the Nodal Anatomy of *Ulmus americana* and *U. pumila*

F. C. Richardson and Lafayette Frederick,
Atlanta University

Current season twigs of *Ulmus americana* and *U. pumila*, at various developmental stages, have been collected and a critical comparative study of the nodal structure has been made. Collected materials prepared for histological observations have revealed basic similarities as well as basic differences in tissue organization and cellular differentiation in the nodal regions of the two species. The number of leaf traces supplying each leaf are similar for each species. Similarities also occur in the location of leaf trace insertion in the stele and in the general anatomical organization of the petiole. Differences between the two species have been noted in the level of insertion of leaf traces into the stele; the number and alignment of tracheary elements in the leaf traces; wall sculpturing of vessel members of tracheary elements; and the amount and distribution of the parenchyma associated with tracheary elements in the leaf traces. Differences have also been noted in petiolar organization of the vascular tissues of the species. The proportion of tracheary elements to associated parenchyma is less in *U. americana* than in *U. pumila*. Evidence from these studies suggest that *U. pumila* is somewhat more specialized in anatomical structure than *U. americana*.

Some Interesting Plants from the South African Karroo

Herbert P. Riley, *University of Kentucky*

The Karroo is an arid region with an average rainfall of less than 12 inches. It is characterized by open vegetation with no trees and only small shrubs with large areas of bare soil between them. The Upper Karroo consists of a plateau surface over 4,000 feet above sea level and is found to the north of the Great Escarpment. The Great Karroo lies to the south and west and is a basin between the Escarpment and the Cape Folded Belt and the Little Karroo occupies the lowland within the southern folded belt. The Upper Karroo consists of arid bush vegetation while succulent bush occupies the Great and Little Karroo. The flora is rich and varied with interesting environmental modifications for water storage and concealment. Various genera are described and illustrated.

Plasmasol-Plasmagel Conversion in the Hyaline Cap of *Chaos chaos*

Robert A. Rinaldi, *University of Tennessee*

The formation of the plasmagel sheet during amoeboid motion has been postulated by S. O. Mast to control the forward movement of granular plasmasol. Recently, existence of the plasmagel sheet has been questioned. However, analyses of time-exposure photographs, which graph motion of individual granules (illuminated by darkfield microscopy) in a manner similar to the astronomer's graphing of movement of the stars, reveal a pattern of granular flow into the pseudopodial tip which demands the presence of the plasmagel sheet. Further, cinemas record that the plasmagel sheet forms directly under the cell membrane in the non-granular (hyaline) plasmasol, and that this plasmagel sheet helps control the granular plasmasol's movement. These positive demonstrations of plasmagel sheet formation in the hyaline fluid confirm the basic predictions by L. H. Hyman (1917) and S. O. Mast (1926) that plasmasol-plasmagel conversions are basic mechanisms of protoplasmic motion.

"Flow-Charts" of Amoeboid Movement

R. A. Rinaldi,* Iris Snider,† and
Margaret Dozier,† *University of Tennessee*

A technique of "Flow-Charts" was devised to aid in understanding the mechanism of amoeboid motion. "Flow-Charts" are made by using darkfield motion pictures of moving amoebae and printing single frames in sequence, and tracing the movement of granules from frame to frame. A "Flow-Chart" contains paths of granules traced within outlines of the extending pseudopod, the distance traveled by each of the granules, and the frames on which the granules first and last appeared. Since they give the viewer a way of seeing how the granules move relative to each other and to the plasmagel, "Flow-Charts" are useful in determining some of the mechanics of flow in amoeboid motion.

* Supported in part by the Tennessee Heart Association Inc.

† N.S.F. Summer Undergraduate Research Participants.

Studies on the Origin and Potentiality of Lateral Root Meristems

James L. Riopel, *University of Virginia*

Lateral roots arising from the large adventitious roots of banana may exhibit a long or short root expression. Normally, laterals are 4-6 cm. in length. When the parent root apex is removed, damaged, or its growth suppressed by mechanical restrictions, laterals of an indeterminate length are formed. Present evidence indicates that the short or long type is determined before the laterals emerge from the parent root. It is proposed that lateral determination may result from specific morphogenetic differences in the two types of lateral meristems or that nutritional deficiencies limit the growth of the short root laterals. Studies in progress concerning this problem are reported.

Factors which determine the location for the origin of lateral roots from the pericycle are also imperfectly known. Studies of the distribution of laterals in banana suggest that laterals arise in a dispersed pattern and that previously formed primordia may in some way influence the location for the initiation of new primordia.

The Effect of Methylene Blue on the Respiration of Small Whole Fishes

Martin Roeder and Rachel H. Roeder,
University of North Carolina at Greensboro

The log-log relationship between weight and oxygen consumption has been determined by *Xiphophorus helleri*, the swordtail. Standard treatment for fish diseases, and treatments of various tissues indicates that the respiratory rate is increased in the presence of methylene

blue. Whole fishes have been subjected to various concentrations of the drug, and their respiration has been measured. The data will be discussed in the light of the reports in the literature.

A Preliminary Report on the Biosystematics of Three Species of *Cuscuta*

J. Lee Rogers, *University of North Carolina*

Among the Cuscutas of the southeastern United States are three representatives of a single subsection of the genus. *Cuscuta harperi*, which is endemic to northwestern Alabama, is rather distinct; but the two more common species, *C. pentagona* and *C. campestris*, both occurring throughout the U.S., present some difficulty in determination. The characters classically used to distinguish between the two are flower size, shape of the calyx, and shape of the corolla lobes. A biosystematic study indicates that morphological differences are somewhat ambiguous, and forms intermediate with regard to these characters have been found. Preliminary cytological investigations suggest the three species may form a polyploid series. Chromatographic profiles permit differentiation of the species, and an apparent correlation between number of phenolic compounds and polyploid level may be indicated.

Self-Incompatibility among Easter Lilies

Yoneo Sagawa, *University of Florida*

Although the self-incompatibility of diploid Easter lily clones have been known for a long time, little has been done to establish its nature. This paper deals with the characterization of its nature and attempts to overcome it. Observations of the time of expression of the incompatibility reaction and pollen cytology indicate that this is of the gametophytic type. The reaction is expressed after the pollen tubes attain a length of 3 to 3.5 cm. The generative nucleus, however, divides to produce 2 sperms. These sperms are functional since viable seeds result when pollen is placed on styles shortened to approximately 2 to 4 cm. Bud pollination was not successful in incompatible clones.

Identity of the Biologically Active Breakdown Products of Indolepyruvic Acid

Emanuel Scarbrough and J. H. M. Henderson, *Department of Biology and The Carver Research Foundation, Tuskegee Institute*

The main objective of this investigation was to determine if any of the breakdown products of indolepyruvic acid (IPyA) had biological activity. Chromatograms of IPyA were developed in isopropanol-ammonia-water (10:0.1:19.9) on strips of Watman No. 1 chromatographic paper. After development each chromatogram was split into two equal parts. One part of each chromatogram was sprayed with Ehrlich reagent to locate the breakdown products, whereas the other part was used for testing the biological activity. A pattern of six spots was obtained from the chromatograms. One spot is indole-3-acetic acid (IAA), another is thought to be indole-aldehyde (IAld), and another is thought to be indoleglycollic acid (IGA).

To test the biologieal activity of the chromatograms, the *Avena* first internode test and the *Avena* coleoptile test were employed. Two spots showed biological activity. One of these is certainly IAA. The other remains in doubt and may be indoleglycollic acid. There seems to be no active spot where the IAld is thought to be, and indeed this eompound would be inactive in these tests.

Environmental Radioactivity in Molluscs

Claire L. Schelske, William D. C. Smith, and Jo-Ann Lewis, *Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, N. C.*

In three species of molluscs, Ce^{144}, Ru^{106}, Zn^{95}, Mn^{54}, Cs^{137}, Zr^{95}-Nb^{95}, and K^{40} have been detected during a survey of the radioactivity existing at the present time in the estuarine environment. These molluscs were hard clams, *Mercenaria mercenaria;* oysters, *Crassostrea virginica;* and bay scallops, *Aequipecten irradians.* The gamma radioactivity was determined with a low background detecting system consisting of a large shield, a 4×4-inch NaI(Tl) crystal, and a 512-channel analyzer. In clams and oysters most of the activity was due to Ce^{144}, Ru^{106}, Zn^{65}, and K^{40}. Scallops contained at least ten times more activity than clams or oysters, this being primarily Mn^{54}. Results of experiments have shown that these three molluscs accumulate similar amounts of Mn^{54} from sea water in the laboratory; therefore, to explain the differences in the distribution of this isotope among naturally occurring populations poses an interesting ecological problem.

Tritiated Uridine Incorporation in Grasshopper Neuroblasts *

Stefan O. Schiff, *University of Tennessee*

Embryos of the grasshopper *Chortophaga viridifasciata* (DeGeer) were incubated in Shaw's medium containing tritiated uridine (H^3U). Embryos were fixed and sectioned, and autoradiograms were prepared. Neuroblasts which had been mapped and observed *in vitro*, as well as neuroblasts for which mitotic stage was determined after fixation, were identified in autoradiograms. Grain counts over these cells showed that (1) nuclei were labeled from late telophase until late prophase; (2) nucleoli were labeled from at least late telophase until middle prophase; (3) maximum labeling occurred during interphase and very early prophase. Deoxyribonuclease digestion had no demonstrable effect on grain numbers. Autoradiograms of hypertonic preparations had fewer grains than those of isotonic or hypotonic preparations. These results are interpreted as evidence that ribonucleic acid synthesis extends from late telophase until early middle prophase, and that rate of uptake of H^3U is partly dependent on the tonicity of the incubating medium.

* This investigation was supported in part by Training Grant 5T1GM-730-03 from the Division of General Medical Sciences, Public Health Service.

The Effect of 2-Chloro-4,6-Bis (Ethylamino)-S-Triazine (Simazine) on the Ribonucleic Acid and Protein Content of Oat Seedlings

R. P. Singh and S. H. West, *University of Florida*

Oat seeds were placed in sand, and nutrient solution containing 2-Chloro-4,6-Bis (Ethylamino)-S-Triazine (Simazine) was applied. The seedlings were grown under controlled conditions in a growth chamber. Four samples were collected at two-day intervals starting six days after planting. These samples were analyzed for total RNA, nucleotide composition of RNA and protein eontent. The results showed an increase in the protein and total RNA content at 2 lbs. per acre rate of Simazine, in the six- and eight-day samples. In the ten- and twelve-day samples RNA and protein content was decreased. The 0.5 lb. per acre rate of Simazine resulted in a decrease in

RNA and protein content in all four samples. The higher rate of Simazine caused an increase in CMP and GMP nucleotides in the beginning but these nucleotides decreased in later samplings. AMP and UMP were decreased in all samples by the higher rate of Simazine. The low rate of Simazine resulted in a decrease in all the four nucleotides in all samples.

Effects of Sex and Ambient Temperature on the Endogenous Diel Body Temperature Cycle of *Peromyscus polionotus*

Michael H. Smith and Wayne E. Criss,
University of Florida

Temperature relationships of *Peromyscus polionotus* were studied in the field and in the laboratory. The temperature of the air in the nest cavity is positively correlated with the temperature of the surrounding soil. Animals regulate their body temperature at 12° and 24°C. but show significant variation in mean body temperature between individual animals and between sexes. A significant diel body temperature cycle with a mean maximum value of 38.3°C. occurring at 0400 and a mean minimum value of 36.2°C. occurring at 1600 is characteristic of *P. polionotus*.

Sound Communication in Phaneropterine Katydids

John D. Spooner, *University of Florida*

Recent investigations have revealed that the loud sounds produced by crickets and katydids are used in elaborate intraspecific communications systems. Sound production in the subfamily Phaneropterinae (Orthoptera, Tettigoniidae) has heretofore been uninvestigated, and present research reveals some of the most complicated systems of sound communication among invertebrates occurs in this group. Sound functions in male spacing, attraction of males to females, attraction of females to males, female orientation toward males, male orientation toward females, stimulation of other males and females to produce sound.

Observations in the Ecology of a Granite Outcrop Isopod, *Lirceus fontinalis* Raf., with Emphasis on Ionizing Radiation Effects

Clarence Styron, Jr., *Emory University*

Lirceus fontinalis Rafinesque, an aquatic isopod, occurs in the weather pools of a granite outcrop near Atlanta and in the intermittent creek draining the outcrop. Animals living in the outcrop weather pools are exposed to extreme physical conditions, while those living in the creek have a more buffered habitat since it flows through an open pine and hardwood stand which has a good accumulation of soil above the granite. This initial work on animal ecology of the granite outcrops near Atlanta involves an investigation of the biological interactions between the isopods and various environmental stresses including ionizing radiation and of their behavior patterns, and based on these an attempt to determine the factors or combinations of factors which control the size, survival, and movements of the populations.

Effects of Manganese Nutrition on the IAA-Oxidase System of Cotton

D. M. Taylor, P. W. Morgan, J. V. Amin, and H. E. Joham, *Texas A&M University*

Cotton plants were grown in water culture with 0.000, 0.005, 0.05, 5.0, and 50.0 ppm of manganese. The 0.000-ppm plants developed severe deficiency symptoms including shortened internodes, loss of apical dominance and chlorosis outlining the leaf veins. Later, leaves abscissed and meristem died. Deficiency symptoms developed in the 0.005-ppm plants after flower initiation. Toxic levels of manganese produced severe stunting and loss of apical dominance (50.0 ppm) or necrotic spots on primary leaves (5.0 ppm).

The above symptoms suggested auxin deficiency in both toxic and deficient levels of manganese. A study of the IAA-oxidase system in leaf extracts yielded the following results: (1) Both deficient and toxic plants exhibited a much greater IAA-oxidizing capacity than did other treatments. (2) the 5-ppm plants destroyed IAA without the addition of $MnCl_2$ to the assay medium. (3) The 0.000-ppm plants destroyed IAA without the addition of 2,4-dichlorophenol but $MnCl_2$ was necessary.

Histidine Effects on Radiation Recovery in *Tradescantia paludosa*

M. Kenneth Taylor, *Emory University*

Tradescantia inflorescences which were treated in a histidine solution prior to irradiation yielded chromosomal aberration frequencies that were significantly lower than the frequencies of the untreated controls. Experiments in which the inflorescences were treated with histidine following irradiation yielded the same aberration frequencies as the pretreated inflorescences, indicating that the action of histidine is a recovery phenomenon. Investigation, as to the nature of the histidine effect, using: various concentrations of histidine, varying times and methods of treatment, degradation products, and related chemicals is presented. Based on the belief that an increase in available energy results in recovery from radiation damage, and on these data, an attempt is made to show that a biological inhibitory feedback mechanism might be involved in increasing the available energy in the case of histidine.

Interspecific Competition Cage Experiments with *Drosophila*

Sylvia S. Talmadge and John M. Carpenter,
University of Kentucky

In eight laboratory populations of mixed species of *Drosophila, Drosophila melanogaster* was successful in eliminating *Drosophila pseudoobscura* from population cages at temperatures of 23°C. and 16°C. At the latter temperature, elimination took twice as long. It is suggested that this was due to a lower rate of egg production and longer life cycle for both species at the colder temperature. Fecundity experiments showed the rate of egg production at 23°C. to be nearly twice that at 16°C. *D. pseudoobscura* were completely eliminated at 23° at the end of two months. No adults were recovered from egg samples taken during that time. *D. melanogaster* was also successful in eliminating *D. robusta* and *D. hydei* from population cages. *D. hydei* was more successful in competing with *D. melanogaster* than the other species.

A Method of Irradiating *Hymenolepis microstoma*, the Bile Duct Tapeworm of Mice, *in vitro*, with Subsequent Survival and Growth

Bian Djoen Tan, *The University of Tennessee*

Seven-day-old worms collected from mice previously infected with tapeworm cysts were exposed to X-radiation of 7,500, 5,000 and 2,500 roentgens. These worms were then transplanted to other mice by opening the abdomen of the mouse and injecting the worms into the duodenum through its wall by means of a 20-ga. hypodermic needle—five worms per mouse. After varying intervals of time, e.g., 2, 4, 6, 8 and 32 days, mice were sacrificed and worms collected for study. The survival rate of the host animal was very high (90% of 177 mice). The lack of 100% survival can be explained by the poor condition of one group of animals on arrival from the supplier. Without this group we had 100% survival (of 112 mice). The number of irradiated worms recovered averaged 3.82 per mouse or 76.4 per cent. The level of irradiation used in this study did not seem to affect infection rate. This method could possibly be useful with other organisms. Several trials with *Hymenolepis diminuta* were successful.

Changes in Animal Populations Related to Population Density

James T. Tanner, *University of Tennessee and Oak Ridge National Laboratory*

It is often assumed that the rate of change of an animal population must be a function of the density of that population to explain the regulation of population sizes. This assumption has never been adequately tested. Data were obtained from over 100 populations, representing over 60 species, that had been censused regularly for a number of years or generations. For each population a regression was calculated for population change as a function of population size. For most the function was significantly negative, meaning that population changes were inversely related to density. One exception is the world human population which has a rate of change that is a positive function of the density. The causes for the rate of change usually being a negative function of density are briefly discussed.

A Hymenostome Ciliate from Antarctica *

Jesse C. Thompson, Jr., *Hampden-Sydney College*

A ciliate was isolated from an unidentified plant sample collected from an exposed rock surface on Nelly Island, located 12 miles west-northwest from Wilkes Station, Antarctica. Morphological studies of this ciliate differ slightly from a new species described (in press) from Daytona Beach, Florida.

* This investigation was supported by NSF Grants GB 1325 and G 15445.

Applications of Cryobiology in the Biomedical Sciences and Cancer Research

J. Richard Thomson and Gail Yerby, *Southern Research Institute, Birmingham, Alabama*

In recent years, spectacular advances have been made in the applications of low temperatures (−76°C. to −196°C.) in biological and medical research. Basal ganglia surgery, using an insulated probe to apply liquid nitrogen to pinpoint areas of the brain, has proven 90 per cent effective in relieving the tremors and rigidity of parkinsonism. The storage of bull semen at ultra-low temperatures—the first application of cryobiology to become a commercial venture—is now a standard procedure, used routinely in more than 35 per cent of the dairy cattle breeding program. The low-temperature storage of whole blood, bone marrow, and other human tissues for eventual transfusion or surgical transplantation is rapidly becoming a reality.

Experimental cancer research, which relies heavily upon the continuity of genetically stable cancer tissues through successive serial transplantations, is especially aided by the use of a frozen tumor bank. The constant risks of infection of experimental tumors, cross-contamination by other cell types, "genetic drift," stromal tissue invasion, and accidental loss are avoided when reference tissues are safely preserved at −76°C. Periodic "renewal" of the original line of a specific experimental neoplasm assures genetic stability of a transplantable neoplasm maintained in a long-term chemotherapy screening program. Data will be presented showing our four-year record of successful recovery of a wide spectrum of rat, hamster, and mouse neoplasms from an operational frozen tumor bank.

Aspects of the Taxonomy of *Nolina* in the Southeast

Francis M. Thorne, *University of Georgia*

The genus *Nolina*, a wholly North American taxon of twenty-five species, is represented in the Southeastern United States by *N. georgiana* L., *N. brittoniana* Nash, sandhill species of Georgia and Florida respectively, and *N. atopocarpa* Bartlett, a Florida flatwoods species. Although isolated from each other and distinct, these species are poorly defined from the taxonomic standpoint. Traditional definition is based on the morphology of the triangular capsule, whether it is notched at the base, apex or at both ends and whether the capsule is symmetrical or asymmetrical. Morphological studies indicate that the definitive characters of one species are too often shared by the other two to be of taxonomic value. Other morphological aspects and anatomical structure are functional in characterizing the species. Cytological data to date and certain aspects of the breeding systems will also be discussed.

Coelomomyces in North Carolina *

Clyde J. Umphlett and John N. Couch, *Botany Department, University of North Carolina*

In 1944 Couch found the first specimen of *Coelomomyces*, blastocladiaceous parasites of mosquitoes, known to have been collected in North Carolina. *Coelomomyces quadrangulatus* appeared in a single larva of *Anopheles crucians* from the larval collection of the N. C. State Board of Health at Raleigh. The larva had been collected from Elizabeth City. No more specimens of the fungus were taken from North Carolina until 1961 when *C. punctatus* in larvae of *Anopheles quadrimaculatus* was collected by Umphlett near Elizabeth City. Continued extensive collection of mosquito larvae has yielded in the vicinity of Chapel Hill about 19 sites from which parasitized larvae may be taken from time to time. Various species of *Anopheles* have been found harboring *C. quadrangulatus*, *C. lativittatus*, *C. cribrosus*, and *C. sculptosporus*, all described first from Georgia, and a species of *Coelomomyces* taxonomically very near *C. raffaelei*, described first from Italy.

* This investigation was supported by a PHS research grant, No. 325 NIH 313, from the National Institutes of Health, Public Health Service.

Control of Differentiation and Function by Distribution of Enzymes in a Lipid-Bound System

D. S. Van Fleet, *University of Georgia*

Quantitative analysis by microelectrophoresis reveals five lipid-bound isozymes of peroxidase in mature phloem and two isozymes in dividing and differentiating phloem.

Lipid-bound haematin isozymes are changed in formation, distribution and quantity by application of regulators affecting lipid and lipo-protein systems. There is a functional relation between unsaturated lipids and haem, esterase, dehydrogenase and other enzymes which determine differentiation and development. Ethylene applied before the appearance of lipid carbonyl compounds and lipid polymerization in cellular membranes changes the distribution of lipids and lipid-bound enzymes, as a result of differentiation and location of the endodermis is changed. Lipid-bound enzymes are asymmetrical in distribution and function as demonstrated by microelectrophoresis, cytochemical methods, and the vacuum tube voltmeter.

Investigations on the Possible Occurrence of Kinins in Nucleic Acids of Coconuts

G. Ware and B. I. Sahai Srivastava,
Tuskegee Institute

Since the isolation of kinetin from the autoclaved DNA of herring sperms, kinin-like compounds have been detected in several plants and the kinins have recently been shown to affect the metabolism of nucleic acids was therefore investigated. The solid endosperm of coconut was used as experimental material because it is rich in kinins, although both young and mature endosperms were found to be poor in nucleic acids. The solid endosperm was successively extracted with cold ethanol, ethanol-formic acid, acetone, cold 5% perchloric acid, hot ethanol, ethanol-ether and ether. The residue containing the nucleic acids was suspended in water and adjusted to pH 4.2. The resulting suspension was autoclaved for one hour at 120°C., cooled and filtered through celite. The filtrate, after adjusting to pH 10.5 was chromatographed on a Dowex 1 column and the appropriate fractions were further chromatographed on paper with n-butanol : acetic acid : water (4 : 1 : 5). The purines on the chromatograms were located by treating a marker strip with bromophenol-$AgNO_3$ reagent, eluted from the paper with water, and the ultra-violet spectra of the aqueous eluates were determined. The eluates were tested for kinin-like activity by the leaf senescence test. Several purine-like compounds were detected, but no kinin-like activity was observed.

If larger amounts of plant nucleic acid were available it is possible that kinin-like activity could be detected in autoclaved nucleic acid.

Sociophysiological Differentiation

Bruce L. Welch, *College of William and Mary*

When animals are together they become different physiologically because of the gradient of social effect which exists between them. The variability of dying time for mice injected with d-amphetamine and, for uniformity, placed in isolation to die, is up to 2,600 times greater if they have lived in groups of 5 for 5 weeks prior to injection than if they have lived in isolation for the same period of time. This probably reflects different basal levels of autonomic stimulation under which the various individuals within the groups have been living as a result of their different positions within the social hierarchy.

Paradoxically, animals that are together also become alike physiologically as a result of the common social environment which they share. The variability of adrenal weights between replicate groups of mice becomes greater as the groups size increases. The group takes on an identity as a distinct physiological entity, and this is reflected in the physiology of each of the individuals present.

Morphological Studies in *Vararia* *

A. L. Welden, *Tulane University*

An analysis of the American species of the basidiomycetous genus *Vararia* shows the genus to consist of two well-defined groups of species. The first group, represented by *Vararia effuscata* (Cke. & Ellis) Rogs. & Jacks., *V. granulosa* (Pers. ex Fr.) Laurila, *V. pallescens* (Schw.) Rogs. & Jacks., and *V. peniophoroides* (Burt) Rogs. & Jacks., produce globose or subglobose spores which have a double or thick wall and a warted or spinulose amyloid exosporium. All, except *V. pallescens*, possess pseudocystidia; two of these species, *V. effuscata* and *V. granulosa*, have the macrocystidial subtype of pseudocystidium. The other group, represented by *V. gallica* (Bourd. & Galz.) Menzies, *V. investiens* (Schw.) Karst. (the generic type), *V. pectinata* (Burt) Rogs. & Jacks., *V. phyllophila* (Massee) Rogs. & Jacks., and *V. racemosa* (Burt) Rogs. & Jacks., produce cylindrical or subcylindrical spores which have a single or thin, smooth, nonamyloid wall. All species of this group, except *V. gallica*, produce pseudocystidia, none of which are of the macrocystidial subtype.

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An Improved Method for Removing Media from a Protozoan Population

Carolyn Wells and Jeanne W. Clabough,
Longwood College

One method of removing media from cell populations, repeated centrifugation and washing of a culture, has several undesirable features, particularly when the method is used to prepare large quantities of protozoa for biochemical analysis: 1) expended time and labor increase with cell quantity; 2) cell death increases with cell quantity; 3) the washed population is invariably a mixture of living and dead cells. A new method has been developed in our laboratory whereby a washed suspension of living cells may be obtained with minimum effort. Dryl physiological salt solution (S. Dryl, J. Protozool., 6 (Suppl.): 25) is introduced at a rate of 5–10 drops/min. down the inside surface of a separatory funnel containing a culture of *Tetrahymena pyriformis*. The cells enter and remain in the layer of salt solution that forms on the media surface. After an hour, the funnel stopcock is adjusted so that outflow of media and dead cells equals inflow of Dryl. A 100-ml. population is automatically washed in 4-6 hours. One centrifugation of the Dryl suspension concentrates the cells and removes the small amount of media that has mixed with the Dryl layer. *T. pyriformis* processed in this manner are as sexually reactive as after 4 washings by centrifugation, indicating an equivalent amount of media removal.

An Artificial Stream Apparatus for the Study of Lotic Organisms

L. A. Whitford, G. E. Dillard, and G. J. Schumacher.
N. C. State College of the University of North Carolina

Small artificial streams are produced by circulating stream water through short troughs from a glass cooling reservoir and back, by means of a small centrifugal pump. The reservoirs are kept at a constant temperature by refrigerated open-top tank similar to a milk cooler. When set up in a greenhouse, any two of the three habitat factors, light, temperature and current speed, can be held constant and the other varied to study its effect on algae or other small plants or animals. Data from studies of fresh-water algae are given.

Studies on Induced Apogamy in *Pteridium* Gametophytes

Dean P. Whittier, *Virginia Polytechnic Institute*

Gametophytes of the bracken fern, *Pteridium aquilinum* (L.) Kuhn, were employed in sterile culture to investigate induced apogamy, i.e., the formation of sporophytes from gametophytic tissue without fertilization and in response to cultural conditions. It was demonstrated that apogamous sporophytes developed on nutrient media with suitable concentrations of various sugars. Variations in the light intensity brought about an increase or decrease in the apogamous response depending on the composition of the medium. Renewal of the medium with the optimum concentration of sugar during an experiment brought about a large increase in the number of apogamous plants formed. An experimental procedure which employed changes in the medium at set intervals allowed the testing of various factors on specific stages of apogamy. This procedure demonstrated that light was necessary for apogamy and light or succinic acid would substitute for sugar in the induction of apogamous sporophytes.

Studies on Genera of Clathraceous Fungi

Constance M. Williams and Lafayette Frederick, *Atlanta University*

A survey of the literature on clathraceous fungi has revealed that doubt still exists relative to the validity and relationships of the genera *Laternea, Colonnaria,* and *Pseudocolus.* Recent collections of a clathraceous fungus, in the vicinity of Atlanta, Georgia, has prompted a critical review of these genera. Specimens representing species assigned to these genera have been obtained from various herbaria for comparative taxonomic studies. From these studies, it appears that generic limits for these fungi should be based on the presence or absence of a stipe, gross anatomical structures of the receptacle, number of reeeptacle arms, and the glebal position. Species previously assigned to *Laternea* and *Colonnaria* were found to have the following features in common: lacunose receptacles, "laterne" glebal position, two to four vertical arms grooved toward the apex, smooth outer surface and pitted inner surface, and sessile receptacles. Specimens of species in the genus *Pseudocolus* have stipitate reeeptacles, usually three arms, hollow or lacunose receptacle with fully pitted external surface, and no evident differentiated glebal body. These studies support an earlier suggestion that species in the genera *Laternea* and *Colonnaria* are congeneric and that *Colonnaria* should be regarded as the valid genus. These studies further confirm the validity of the status of the genus *Pseudocolus.*

Differences in Sensitivity to Ultraviolet Light During the Cell Growth Cycle of the Ciliate *Spathidium spathula* *

Donald B. Williams, *Vassar College*
Robert C. Ramger, *Maryville College*

Spathidium spathula divides about every 300 minutes at 27°C. on lettuce infusion containing *Colpidium colpidium* as prey. *Spathidium* of increasing ages during this 300-minute period were irradiated with 10,000 ergs/mm.^{2} of ultraviolet light (2537 Å). Irradiated cells and control cells were individually subcultured and the daily division rate determined. Cells aged 40% and 60% were the most insensitive to UV (31% and 22% respectively were injured), whereas cells aged 2%, 5%, 10%, and 20% all showed more sensitivity (57-68% of the cells showed injury). Cells aged 92% were beginning cytokinesis and were the most sensitive (89% injured). Injury is defined as three or less divisions in 24 hours associated with giantism, replication or oral structures and heavy pigmentation. Descendants of injured cells were subcultured for extended periods. About 70% recovered and produced normal clones; the remaining 30% were permanently injured. Cells from permanently injured clones showed extensive macronuclear fragmentation and complete loss of micronuclei.

* Sponsored by U.S. AEC contract AT(30-1)-3102.

In Vitro Study on the Effects of Pituitary Digest and Somatotrophin on the Growth Rate of Cells of Sarcoma-180 from Crocker Albino Mice

Luther S. Williams, *Atlanta University*

In this study, the growth rate of cells of sarcoma-180 from crocker albino mice was studied utilizing two tissue culture methods, namely, the hanging drop slide culture, and the Carrel flask culture. The cells were cultured at 37°C. in a culture medium containing chicken plasma and embryonic extract. Microscopic observations revealed that many of the cells were bi- and multinucleate and that the nuclear material was often concentrated at one or both ends of the cells. Data from measurements of growth increments for given periods indicate that the cells cultured in a medium, to which pituitary digest or somatotrophin was an added component, grew at a higher rate than the control cultures. The increase in cellular growth was proportional to the concentration of the hormone added to the medium up to a maximum concentration of seven per cent. For all concentrations above seven per cent there was a progressive decline in the rate of cellular growth. Both pituitary digest and somatotrophin augmented cellular growth within the concentration ranges used.

Phytoplankton Productivity at Beaufort, N. C.

Richard B. Williams, *U. S. Bur. Comm. Fisheries*

Regular measurements were made in the Beaufort channel for one year of standing crop of phytoplankton, respiration, photosynthesis and physical factors thought to influence primary production. Throughout the study, nanno plankton was dominant over net plankton. Photosynthesis had a pronouneed seasonal cycle with higher values in summer; respiration was irregular but generally greater in warm weather. Average gross photosynthesis and respiration were estimated to be respectively 786 and 243 mg. C/m.^{2} day for June through October, and 249 and 118 mg. C/m.^{2} day for the remainder of the year in a water column equal to the average depth of the estuary, 1.5 m. Gross photosynthesis correlated neither with standing crop as estimated from pigment concentration nor with insolation entering the water, but had a highly significant correlation with water temperature. The relatively low plankton productivity was thought to arise from rapid tidal flushing of the estuary.

Acid-Soluble Phosphorus Compounds of Corn Roots

Byron H. Wise, *University of Florida*

Methods were developed to determine the concentrations of organic phosphorus compounds, particularly glycolytic intermediates, in TCA extracts of etiolated corn seedling roots. The compounds were separated by anion exchange chromatography, and the eluent fractions were

analyzed by enzymatic assays, colorimetric tests, UV spectrophotometry, and fluorometry.

Composition of the Plasma, Pericardial Fluid, and Pervivisceral Fluid of a Stingray †

Robert A. Wynn and George R. Bernard,
Medical College of Georgia

Sea water (W), and the plasma (P), pericardial fluid (C), and pervivisceral fluid (V) of 25 specimens of a stingray, *Dasyatis americana*, were analyzed using standard laboratory techniques. Mean values are: *pH:* W–8.20, P–6.25, C–5.53°, V–5.30°; *total osmolality* (mOsm./L.): W–836, P–883, C–861, V–849; Na^+ (mEq./L.): W–405, P–238, C–246, V–239; K^+ (mEq./L.): W–13.8, P–16.9, C–9.5°°, V–14.1°; Ca^{++} (mEq./L.): W–4.2, P–2.1, C–0.3°°, V–0.8°°; Mg^{++}: determinations in progress; Cl^- (mEq./L.); W–424, P–238, C–287°°, V–260°; *urea* (mg.%): P–2216, C–2125, V–2345; NH_3-N (mg.%): P–4.4, C–35.8°°, V–50.2°°; *total protein* (mg.%): P–4120, C–41°°, V–137°° (°, significant difference from plasma; °°, highly significant). Histochemically, the pericardial epithelium shows acid phosphatase activity, and mucopolysaccharides and/or mucoproteins within the cells and apically (PAS and toluidine blue reactions). The data suggest that neither pericardial nor perivisceral fluid is a plasma ultrafiltrate (in the strictest sense) and that active transport systems might be involved.

† Supported by USPHS (RG-9347) and by the Professional Research Fund, Medical College of Georgia.

Liquid Scintillation Determination of Radioisotopes in *Chlamydomonas reinhardti*

J. D. Yarbrough, J. C. O'Kelley and A. F. Findeis,
University of Alabama

Chlamydomonas reinhardti was effectively introduced into a toluene scintillation system utilizing an ethyl alcohol dehydration series for extraction of water and pigments. Counting of a graded series of algal cell concentrations in scintillation suspensions revealed little internal quenching by algal concentrations of 0-63 μg., with measurable quenching at 74 μg.

Pre-frozen algal cells treated with calcium-45 for periods of 5, 10, and 15 minutes were introduced into the scintillation system following alcohol dehydration. No detectable leaching of the calcium-45 radioactivity from the algal cells was noted during dehydration, as evidenced by lack of activity in the alcohol after extraction. After the dehydration, however, the cells contained appreciable quantities of calcium-45. The algal cells took up 30-40 per cent of the calcium-45 activity provided them, even in the 5-minute period of contact. The rapid uptake of the calcium-45 by the cells is indicative of an ion-exchange phenomenon, which may have involved algal cell wall material and inactive calcium or other ions already absorbed.

The Effect of Atrazine on the Rate of Transpiration and the Concurrent Uptake and Relative Distribution of Radioactive Phosphorus in *Phaseolus vulgaris* L.

M. B. Yeliger and Gordon E. Hunt,
The University of Tennessee

Recent studies have shown that Atrazine (2-choloro-4-ethylamino-6-isopropylamino-5-trizine) decreases the transpiration rate in plants over a short time interval. A study of the effects of different concentrations of Atrazine on transpiration and concurrent P^{32} uptake was made on *Phaseolus vulgaris* L. The Transpiration Stream Concentration Factors (of Russell and Shorrocks) and the Transport Indices (of Russell and Martin) were calculated. Absorption studies at different time intervals and levels of transpiration suggest that the phosphate ions entered into the bean plants independently of transpiration in a 6-hour time period. The Transpiration Stream Concentration Factor values in most cases were less than one, demonstrating that the entrance of P^{32} in these bean plants was slow, i.e., phosphate ions entered the plant at a slower rate than did water. Finally it was concluded that at least under these conditions, whatever factor produced a decrease in the transpiration rate at 4-6 hours did not directly decrease the uptake of the supplied radioactive phosphate ion during the same period; thus strongly suggesting, the initial PO_4 ion entrance is an independent process rather than one dependent on transpiration.

(*Continued from page 26*—Treasurer's Report)

Miscellaneous Contribution	5.00		
Registration fees—April meeting	434.85		
Membership dues	1,512.00		
		3,175.85	
			$4,068.04
Expenditures:			
General:			
Affiliate dues AIBS 1962 & 1963	200.00		
Secretary's expenses	72.94		
Goethe Travel Awards	342.00		
Guest Lecturer—April meeting	50.00		
Meritorious Teaching Award—April meeting	100.00		
Research Award—April meeting	100.00		
Annual meeting expenses April 1963	318.97		
		1,183.91	
Bulletin:			
Printing, addressing, mailing Jan., April, July, Oct.	1,431.32		

Printing "Deadline Announcements," abstract reprints, cards, stationery	215.89		
Clerical assistance—Editor	25.00		
Travel to ASB Council meeting—Editor	100.00		
Miseellaneous expenses	25.00		
		1,797.21	
Treasurer:			
Printing, postage, mailing lists	153.58		
To Savings Acct. #90 856 6	250.00		
To establish new Contingency Savings Acct. #91 375 6	400.00		
Bank charges	1.25		
Secretarial assistance	50.00		
		854.83	
			3,835.95
Balance as of December 31, 1963			$ 232.09

Leland Shanor, *Treasurer*

The Auditing Committee has examined the Treasurer's records for the period January 1, 1963–December 31, 1963, has found them to be in order, and certifies that his report for the period is correct. Robert B. Short, *Chairman;* Ruth S. Breen; and Ralph W. Yerger.

News of Biology in the Southeast

About People

Fred K. Parrish, Dept. of Biology, Agnes Scott College, has received a grant from the Society of the Sigma Xi and RESA to study the mechanisms involved in the spontaneous recovery of the cricket, *Gryllus assimilis,* from gregarine infections.

William H. Adams, Professor of Biology at Tennessee Wesleyan College, has received a grant of $12,990 for a continuation of the Cooperative College-School Science Program which he is directing within a six-county area. Provisions of the grant include a BSCS summer training institute for twenty high school biology teachers.

P. W. Whiting, Emeritus Professor of Zoology of the University of Pennsylvania, and Mrs. Whiting (Dr. Anna R.), are now located at Oak Ridge, Tennessee. They are serving as consultants for the Biology Division of the Oak Ridge National Laboratory.

Emmett W. Price, Professor of Biology at Jacksonville State College, suffered a heart attack in January while attending a meeting of the Medical Examiners Board in Birmingham. He will be convalescing at his home in Gadsden for an indefinite period. Dr. Price is known internationally in the field of parasitology. His publications include articles in all the major journals of parasitology and bacteriology as well as the Encyclopedia Britannica.

Mrs. **Richard Bramblett** has been appointed temporary instructor of biology at Jacksonville State College. Mrs. Bramblett earned her B.A. at Worster College in Ohio and her M.A. at the University of Michigan. Her prineipal field of interest is Invertebrate Zoology.

Stanley A. Rhodes, assistant professor of biology at Jacksonville State College, attended a six weeks National Science Foundation sponsored summer institute for college teachers of Zoology at Williams College in Massachusetts.

Ernest L. Hunt, Professor of Biology, Emory University, will spend the spring and summer quarters of 1964 at the Gatty Marine Laboratory, University of St. Andrews, Scotland, working in collaboration with Dr. A. J. Matty.

In the fall of 1963, **Raymond T. Damian** joined the staff of the Department of Biology, Emory University, as Assistant Professor. He received his Ph.D. from Florida State University in 1962 and was a Research Associate for one year before accepting a position at Emory.

Calaway H. Dodson of the Missouri Botanical Garden will join the Botany staff of the University of Miami the second semester of this school year. He is appointed as Curator of the Buswell Herbarium and will teach taxonomy. He has wide experience in the American tropics and has specialized in the Orchidaceae.

Claude S. Chadwick, for 24 years on the staff of the biology department of Vanderbilt University, and 12 years chairman of the biology department of George Peabody College, assumed the chairmanship of the department of biology at Emory & Henry College, Emory, Va., last September. He has just completed a four-year service on the Biology Data Book Committee of the Federation of Societies for Experimental Biology. This book, useful to both high school and college teachers, will be published in July, 1964.

R. T. Lynn, a recent doctoral graduate of the University of Oklahoma, has been appointed assistant professor of biology at Emory & Henry College.

Eugene P. Odum, Director of the Institute of Radiation Ecology at the University of Georgia, announces the appointment of two new members to the research staff. **Dr. J. Franklin McCormick** will work with a new portable cesium-137 source as a tool in the study of relationships between structure and function in vegetation; and **Dr. Robert J. Beyers** will continue his pioneer work on self-contained microecosystems as one approach to the problem of the "minimum ecosystem for man."

Bruce L. Welch, Assistant Professor of Biology at the College of William and Mary, received a grant of $24,000 for one year from the National Aeronautics and Space

Administration for studies on "Psychophysiological Effects of Prolonged Confinement in Small Groups and in Isolation." He also received a one-year grant of $11,342 from the Foundations Fund for Research in Psychiatry to conduct a research program entitled "The Psyehophysiological Identity of Groups."

G. Ray Noggle, Chairman, Botany Department, University of Florida, has resigned from his duties as of June 30, 1964. He will assume the Chairmanship of the Botany Department at North Carolina State College, Raleigh, starting on July 1, 1964.

Nolan E. Rice, Department of Biology, University of Richmond, was promoted to Professor of Biology. His promotion became effective in September, 1963.

Frank Leftwich was recently appointed Assistant Professor of Biology at the University of Richmond. He will be in charge of classes in physiology and cytology. Dr. Leftwich received his B.S. and M.S. degrees at the University of Richmond and his doctorate at the University of Tennessee. He is currently working on a post-doetorate fellowship at Rutgers University.

R. W. Menzel, Associate Professor, Oceanographic Institute, Florida State University has received a contract from the Bureau of Commercial Fisheries on "The Effects of Electrical Stimulation on Benthic Invertebrates Other Than Shrimp. Part I. Effect on polychaete annelids, a dominant benthic group."

Institutions and Organizations

SMART: The South Mississippi Association for Research and Technology was formed January 15, 1964, at Hattiesburg, Mississippi, to make new product and process studies for industries in the Gulf Coast region. According to Dr. Charlcs Brent, executive secretary for the group, the Association has computer programming and operations research capabilities with Ph.D.'s in fields of mathematics, chemistry, physics, biology, and geology. The address of this consulting group is Box 314, Southern Station.

In 1965, the **National Science Foundation** will again provide opportunities for U.S. scientists to participate in the **Antarctic expeditions of foreign countries** as exchange scientists from the U.S. Antarctic Research Program. Foreign nations with active Antarctic scientific programs include Argentina, Australia, Belgium, Chile, France, New Zealand, the Union of South Africa, the United Kingdom, and the U.S.S.R. Field research possibilities exist in atmospheric physics, meteorology, geology, glaciology, biology, and the marine sciences. The research program could be planned for a four- to six-month austral summer or for the Antarctic winter of 1965, which would involve a fourteen-month period. Departure from the U.S. would probably be late in 1964. Salary and expenses for travel, research equipmcnt, etc., associated with the exchange would be included in a grant to the investigator's institution. If necessary, assistance can be provided for acquiring a working proficiency in the appropriate foreign language before departure for the Antarctic. Interested scientists are requested to transmit an outline of their proposed field program with a specific foreign Antarctic expedition to the Office of Antarctic Programs, National Science Foundation, Washington, D. C. 20550. Instructions for preparing a proposal are contained in the Foundation brochure, "Grants for Scientific Research" (NSF 63-27), obtainable upon request.

The Division of Biological and Medical Sciences of the National Science Foundation announces that the next closing date for receipt of basic research proposals in the life sciences is May 1, 1964. Proposals received prior to that date will be reviewed at the summer meetings of the Foundation's advisory panels and disposition will be made approximately four months following the closing date. Proposals received after the May 1, 1964 closing date will be reviewed following the fall closing date of September 15, 1964.

Inquiries should be addressed to the *Biological and Medical Sciences Division,* National Science Foundation, Washington, D. C. 20550.

The 14th Annual Wildflower Pilgrimage will take place in the Smokies, April 23-25, 1964. There will be the usual guided botanical hikes, motorcades, and bird walks sponsored by the Dept. of Botany, The University of Tennessee, and the Naturalist Service of the Great Smokies.

The Botany Department, **University of Florida,** Gainesville, has been awarded a grant by the National Science Foundation for renovation of laboratories for graduate student use. A small laboratory has been established for housing the counting equipment used in isotope work.

The Botany Department has also been awarded a grant by the National Science Foundation to support undergraduate students in independent research problems. Under the program, students are attending weekly seminars during the Winter Trimester. In the Spring Trimester, 7 weeks will be devoted to reading and preparation and 7 weeks of full time research will follow.

French Oceanographer to Teach Special Course at University of Miami

An eminent French scientist, Professor Alexandre Ivanoff, will teach a six-week course in Optical Oceanography this spring at the Institute of Marine Science, University of Miami. Professor Ivanoff, who is director of the Oceanographic Laboratory, University of Paris, is a physical oceanographer and a specialist on the optical properties of sea water.

In addition to teaching the course, which begins in March, Professor Ivanoff will do research on underwater light. In this project he will work with Mr. Charles Yentsch of Woods Hole Oceanographic Institution, who will also be visiting the Institute of Marine Science at the time. The two researchers will study the relationship between light-scattering and the vertical distribution of phytoplankton, and also the relationship between natural fluorescence and productivity in the sea.

While Professor Ivanoff is in Miami, the National Academy of Sciences will sponsor a conference on *in situ* measurement of light in the sea. Dr. John E. Tyler of Scripps Institution of Oceanography will join Professor Ivanoff and Mr. Yentsch for this program.

For further information, contact: William M. Stephens, Institute of Marine Science, University of Miami, 1 Rickenbacker Causeway, Miami, Florida 33149.

Books and Periodicals

BIOLOGICAL BASIS OF BEHAVIOR: A PROGRAM. F. J. McGuigan. Prentice-Hall. $5.25.

Although the so-called "revolution in education" brought about by programmed instruction began almost a decade ago and has been gathering force ever since, there are still many areas for which no adequate texts exist. This paperback is an attempt to fill the need for an elementary program of self-instruction covering the physiological principles of human behavior. It is written by a psychologist apparently for use in first and second year biology courses, as well as in introductory and physiological psychology courses at the college level; but it cannot be recommended for use in biology courses above the high school level: indeed zoologists may be surprised to learn that the only sciences concerned with both behavior and internal functions are physiology and psychology (page 3).

The main subject matter of the text is divided between Receptors (73 pages), the Nervous System (109 pages), and the Effectors (73 pages). These are treated in an elementary way although such topics as the relative refractory period and the reticular activating system of the brain stem are touched on briefly. As is almost inevitable with such an approach there is much oversimplification as well as the usual sprinkling of errors or misleading statements. For example Figure 25 depicts taste hairs which are known to be artifacts, as well as supporting cells which are not now considered to be distinguishable from the receptor cells. The view that nerve impulses arise in the reeeptor cells of the retina is not generally accepted and there is no evidence that impulses arise above the cell body in the olfactory receptors. In general, however, the material chosen for coverage provides a fairly balanced introduction to some of the physiological foundations of behavior.

Given the subject matter there remains the question of whether it has been successfully moulded into a programmed text. This is doubtful. As such texts go this one is relatively conventional and unimaginative in design as compared with some of the pyrotechnical displays now being offered. The 1-7 missing words in each short paragraph appear in the left-hand margin of the page. The student is expected to hide these words while answering the question but they would seem to offer the temptation of looking at the answer before reading the question. Additional information is provided by the simple line drawings scattered throughout the text.

Is this rather mechanical mode of presentation, with its tendency to emphasize the acquisition of a vocabulary, an improvement on conventional texts? It is true that formal tests, such as multiple choice questions may indicate that there is such a gain. But are these adequate indices of the amount of latent learning that has occurred, or the ability to develop and expound concepts, or interrelate facts? In short, what is lost by sacrificing the greater variety and richness of material which is found in the same space in a good conventional text? One might expect that individual differences would loom large in any adequate answer to this question. At any rate, it is curious, if not a little disturbing, to read in the instructor's manual which accompanies this book, that students in the lower intelligence group learned as much from this text as did the more intelligent students.

David G. Moulton
Dept. of Biological Sciences
Florida State University

INTRODUCTION TO HERPETOLOGY. Coleman J. and Olive B. Goin. W. H. Freeman and Company, San Francisco. ix + 341 pp., illustrated.

This modest-sized volume is intended for use as the text of a one-semester course in herpetology. The desired prerequisite is one year of college biology. The vast amount of material condensed to manageable proportions by the authors is presented in the following order. Chapter 1, the position of amphibians and reptiles in the animal kingdom, basic principles of classification, a brief historical review of herpetology. Chapters 2-5, the structure and evolutionary history of the two included classes. Chapters 6-11, natural history, mechanisms of speciation and geographic distribution. Chapters 12-17, a summary of living amphibians and reptiles to the family or subfamily level. Two appendices follow; the first a classification of amphibians and reptiles to the family level; the second, a tabulation of known amphibian and reptilian chromosomal numbers. An index completes the volume.

The text is well illustrated with an excellent selection of photographs, drawings and charts. All are done well and enliven and enlighten the text admirably.

In producing the first text-book of herpetology, which fact alone makes this an important book, Dr. and Mrs. Goin have attempted the fantastic job of assimilating thousand upon thousand pages of herpetological literature. From this they have sueceeded in producing a smooth-flowing, readily understandable text. Complete detailing of each study subject is not permissible but each chapter concludes with a list of references in which details of interest may be found. Not content with the hereulean task of synthesis, the Goins, with their characteristic directness and drive, have interpreted the data into, or have adopted, classifications that may or may not find agreement among their colleagues. Unfortunately, but understandably, in a book of this type complete doeumentation of the presentation is not possible. Some students of amphibian and reptilian classification may find the taxonomic changes unnerving in these circumstances. This student finds the variations in his area of

interest (snakes) stimulating, with or without comment. The authors have found it necessary to make a choice in several areas where limited knowledge permits discussion and alternate classifications. Not always do the choices follow the more or less standard or more conservative treatment. The points of systematic variations may not be obvious to the biologist who is not herpetologically oriented; the variations, however, need not inconvenience him in the utilization of the book.

All biologists will find in this volume a basic knowledge of amphibians and reptiles that will prove a most useful adjunct to their knowledge of the various modes of life. The teacher of a herpetological course presumably will be an active herpetologist. This text will permit the development of a course of study that will be exciting and stimulating to students and teacher alike.

EDMOND V. MALNATE

Biological Abstracts' B. A. S. I. C. Offers Comprehensive Retrieval Aid

B.A.S.I.C., the machine-generated Subject Index to BIOLOGICAL ABSTRACTS (BA), has proved a most effective tool to enable research biologists and basic medical scientists to keep abreast of the rapid advances in world biology. Now in its third year of publication, the index has been acclaimed by life scientists from all sections of the globe for its direct, natural language approach to both current and retrospective search problems.

It is now possible for a researcher to select a list of key words important to his special studies, check each semi-monthly index for references to these words and turn immediately to the pertinent abstracts. The immediate values of the index are the following: they are current—complete subject, author and systematic indexes appear with each issue of BA; the use of key words quickly guides one to the individual abstracts of interest to him and eliminates time-consuming searches; a complete survey of any given issue of BA can be made in a half hour or less—thus saving priceless hours for laboratory research; through use of key words, automatic cross-references are provided.

With the incorporation of supplementary key words and other time-saving computer and graphic techniques, B.A.S.I.C. has become today a rapid, comprehensive search tool, an invaluable aid for biology and all related fields. Further refinements and research are planned in order to continue BA's policy to serve all life scientists with the most complete and efficient scientific information aids.

Sapelo Island Research Foundation And University Of Georgia Marine Institute Pursue Joint Research Programs

The research operations on Sapelo Island, Georgia, within recent years have been a joint effort of the University of Georgia Marine Institute and the Sapelo Island Research Foundation. The Sapelo Island Laboratory is involved in several research programs of interest to biologists in the southeast.

A systematics program, planned to provide taxonomic information on the major marine invertebrate groups, was initiated in late 1961. Mr. Milton B. Gray, formerly biological collector at the Marine Biological Laboratory at Woods Hole, Massachusetts, joined the staff and his excellent collections provide the basis for the studies being pursued. Within the past year, the program has brought several visiting biologists to the laboratory for varying periods, ranging up to several weeks in duration: Dr. E. L. Bousfield of the National Museum of Canada has worked on the Amphipoda, while Dr. J. B. Burch, University of Michigan Museum of Zoology, has begun a study of the Gastropoda. Dr. R. J. Menzies, Duke University Marine Laboratory, has studied the Isopoda. Mr. M. J. Cerame-Vivas, also from the Duke laboratory at Beaufort, plans to work on the Echinodermata this spring; both Drs. Burch and Bousfield contemplate returning within the next few months to continue their investigations.

Dr. Robert Johannes, who recently received his doctorate from the University of Hawaii, has been appointed a Research Associate of the University of Georgia Marine Institute. Dr. Johannes is studying the uptake and release of phosphorus by marine organisms in conjunction with the studies of Dr. L. R. Pomeroy.

Dr. Dirk Frankenberg of the University of Georgia Marine Institute has been awarded a National Science Foundation grant to support a research project entitled "Animal-sediment relationships in marine level bottom communities off the coast of Georgia." Dr. Frankenberg recently completed his Ph.D. degree at Emory University where his dissertation won a Sigma Xi Annual Student Research Award.

The ASB BULLETIN

Volume 11, Number 3 July, 1964

POOLS IN ROARING RIVER PASSAGE OF MAMMOTH CAVE C.W.H.

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 11, Number 3—July 1964

The ASB Bulletin is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Penna. Changes of address should be sent promptly to the Secretary of the ASB, Dr. Margaret Y. Menzel, Dept. of Biological Sciences, Florida State Univ., Tallahassee, Fla. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Subscription rate for nonmembers of the ASB: $4.00 per year. Printing and typography by the Wickersham Printing Co., Lancaster, Penna.

Second-class postage paid at Philadelphia, Pennsylvania.

C. Willard Hart, Jr.
Editor

Margaret Y. Menzel, Associate Editor
Betty Ursomarso, Assistant Editor
Leland Shanor, Business Manager

CONTENTS

The cover photograph shows two of the many pools left in the Roaring River passage of Mammoth Cave, Kentucky, when the water recedes during certain seasons. These two pools, each roughly eight to ten feet in diameter, are small when compared with others in the area, but support a surprising variety of organisms ranging from bacteria and protozoa to shrimp, crayfish, and fish.

ASSOCIATION AFFAIRS

State Correspondents Needed

The State Correspondent positions for Kentucky, Maryland, and West Virginia are vacant, and need to be filled. ASB State Correspondents perform a vital function in the organization—seeing that news of biologists and institutions is submitted for publication in the *Bulletin*. After all, the *Bulletin* is designed primarily to serve as a medium for the dissemination of news about biologists and biology in the southeast—and without the correspondents it would certainly fail in this task. Should anyone in the states listed above like to voluntcer to serve as correspondent, please write to C. W. Hart, Jr., Editor, Academy of Natural Sciences, 19th and The Parkway, Philadelphia, Pa.

Today's Biology

BY WALTER S. FLORY, Wake Forest College

THE subject is somewhat non-eommittal, and could mean many things to many different people. To me this subject covers especially the amazing advances in cellular biology which have resulted from biochemical investigations of thc basic cellular structures and units. But, equally as important, it also ineludes the aetual or probable relationships and impacts of these studies on the more classical fields of biology--systematics, morphology, ecology, and so on--as well as on genetics, physiology and the other broad fields that are included in our science.

We all know that Today's Biology is not the biology of even ten years ago. We can feel confident that our science is progressing at such a rapid rate that Today's Biology differs materially from what promises to be the Biology of 1975.

The State of Biology has been well discussed and analyzed in recent years and months by Barry Commoner (1961), by Tracy Sonneborn (1963), by Ernst Mayr (1963), by Ledyard Stebbins (1964) and by others of our more eminent colleagues. Many of you have heard the talks, or read the papers of these biological leaders. I am not under the illusion that I ean add anything remarkable to our knowledge of the present status of biology. However, I fecl—selfishly--that a discussion of the problems and of some of the opportunities of Today's Biology will help clarify my own thinking here,--and further, hopefully, may even add an idea or two possibly presenting some new facets of the topic to others.

It is frequently pointed out that current biology is in something of a ferment. That many recent outstanding discoveries in biology have been based on biochemical studies is well known, and is perhaps a chief agent of the ferment.

We easily recall that work leading to several recent Nobel prizes in Physiology and Medicine has been founded on research showing either (1) the genic control of biochemical events; (2) genic control in bacteria at near minimal-life levels; (3) methods of synthesis of DNA and of RNA; or (4) the general nature of the Genetic Code as drawn from results of biochemical experimentation. Several of these works have been carried out by biologists using biochemical methods. One contribution was by biochemists working toward the synthesis of fundamental biological materials. In another case two British chemists have shared a Nobel Prize—this one in chemistry—for their deciphering of the atomic structure of myoglobin and hemoglobin, two important proteins, the knowledge of which forwards an understanding of the life processes since all known enzymes—the catalysts controlling the chemical reactions of living systems—are proteins.

With such discoveries as background, there is little wonder that the second half of the 20th century is frequently referred to, by scientists at least, as the era of the biologist. Biology was recently referred to by Stebbins (1964) as "having come of age" with the elaboration of the Genetic Code, just as did chemistry when Newlands first clearly formulated the Periodic Table of the elements in 1866. At the same time the earlier 1900's are sometimes referred to as the 'age of the physical scientists' since it was during that period when such great forward strides resulted with respect to knowledge of the atom and its fission, as well as of many related physical principles.

In almost the same breath that the 'Age of the Biologist' is proclaimed, it is often implied that it is the 'New Biology' and the 'Molecular Biologists' which really inherit, are responsible for, and are perhaps the chief benefactors of the current biological bonanza.

Professor James Bonner, a prominent spokesman for Botany and for Biology, last year authored an article in the AIBS Bulletin, whieh has been widely read. His stimulating remarks were entitled "The Future Welfare of Botany." With some slight change of wording the article seemingly would apply about equally as well to articles entitled "The Future Welfare of Zoology" or "The Future Welfare of Biology as a Whole." Sound premises are set forth concerning the advantages accruing from a common attack on common problems encountered by botany, zoology, microbiology, etc. Likewise, Bonner's views concerning the value of feedback among related sciences are obviously sound ones. His basic

Address by Immediate Past President, Association of Southeastern Biologists, at annual meeting on April 17, 1964, Emory University, Atlanta, Ga.

premise, however—aside from his final conclusion, is that many fields of plant science are nearing exhaustion as source areas for research, because—it is contended—most of the facts in these fields have now become known. His views here seem quite erroneous and very much open to question. Few taxonomists, anatomists, ecologists, etc., would agree, I feel sure, that their fields are exhausted, or are apt to be bereft, of problems in the foreseeable future.

After the author paints his gloomy picture of the dissolution of one of biology's important branches—presumably as its study is pursued in the classical manner—his article concludes with the following optimistic outlook "but if we are wise, and if we continuously plow back and apply to botany our new and deepening insights on the molecular level, then our science can live and prosper for generations to come." In other words, in essence the writer seems to say 'botany is a gone science except for the saving grace of molecular methods.'

Among the excellent replies to Bonner's article attention may be called to Dr. Earle Smith's reaction to the implication that all the plants of the world would be known shortly. Smith (1964) emphasized that instead of most plants being known—there is actually an appalling lack of information concerning the flora of a great part of the world—including that of the western United States where Bonner lives. In addition, for the flora that is known there are far too many voids in the adequate knowledge about existing relationships, existing structures and existing chemical make-ups to permit anything like an effective use of much of the information which is available. Smith's discussion ends with this statement: "The contents of a detached cell can doubtless be discussed with vigor and clarity, but, unless this cell is related to its proper place in a plant of known identity, the details cannot be evaluated, since there is nothing with which they may be compared and related."

The stimulus furnished to biological thinking by Bonner's article is attested to by the number of opposing responses which have appeared in the AIBS Bulletin and elsewhere, and also by the lively discussions that it has evoked. The writer has been in several groups in which Bonner's points have been discussed, pro and con. Countless similar discussions must have occurred on college campuses across the country. One is tempted to speculate that Dr. Bonner's writing may have been done with, so to speak, "tongue in cheek"—perhaps to furnish the very stimulus to analysis which has resulted.

As biologists we can all take pride with the great forward steps in knowledge concerning the phenomena of life. We can and do review with satisfaction the sequence of findings which lead to the conclusion that DNA is "the vehicle for the continuity of life." We are happy that chemical and physical approaches have contributed so broadly to our present knowledge of life processes—and continue to promise much in that direction for the future.

At the same time it seems evident that those who believe that the biochemical approach offers a panacea concerning biological problems, and one which will furnish answers for all outstanding questions, tend to lull themselves with false premises.

Professor Stebbins (1964) covers what appears to be a basic point, and quite aptly, when he writes: "At the molecular level we can discover universal principles which are common to all life" but "at higher levels of organization the differences between kinds of organisms may be more important than their similarities" and he adds "even in respect to such basic features as their physiological functions and patterns of development." I believe that few biologists will dispute the truth of this statement.

It is evident that the molecular biologists, with few exceptions, are well-trained in both their biological specialty and in biochemistry. They avowedly concentrate their energies to the solution of basic problems on elemental organisms of simple structure. From their attempts to date have appeared glittering successes over a remarkably short period of time.

The molecular biologists, so far—as already suggested—have concentrated their team efforts on studying the very simplest—often the single-celled—organisms. In some cases they have worked with single, or with a very few, chromosomes. They expect, however, to work on increasingly complex problems with more complicated organisms—securing the answers in molecular terms to the several more complicated problems as these are encountered.

Sonneborn (1963) has very clearly pointed out the dependence of the molecular biology on the classical. He recalls that the essential nature of classical genetics was almost completely developed by Mendel from "making inferences about the existence, organization and behaviour of unseen objects—genes—from very simple purely biological observations." Quoting further from Sonneborn: "Simple, purely biological methods, without the essential aid of chemistry or physics, of biochemistry or biophysics, led to the exposure of some of the deepest secrets of living nature. Modern researchers and students often forget—or never knew—that they could not have guessed what questions to ask or what problems to attack at the biochemical and molecular levels, had not a sound and profound theoretical

structure first been established by the elegant and powerful methods of pure biology." Sonneborn also points out that at each level with each problem, the biological approach will again be necessary to discover the problems needing solution, to find the most suitable materials to investigate, and to infer the nature of the mechanism and problems—before molecular biology is in a position to attempt its contributions.

Such discussion could be considerably prolonged but at the end we would still admit that in Today's Biology we have the two important groups of Classical and of Molecular workers. Both groups are making important contributions in many ways. The molecular biologists are coming forward with dramatic discoveries, overshadowing the more prosaic advances of the classicists. On the other hand, the molecular biologists are dependent upon the classical group for their background in biology, for their materials, and for their basic leads and suggestions for approach. I believe it is fair to say—although there will probably be strong opposition to the statement—that it is the group often called the "Classical Biologists" which are the 'heart' of Biology—the *real* Biologists, if you please. A proportion, and probably a sizable proportion, of the Molecular Biologists have a stronger leaning toward, and probably a stronger baekground in, biochemistry, than in biology. Some at least are chiefly biochemists, although counted among molecular biologists because they are using biological organisms, rather than inanimate chemicals, for their research materials. At times the two groups seem more competitive than cooperative, regrettable as this situation is.

The optimum relationship between the two schools would seem to be one of *admiration* on the part of the classicists for the skilful techniques and advances engineered by the new biologists; coupled with one of *appreciation* by the molecular workers for the long and constantly being broadened background of biological theory and fact from the traditional school—on which they so freely draw. Both groups derive aid and strength from the other; this strength will be greatest if and when all debts to the other are freely acknowledged.

Biologists cannot afford to accept other than whole-heartedly and gratefully every new contribution to a knowledge of the life processes, especially those of such epoch-making stature as are being furnished through current biochemical studies. But even more surely, biologists cannot afford to depend on biochemistry to teach young scientists the fundamentals having to do with the very science of biology itself. We cannot develop biologists by teaching our students biochemistry alone. For 20th century Biology to attain its ultimate potential as a science, the complementary roles of classical and molecular, the old and the new, biologies must each support, as well as draw from, the other. Otherwise, they will become separate sciences, not merely separate branch roads of the same science.

One is reminded of the faet that popular or so-called fashionable topics become periodic research vogues in a given science. In the field of botany, for example, in the past 25 years it has been successively "fashionable" to study the effects (1) of colchicine; (2) of plant hormones; (3) of radiation; and (4) of gibberellic acid. I am sure there have probably been several other "fashionable" trends in botanical research during the same period. The really serious workers with each subject have persisted until important problems have been solved. But a sizeable number of workers have tended to jump from one "band-wagon," if you will, to the next, often without much to show in the way of basic accomplishment. Even during the height of a given subject's popularity, the majority of workers in the broad field concerned—botany in our example—proeeed with their usual, often long-planned, experiments. More often than not it is these "plodders," if we may so speak of them, who are also the real producers of substantial, and substantial amounts, of new facts and truths.

This is not to suggest that studies of life forms at the molecular level are a passing phase of popular biological interest. The new biology requires broad knowledge in diverse, as well as specialized, fields which more or less precludes hasty entrances and exits to and from molecular studies. But it *is* the fashionable thing to carry out studies at the molecular level during the present period. In that connection it is important that brilliant students whose real interests lie in taxonomy, in morphology, in ecology, and in all the other purely biological fields, realize that great problems and opportunities exist in these basic fields of biology. It is not only desirable but necessary that this be clearly and widely recognized if students with such basic interests in biology are not to be more or less stampeded into currently more glamorous and alluring fields of perhaps less actual interest to them.

It is important not only for biology, but also for biochemistry, to be cognizant of the need for many bright young minds to be coming along in the classical fields of biology, as well as studying the methods of biochemistry. Otherwise the biological goose which is laying the golden eggs of knowledge upon which molecular attacks on the secrets of life depend will gradually sicken and die.

It may be the biochemist who eventually gives the answers to such questions as (1) how did life actually arise? (2) how can the span of human life (not just the average life span) be lengthened? (3) how can mutations of specific rank be induced?—as well as perhaps also the answer to the question that Stebbins (1964) considers as the most important unsolved problem of biology —(4) What is the explanation of development and differentiation in higher plants and animals; that is "how do you explain how cells containing the same genes can be so different as a parenchyma cell and a wood fiber, a root hair and an ordinary epidermal cell, or a pollen tube and an egg cell?" But if the biochemist rather than the biologist produces these answers this would seem necessarily to result from and rest upon the background of many years of biological contributions and investigation, and would probably eventuate —as Sonneborn believes—after the spade work of the biologist has suggested the specific problem, pointed to the most suitable materials, and inferred the nature of the controlling mechanisms. (The repetition here is purposeful—to emphasize Sonneborn's salient point.)

The indispensable role which the biologist would play in such a drama may not be accompanied by emotions of quite the strength which cause the work of the molecular biologist to be announced along with adjectives such as "exciting" and its synonyms. The contribution of the classical biologist may not have as great an opportunity of being hailed as a "breakthrough." On the other hand, there is great satisfaction in doing the work that one enjoys doing, especially when that work is important and may well be essential as a forerunner from which a real "breakthrough" may possibly eventuate. For the able and the swift opportunities are great, the problems are manifold, and the olive laurel is available in classical, as well as the new, biology. This point must be impressed on many of the able young students with interests tending to point them toward our graduate schools of biology.

Finally, I suggest again—Biology Today is in its ascendancy. I am convinced that this is as true for classical fields as for the molecular levels. Workers from each of these groups can complement, aid and further those from the other. It behooves all of us to learn as much about the methods, and certainly as much about the results, from all allied sources as can possibly be assimilated. We each need help and leads from every possible approach to be as effective as possible in our own fields of interest.

The whole-hearted recognition of these facts should extend and hasten the development of every aspect of Biology—and should indeed assure the late 1900's of being rightfully designated as the Age of Biology.

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The National Register As A Privacy Invader— Where Do We Go From Here?

Most of us have recently received from the AIBS a form to be filled in for the National Register of Scientific and Technical Personnel of the National Science Foundation. We would like to point out that this form differs from those sent out in past years, in that it not only asks for your income from all sources, but also your Social Security number. These items seem innocuous at first glance, and may well be so. However, such personal information as income, coupled with your Social Security number, may very well be just one more step toward George Orwell's *1984* —and is certainly an unjustified invasion of privacy.

It is not that we disapprove of the National Register. We know that Congress instructed the NSF to maintain the register, and we realize that it is an important adjunct to our national security (we also realize that the register, for various technical reasons, needs our Social Security numbers). And it is not that we disapprove of the AIBS knowing our incomes. We agree that it

should, for by having such information it can work toward higher salaries for biologists. Our point is that biologists' incomes are of no concern to the NSF's National Register, and if the AIBS wants such information it should find some other way to gather it.

No matter how well intentioned governmental organizations may be today, and no matter how much they assure us that such information is confidential, there can be no assurance that the information may not be used for other purposes tomorrow.

We therefore urge you to protest this invasion of your privacy—both by not giving the information asked and also by writing directly to Dr. John R. Olive of the AIBS and asking that information on incomes be gathered in some other way.—C.W.H.

Literature Citation Abbreviations—A Waste Of Time

C. W. Hart, Jr. and Betty Ursomarso
Academy of Natural Sciences of Philadelphia

Unlike women's skirts, the more abbreviated a journal citation, the less it reveals. Yet, despite scientists' alleged cravings for accuracy, they (and their editors) persist in demanding that journal titles in literature citations be abbreviated—sometimes to a point approaching absurdity, sometimes apparently abbreviated just for the sake of abbreviation.

When asked why they abbreviate journal citations, those who are concerned with such things (usually editors) reply vehemently that the abbreviations save space, and that a saving of space is equivalent to a saving of money. To both of these assumptions we say "nonsense!" The only scientific publications that can use abbreviations with good reason are certain catalogues and abstracting journals.

In the first place, equating space with money in this instance is, if not actually erroneous, certainly carrying economy to a damaging extreme. The time spent by an author determining the abbreviations used by the journal to which he plans to submit his papers must be accounted for—as must be the time spent by the interested reader who must somehow determine what the citations mean.

If an editor then says that the expense he is worried about is that having to do with the production of his journal, it can be pointed out that the average literature citation section of a paper consists of comparatively few bibliographic items —often under ten—and that the cost of printing the complete literature citations for ten artieles would be insignificant when compared with the cost of the time spent preparing the abbreviations in the first place.

In order to get a concrete idea of the actual saving incurred by using abbreviations rather than full citations, we had two exceptionally long lists of literature citations set in type (Figs. 1 and 2). One was botanical in content; the other zoological. One consisted of 41 bibliographic items; the other, 70. Both were set twice—once with the journal citations spelled out completely, once with them abbreviated according to the recommendations of the *World List of Scientific Periodicals*, Third Edition.

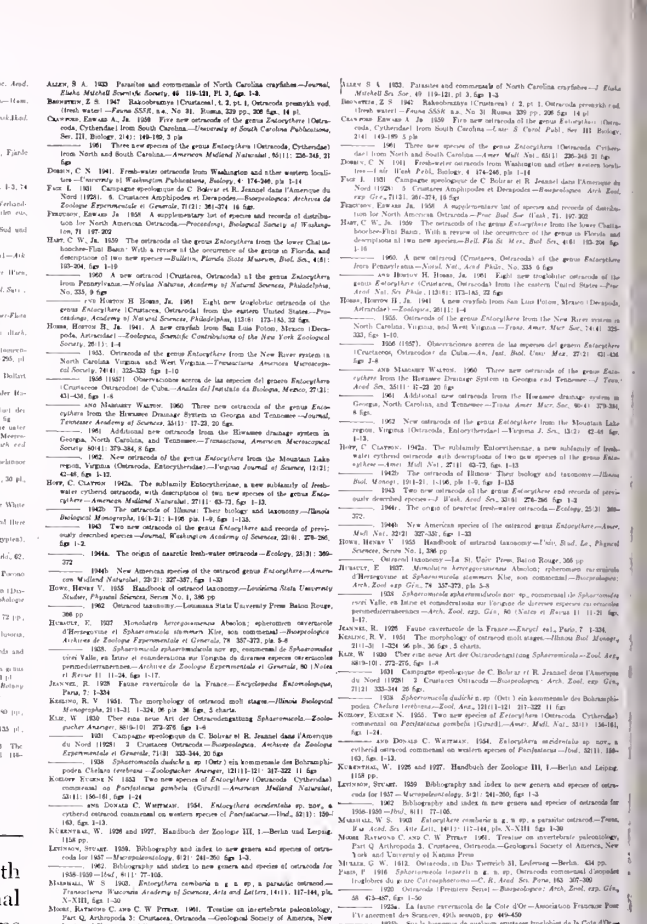
It can be seen from Figures 1 and 2 that the space saving for even an extensive list of citations is small—eight lines out of a total of 88 in a list of 41 citations; 10 lines out of a total of 180 in a list of 70 citations.

To illustrate the situation involving a small number of citations, the bibliographic items shown in Figures 1 and 2 were numbered consecutively and a series of citations representing combinations of one through 15 items were picked from the list by means of a table of random numbers. The results—showing the number of lines saved by abbreviating the citations—are shown in Table 1. The largest number of lines saved was five; none were saved in two instances; the average was 1.7.

The cost of 1.7 lines of type—or for that matter five lines or ten—is not enough to warrant the time spent in forming committees to study abbreviations, preparing approved lists, and seeing that authors follow the prescribed forms.

Fig. 1 (above).—Forty-one bibliographic citations with journal citations complete (left column) and with journal citations abbreviated (right column). These citations were set 28 picas wide in 8 point No. 21 type, one point leaded.

Fig. 2 (right).—Seventy bibliographic citations with journal citations complete (left column) and with journal citations abbreviated (right column). These citations were set the same as those in Fig. 1.



Without going into a long list of the absurdities inevitably connected with abbreviation schemes, an intriguing example of the abbreviators art appeared in a recent list of serial title abbreviations prepared for botanists. The recommended abbreviation for the obscure journal, *Notulae Naturae of the Academy of Natural Sciences of Philadelphia*, was "Not. Nat." Consider for a moment the plight of the biologist in one of the emerging nations whose bibliographic tools might be at a minimum. Were he to actually determine the meaning of those two recommended abbreviations, he could only assume that the journal originated in ancient Rome—or perhaps the Vatican City. Just because a journal is familiar to those who are continually thrown in contact with it does not mean that someone else has heard of it.

On the other end of the scale are those abbreviations that drop just one or two letters and add a period. A saving of *no* charaeters in the first instance; one in the second. These abbreviations-for-the-sake-of-abbreviations occur in many approved lists; for instance, a recently published and much publicized list actually recommends *Compt.* as an abbreviation for *Compte.* Examples of two letters dropped and a period added appear throughout the list.

Wastes are not only involved in the construction and subsequent deciphering of every abbreviation, but potential breakdowns in communication become more and more likely as the short-cuts increase.

The inexcusable practice followed by the editors of *Science,* who merely give the author's name (or names) and the abbreviated journal citation is most disturbing when the possibilities of communication breakdown between the author and his audience are considered. A wrong name, a name misspelled, an obseure journal abbreviation, or an erroneous volume or page number can all lead to potential breakdowns in communication.

Before another editorial board devotes valuable time deciding *what* list of abbreviations its journal will use, let it first seriously consider whether *any* such list merits consideration.

TABLE 1.—A compilation of one through 15 literature citations picked at random from those citations illustrated in Figures 1 and 2, showing the number of lines of type saved when the citations are abbreviated according to the recommendations of the *World List of Scientific Periodicals.*

Number of literature eitations	Lines of type with citations complete	Lines of type with citations abbreviated	Lines saved
1	3	2	1
2	6	6	0
3	6	5	1
4	10	10	0
5	11	10	1
6	16	15	1
7	17	15	2
8	15	14	1
9	20	17	3
10	26	23	3
11	29	26	3
12	30	25	5
13	31	30	1
14	38	35	3
15	33	32	1

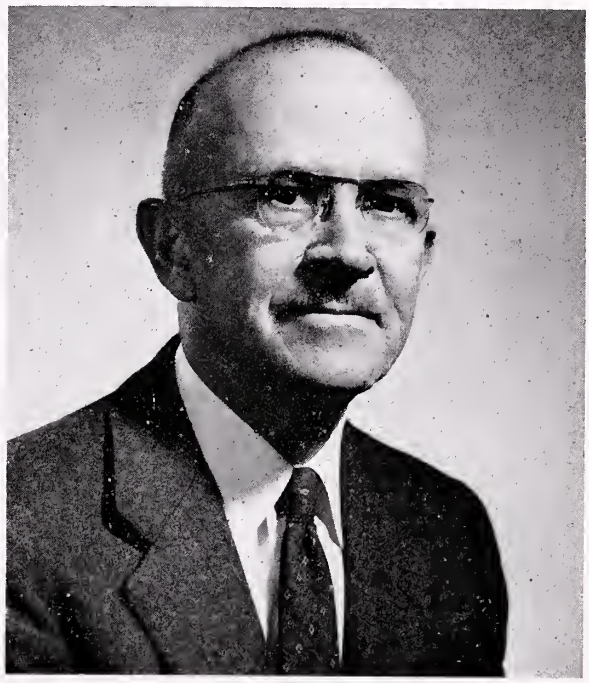
Ruskin S. Freer Is Recipient Of ASB's 1964 Meritorious Teaching Award

The 1964 Meritorious Teaching Award which carries with it a gift of $100 from the Will Scientific, Inc., was presented to Dr. Ruskin S. Freer of Lynchburg College, Lynchburg, Va.

Born and educated in Ohio, Dr. Freer received a Bachelor's degree from Hiram College and a Master's from Ohio Wesleyan University. Subsequently he did graduate work at Oberlin, Cornell, Ohio State, and the University of Virginia. He received an honorary Doctor of Science degree from Culver-Stockton College.

After teaching a short time in the public schools of Ohio and at Milligan College in Tennessee, he joined the faculty of Lynchburg College in 1924 where he continued a teaching career distinguished by the number of enthusiastic biologists which came from his classes. He has also taught certain summers at Mountain Lake Biological Station in Virginia and at the University of Pittsburgh.

Professionally he has been active as the author of botanical and ornithological papers. He was the founder and first president of the Virginia Society of Ornithologists and he has been the editor of *Claytonia* and the *Virginia Journal of Science.* He is an authority on the flora of the



RUSKIN S. FREER

Blue Ridge of southwestern Virginia, as witnessed by Dr. Fernald in his preface to the last edition of *Gray's Manual*, and is a member of the Association of Southeastern Biologists, a fellow of the AAAS, and a member of other scientific organizations.

However, the most important contribution he has made has been in the quality and the numbers of students whom he has stimulated to become good professional biologists.

Books and Periodicals

FAMILIES OF FLOWERING PLANTS OF SOUTHERN AFRICA. Herbert Parkes Riley. University of Kentucky Press. Lexington. November, 1963. xviii + 269 pp., 144 full-color illustrations, 3 maps, Foreword by M. R. Levyns. $14.

This beautifully printed, illustrated, and produced book provides the general botanist with an excellent introductory survey to the rich and varied flora of Africa south of Tanganyika and the Congo Republic. Three full page maps correlate the political divisions, physiographic features, and vegetation regions, respectively, of the area concerned. Concise but adequate descriptions are furnished of 411 plant families (with tribal consideration of some of the larger ones) represented in South Africa. To information concerning a family as a whole is added that pertaining to its representatives in the area. Chromosome numbers are presented as known for African taxa. Phytogeographical information, including the numbers of endemics of the various groups, is an added helpful feature. The economic importance of the plants treated is pointed out and discussed.

Both verbally and pictorially the book presents a brief but clear picture of a large and somewhat unusual flora which is far removed, and mostly outside the common range of knowledge of most American botanists. This should cause it to be a sought after source book by plantsmen of this country and—it would seem—of Europe, as well. In addition, it would appear to be a helpful addition to the libraries of South African botanists and horticulturists, whether they be professional or amateur. —Walter S. Flory, Wake Forest College.

Books received recently

The following books have been recently received by the ASB. Should any member of the ASB wish to review one of these books in return for the review copy, please write to *Mrs. Betty Ursomarso, Assistant Editor, Academy of Natural Sciences, 19th & The Parkway, Philadelphia 3, Penna.*

TAZIMA, YATARO. 1964. *The Genetics of the Silkworm.* Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 253 pp. $9.95.

WILLIER, BENJAMIN H. AND JANE M. OPPENHEIMER. 1964. *Foundations of Experimental Embryology.* Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 225 pp. $5.95.

WANG, G. H. 1964. *The Neural Control of Sweating.* Univ. of Wisconsin Press, Madison, Wisconsin. 129 pp. $5.00.

WALLACE, ALFRED RUSSEL. 1869. *The Malay Archipelago.* Dover Publications, Inc., New York. 515 pp. $2.00. (A Dover Reprint.)

News of Biology in the Southeast

About People

Robert A. Jervis, B.A., Dartmouth, M.A., Ph.D., Rutgers, has accepted a position as assistant professor of biology at Emory & Henry College, beginning with the fall semester. He will spend the summer touring Europe from the Scandinavian countries to Sicily, making color pictures for National Geographic Magazine.

Paul C. Bailey has joined the faculty at Birmingham-Southern College as Professor of Biology and Chairman of the Department. Dr. Bailey was previously Chairman of the Department of Biology at Alabama College. He has received a research grant from the U. S. Atomic Energy Commission for $7,978 to continue his work on ultraviolet- and X-ray-induced aberrations in pollen tube chromosomes of *Tradescantia.*

Dan C. Holliman, Assistant Professor of Biology at Birmingham-Southern College, is currently cooperating with Dr. Gordon Orians of the University of Washington on a research problem dealing with redwing blackbird ecology.

Dan Kimbrough, currently a graduate student at Auburn University, will join the staff of Birmingham-Southern College in September as an assistant professor of biology. His area of interest is physiology.

Dempsey L. Thomas, Biology Teacher, Riverview High School, Sarasota, Florida will participate in a Biology Institute for high school teachers in India this summer. The institute is one of several in biology, chemistry, physics, and mathematics sponsored jointly by NSF and the University Grants Commission in India. The institutes are designed to modernize science education in that country. Thomas has served as President of the Florida Association of Science Teachers, and is Managing Editor of the FAST Journal. Upon his return from India, he will study a year at the University of Texas under an NSF grant.

W. Ralph Singleton, Miller Professor of Biology and Director of the Blandy Experimental Farm of the University of Virginia, will leave this August for a year's stay in Bangkok, Thailand, as a representative of the International Atomic Energy Agency.

J. J. Murray, Jr., Assistant Professor of Biology, will serve as Director of the University of Virginia's Mountain Lake Biological Station this summer. In succeeding years he will alternate in that capacity with **J. L. Riopel**, Assistant Professor of Biology, who was Director in 1962 and in 1963.

Ruskin S. Freer, professor of biology at Lynchburg College, retires June 1, 1964, after 40 years at the college.

The Piedmont University Center has awarded **Arnold Van Pelt**, Professor of Biology, a pilot matching grant to investigate the ant-host parasitization by *Cordyceps unilateralis*, a fungus. The grant is for one year, beginning July 1. Dr. Van Pelt will pursue the initial phases of this work at Mountain Lake Biological Station this summer under a post-doctoral fellowship.

Wilton R. Tenney and **William S. Woolcott**, Associate Professors of Biology at the University of Richmond, have received a grant from the Highlands Biological Station to support their research on the bryozoans of the river gorges near Highlands, North Carolina.

Franklin F. Flint, Chairman, Biology Dept., Randolph-Macon Woman's College, has received a Fulbright-Hays research fellowship and will be at Estacao Agronomica Nacional, Oeiras, Portugal during the academic year 1964-65. **Dr. Flint** and **Dr. Dorothy L. Crandall** will attend the X International Botanical Congress at the University of Edinburgh, Scotland, during August.

Kenneth P. Stevens is retiring in June as chairman of the Department of Biology at Washington and Lee University, Lexington, Virginia.

Henry S. Roberts has been appointed chairman of the Department of Biology at Washington and Lee University. Dr. Roberts will come to Washington and Lee from Duke University, Durham, North Carolina, where he has been Associate Professor of zoology since 1952.

James C. McDonald, Wake Forest College, has received a $16,800 National Science Foundation grant to study the morphology and ecology of North Carolina myxobacteria. The grant is for two years, and will support a graduate student in addition to his own research.

Alice Louise Bull of the Department of Zoology and Physiology, Wellesley College, will assume her duties as Associate Professor of Biology at Hollins College in September, 1964.

James W. Hardin, Associate Professor of Botany, North Carolina State, will teach the course in Taxonomy of Seed Plants at Mountain Lake Biological Station the second term of this summer session.

Royall T. Moore will join the faculty of the Department of Botany, North Carolina State, as Assistant Professor. Dr. Moore has been Assistant Research Biophysicist in the Electron Microscope Laboratory, University of California, Berkeley. He will begin a teaching and research program in mycology.

J. Gerald Eller, Professor of Biology at Western Carolina College, Cullowhee, N. C., has been named Chairman of the recently created Department of Biology. Prof. Clinton F. Dodson will continue as Head of the Science Department.

Donald E. Davis, Department of Botany and Plant Pathology, Auburn University, has been elected president of the Auburn University Chapter of Sigma Xi. As a participant in the Alabama Academy of Science Visiting Scientists Program, he gave one lecture titled "Plant Growth Regulators" and another titled "Alabama Wild Flowers" to student groups at Foley High School.

E. J. Cairns, Department of Botany and Plant Pathology, Auburn University, spoke to the Auburn High School Biology Club on "Macro- and Micro-Photography in Science." He presented two programs at Enterprise High School on the Alabama Academy of Sciences Lecture Program; one on "Alabama Wild Flowers" and one on "Plant Growth Regulators."

D. E. Davis, Department of Botany and Plant Pathology, Auburn University, visited the NASA Ames Research Center, Moffett Field, California, March 8-11. Dr. Davis conferred with Dr. **K. Yokoyami** of the Center on exobiology and other aspects of bioscience in space research. He also familiarized himself with the space research program as it relates to the station's bioscience program in reference to plant physiology.

Emory Ford Eastin, a doctoral student in botany, Auburn University, has been awarded an air pollution special fellowship by the National Institutes of Health. Eastin will use the fellowship while studying under the direction of Dr. **Donald E. Davis**. His research will be concerned with fundamental aspects on the action of herbicides in plants. Eastin holds B.S. and M.S. degrees received from Mississippi State University.

J. L. Seal, professor, Department of Botany and Plant Pathology, Auburn University, was accorded the honor of being Professor Emeritus, July 1, 1963. This is the first such emeritus rank granted to a member of the Department of Botany and Plant Pathology.

Ralph E. Motsinger, doctoral student in botany, was awarded second place and a $15.00 cash award in the Graduate Student Research Award category of the Alabama Academy of Science, April 2-4, 1964, Auburn University, Auburn, Alabama.

Wayland A. Shands, Jr. is a new Assistant Professor of Botany and Plant Pathology at Auburn University. A native of Colorado, he received his B.S. in agronomy from the University of Maine, and M.S. in plant pathology from the University of Delaware. He has fulfilled resident requirements for the Ph.D. at Pennsylvania State University. He will teach courses in botany.

H. H. Funderburk, Jr., Department of Botany and Plant Pathology, Auburn University, has been appointed by President **Ralph B. Draughton** to serve on the Research Council.

Ralph E. Motsinger, graduate student aide, Department of Botany and Plant Pathology, Auburn University, has been appointed instructor in botany for the winter and spring quarters. Motsinger, who will receive his Ph.D. degree in June, will instruct students in elementary botany courses. He holds the B.S. degree in agronomy from North Carolina State College where he was an honor graduate, and the M.S. degree in botany from the University of Maryland.

Eldon J. Cairns, Department of Botany and Plant Pathology, Auburn University, has been appointed a member of the Subcommittee on Nematodes, Agricultural Board, National Aeademy of Sciences.

U. L. Diener and **N. D. Davis**, Auburn University, received a Public Health Service grant in support of a research project on "Growth and Toxin Production of Food-Storage Fungi." The grant, covering a three-year period, was funded in the amount of $35,230.

D. E. Davis and **H. H. Funderburk, Jr.**, Auburn University, received a Public Health Service grant in support of a research project on "Fate and Mechanism of Action of Herbicides." The grant, covering a five-year period, was funded in the amount of $84,700.00.

H. H. Funderburk, Jr., and **J. M. Lawrence**, Department of Zoology-Entomology, Auburn University, received a Public Health Service grant in support of a research project on "Effect of Herbicides on An Aquatic Environment." The grant, covering a three-year period, was funded in the amount of $70,000.

H. H. Funderburk, Jr., Auburn University, received a grant in the amount of $3,000.00 from California Chemical Company for research with the herbicides diquat and parquat.

D. E. Davis, Auburn University, received a grant in the amount of $4,000.00 from the Geigy Chemical in support of research on the physiological relationships of atrazine herbicides.

U. L. Diener and **J. A. Lyle**, Auburn University, received grants of $500.00 each from American Cyanamid Company, California Chemical Company, Diamond Alkali Company, and Tennessee Corporation for plant disease control research on apple, peach, peanut, and pecan.

W. van der Zweep, head of weed control, Wageningen, The Netherlands, visited weed researchers in the Departments of Botany and Plant Pathology and Zoology-Entomology at Auburn University recently. Dr. van der Zweep was one of the guest speakers at the recent Weed Society of America meeting in Chicago. He is active in research in his country and is primarily responsible for organizing the European Weed Research Council.

Norman G. Sansing, Biology Division, Oak Ridge National Laboratory, presented a seminar to the Plant Science Institute, Auburn University, on May 4. His subject was "Nucleic Acid Metabolism in Plants." A native of Bibb County, he received a B.S. in agriculture from Auburn in 1954, M.S. in botany in 1959, and a Ph.D. in plant physiology from Iowa State University.

John G. Barker, Head, Division of Natural Sciences, Radford College, will be teaching an experimental biology course of six weeks duration in Woodson High School, Fairfax County. This course of study is sponsored and financed by the Fairfax County School Board in order to enrich the educational experiences of high school students. Twenty students will be selected for participation on the basis of their attainments, interest and teacher's recommendations.

Richard L. Hoffman, Professor of Biology, Radford College, will be in Europe this summer to carry out one phase of his current NSF supported project on the systematics of chelodesmoid millipeds. The main purpose is to restudy type specimens in various collections, chiefly of species described in the last century on the basis of characters which are no longer adequate for the definition and recognition of species and genera. Over a period of nine weeks Dr. Hoffman will visit Amsterdam, Geneva, Brussels, Munich, Vienna, Frankfurt, Berlin, Hamburg, and London, with major stopovers of two weeks for both Vienna and Berlin.

Daniel E. Marvis, Jr., Assistant Professor of Biology, Radford College, will attend NSF sponsored summer institute in Animal Behavior, given by Michigan State University. The institute will run from July 6th to August 14th.

David Moore, Assistant Professor of Biology, Radford College, will attend the NSF sponsored Institute in Microbiology for College Teachers at the University of Southwestern Louisiana at Lafayette, La., from June 8 until August 7th.

Institutions and Organizations

The Division of Natural Sciences and Mathematics of **Lynchburg College** has received a grant from the National Science Foundation which will include funds for a plant growth room and a greenhouse.

The **Mountain Lake Biological Station** has recently added to its facilities a laboratory equipped for year-round use. It combines a research laboratory with an efficiency apartment in order to provide both living and working space for the investigation of field problems throughout the year. Applications for the use of this unit should be addressed to the Director, Mountain Lake Biological Station, Department of Biology, University of Virginia, Charlottesville, Virginia.

Greensboro College has received a matching National Science Foundation award of $11,940 for the purchase of instructional equipment. The liaison officer who will direct the project is Dr. Arnold Van Pelt, Professor of Biology. The funds will be used to up-date equipment in biology for both course work and independent study programs.

The **North Carolina Academy of Science** recently received a grant from NSF to support a project for 1964-65 in which seven colleges in the state will direct a group of high school teachers in new methods of teaching high school biology. BSCS methods will be used in each group. Eight high school teachers will be associated in each group and two members of the biology staff of each college will act as consultants. Contributions from the Curriculum Study Project in North Carolina made possible the inclusion of the seventh group. Colleges involved are: East Carolina College; N. C. State of UNC, Raleigh; Wake Forest College; Charlotte College; Davidson College, Appalachian State Teachers College and Pfeiffer College. Dr. John A. Yarbrough, Meredith College, is director of the program.

The **University of Georgia** received an NSF grant for Research Participation by college teachers in plant taxonomy for the Summer 1964. Appointments announced by Wilbur H. Duncan, Director, are Wayne Faircloth, Valdosta State College, Valdosta, Ga.; Philip F-C Greear, Shorter College, Rome, Ga.; and Edward J. P. Hauser, Kent State University, Kent, Ohio.

Biologists who take offices in the **Georgia Academy of Science** for 1964-65 are *President*, Dr. Wilbur H. Duncan, Dept. of Botany, Univ. of Georgia; *Secretary*, Dr. Jack T. May, School of Forestry, Univ. of Georgia; *Editor of the Bulletin*, Dr. Branch Howe, Dept. of Bacteriology, Univ. of Georgia; and *Historian*, Dr. W. B. Baker, Univ. Museum, Emory University.

The Department of Biology, **Western Carolina College**, Cullowhee, N. C. has been awarded a National Science Foundation Grant to be used in equipping two new laboratories. One of the new labs will be used for courses in animal physiology, plant physiology, and microbiology; the other, for a new freshman course in molecular and cellular biology which will be prerequisite for all botany and zoology courses.

The **Smithsonian Institution** initiated a three-year biological survey of the Island of Dominica, B.W.I. in January. Horton H. Hobbs, Jr., and Richard S. Cowan are serving as co-directors of the project. Dr. Hobbs was in Dominica from January to April, and C. W. Hart, Jr., spent a week there in March.

Recent deaths

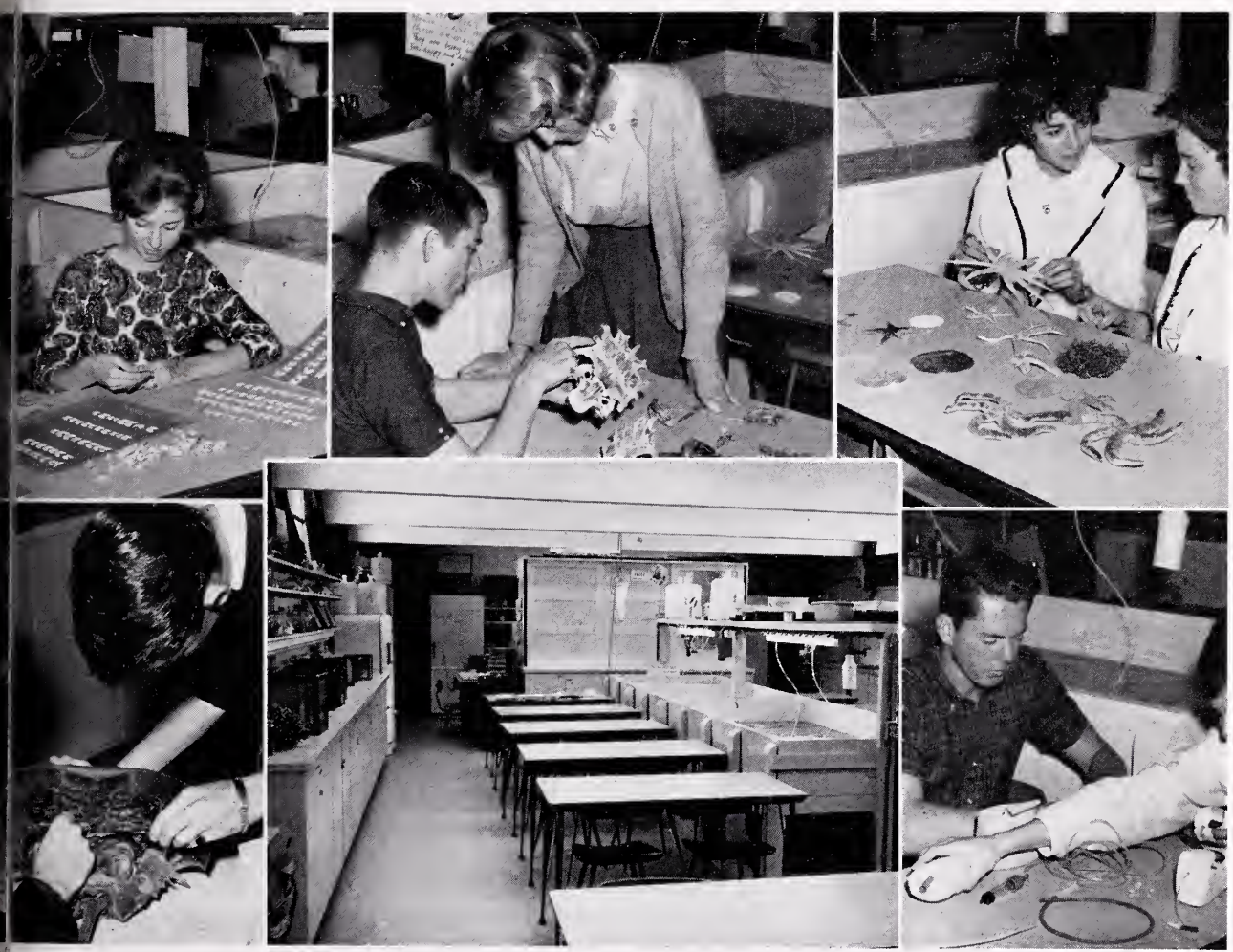
Dean and Professor Emeritus **Ivey Foreman Lewis**, University of Virginia, 16 March 1964.

Professor **Henry G. Good**, Auburn University, 10 April 1964.

Professor **J. T. Penney**, University of South Carolina, 29 March 1964.

The ASB BULLETIN

Volume 11, Number 4 October, 1964



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RIVERVIEW HIGH SCHOOL MARINE LABORATORY—SEE PAGES 78 AND 87-89

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The Association of Southeastern Biologists

ASB BULLETIN

Volume 11, Number 4—October 1964

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Editor

Margaret Y. Menzel, Associate Editor
Betty Ursomarso, Assistant Editor
Leland Shanor, Business Manager

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Riverview High School Marine Laboratory, Sarasota, Florida
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ASSOCIATION AFFAIRS

Minutes of the Business Meeting, 17 April 1964

The business meeting was called to order by President Jones at 11:45 A.M., April 17, 1964.

SECRETARY'S REPORT: The secretary reported that 70 new members had joined the Association in 1964 and that the active membership totalled 1052 and that there were 24 Emeritus Members. He stated, also, that there were 39 library and institutional members and

(*Continued on page 99*)

AN APPRAISAL OF THE PRESENT STATUS AND FUTURE OF ESTUARINE-OCEANOGRAPHIC LABORATORIES OF THE SOUTHEAST[1]

Federal Laboratories With Special Emphasis on the Bureau of Commercial Fisheries Radiobiological Laboratory

T. R. Rice, *Director*
Radiobiological Laboratory, Bureau of Commercial Fisheries, Beaufort, North Carolina

Most of the laboratories in the southeastern United States concerned with estuarine and oceanographic research and supported by the federal government are Bureau of Commercial Fisheries laboratories. These laboratories are situated along the Gulf and Atlantic Coasts from Galveston, Texas to Beaufort, North Carolina, where the Radiobiological Laboratory is located. In addition to these laboratories, the Bureau of Commercial Fisheries has others located throughout the United States including Alaska and Hawaii.

Federal Support of Oceanographic Research

The Federal Government, without doubt, is the largest single organization or agency supporting research in the United States. Recently, a revolution has occurred in the interrelations of industry, the federal government, and universities in mounting the nation's scientific effort, as shown in the distribution of some $12 billion spent in a recent year on research and development. Industry used most of these funds. However, the federal government furnished most of industry's funds, all of the government's, and most of the universities'.

Large scale research such as the Manhattan Project, which gave us the atomic bomb, and NASA, which claims it will put a man on the moon in the sixties, probably could not have been financed by any other organization than the Federal Government. Another large research program of the Federal Government is in the field of oceanography.

Interest in oceanography has been aroused and is increasing because man's knowledge of the ocean is limited indeed when compared with its importance to him. The time has come when this condition must be changed. To speed this change the Federal Council for Science and Technology has given the Interagency Committee on Oceanography the assignment of planning and coordinating programs in the science of oceanography sponsored by government agencies. Of the total money received for the National Oceanographic Program for fiscal year 1964, 40 percent will be spent on research, with the remainder going for supporting functions.

The Interagency Committee on Oceanography is composed of members from the Atomic Energy Commission, National Science Foundation, Public Health Service, the Smithsonian Institution, and Departments of Commerce, Interior, State, and Treasury. The Department of Interior received 12.1 percent of the National Oceanographic Program Budget for fiscal year 1964. A portion of these funds are allocated to the Bureau of Commercial Fisheries.

Bureau of Commercial Fisheries

The Bureau of Commercial Fisheries, which is a part of the U. S. Fish and Wildlife Service, is composed of four divisions (Figure 1). Estuarine and oceanographic research are conducted within laboratories under the Division of Biological Research. These laboratories come under the supervision of the four Branches of the Division of Biological Research: Anadromous Fisheries, Inland Fisheries, Marine Fisheries, and Shellfisheries.

In the southeastern United States the Bureau presently supports five laboratories. At Galveston, Texas the Biological Laboratory is concerned with shrimp biology and population dynamics, estuarine ecology, experimental biology, industrial bottomfishes, and the chemistry of sea water. The Biological Laboratory at Gulf Breeze, Florida is studying the environment in order to determine the effect of man on estuaries and the effects of pesticides on marine organisms. At the Biological Laboratory at Brunswick, Georgia systematics and life history studies of fishes of the western North Atlantic are being

[1] The three papers printed here, by T. R. Rice, L. R. Pomeroy, and Albert Collier, respectively, were presented as an invited symposium at the 25th annual meeting of the Association of Southeastern Biologists in Atlanta, Georgia, on 16 April 1964.

followed. There are two laboratories at Beaufort, North Carolina: the Biological Laboratory and the Radiobiological Laboratory. The biological Laboratory research is concentrated primarily on menhaden, blue crabs, and striped bass. The research of the Radiobological Laboratory will be treated at greater length in this paper. In addition to these laboratories, the Bureau supports a number of field stations. Possibly the largest of these stations is located at St. Petersburg Beach, Florida. This station is studying estuarine ecology and the problem of red tide.

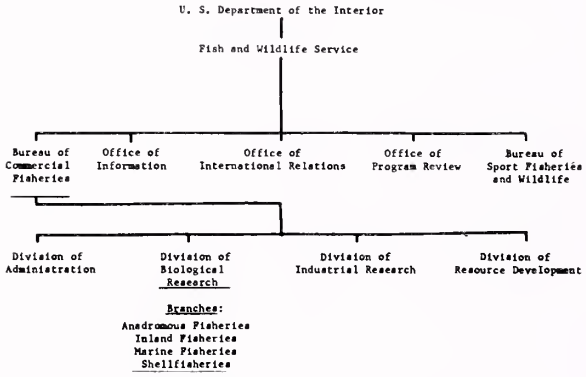


FIGURE 1.—Organizational chart of the Bureau of Commercial Fisheries, Fish and Wildlife Service.

Radiobiological Laboratory

The Bureau of Commercial Fisheries is vitally concerned with any situation that might adversely affect our fishery resources. The introduction of radioactive materials into the aquatic environment might constitute such a situation, and those in the Bureau who so quickly saw the need of a Radiobiological Program to study such problems deserve much credit for their insight. Although there now exists a widespread interest in radiobiology and many organizations in this country and throughout the world are engaged in radiobiological research, the Bureau's program carried on at the Radiobiological Laboratory was one of the first to be initiated and continues to be unique in many respects.

The Radiobiological Laboratory has the responsibility for advising the Bureau of Commercial Fisheries on matters pertaining to pollution from uses of atomic energy, for investigating instances of reported radioactivity in seafood, for training personnel in techniques of radioisotope application to fishery problems, and for carrying on research pertaining to basic aspects of fishery biology.

Atomic Plants and Power Reactors

An increasing number of atomic plants and power reactors are being planned or constructed by private industry under license by the Atomic Energy Commission. These are located on streams, estuaries, or the seacoast. All such plants pose problems of possible radioactive contamination of the environment. It is conceivable that these plants or nuclear power reactors could have some effect upon fish, shellfish, or wildlife in the surrounding area, since they release some radioactivity to the environment and raise the water temperature by the return of coolant water heated in the reactor. Therefore, it is understandable that the local citizens and various fish and game organizations show their concern. There is need for assuranee that the installation creates no significant hazard in this regard. The Fish and Wildlife Service, in order to carry out its functions in protecting our fish and wildlife resources, we must keep informed of any activities which might have adverse effects on our resources.

Fishing Industry

The fishing industry may be confronted at some future time with the problem of marketing seafood which supposedly contains radioactivity. This could cause serious loss of markets. In such situations there is a definite need for a Radiobiological Laboratory within the Bureau of Commercial Fisheries, so that the Bureau can be in a position to thoroughly assess the situation. The proper performance of such functions requires a knowledge of the fate of radioactive materials introduced into the aquatic environment. This knowledge has been gained largely as the result of laboratory experiments conducted along the lines of the original objectives of the program.

Training

We have encouraged persons interested in acquiring training in radioisotope techniques to come to our laboratory. Our facilities have been shared with graduate students, professors, Fish and Wildlife Service personnel, and foreign investigators. The rapid advances in this field require continual training of both new and old employees of our own program. Our staff has completed a training course given at our laboratory by the Mobile Laboratory Group of the Oak Ridge Institute of Nuclear Studies.

Organization of Research

The widespread use of isotopes produces a host of related problems which can be solved more easily by investigators in related fields working in the same laboratory than can be accomplished by individual investigators working at separate locations. A group of such investigators can offer: (1) a team approach in solving problems, (2) more efficient use of costly equipment needed for this work, (3) continuity to the

research work, (4) convenience for sponsors of research, and (5) a much broader approach in the research program than available to an individual investigator. The staff of the Radiobiological Laboratory has been organized with these points in mind. The research interests are broad and the staff numbers 24, including 8 Ph.D.'s.

The research of the Radiobiological Laboratory is divided into the broad areas of estuarine ecology, biogeochemistry, pollution studies, and radiation effects (Figure 2). These four areas of research are called programs. Within each program are a number of projects. Each project leader has considerable freedom in planning the details of his research, resulting in a wide variety of interests. For example, there are projects concerned with ion transport in eells, productivity of estuaries, and trace elements in sea water. The four program chiefs, along with the laboratory director, considered the broader aspects of the research program and decide when two or more programs should cooperate in solving problems too general to be handled completely by a single program or project.

There are three general problems with which most research is concerned. These are: (1) the fate of radioactive materials in the marine environment, (2) the effect of radiation on marine organisms, and (3) the applieation of radioactive tracers to fishery biology. In the past many data have been colleeted in the laboratory in order to be able to predict what might happen to radioactive materials introduced into the marine environment. More recently the use of tanks and ponds has permitted the testing of questionable findings obtained in the laboratory. Present plans are to use certain natural bodies of water, restricted from the public, for observing the eycling of radioisotopes.

More complete and accurate information on the sensitivities of marine organisms to ionizing radiation is needed in order to predict and evaluate results occuring from radioactive contamination. The limited amount of data on the effects of radiation on marine organisms now available deals mostly with levels of radiation necessary to cause death or to severely alter the normal embryology and development of these organisms. One of the most probable effects of sublethal ionizing radiation is a change in the genetic material. With the new facilities of the Radiobiological Laboratory, a knowledge of radiation effects may be used to increase production of the marine environment sinee all mutations from radiation are not necessarily detrimental. With the use of radiation and controlled breeding experiments, larger, faster growing, and more resistant strains of commercially important species may be produced. Also, controlled irradiation may prove to be useful in eradication of undesirable species through sterilization or mutation.

Many new research possibilities have arisen in the field of fishery biology as radioactive materials have become available. The great sensitivity in the determination of radioactivity has made possible the application of traeers to problems beyond the range of standard methods. Radioisotopes have been used in fishery biology to (1) measure primary productivity, (2) determine feeding habits and rates and the extent to which "food" is utilized, (3) follow physiological processes, (4) determine the cycling of nutrients, (5) label or mark marine organisms, and (6) trace sediment and water movement.

The Future

Support for federal laboratories has increased in the last few years. The Radiobiological Lab-

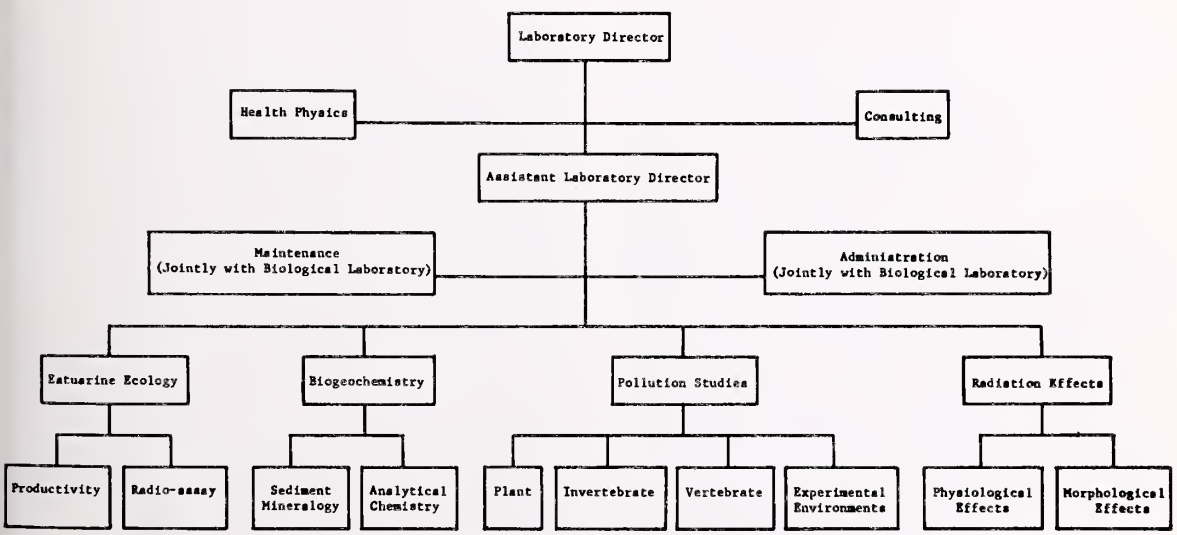


FIGURE 2.—Organizational chart of the Radiobiological Laboratory, Beaufort, North Carolina.

oratory has received appropriations for the design and construction of two laboratory buildings to be used specifically for radiobiological research. The larger facility, a two-story structure 188 feet long and 52 feet wide, will contain various types of laboratories, salt water rooms, offices, counting rooms, and special facilities for handling radioisotopes. The smaller building, 34 x 59 feet, will be used for studies of the effect of radiation on marine organisms. This building will house two cobalt-60 sources. One of these, a 50-curie source, will be placed in a 21 x 23-foot radiation room with 3-foot concrete walls and will be used for studies of the chronic effects of low levels of radiation. The other will be a self-contained drawer-type irradiator containing 1,500 curies of cobalt-60 and having a dose rate of 30,000 roentgens/hour. Organisms will be placed in a special chamber in the irradiator that will allow them to be maintained in flowing sea water while being irradiated. Construction of these buildings was completed in June 1964.

The rapid growth that has occurred in marine research in the southeastern United States during the last decade, no doubt, will continue. With the increased emphasis on oceanography, federal marine laboratories will grow in size and number. Already, the Bureau of Commercial Fisheries is building another laboratory. This new laboratory will be located at Miami, Florida near the University of Miami Marine Laboratory. It will be concerned with investigations of the Tropical Atlantic.

Cooperative Training Programs In Southeastern Marine Laboratories

L. R. Pomeroy
Marine Institute, The University Of Georgia

The demand for marine scientists is growing steadily, and it can be expected to continue to grow as we look to the sea for more resources. The present demand comes primarily from educational institutions and from federal and state agencies. As we move gradually from an age of exploration of the sea to one of utilization, more demands will come from industries for marine scientists.

Awareness of the demand for marine scientists is growing, but not fast enough. Many students in high schools and colleges still are being told that the only financially sound biological careers are in medicine. In fact, there are many. There is also a general lack of understanding about what marine biologists do and what their training entails. Most people associate marine biology with SCUBA diving. While this has a place in some kinds of scientific work, it is by no means the primary occupation of marine biologists. The marine biologist today is not a fish watcher. He gets the same training in a broad spectrum of basic sciences that any other biologist would. In fact, the training of the marine biologist is perhaps broader than that of some other biologists, because of his need to understand something about the physics, chemistry, and geology of the sea.

Probably the Southeast is not supplying its own needs for new marine biologists today, although the shortage of this commodity is worldwide. One way to broaden the base for training is through cooperative training programs. Not every university can have a marine laboratory or an oceanographic vessel, but cooperative training programs make it possible for landlocked universities to have an outlet to the sea for their students and faculty. Two cooperative programs exist in the Southeast today, at Duke University and at the University of Georgia.

The Duke University program in oceanography is starting this year. Cooperative fellowships for graduate students are available that will permit them to come to the Duke Marine Laboratory from other institutions and do their thesis research aboard the R/V *Eastward*. Faculty members of other institutions also may go on research cruises on the *Eastward*, and it is possible to take classes in marine biology or related subjects on short training cruises.

Over the past ten years the University of Georgia Marine Institute has permitted qualified graduate students from any university to reside at the Institute and use its facilities. Financial support for these students has varied, but typically they have been supported either through a grant to their major professor from a federal agency or by a fellowship from a federal agency. Students have come from such institutions as Emory University, the University of Michigan, Harvard, and Dalhousie. The research area includes the estuaries and the continental shelf.

There are some problems inherent in cooperative programs that we have come to recognize and expect. I shall mention some of them in the hope that it may help persons who are planning cooperative teaching or research programs.

For the graduate student there is the problem of diffuse, or at least remote, guidance. With his major professor at a distance, the student

may depart from his research plan when things do not go as anticipated. He may get conflicting advice from various *ad hoc* sources. Some students are sufficiently mature and competent to avoid this pitfall, but many are not.

Even when the graduate student does have advice from his major professor or his committee, this may leave something to be desired, if it is of the mail-order variety. In one case, a student obtained detailed written advice from his professor and every member of his committee, none of whom had ever visited the laboratory or seen the study area. While we cannot hope to have seagoing doctoral committees, the major professor should be expected to know the study area and the laboratory facilities. He should present this information to the committee and help the student both in formulating his problem and in starting the actual research on the scene.

The basic problem, probably, is one of communication between persons and institutions. If cooperative training programs are to succeed, major professors must expect to put more than the usual time and effort into the programs. They must be regular participants in research at the cooperative laboratory, or at least they must be regular visitors who know at first hand the important research questions in their field and the technical or logistic problems that may be involved in solving them.

While this problem of communication can be a major one, recognition that it exists should help all concerned to keep active channels of communication. Cooperative research programs offer a great opportunity for broadening the course offerings and research capabilities of many universities. In research areas such as marine research, where specialized facilities are necessary, they may prove to be the answer to the need for more scientists.

State Supported Marine Laboratories: Their Missions And Related Specifications

Albert Collier
Oceanographic Institute, Florida State University

Any appraisal of a marine station, and its present or future plans must be made in the light of its mission. My contribution to this symposium concerns those estuarine-oceanography laboratories supported by states. One group of state supported laboratories is associated with the state university systems, and another group is a part of the state conservation agencies. The functions of the laboratories in these two cases are as different as the missions of the parent organizations.

The state conservation agencies are primarily concerned with the control of the human utilization of renewable marine resources. The marine laboratories in this case exert their main efforts towards the development of information directly applicable to the improvement of fisheries production. These efforts may take a negative form, such as limitations on fishing seasons, areas, types of gear, and size of animals. Positive approaches are taken when life histories, migration patterns, disease control methods, and other such problems are attacked. All of this work is essentially of the applied type.

In contrast to the state conservation agency marine laboratories we have the laboratories of the state universities, whose mission, of course, is education and research. The university curriculum in marine science should be oriented to provide graduates with the broadest possible formal background and the most intensive research experience available. To do this the faculty must engage in high quality research. The research must follow basic lines, and university teaching and research faculty should be chosen to assure that this direction will be followed. The results of basic research provide the nourishment for an advancing technology in numerous fields of human activity and the exploitation of the sea is no exception.

The university laboratory and the conservation agency laboratory should compose an effective team. The university supplies trained personnel and the stimulation inherent in creative basic research. The conservation agency can assist in supporting the work of faculty members and students in basic research which is beyond the scope of its mission.

Against this background of generalities I would like to discuss in more detail the principles guiding the planning and operation of a marine station which is a part of a state university.

The functions of the marine laboratory in this context are:

1) To supplement campus teaching by providing facilities for direct contact between students and the marine environment.
2) As a laboratory site for research on marine problems requiring continuous observation and/or running sea water.

3) As a base for collecting and storing living marine organisms to be transported inland.
4) As a base for floating equipment.

These functions are all extensions of the university campus and in themselves do not eonstitute complete programs in oceanography, since all the resources of a university campus are needed to back up such a program. Yet the shore laboratory, to be really effective must be as self sufficient as possible, intellectually as well as physically and logistically. This degree of self sufficiency can only be attained through the year round presence of a research staff, and this requires certain minimal facilities. The specific facilities for a given researcher will depend upon his interests, but there are eertain types of general equipment with which such a laboratory should be furnished.

Perhaps the greatest problem in the successful operation of anv shore establishment is that of isolation. People, generally are gregarious, and locations suitable for marine laboratories have a habit of ignoring that human instinct. Many of us welcome a few weeks at some isolated seashore for contemplation and the production of great ideas, but too much of a good thing can become noxious, especially to the permanent staff. Again the only answer is a situation in which transportation to and from the parent institution is reasonably simple; anything beyond a one-hour auto drive becomes burdensome. But even beyond this there must be sufficient staff to offer the spectrum of personalities necessary for a stable social environment.

From the point of view of political economics an establishment of proper size and substance for offering a good summer teaching and research program should be used 12 months per vear instead of 3 or 4 months. Hence we are faced with the need to design a facility which is self-sufficient for year round operation and yet does not uneconomically duplicate campus assets.

The phvsical attributes most important in the consideration of a site for a shore facility are:

1) Proximity to the campus with easy access by auto.
2) Access to waters navigable to boats of suitable size.
3) Availability of reasonably clean sea water which is not subject to excessive variation in salinity.
4) Sufficient elevation to insure maximum protection against storm damage.
5) An abundance of high quality fresh water.
6) Proximity to a community of sufficient size to make convenient shopping for the daily needs of personnel.
7) Availability of electric power and telephones.
8) Sufficient area to permit construction of boat harbor, laboratories, residential and auxiliary buildings, experimental ponds, and to allow room for future expansion.
9) Availability of a variety of marine environments.

The functional requirements of the laboratory building are (1) class rooms and student laboratories, (2) library, (3) museum, (4) aquaria supplied with running sea water, (5) laboratory rooms for individual investigators in all branches of oceanography, (6) general purpose rooms, such as sterilizing room, distilling room, storage, shipping and receiving, etc. All of these features are required both for teaching and research functions. Of all these facilities, the most troublesome is the circulating sea water system. There is no easy answer. Not many years ago corrosion caused the most difficulty, and when this problem was solved by the introduction of industrial type glass and modern plastics, biological fouling beeame the dominant problem. In some localities suspended solids combine with biological fouling to make it very difficult to circulate useable sea water through a central system in a large laboratory.

The system most generally used is that of an overhead tank supplied by intermittent pumping from the sea. The supply and demand are adjusted to give sufficient time for suspended solids to drop out. However, the accummulated solids and related biota tend to establish an ecological system within the tank which must have some effects on the water leaving it to go to the laboratorv, thus making controlled experimentation difficult or impossible in some cases.

The low turnover rate in the tanks does serve as a damping system on natural salinity and temperature fluctuations. The effectiveness of this action depends on the retention time in the tank.

The settling tank does not necessarily solve the problem of biological fouling, because the seaward intake is submerged and all of the lines between it and the settling tank are exposed to fouling if kept filled continuouslv. Intermittent emptying and drying, especially if there is a dual system, would be helpful. Perhaps the most easily controlled system would be that in which a high velocity, high pressure flow is used. The high velocity within the walls of the pipes makes attachment of organisms practically impossible. A necessary feature of this approach is the "through-flow" or "open-end" pumping of water. In other words the discharge line from the pump is "run by" the table taps, etc. in such a way that water whieh is not needed goes into a wasteline. This permits maximum velocity at all times. A variation on this last arrangement is possible in the elimination of the settling tank. In other words the water flow is direct to the laboratory,

and in cases where there is no appreciable load of suspended solids this would probably be the most satisfactory of all systems. In two cases I have used this system for as long as four years, with very little time lost on breakdowns. The principal objection to these systems is the use of a continuously operating pump and the consequent power bill.

Another promising idea for sandy beach areas, but untried as yet so far as I know, is the construction of a sump in the open sea, or estuary, as the case may be. The construction of the sump is simple in principle—it calls for a walling-in and roofing over of a small piece of sea bottom, say 20′ in diameter. The walls could be constructed of sheet piling and with a roofing of plastic to keep out spray and drifting debris. The bottom is left open. In sandy areas (this idea would not work where the bottom is roeky) seepage up through the bottom should supply a filtered water supply with a minimum of suspended material. The capacity of the sump would be a function of the total floor area and the type of sedimentary materials composing the sea bed. If this idea is sound it would make possible a system of considerable reliability and economy. Fouling organisms as well as suspended solids will have been removed by filtration through the sea floor.

A second feature in the general layout of a marine station really combines two items: a pier and a boat harbor. The pier is one of the most useful tools at a marine station. It provides a stable platform on demand; if it reaches far enough to the seaward it offers water sampling and animal collecting at a variety of depths and from a variety of bottom types. If the site is not located on a rocky coast, boulders can be placed at suitable points along the pier to add environmental variety. At the shore end of the pier aquaria can be set up and supplied with running water, thus combining observations of animals in captivity with those collected in the open water from the pier.

The boat harbor can be constructed in conjunction with the pier with some gain in total effectiveness. The exact plan would depend of course, upon the local terrain. In any event one side of the pier, suitably widened and strengthened, could serve as the main landing for the laboratory boat. On the opposite side the boat-servicing area should be loeated. This would include a marine ways, constructed so as to permit the "hauling-out" of the boat for safety in case of an impending hurricane. The boat harbor should include a ramp for launching outboard rigs and a dry-storage boat-house for small boats in the service of the laboratory.

At an isolated spot in the boat harbor there should be a fueling dock. Fire hazards should be reduced to a minimum.

Suitable arrangements for the transfer of materials from the boat to the laboratory is an often overlooked convenience. Depending again upon the locale, this might simply mean locating the laboratory door at dockside, or the provision of a lift or crane and suitably designed wheeled conveyances for transporting equipment and specimens. Whatever the solution to the problem, it should not be left to chance.

Up to this point we have discussed that part of a marine station which involves its physical contact with the sea. There remains the internal organization of the laboratory itself.

A starting point would be the recognition of the general functions of the laboratory and the physical layout needed to support them. The summer teaehing program has already been mentioned and obviously class rooms and laboratories are central in this respect. Teaching students in direct contact with the marine environment is the most effective way possible to stimulate deep and continuing interest in the subject. The number of students should be as many as resources will allow. It is doubtful that teaching of this nature should be based on the lectures supplemented by laboratory work. The converse of this would be more appropriate, namely laboratory work supplemented by lecturing. In this light a combination laboratory-class room may be the more economical approach. Such a room should be supplied with running sea water and aquaria at eaeh table in addition to larger holding tanks centrally located in the laboratory. The student's lab benches should be designed for a variety of technical operations typical of oceanography—: handling of cores and analysis of sediments, plankton sorting, photometric determinations of chemical attributes, conductivity and specific gravity experiments, light absorption experiments and others. The laboratory teaching would be done as a background for related works in the field.

Teaching work of this nature is not very productive without adequate library facilities. A carefully selected library should be available, but there should be no attempt to stock complete files of all the desireable serial publications. All reeent texts, reference books, current files, and selected journals, should be available. A state-supported laboratory might be in a better situation with respect to library services. Certainly in the case of Florida State University the main campus library is available within an hour's drive of the laboratory.

A museum is as important as the library from the point of view of teaching. The collections should include plants, animals, and geological specimens. All should be properly curated.

When students are learning new groups of animals, classifying the algae from field collec-

tions, or attempting to analyze core collections, reference collections are necessary.

Since graduate teaching is one of the important activities at a marine station and graduate students are for the most part beginning research scientists, an atmosphere of scholarly research must be created as a part of the normal environment. This can only be done through active research performed by scientists who spend most of their time at the laboratory.

It is necessary to provide laboratories for a variety of research areas in oceanography, each with its own peculiar suites of equipment and furnishings. There should be some staff members working at the laboratory almost continuously, with a generous seasoning of visiting investigators.

The Florida State University laboratory at Alligator Harbor is cited here as a state operated laboratory with which I am most familiar at the moment.

When evaluated according to the criteria discussed in the preceding paragraphs, we find the Alligator Harbor laboratory somewhat deficient. It served its purpose well as a beginning, but today the pace is faster and we are planning now for a completely new laboratory at a new site. We have already mentioned the need for a facility sufficiently complete to make it a desireable place for full time, resident investigators. It is our belief that these improvements will bring our shore laboratory into the high degree of usefulness that it should have. The site now being sought offers several important improvements over Alligator Harbor. Water depths in channels to carry vessels up to 6 feet in draft can be obtained. The building sites are of sufficient elevation to prevent damage by hurricane tides. Some 100 acres of land will make future additions possible. On this property facilities meeting the general criteria set out above will be constructed.

In the past the shore facility of the Florida State University Oceanographie Institute has been a biological station. We hope that it will become an oceanographic station encompassing all the varied interests and disciplines that make oceanography what it is.

This means that it shall become more than a collecting base and a place for transient visitors who would not be so transient if suitable facilities are available.

In short, it will be a place where students and investigators of the oceans can bridge the gap between the campus classroom and the open sea.

Martin D. Young Appointed Director of the Gorgas Memorial Laboratory in Panama

Carl M. Johnson, Director of the Gorgas Memorial Laboratory, Republic of Panama, will become Dirctor Emeritus on July 1, 1964. Appointed to succeed Dr. Johnson as Director is Dr. Martin D. Young, who recently retired from the Commissioned Corps of the United States Public Health Service. Before his retirement, Dr. Young served as an Associate Director of the National Institute of Allergy and Infectious Diseases, Bethesda, Maryland.

Dr. Young, one of the world's leading authorities on malaria and tropical diseases, has received many honors for his contributions to research, especially in the field of malaria. In 1963 he was the recipient of the Darling Foundation Medal and Prize awarded by the World Health Organization. Only ten other malariologists have ever been so honored. Recognition of his outstanding service was also made in 1953 when he received the Rockefeller Public Service Award and again in 1946, 1952, and 1960 when he was co-winner of the Jefferson Award of the South Carolina Academy of Science.

Most of Dr. Young's research on malaria was conducted at Columbia, South Carolina, where he was head of the field station of the Laboratory of Parasite Chemotherapy before coming to Bethesda in 1961. His research there was concerned with all phases of malaria, particularly the use of malaria parasites in the treatment of neurosyphilis. During this period he contributed important knowledge of malarial drug resistance and documented cases that showed parasite resistanee to the very drugs which have been among those used most effectively in suppressing and curing malaria.

Since 1950 Dr. Young has served as a member of the Expert Panel on Malaria of the World Health Organization. In 1957 he was a consultant of the International Cooperation Administration mission to the Government of India where he assisted in evaluation of malaria control in that country. He was subsequently named an Honorary Fellow of the National Society of India for Malaria and Other Mosquito-borne Diseases. He had acted as consultant on malaria to World Health Organization and Pan American Health Organization.

A native of Moreland, Georgia, Dr. Young is a member of numerous honorary and scientific societies. He was the first president of the American Society of Tropical Medicine and Hygiene. Currently he is president-elect of the American Society of Parasiologists.

SARASOTA: Spawning Ground For Marine Biologists

John D. Woolever
Riverview High School, Sarasota, Florida

During the past five years, there have probably been as many budding marine biologists spawned in a quiet Gulf Coast community as there have been in any of several marine biological stations. Here there is a noted marine laboratory, two high schools, a science museum, a junior college and an NSF sponsored summer institute offering programs in marine biology. One of these institutions is the result of children's interest in their environment, a conscientious school system, and the efforts of some Southeastern biologists.

Six years ago, several students at Riverview High School, in Sarasota, Florida, prevailed upon their biology teacher to permit them to "*extend* their biology studies" in the laboratory, rather than be enrolled in a study hall. The high school biology course in which they were enrolled was emphasizing the study of *local* plant and animal life, rather than depending upon commercially preserved specimens, which frequently did not represent life as the students saw it every day. Since Sarasota is a city on the Gulf Coast, marine organisms made frequent appearances. As the biology course progressed, it was noted in this new school that even though many of the students lived on the coast most of their lives, they had little knowledge of local marine life. The growing population coming from the north presented a similar situation, with hundreds of students seeing many and strange organisms which they had only read about in books such as Buchbaum's *Animals Without Backbones.* These requested "extended studies," meant—"learn more about the sea and its residents."

Within three months, more than a dozen students had their study hall membership transferred to a group which soon spent its time studying marine invertebrates. As is natural for this age group, a biology club had formed, and by January, they were sending packages of marine specimens to other biology clubs all over the United States, including Alaska, and, of course, the interior of Florida.

Collecting, dissecting, preserving, reading, and studying habitats is not enough if you really have an interest in biology. Keeping them alive and studying behavior is probably more interesting than anything else. This meant hauling in saltwater, aerating, filtering, and resisting corrosion. These problems led to an interesting solution which resulted in students from many parts of the United States coming to Riverview High School to study Marine Biology. This past summer, approximately eight high school biology teachers and eighteen students of high ability from many parts of the United States were enrolled in a NSF program, jointly sponsored by the Cape Haze Marine Laboratory and the Sarasota Board of Publie Instruction. Most of the work was conducted at the Riverview Laboratory, where facilities are much like the typical marine station anywhere in the country. Chief instructor of the program was Dr. Harold J. Humm of Duke University, former director of both the Florida Oceanographic Institute and the Duke University Marine Station. Conditions are far different from those first eneountered by the pioneering students who struggled to keep their specimens alive with only an aquarium pump and a few gallon-jars.

Inasmuch as the science facilities needed expansion, particularly to accommodate the growing numbers of biology students at Riverview, it was decided that one of the laboratories, with minor modification, could be constructed for the study of marine organisms. The school property is bounded by a creek that empties into nearby Sarasota Bay. Instead of adding a room to the main structure, a separate "portable" type structure, 26 by 50 ft., was erected near the creek. It adjoins some wild property which is being considered for the development of an outdoor lab-

oratory, to fit in with another part of the school's biology program.

The air-conditioned building has high windows, which permit extensive use of adjustable shelves along the walls yet can be darkened easily for visual aids by using heavy drapes. Countershelves with storage space beneath offer added working space in addition to the laboratory tables. Along the countershelves, an extensive aerating system can service more than two hundred aquaria. This air line is paralleled by a line of electrical outlets and fluorescent lights. The latter supplies not only supplementary light for microscopes, but is used in selective lighting for plant experimentation.

The center of the room is occupied by three large water tables made of cypress, lined with glass. Freshwater and saltwater systems serve these tanks, as well as aerator outlets and overhead lights. Plastic pipe is used for both the air and saltwater. The saltwater system consists of two connecting concrete tanks located underground, where they can be easily drained or filled.

In addition to the standard cabinets holding the microscopes, collections, chemicals, and the usual biological materials, the room has tote-tray cabinets, a refrigerator, deep freeze, and oven. From past experience, it was decided that the laboratory tables should not be hampered by being tied down to gas lines. Instead, portable compressed gas units, in addition to the large stove and small electric hot plates, serve as sources of heat. This allows for mobility of desks for small or large working surfaces. Salinometers, centrifuge, autoclave, scales, and many other standard laboratory items are available for use by students.

The course offered is primarily a survey of local marine life, and oceanography with marine chemistry limited only by the students' chemical backgrounds. Although the ecology, anatomy, and physiology of local phyla are stressed, the students spend much of their time developing group and individual studies in animal behavior.

Over the years, students and teachers have been working on a vertical file by soliciting reprints at every opportunity. For the average high school there is an extraordinary library on marine life. Four books are used by each student as basic texts, ranging from the popular *Edge of the Sea* by Rachel Carson to *Natural History of Marine Animals* by MacGinitie and MacGinitie. The reason for this range is due to the nature of the students enrolled. It is considered an enrichment class, even though it is a "second level" course. Any student with a satisfactory grade in high school biology may enroll. This permits any student interested in any phase of marine life to participate in the offering. An attempt is made to satisfy each student's interest and needs: a tenet of the Sarasota Public School system.

Students electing to take the course are scheduled to have a free period before or after the scheduled marine classes which meet the last two periods of the day. The ordinary class period lasts fifty minutes daily, but by having a study hall before or after the regular marine class, field trips can be arranged during the school day for two periods, and may extend for some time after school. It is not uncommon to have students enroll in the class every year until graduation. As they have discovered, the course is not identical year after year. They serve as laboratory and field assistants, while studying an organism which they select and maintain from year to year. These students are also given the responsibility of maintaining the continuity studies conducted by the classes from year to year. These include a tagging program of fishes, invertebrates, growth studies, drift bottles, and others.

The Cape Haze Laboratory, under the direction of Dr. Eugenie Clark, is a short distance from the Riverview facility. As an educational service, Dr. Clark permits students to use the laboratory's library and frequently has some of the more able students assist in some of the studies underway at Cape Haze. One of the original marine students is presently employed at Cape Haze. Several are at Florida universities studying biology, with plans to major in some phase of oceanography.

Having had several years experience with budding marine biologists, the Cape Haze laboratory graciously consented to co-sponsor the Cooperative College-School NSF program, thereby lending additional material resources and the services of scientific personnel in an instructional and advisory capacity.

In reflecting upon the history and development of this unique high school facility and the enriching activity offered to students in this area, it is interesting to note the influence that research biologists and university personnel can have upon public school education. After the first year of this program, when the instructor was considering the termination or expansion of the program for the following year, several marine biologists were consulted. Many hesitated to advise and did not commit themselves. Two well-known regional biologists stated emphatically that the study of marine biology was far above and beyond high school students. They said it should be left to college students who would get a taste of it at the senior college or graduate level. One biologist, however, who had taught many high school students, felt the program should be continued. This suggestion was supplemented with personal resource materials as well as encouragement and advice.

During the 1964 NSF-sponsored summer program, only a limited number of teachers and students benefitted directly from the instruction afforded by Dr. Humm, the gentleman who was such an encouraging university mentor of this project. However, it would be difficult to estimate the untold numbers whose careers will indirectly be moulded by his personal interest and unselfish efforts.

The AAAS Montreal Meeting

DECEMBER 26-31, 1964

THE 131ST MEETING of the American Association for the Advancement of Science will include sessions of 20 AAAS sections and of some 76 participating organizations. Programs of particular interest to biologists are:

Moving Frontiers of Science I. One of two speakers the evening of Dec. 26 will be V. C. Wynne Edwards, University of Aberdeen, whose topic will be "Self-Regulating Systems in Populations of Animals." Henry Eyring will preside.

AAAS Distinguished Lecture. Lord Brain, consulting physician to London Hospital and Maida Vale Hospital for Nervous Diseases; retiring president, British AAS, will speak on "Science and Anti-Science" the evening of Dec. 27. L. Paul Dugal, Dean, Pure and Applied Science, University of Ottawa; General Chairman of the Meeting, will preside.

Moving Frontiers of Science II. One of two speakers the afternoon of Dec. 28 will be Clement L. Markert, Johns Hopkins University. His topic will be "The Role of Genes in Embryonic Development." Alan T. Waterman will preside.

Fifth George Sarton Memorial Lecture will immediately follow Clement L. Markert. Lloyd G. Stevenson, Professor of the History of Science and Medicine, Yale University will speak; Wilder G. Penfield, Honorary Consultant, Montreal Neurological Institute, McGill; Honorary General Chairman of Montreal Meeting, will preside.

AAAS Interdisciplinary Symposia. Two of the four interdisciplinary symposia, all on the morning of Dec. 28, are:

1. "Medical Geology and Geography," arranged by Harry V. Warren, University of British Columbia, who will preside. Other speakers include Helen Cannon, U. S. Geological Survey, Denver; Arthur Furst, Institute of Chemical Biology, University of San Francisco; Anna H. Koffler, Ohio Northern University; and R. J. F. H. Pinsent, College of General Practitioners, Birmingham, England.
2. Part I of the five-session symposium, "Biochemical Differentiation," arranged by Norman Kretchmer, James D. Ebert, Robert E. Greenberg, and Oscar Touster. This session on "Protein Synthesis: A Fundamental Problem in Embryology and Differentiation," besides Norman Kretchmer, who will preside, has as speakers: James D. Ebert, and Mahlon Hoagland. James D. Ebert's vice presidential address will be "Interacting Systems in Development."

International Conference and Symposium on Primate Behavior. Six open sessions Dec. 27-31 inclusive. Sponsored by the combined Section of Animal Behavior and Sociobiology of the Ecological Society of America and the same Division of the American Society of Zoologists, cosponsored by the AAAS Sections in Zoological Sciences (F), Anthropology (H), and Psychology (I), and by the American Psychiatric Association and American Psychological Association. The program chairman is Stuart A. Altmann, University of Alberta. Speakers from four continents, include:

A. Stuart A. Altmann, Alison Jolly, Makerere College, Kampala, Uganda; Paul E. Simonds, University of Oregon; Thelma Rowell, Makerere College; Gordon D. Jensen, University of Washington; Leonard A. Rosenblum, Downstate Medical Center, Brooklyn;

B. Hans Kummer, Delta Regional Primate Center, New Orleans; John H. Kaufmann, University of Florida; Jeanne Altmann, University of Alberta; Yvett Spencer-Booth and Robert A. Hinde, Cambridge University, England; Stephen Gartlan, Bristol University, England;

C. Films and Tapes.

D. Martin Moynihan, Canal Zone Biological Area, Smithsonian Institution; Junichiro Itani, Kyoto University, Japan; K. Ronald L. Hall, Bristol University; Irwin Bernstein, Yerkes Laboratory of Primate Biology, Orlando, Florida;

E. Jean-Jacques Petter, Laboratoire de Physiologie, Faculte de Medicine de Paris; Yukimaru Sugiyama, Kyoto University; Suzanne Ripley, University of California, Berkeley; Thomas Struhsaker, University of California, Berkeley; John Vandenbergh, Laboratory of Perinatal Physiology, National Institutes of Health;

F. Robert E. Miller, University of Pittsburgh; Brian W. Robinson, Stanford Medical Center; Atsuo Tsumori, Japan Monkey Center, Aichi-Ken, Japan; C. Ray Carpenter, Pennsylvania State University.

AAAS Section F—Zoological Sciences. Contributed papers, Dec. 27; Biologists' Smoker, Dec. 27, eve.; and Zoologists' Dinner and vice presidential address by Arthur D. Hasler, Dec. 29, eve.

AAAS Section G—Botanical Sciences. The two-session symposium "Plant Biology Today V," Dec. 29, is a continuation of the four-year series of basic papers for teachers. Luncheon and vice presidential address by Harriet B. Creighton will be Dec. 29. Sessions for contributed papers, Dec. 30.

AAAS Section N—Medical Sciences. Remaining four sessions of the symposium, "Biochemical Differentiation," arranged by Norman Kretchmer, James D. Ebert, Robert E. Greenberg, and Oscar Touster, Dec. 29, 30. Topics and speakers are:

A. Oögenesis and Fertilization—Daniel Mazia (Chm.), Joseph Gall, Fred H. Wilt, David Epel, Paul Gross;

B. Cytodifferentiation—Clifford M. Grobstein (Chm.), Stanley Cohen, Irwin Konigsberg, Norman Wessells;

C. Sequential Appearance of Proteins during Differentiation—Eugene Knox (Chm.), Norman Kretchmer, John Papaconstantinou, Olga Greengard;

D. Regulatory Phenomena—Sol Spiegelman (Chm.), Ulrich Clever, H. O. Halvorson, Howard Hiatt.

AAAS Section O—Agriculture. Six-session symposium "Pest Control by Chemical, Biological, Genetic, and Physical Means," arranged by Edward F. Knipling, Dec. 27-30.

SOCIETAL PROGRAMS

American Astronautical Society. Two-session symposium on Bioastronautics, Dec. 29.

American Fisheries Society and **Biometric Society, ENAR.** Joint two-session symposium on "Population Estimation," arranged by Douglas S. Robson, Dec. 29.

American Nature Study Society. Annual meeting, Dec. 27-30.

American Physiological Society, National Academy of Sciences Space Seience Board, and NASA Office of Space Science and Applications. Invited papers on space biology and medicine, arranged by Robert E. Smith, Dec. 27.

American Society for Microbiology. Two symposia, "Pleuropneumonialike Organisms," arranged by J. Gershon-Cohen, and "Viruses and Cancer," by Charles Panos, Dec. 30.

American Society of Naturalists. Annual meeting will include a two-session symposium "Cytoplasmic Units of Inheritance," Dec. 27, and the presidential address of Albert Tyler and business meeting, Dec. 28.

Biomedical Information-Processing Organization. Symposium on "Classification Problems in Medical Diagnosis," arranged by Max A. Woodbury.

Ecological Society of America. Program, arranged by George M. Woodwell and George W. Barlow, Dec. 26-31, includes several symposia, sessions for contributed papers on plant and animal ecology, and sessions on animal behavior (in addition to the International Conference on Primate Behavior already mentioned).

Entomological Society of Canada, Société Entomologique du Québec, and the **Lyman Entomological Museum.** Contributed papers by the two societies, Dec. 30, and an anniversary celebration at the Museum.

Mountain Lake Biological Station "Alumni." Annual breakfast for all persons who have been students, investigators, or staff members at the station, Dec. 29.

National Association of Biology Teachers. The annual national meeting, Dec. 27-30.

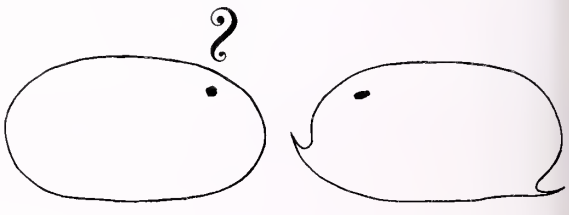
National Geographic Society. Special Film, "My Life among Wild Chimpanzees," by Jane Goodall, Sub-Department of Animal Behaviour, Cambridge University, England, Dec. 30. Stuart A. Altmann will be the commentator.

Sigma Delta Epsilon. National meeting will include a tea for all women in science, Dec. 28, and the annual society dinner meeting, Dec. 29.

Society of Economic Botany. Contributed papers, dinner, and business session, Dec. 30.

Society of the Sigma Xi. Sixty-fifth annual convention, luncheon, and joint address with Phi Beta Kappa, by René Dubos, Dec. 29. H. Bentley Glass will preside.

The **AAAS Exposition of Science and Industry** and the **AAAS Seience Theatre,** with recent foreign and domestic films, will be prominent features of the meeting. Coupons for sleeping accommodations and advance registration will be found in *Science* from July 17 on.



IVEY FOREMAN LEWIS

1882-1964

Dean and Professor Emeritus Ivey Foreman Lewis died in Charlottesville, Virginia, on March 16, 1964.

Dean Lewis was born in Raleigh, North Carolina. He received his A.B. and M.S. from the University of North Carolina, and his Ph.D. from the Johns Hopkins University. The Doctor of Science degree was awarded Dean Lewis by the University of North Carolina in 1947.

In 1908 Dr. Lewis studied at the University of Bonn, working under Edward Strasburger. During the same year he held the Smithsonian Table at the Stazione Zoologica at Naples.

Upon recommendation of the Miller Board of Trustees to the University of Virginia Board of Visitors, Dr. Lewis was appointed Miller Professor of Biology and Agriculture, beginning in September, 1915. From that date until his recent retirement, Dr. Lewis has served the University in many fields of endeavor other than as Professor of Biology. In 1934 he was appointed Dean of the University, served as Director of the Mountain Lake Biological Station from 1933 to 1946, and was appointed Dean of the College or Arts and Sciences in 1946.

Dean Lewis served as a member of the National Research Council from 1928 to 1932, was a member of the Executive Committee from 1930 through 1931, Vice Chairman of the Division of Biology and Agriculture from 1933 through 1936.

He was a trustee of Biological Abstracts, Fellow of the A.A.A.S., Secretary, Vice-President, and President of the Botanical Society of America, President of the American Biological Society, and President of the Ameriean Naturalists. He was a member of Phi Beta Kappa, Omicron Delta Kappa, the Raven Soeiety of the University of Virginia, and as a member of the Society of Sigma Xi was most instrumental in having a chapter of that society established at the University of Virginia.

In December, 1920, Dr. Lewis founded the Association of Virginia Biologists, an organization which has been superseded by the Virginia Academy of Science. He was instrumental in organizing the latter in May, 1923, and served as its first president.

IVEY FOREMAN LEWIS

HENRY G. GOOD

1897-1964

Henry G. Good, Professor of Zoology and Entomology at Auburn University since 1924, died of a heart attack April 10, 1964. During his period of service at Auburn, he taught approximately 12,000 students, served as advisor to students in zoology, and participated in many other activities of interest to students and the University.

Dr. Good was born in Ohio in 1897, and was reared in California. He held the B.S. degree from the University of California at Berkeley and the M.S. and Ph.D. degrees from Cornell University. He was a member of Phi Kappa Phi, Sigma Xi, and Gamma Sigma Delta honor societies. He was also a member of Sigma Pi social fraternity and was advisor to the local chapter. He was a member of the Entomological Society of America, Alabama Academy of Science, and an honorary member of the Alabama Ornithological Society. He had served as president of the Faculty Club of Auburn University, and participated in civic as well as academic affairs.

J. T. PENNEY

1900-1964

J. T. Penney, Professor of Biology and head of the Department at the University of South Carolina, died suddenly following a heart attack on March 29, 1964.

J. T. PENNEY

Dr. Penney was a native of Charlotte, North Carolina, and received his A.B., M.A., and Ph.D. from the University of North Carolina. He taught high school in Charlotte, North Carolina, and at the University of Tennessee School of Medicine, Memphis, Tennessee, before joining the University of South Carolina in 1929. He was promoted to the rank of full Professor in 1945, and at one time served the University as Dean of Men, Director of Student Activities, and Professor of Biology. He was appointed Head of the Department of Biology in 1959, and served in this capacity until his death.

He was a Past President of the South Carolina Academy of Sciences, the LeConte Scientific Society, and the Association of Southeastern Biologists and was also a charter member of the ASB. Dr. Penney was a member of the American Society of Zoologists and Sigma Xi.

Author of a large number of published scientific works, both articles and monographs, Dr. Penney conducted extensive investigation of sponges, and made important contributions to the taxonomy and biology of fresh water species. He was a member of a team from the University of South Carolina that studied the biology of the Atomic Energy Commission's Savannah River Plant in its early days.

The loss of Dr. Penney to the University of South Carolina will be felt in many ways. He was a man who had strong opinions on many things—and his dedication to teaching and his sincere interest in students and their academic progress was an important part of his personal make-up and character. It was under his guidance that the Department of Biology grew, and although of the "Old School" in training and early experience, Dr. Penney never failed to keep up with the times.

PAUL J. ARNOLD

1896-1964

Paul J. Arnold, Chairman of the Division of Sciences and Mathematics at Jacksonville State College, Jacksonville, Alabama, died at University Hospital in Birmingham.

Dr. Arnold was born in Wheatley, Ky., July 1, 1896. He received his A.B. from Georgetown College, Ky., and his M.S. from Peabody College. Dr. Arnold received an honorary Doctorate of Science from Georgetown College.

His teaching career began in the schools of Scott County, Ky., 1919-21. From 1921-25, Dr. Arnold served as Superintendent of Schools, Augusta, Ky., and 1925-29 in the same position in Williamstown, Ky.

His career at Jacksonville began in 1929, when he served as an Associate Professor of Biology. In 1932 Dr. Arnold became acting head of the Department of Biology. In 1935 he became Professor and Head of the Science Department. In 1947 he assumed the position of Professor and Chairman of the Division of Sciences and Mathematics, in which capacity he served until his death.

G. MILES CONRAD

1911-1964

G. Miles Conrad, director and trustee of Biological Abstracts, Philadelphia, died unexpectedly at his home on September 9.

A world-recognized expert in the field of communication of scientific information, Mr. Conrad had served in many prominent positions at both the national and international level. Prior to his appointment at Biological Abstracts, Mr. Conrad was associated with the Library of Congress as a documentation speeialist (1950-53); as editor, Graphic Science Associates, Inc., New York (1948-50); as technical editor and market research director, Hazard Advertising Company, New York (1943-48), and as assistant curator of Comparative and Human Anatomy, American Museum of Natural History, New York (1934-43).

He received the A.B. degree from Oberlin College in 1933 and the M.A. from Columbia University in 1938. From 1936-39 he participated in six scientific marine expeditions for the American Museum of Natural History. Mr. Conrad was awarded the Bronze Star and Conspicuous Service Cross for service in the China-Burma-India Theatre during World War II.

His numerous publications include scientific research articles in comparative anatomy, ichthyology and paleontology; popular biology, and documentation.

EZDA DEVINEY

1895-1964

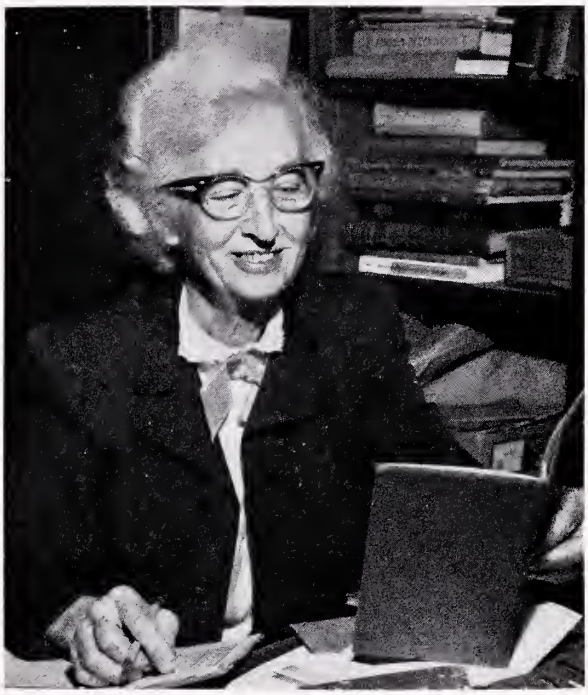
Ezda Deviney, Emeritus Professor of Zoology, at the Florida State University, died of a heart attack in Greensboro, N. C. on March 19, 1964.

Dr. Deviney was head of the Department of Zoology at the Florida State University for several years, and in 1957 she received the Meritorious Teaching Award given by the Association of Southeastern Biologists.

A native of Julian, N. C., she completed her undergraduate work at Woman's College of the University of North Carolina in 1919, and started as an Instructor in the same school. In 1921-23 she held a similar instructorship at Salem College in Winston-Salem, N. C.

After receiving her M.S. from the University of Chicago, she went to Tallahassee. Later study at the University of North Carolina earned her the Ph.D.

At Florida State College for Women, and its successor, Florida State University, she taught practieally every zoology course offered. She served as president of the Alpha of Florida chapter of Phi Beta Kappa, which was organized at



EZDA DEVINEY

Florida State in 1935, and was first president of the Florida State Sigma Xi Club. Other memberships included the American Association for Advaneement of Science, the Florida Academy of Science, the Association of Southeastern Biologists, and the National Association of Biology Teachers.

Books and Periodicals

A new booklet, entitled *Alabama Trees*, is now available through the University Book Store, Auburn University, to students and others interested in common trees of the State. Authors are Dr. Donald E. Davis and Dr. Norman D. Davis, Department of Botany and Plant Pathology.—The booklet consists of two parts. Part I contains instruction and keys to be used to identify 172 species of Alabama trees. The authors have attempted to include all native trees, all introduced trees that are now reproducing in the wild state, and most of the common cultivated trees in Alabama. Alphabetical lists to both scientific names and common names are included. Part I also includes six plates illustrating key features of leaves and stems, a glossary of all technical terms used in the key, and a list of pertinent additional references. Part II of the booklet by I. R. Martin, forester, Cooperative Extension Service and W. B. Devall, head, Department of Forestry, contains pictorial illustrations of 77 of the most common trees of the State and pertinent information concerning each tree.—The booklet has been prepared especially for use in elementary botany courses.

Books received recently

The following books have been recently received by the ASB. Should any member of the ASB wish to review one of these books in return for the review copy, please write to *Mrs. Betty Ursomarso, Assistant Editor, Academy of Natural Sciences, 19th & The Parkway, Philadelphia 3, Penna.*

STURTEVANT, A. H. AND G. W. BEADLE. 1964. *An Introduction to Genetics.* Dover Publications, Inc., New York. 391 pp. $2.00. (A Dover Reprint.)

PENNAK, ROBERT W. 1964. *Collegiate Dictionary of Zoology.* The Ronald Press Co., New York. 583 pp. $8.50.

SHELFORD, VICTOR E. 1963. *Ecology of North America.* University of Illinois Press, Urbana. 610 pp. $10.00.

Foundations of Modern Biology Series—2nd Edition
(Prentice-Hall, Englewood Cliffs, New Jersey)

The Cell, by Carl P. Swanson. 1964. 118 pp. $1.75 (paper); $3.95 (cloth).

Animal Diversity, by Earl D. Hanson. 1964. 118 pp. $1.75 (paper); $3.95 (cloth).

Cell Physiology and Biochemistry, by W. D. McElroy. 1964. 120 pp. $1.75 (paper); $3.95 (cloth).

The Plant Kingdom, by Harold C. Bold. 1964. 118 pp. $1.75 (paper); $3.95 (cloth).

Adaption, by Bruce Wallace and Adrian M. Srb. 1964. 115 pp. $1.75 (paper); $3.95 (cloth).

Chemical Background for the Biological Sciences, by Emil H. White. 1964. 152 pp. $1.95 (paper); $4.95 (cloth).

Growth and Development, by Maurice Sussman. 1964. 116 pp. $1.75 (paper); $3.95 (cloth).

Animal Behavior, by V. G. Dethier and Eliot Stellar. 1964. 118 pp. $1.75 (paper); $3.95 (cloth).

Heredity, by D. M. Bonner and S. E. Mills. 1964. 115 pp. $1.75 (paper); $3.95 (cloth).

The Life of the Green Plant, by A. W. Galston. 1964. 118 pp. $1.75 (paper); $3.95 (cloth).

Animal Physiology, by Knut Schmidt-Nielsen. 1964. 118 pp. $1.75 (paper); $3.95 (cloth).

Foundations of Modern Genetics—New Series
(Prentice-Hall, Englewood Cliffs, New Jersey)

The Mechanics of Inheritance, by Franklin W. Stahl. 1964. 171 pp. $4.95 (cloth).

Extrachromosomal Inheritance, by John L. Jinks. 1964. 177 pp. $2.95 (paper); $4.95 (cloth).

Human Genetics, by Victor A. McKusick. 1964. 148 pp. $2.95 (paper); $4.95 (cloth).

Agricultural Genetics, by J. L. Brewbaker. 1964. 156 pp. $2.95 (paper); $4.95 (cloth).

Concepts of Modern Biology Series
(Prentice-Hall, Englewood Cliffs, New Jersey)

Molecular Biologys Genes and the Chemical Control of Living Cells, by J. M. Barry. 1964. 139 pp. $3.35.

PRIMARY EMBRYONIC INDUCTION. Lauri Saxén and Sulo Toivonen, Logos Press, Prentice Hall. 1962. $8.75.

There was a great surge of excitement among the embryologists of the 1920's following the discovery of the "organization center" by Hans Spemann and Hilde Mangold. After a few years of rather feverish activity the capabilities and limitations of the living organization center were described. When it became known that inductions with non-living material are possible, the stage was set for the orderly progression of synthetic and analytical studies that were carried out in the 1930's. With quiet optimism teams of workers conducted experiments that would surely, it seemed, result in the characterization of "the" evocator, but the embryonic heritage of the 1940's was largely great masses of inconclusive data. Work in this area was rather uninspired until the 1950's brought fresh ideas and some new techniques.

The time has not yet come to tie up the problem of primary embryonic induction in a neat little bundle and mark it solved, but the resurgence begun in the 1950's has produced enough results to make a comprehensive and analytical discussion of them worthwhile. Such a discussion has been provided for us by Saxén and Toivonen.

There are several textbooks that give very good and comprehensive accounts of the earlier work on induction,

but for the sake of completeness and order, Saxén and Toivonen go over it again in their first three chapters. In their fourth and fifth chapters on the responding tissue and on heterogenous inductors, they begin to introduce the more recent information. Chapters six and seven deal with what is known of the physical and chemical nature of the primary inductors and chapter eight is set aside for a short treatment of the immunological approach to the problem of induction. Finally, in chapters nine and ten the various theories that have been elaborated to explain primary induction are recounted, discussed and evaluated extensively in the light of experimental data.

In this book a great many diverse pieces of information are brought together and thoughtfully arranged. The authors have critically and candidly, but without apparent bias, discussed the findings and views of a number of different investigators. Their own work is (quite naturally) particularly well presented, but is not given undue emphasis.

The beginning graduate student and the zoologist who is interested in induction but who has not followed its literature closely in recent years should find this book particularly helpful. It is written and illustrated with unusual clarity.—J. N. Dent, University of Virginia.

ADVANCES IN MARINE BIOLOGY, vol. 1. F. S. Russell, Ed. xiii + 410 pp., 1963. Academic Press, London and New York. $13.50.

This series was initiated to "help biologists to keep abreast of knowledge in the different lines of research on the biology of marine organisms." An annual volume will be issued, each with a wide variety of review articles. Emphasis will be placed on fishery sciences in which the results of many studies are being published in relatively inaccessible journals.

The first volume contains five interesting articles. In the first, "Rearing of Bivalve Molluscs" (pp. 1-136), Victor Loosanoff and H. C. Davis summarize the important work on rearing bivalves carried out at the U. S. Bureau of Commercial Fisheries Biological Laboratory at Milford, Connecticut. Roughly half of the article is concerned with mechanics of rearing larvae in the laboratory and effects of different conditions on eggs and larvae. Specific information is included on 19 species.

A posthumous article by Anton Bruun, "The Breeding of the North Atlantic Freshwater-Eels" (pp. 137-169), is an unfinished manuscript in which Bruun attempted to answer some of the points raised by D. W. Tucker concerning the "Atlantic eel problem." Bruun supports Schmidt's theory of two breeding populations in the North Atlantic, basing most of the present article on Schmidt's original data. Although Bruun was able to answer some of Tucker's arguments, the problem is by no means settled.

J. A. Nicol, in the third article "Some Aspects of Photoreception and Vision in Fishes" (pp. 171-208), concentrates on summarizing recent findings on photobehavior and the functioning of the eye in the marine habitat. Topics include extra-ocular reception, regulation of light at sensory surfaces, visual pigments, and the chorioidal gland.

C. M. Yonge provides an interesting survey of recent studies in the fourth article, "The Biology of Coral Reefs" (pp. 209-260). As might be expected from Yonge's long interest in tropical reefs, the article is restricted to recent findings on reef-building, tropical corals. Such topics as systematics and distribution, settlement of planulae, zooxanthellae, erosion, and growth, among others, are included. Suggested lines of research can be found throughout the article.

The final paper, "The Behaviour and Physiology of Herring and Other Clupeids" (pp. 261-393), by J. H. S. Blaxter and F. G. T. Holliday, is a detailed review of the biology of *Clupea harengus* and about a dozen other clupeids, in which the life histories of these species are followed in some detail. Behavior and physiology based on aquarium experiments and on observations at sea are included; their behavior in relation to fishing gear has been stressed. The authors point out that although the herring is probably the most intensively studied of the fishes, many aspects of its basic biology are unknown. They also suggest that a better knowledge of behavior and physiology will help to solve fisheries problems.

Each of the articles is accompanied by an extensive bibliography. There is an index to authors mentioned in the articles and the bibliographies and a skeleton subject index is included.

This useful volume will prove to be a welcome addition to the library of any institution in which the marine sciences are studied, taught, or practiced. It is hoped that future volumes will be as interesting.—Raymond B. Manning, U. S. National Museum.

SYMPOSIUM ON MARINE MICROBIOLOGY. Carl H. Oppenheimer, Ed. C. C. Thomas, Springfield, Ill., 1963. xviii + 769 pp. Illus. $22.50.

The word symposium stems from the Greek symposion, meaning feast. We have here a sumptious smorgasbord of sixty-six papers by eighty-eight authors, representing the first international meeting on marine microbiology held in Chicago in 1961. It seems fitting that the opening contribution should be by Claude E. ZoBell, the grand old master of marine microbiology, who succinctly summarizes the dominant ecological problems attending marine microorganisms, thus setting the stage. It is not clear why his original, fetching title, The Sea Around Us Microbiologists, was transmuted into the sombre Domain of the Marine Microbiologist. There follow four other reports which collectively constitute an introduction, each author reviewing a group of papers within the six topical divisions into which the symposium was conveniently arranged: producers and their relation to the chemical and biological environment; geomicrobiology; ecology of algae, protozoa, fungi, and viruses; bacterial distribution and function; mineralization; while one such division dealing with heterotrophy has somehow not been similarly treated.

It is salutary to note that today, when a microbiologist is hardly considered *au courant* unless he is tracing the

lineage of fragments of DNA or sRNA, there is a robust and increasing number of workers happily engaged in the largely descriptive efforts to elucidate the roles of microorganisms in the sea. Although the individual reports vary in the usual way in length and content, they seem uniformly surcharged with a subtle enthusiasm. To sample a few: S. W. Watson isolated nitrifying bacteria from the Atlantic morphologieally differeat from *Nitrobacter* and *Nitrosomonas;* M. B. Allen believes the blue-green alga, *Calothrix,* to be a possibly indigenous aerobic nitrogen-fixer, and suspects the yeast *Rhodotorula;* some feasible explanations for the existence of thermophilic bacteria in polar regions are set forth by R. H. McBee; J. C. Lewin describes the nutrition of several species of diatoms which grow well in the dark; S. P. Meyers and E. S. Reynolds account for the degradation of lignocellulose by species of the deuteromycete *Zalerion* and the ascomycetes *Torpedospora* and *Halosphaeriopsis;* Marine yeasts are well surveyed by J. W. Fell and N. van Uden; R. Spencer briefly reviews marine bacteriophages; L. Moewus incriminates a holotrichous hymenostome ciliate as a viral vector; F. W. Ochynski and J. R. Postgate report some biochemical differences between fresh water and marine strains of sulfate-reducing bacteria; R. A. MacLeod discusses the need for sodium by marine bacteria and reports the isolation of a sodium-independent mutant; H. W. Jannasch studied the chemostatic growth of a spirillum when the growth-limiting substrate, asparagine, was supplied decreasingly while the dilution rate remained unchanged; J. Liston and R. R. Colwell report on host and habitat interrelationships of commensal bacteria; A. I. Zhukova reports on the contribution of microorganisms to the nutrition of aquatic invertebrates; F. D. Sisler, who has been interestingly involved with electrical energy from biological fuel cells and with the possible presence of organisms in meteors, now turns his attention to the role of the earth's magnetic field in the creation of electrical potential differences in the sea and their possible effects on microbiological activities. Ferguson Wood, the lone Australian, laments in two or three papers the paucity of fiscal largess in marine microbiology; my impression from a visit to his country's marine research establishment at Cronula was that as long as there is ample animal protein on the hoof the Aussies will not give a hoot for the sea. Then, if one believes that it is essential to possess a laboratory on the beach and an expensive ocean-going vessel in order to do justice to marine microbiology, there is an excellent, but disquieting, paper from R. E. Kallio and his co-workers from the middle of Iowa detailing the mechanisms of bacterial oxidation of alkanes, an area that has fallen within the purview of marine microbiology.

There is clearly enough here for almost anybody. This volume should provide a plethora of ideas and exciting problems not only for the microbiologist but for the biologist generally, and I recommend it to your critical attention. One can no longer balk at the price of a book of such impeccable craftmanship, including large type on super-glossy paper, especially when I recently spotted a scientific volume listed at $100. However, I would have preferred to see this publication in double-column, off-set printed, at less than half the cost; one important objective of a symposium, after all, is dissemination. Fifty pages are devoted to an alphabetical listing of the references which appear at the end of each presentation; this will appeal to some workers, but I have a strong aversion to duplication, and would certainly have liked to see these fifty pages used for the discussion, which is entirely omitted. In fact, I would like to see the scientific community adopt an unwritten law that would proscribe publication of a symposium unless the complete discussion, preferably verbatim, is included. The Cold Spring Harbor symposia might well serve as a model.—J. Q. Heplar, Old Dominion College.

A PHYTOTRON FOR THE SOUTHEAST

Scientists at Duke University and North Carolina State at Raleigh wish to inform their colleagues that they are planning the construction of a two-unit phytotron, which will provide extensive controlled environment facilities for investigators in the Southeast, as well as for their own staff members. The concept of a two-unit phytotron was developed in order to make the greatest possible use of the scientific talent residing on the two campuses. Each unit will specialize in research in areas where it is strongest. North Carolina State will be particularly concerned with research in population genetics, plant pathology, and entomology, although several other departments expect to make use of the phytotron. At Duke University, research on ecological and physiological problems concerned with the distribution of natural vegetation and research on trees will receive special attention from members of the botany and forestry staffs.

The Duke University unit will consist of a group of air-conditioned greenhouses attached to a large two-story building which will house plant growth rooms and chambers, offices, laboratories, and air-conditioned equipment. Preliminary plans call for six 16 by 24 ft. greenhouses and about 40 plant growth rooms and chambers of various sizes and characteristics. About a dozen of these will be 9 by 12 ft. walk-in rooms to operate at temperatures of 25 to 95°F. Another group of chambers will be 4 by 8 ft., and a number of small reach-in type chambers will be included for seedlings and small plants. Most of the rooms and chambers will provide at least 3000 foot candles 36 inches below the lights. Special humidity control will be provided for a few, and there will be limited control of humidity in most of the growth chambers.

Offices and some laboratory space for visiting investigators will be included in the building, which will be completely air-conditioned.

Because of space limitations, the unit at North Carolina State will consist of a three-story building with greenhouses on the roof. The principal plant growth rooms and chambers will be similar to those used in the Duke unit, but arranged somewhat differently. Special sections will be isolated from the main strueture for use by pathologists and entomologists.

It is estimated that the Duke unit will cost approximately $1,500,000; the North Carolina State unit, $1,750,000. North Carolina State has obtained $750,000 from the Z. Smith Reynolds Foundation of Winston-Salem, and Duke University will provide $250,000. The National Science Foundation has granted $383,150 to start construction, and it is anticipated that it will furnish additional support in succeeding fiscal years. It is expected that both units of the phytotron will be in operation within three years.

Construction of this phytotron is an important step forward for science in the Southeast because this region has relatively few large scientific facilities other than those related to medical research. The construction of this important research tool should be a strong stimulus to graduate training and research in the entire Southeast. In fact it might well result in development of nationwide or even a worldwide center for research on the effects of environmental factors on living organisms.

The planning and construction of the two units is being coordinated by a Phytotron Board, consisting of two members from each campus plus a director appointed by the presidents of the two institutions. The members from North Carolina State are K. R. Keller and H. F. Robinson, those from Duke are W. D. Billings and H. J. Oosting. P. J. Kramer is serving as chairman. This board is expected to supervise the research programs and correlate the activities of the two units to make them as effective as possible.

Eventually we expect to organize a regional advisory board of scientists interested in this type of research, who will assist in developing a research program which will be of the greatest possible usefulness to the Southeast. Meanwhile we hope that persons interested in this type of research will write us about their needs so we can take them into account in our planning. If enough interest develops, we might hold a one-day conference this fall to give those interested an opportunity to inspect the plans and offer suggestions.

Scientists who have strong interests in research involving the use of controlled environment facilities are invited to write Paul J. Kramer, Department of Botany, Duke University, Durham, North Carolina, or other members of the phytotron board.

News of Biology in the Southeast

About People

Robert A. Woodmansee, formerly of the University of Southern Mississippi faculty, has been appointed to the Virginia Institute of Marine Science research staff. According to Dr. William J. Hargis, Jr., Director of the Institute, Dr. Woodmansee will head marine plankton studies at the Gloucester Point research facility.

Leonard O. Morrow has joined the faculty of Richmond Professional Institute as Assistant Professor of Biology. Mr. Morrow is currently completing his doctorate in Botany at Cornell University and will develop advanced courses in Botany at R.P.I.

Ralph E. Thorson, Professor and Head of the Department of Biology, University of Notre Dame, has been granted a leave-of-absence to serve as professor of parasitology and tropical health, School of Public Health, American University, Beirut, Lebanon. **Robert E. Gordon,** Associate Professor of Biology, has been appointed acting-head of the department, **Brother Raphael Wilson, C.S.C.,** assistant head, and **Joseph A. Tihen,** as editor of The American Midland Naturalist, University of Notre Dame. All appointments are effective September 1, 1964.

B. Theodore Cole, Professor of Biology, has been appointed Head, Department of Biology, University of South Carolina, Columbia, S. C.

Burton J. Bogitsh, formerly Assistant Program Director, Division of Scientific Personnel and Education, National Science Foundation and Professor of Biology at Georgia Southern College has joined the faculty at Vanderbilt University as Associate Professor of Biology.

William H. Adams, former Professor of Biology at Tennessee Wesleyan College, has accepted a position as Dean of the School of Arts and Sciences at Tennessee Polytechnic Institute effective September 1.

Robert F. Drescher joined Sharpley Laboratories, Inc. as Vice-President on July 15, 1964. For the past 10 years Dr. Drescher has been Chief Microbiologist, Paper Section, Buckman Laboratories, Inc., Memphis, Tenn. Prior to this he was a graduate student of Dr. Clyde Christensen at the University of Minnesota. Dr. Drescher will be active in stream pollution research, the microbiology of pulp and paper, and industrial mycology at Sharpley Laboratories, Inc.

Nell B. Causey joins the staff of Louisiana State University to teach an undergraduate course in invertebrate zoology and a graduate course in taxonomy. Dr. Causey, who will continue her work on millipedes, spent the summer vacation at the British Museum of Natural History.

Arthur L. Applegate, who received his Ph.D. from Emory University, will teach graduate and undergraduate embryology at Louisiana State University.

After postdoctoral work at Washington State University, **Albert M. Meier** will teach vertebrate physiology at Louisiana State University. He will continue his research in avian physiology.

Wallace D. Dawson, Assistant Professor of Biology, Department of Biology, University of South Carolina, has been awarded a $24,064 research grant by the National Institutes of Health for a three-year study of genetic factors in hybridization.

John D. Reynolds and **Mrs. Rowena G. Matthews** have been appointed Instructors in the Biology Department, University of South Carolina.

John Plymale has been appointed Assistant Professor of Biology at Howard College, Birmingham Ala. Dr. Plymale received his degree from the University of Alabama. His principal field of interest is parasitology.

Lynn Raulerson, Assistant Professor of Biology, returns to the staff at Howard College, Birmingham, Ala., after one year of graduate work toward her Ph.D. in zoology at the University of Georgia.

James Dobie has accepted the position of Assistant Professor at Howard College, Birmingham, Ala. Dr. Dobie received his degree from Tulane University. His field of interest is vertebrate zoology.

Howard J. Teas, program director for metabolic biology with the National Science Foundation, is joining the University of Georgia in Athens as Chairman of the Division of Biological Sciences September 1, 1964.

C. **Theresa Cali** has joined the faculty of the Department of Biology and Genetics, Medical College of Virginia, as Interim Assistant Professor. She was formerly Assistant Professor of Biology at Auburn Community College. Dr. Cali's major interest is evolution of nematodes. The same department is host to Petrona D. Noblejas, M.D., Instructor in Anatomy, University of Santo Tomas, Phillipines, who has begun a two-year visit under auspices of the Agency for International Development. Dr. Noblejas, whose major interest has been embryology, will establish a subsection of genetics upon her return to the University of Santo Tomas.

Institutions and Organizations

The Department of Biology at **Tennessee Wesleyan College,** under the Chairmanship of William H. Adams, has been awarded a $16,000 matching grant for the purchase of undergraduate instructional scientific equipment by the National Science Foundation.

The Department of Zoology at Tulane University has established the **George Henry Penn Memorial Award** for outstanding graduate research in zoology by Tulane graduate students. The initial recipient of this award is Doctor Aelita Pinter, whose dissertation, "Effects of nutrition and photo-period on reproductive physiology, growth, and malnutrition in *Microtus montanus,*" was judged the most outstanding for the period June 1, 1963-May 31, 1964.

The **Virginia Institute of Marine Science at Gloucester Point, Virginia** has been conducting three programs this summer sponsored by the NSF. The **Research Participation for College Teachers Program,** the **Undergraduate Science Education Program,** and the **Cooperative College-School Science Program** held at Norview High School, Norfolk, Virginia. There have been four participants in the RPCT program working on individual research for twelve weeks, ten undergraduate students working with staff members for ten weeks, and fifteen high ability students and three teachers working under the supervision of Dr. Sewell H. Hopkins for eight weeks.

The Biology Building at **Howard College,** Birmingham, Ala., was dedicated in honor of Alabama industrialist, Thomas D. Russell. The building has been air-conditioned, and two greenhouses and a walk-in cold room added. Other equipment, amounting to $60,000, will be added.

The Department of Biology and Genetics at the Medical College of Virginia will be a principal beneficiary of a $230,000 fund received from NIH and the Commonwealth of Virginia for renovation of laboratories in McGuire Hall. During the past year the Department has expanded to occupy 52 per cent more space.

THE NOMINATING COMMITTEE for 1965 consists of Dr. Alvin Beatty of Emory University; Dr. George Kent of Louisiana State University; and Dr. E. Ruffin Jones of the University of Florida, *Chairman.* In order to help this committee with its task, please fill in the form below (or write a letter if you do not wish to mutilate the *Bulletin*) and mail to Dr. Jones as soon as possible. The deadline is January 1, 1965.

SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

PRESIDENT-ELECT .....

VICE-PRESIDENT .....

TREASURER .....

EXECUTIVE COMMITTEE MEMBERS (2 for 3-year terms) .....

.....

Deadline: January 1

Mail to: DR. E. RUFFIN JONES, DEAN
College of Arts and Sciences
University of Florida
Gainesville, Florida

(*Continued from page 78*)

that nine foreign countries were represented by 18 members. It was moved and seconded that this report be approved. The motion passed.

TREASURER'S REPORT: The Treasurer called attention to his report as published in the Vol. 11, No. 2 issue of the Bulletin. He then presented his report for the January 1–April 10, 1964 period. A motion was made and seconded to accept his report. The motion passed.

AUDITING COMMITTEE: The report of the committee which stated that the books of the Association had been examined and found to be in order was read by President Jones. A motion to accept the report was made and seconded. The motion passed.

GOETHE AWARDS: The report of the committee was read by Dr. Margaret Menzel in the absence of the Chairman of the committee. She reported that 18 applications for financial assistance had been received and that all had been approved. A total of $511.00 was expended in support of the awards. A motion was made and seconded to accept the report. The motion passed.

CONSTITUTION AND BY-LAWS COMMITTEE: No report.

MEETINGS COMMITTEE: The Chairman of the committee reported that an invitation for the Association to meet at the University of Virginia in 1965 and at the North Carolina State College in 1966 had been accepted. A motion to accept the report was made and seconded. The motion passed.

RESOLUTIONS COMMITTEE: The Chairman of the committee presented the report. A motion was made and seconded to accept the report. The motion passed.

NOMINATING COMMITTEE: The Chairman of the committee submitted nominations for the following offices: President-Elect, Vice President, Secretary and two Executive Committee members. Nominations from the floor were called for and there being none a motion was made and seconded to close the nominations. The motion was passed. President Jones announced that the results of the election would be given at the annual banquet.

President Jones reported that the Southern Section of the American Society of Plant Physiologists had become the first affiliate of the Association and that its representatives on the Executive Committee would be Dr. Frederick T. Wolf.

President Jones then raised the question of affiliation with AIBS as an Adherent. He presented some of the objections to such a relationship and called attention to the action of the Executive Committee on April 16, 1964 which was embodied in the following motion:

> WHEREAS, The ASB in full accord with the aims and objectives of the AIBS, and WHEREAS, the ASB wishes to cooperate with all interested in the efforts to strengthen Biology:
>
> We encourage members of the ASB to become members of AIBS and to work toward an arrangement whereby ASB could continue to support AIBS in some special category on the same or similar basis as in the past.

The floor was opened for questions and after a brief period a motion was made and seconded to adopt the policy embodied in the motion. The motion passed.

President Jones called to the attention of the membership the passing of Dr. James T. Penney, Chairman, Department of Biology, University of South Carolina and two Emeritus Members, Dr. Ezda M. Deviney and Dr. Ivey F. Lewis.

He then expressed his appreciation for the support given him as President of the Association.

There being no further business the meeting was adjourned at 12:45 P.M.

August 1964 ASB BULLETINS sent to the following people were returned by the Post Office with notations that the addressees had moved and left no forwarding addresses. Our records show that their membership dues are paid up to date, and that they should be receiving the BULLETIN. If anyone knows the whereabouts of any of these people, please notify *Mrs. Betty Ursomarso, Assistant Editor, Academy of Natural Sciences of Philadelphia, 19th & The Parkway, Philadelphia, Pa. 19103.*

Julian T. Darlington
Dept of Biology
Furman University
Greenville, South Carolina

Wanda S. Hunter
Zoology Dept.
Duke University
Durham, North Carolina

Irving E. Gray
Zoology Dept.
Duke University
Durham, North Carolina

John D. Reynolds
Biology Dept.
Coker College
Hartsville, South Carolina

LETTERS

Thank you for publicly and effectively saying in your ASB **Bulletin** editorial, "The National Register As A Privacy Invader—Where Do We Go From Here?" what many other biologists must have strongly felt. In fact this is the first time that I have rebelled and refused to fill in any National Register questionnaire at all; each time I picked up the latest form, my misgivings about the new information it demanded greatly overcame my considerable desire to co-operate.

My feelings about this sort of thing not only exactly reflect the points you express, but also include deep resentment (that is surely thought perverse by those legions of true believers in expedieney) that we must redesign our vital statistics —even our lives—to fit the needs of machines, instead of doing things the other way around.

J. Ives Townsend
Medical College of Virginia

I have just read the article on literature citation in the July ASB bulletin. I should like to say that I am in your corner in this fight . . . The appearance in print of your comments coincide with several fruitless hours spent in the library trying to second guess a 19th century German who published something in "Zool." The abbreviation saved 6 characters of print and cost me nearly that many hours of work

in the library. Congratulations on your stand and I wish us all luck.

Walter J. Harman, Chairman
Department of Zoology and Physiology
Louisiana State University

Congratulations on the editorial in the last ASB Bulletin "Literature Citation Abbreviations—a Waste of Time," and also on the one concerning the National Register.

I've felt the way you do about those abbreviations for years. But they occur not only in the bibliography, but also in the text itself of taxonomic papers. Just this morning I got a reprint and there is the same old pointless phenomenon: The names of the species are centered over the descriptions and despite the space on each end, the authority names are so abbreviated as to require Sherlock Holmes to work some of them out. Taylor is "Tayl" for example!

The whole business boils down to the fact that scientists just won't think for themselves; they'd rather do things in the same old way just because their instructors did it that way. But I suspect editors are a little involved in this also.

Harold Humm
Dept. of Botany
Duke University

I have read the article by you and Miss Ursomarso entitled "Literature Citation Abbreviations—A Waste of Time," which appeared in the ASB Bulletin, pages 71-73, Volume 11, July 1964.

I agree entirely with your ideas. Full literature citations are very helpful to scientific readers. I find that I can more readily recall the content of an article if the title is cited. If the title is omitted, it is often necessary to look up the article.

In 1940 Dr. Coatney and I published a note "Reference citations and micro film" in Science, Volume 2, page 429, in which we expressed some of the same ideas in connection with micro film.

Martin D. Young, Sc.D.
Director
Gorgas Memorial Laboratory
Balboa Heights, Canal Zone

Some one has sent me a copy of the *ASB Bulletin* (how did you come to publish in a serial with an abbreviated title?) containing the article by you and Miss Ursomarso on citation of literature. Seeing that I am one of the time-wasters whose work in this kind you mention, I feel impelled to a few remarks of my own.

It seems to me your contention is, in the main, sound, though your title is not (does it really take more time to write an abbreviation, even if you have to look it up, than to copy the full title?). Your thesis accords with a change, just beginning, among taxonomists in citing authority for botanical names. Abbreviations here have certainly outlived their usefulness, and in several key places such authorities are now being cited in full ("A. P. de Candolle" instead of "DC."; "Lamarck" instead of "Lam."; and so on).

But you weaken your case by some exaggeration and certain inaccuracies. Taking the larger of your two bibliographies (a wrong use of that word, by the way; they have no real claim to such a title), I note that 8 of the 70 entries are books, not abbreviated in either column. Is that quite fair? I could show you hundreds of papers in which no books are cited. And a further 7 entries in your "unabbreviated" list are "ibids." If they are not abbreviations, I don't know what is! And to most editors of technical work they are unacceptable abbreviations (so many authors revise their list of references and add new ones—and one new reference in the midst of a flock of ibids can jumble the whole thing. It happens!).

If you take out the ibids and the book-publishers, together about 20 per cent of the list, your statistics may turn out a bit different. You would still have a case, perhaps not quite so striking but more free from possible controversy.

A slight inaccuracy is your statement that a period is equivalent to a single dropped character; you must know that this is not true. However, in our work here we have judged it *nearly enough true* so that we do not replace one character by a period. We *have* abbreviated "Comptes" to "Compt." (perhaps absurdly); but not "Compt." [for "Compte"].

I agree with you that much abbreviation is—or at least seems to be—nonsense. But when you consider the very large proportion of authors who cannot cite the titles of papers—even their own—correctly, do you think that their attempts to copy the titles of serials would be much more informative than the customary abbreviations? May I point out, in defense of our own list of abbreviations, that we have always considered (and stated in our introduction) that much of its value is the provision of complete and accurate titles of serials and information on their provenance. An unabbreviated title *can* be as misleading or mysterious as an abbreviated one—*more so* than our abbreviations for some of the duplicated or often changed titles. How much is the full title, anyhow? Everything on the title-page? (I have not checked you on this point, to see whether you really did use the full titles in your list!) If so, which title-page—that of the issue or that of the volume? They often differ. Have you had occasion to cite some of the technical publications of Latin American departments of agriculture? It's a puzzle to know just how much is title and how much besides the title one should include to avoid error or confusion; and my guess is that, without some such list as ours, a dozen scientists will cite the same serial in half a dozen different ways even when they are attempting to cite it in full! In short, the problems of citing literature are not settled by simply avoiding abbreviation; and sometimes they are aggravated thereby!

H. W. Rickett
New York Botanical Garden

The ASB BULLETIN

Volume 12
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January 1965

IN THIS ISSUE — ANNOUNCEMENTS ABOUT THE CHARLOTTESVILLE MEETING; THE CUEBS SOUTHEASTERN CONFERENCE; THE BENEFITS OF BIOLOGICAL COLLECTING FROM NAVIGATION BUOYS.

At left is a photograph of a buoy taken from Cape Cod Bay. Zonation is apparent on this buoy — the upper part being fouled by algae, below which a belt of hydroids appears as light colored tufts, followed by an area of heavy, dark mussel-dominated fouling. See *The Benefits of Systematic Biological Collecting from Navigation Buoys* on page 3. (Photograph courtesy of the Woods Hole Oceanographic Institution.)

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CONTENTS

The Benefits of Systematic Biological Collecting from Navigation Buoys

BY ARTHUR S. MERRILL [1]

Navigational buoys are placed at vantage points along practically all coastal and large inland waterways. They provide an artificial substrate near the surface for the attachment of species which ordinarily are bottom dwellers. When the buoys are brought ashore for periodic cleaning and servicing by the Coast Guard, the attached species of marine life become readily available for study. Systematic sampling of organisms, close observation of faunal assemblages, and diligent recording of the findings provide a wealth of scientific information.

I have observed and collected fouling organisms from navigation buoys for years, and have considered the varied opportunities for study such data provide. In this article I hope to illustrate some of the benefits of studying buoy animal communities and to suggest techniques that can be followed in these studies. In many cases I will use examples from data derived from my own studies of buoy material. Reference to the sea scallop, *Placopecten magellanicus,* will emphasize the significant role that material from buoys has played in increasing our general biological knowledge of one very important commercial species.

Fig. 1. A piece of iron rust removed from within the sheltered stabilizer tube of a buoy and allowed to dry. A number and variety of organisms can be seen still adhered in their original position.

Fouling Communities

A quantitative study of material collected from buoys along the coast will help determine the dominant fouling species, and at the same time will help establish geographical ranges and local zonation of many species. Usually only a few species dominate a buoy fouling community (see cover figure). The dominant species might well be different on buoys at the same latitude depending upon the precise location of these buoys. For instance, the community structure of the organisms found on a bay or harbor buoy will differ from that found on a buoy from open coastal waters. Equivalent differences in dominance are apparent at various latitudes along the coastline. In the northern coastal waters of Maine a plant such as *Laminaria* may dominate, while along the Cape Cod coast the blue mussel, *Mytilus edulis,* is often the dominant species. In southern waters several species of barnacles or oysters are common foulers. Buoys in protected shallow waters such as bays and estuaries are covered frequently with soft forms such as hydroids and fleshy tunicates. In northern waters goose barnacles are common on buoys located well offshore while further south they may occur on buoys closer to shore.

Vertical zonation is sometimes strikingly apparent on a buoy (cover figure). When such small scale zonation occurs two or more species will dominate, each at a different level. Aboard ship, as the winch reels in lengths of chain, the transition from an abundance of fouling to none at all is often clearly evident. For instance, the blue mussel normally aggregates in colonies along

[1] Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland.

the coast in shallow water and cannot tolerate too great a depth. This is readily apparent when examining a chain from deep water on which *Mytilus* occurs. The number of mussels may decrease with increased depth, or may cease abruptly. A buoy is anchored by a mooring block, usually of metal or concrete. Studying the community structure on a mooring block adds to the complete vertical picture of species relationship.

Fouling assumes vast importance because of the destruction and inconvenience it causes. This is of considerable interest not only to the zoogeographer but, from an economic viewpoint, to governmental and private agencies whose vessels and marine installations are subject to fouling. As one means of combating fouling in general, anti-fouling paints continue to be tested in various marine waters by painting the surface of buoys and noting the effectiveness of various paint mixtures.

The first step in combating fouling is to learn what organisms are involved. In this respect collections from navigation buoys can play a useful and important role. A comprehensive monograph, "Marine Fouling and Its Prevention," [2] devotes an entire chapter to fouling species recorded from submerged objects throughout the world. The information listed was derived from thorough coverage of 244 publications, of which 48 have reference to buoys. The 837 species listed from buoys represent all the major groups. This is hardly an impressive number from a world-wide viewpoint; still it must be realized that most reports on buoy fouling do not emphasize the listing of species. Few people have attempted to identify and record systematically all species from individual buoys; or for that matter, even a particular group of organisms. Systematic identification of species could be a starting point for anyone wishing to participate in and contribute to the general understanding of the composition of fouling.

Communities, Succession, and Species Behavior

Ecologists will find that buoy material presents an excellent opportunity to study the organization and succession of communities and the adaptation of species. In addition, the settling habits and the mechanics of attachment of early postlarvae can be observed and studied.

Since buoys are surface vehicles, they serve also as "spat (larvae) collectors," and species with pelagic young in the upper waters are apt to settle on them. Many are species which adapt readily enough to life on buoys (Fig. 1) but are species which normally adhere to stones or other hard substrates on the bottom. The date a buoy is put into or taken out of the water is important as regards its faunal assemblage. This is because the reproductive habits of different species naturally determine which larvae are available at any particular time during the year. As colonies of attached species grow, the character of the buoy surface changes and in time free-living forms find shelter in the aggregates. The settlers which grow fastest may smother those whose growth is slower; but, if the slow growers do survive, they may eventually crowd out the early dominants. Thus, a buoy which has been long on station may display an extensively modified assemblage of organisms from that of a buoy out for a shorter period of time. The point to remember is that the community structure of a buoy is not static — all the interactions already mentioned, and others such as silting and severe variation in surface temperature, constantly contribute to molding and remolding the community.

In the offshore Cape Cod area the outsides of buoys are often covered with a wealth of life. These are mostly hardy forms able to withstand exposure and turbulence. Certain algae and barnacles, and the pelecypods *Mytilus edulis* and *Hiatella arctica* usually are found in abundance, and small gastropods such as *Mitrella lunata* and myriads of tiny shrimp live hidden among filamentous algae, bryozoa, or hydroids.

On the inside of a buoy stabilizer [3] the following temporal sequence is generally observed. Barnacles are among the first to settle, followed closely by certain of the algae, foraminifera, and bryozoa, blue mussels, and prickly jingle shells (*Anomia aculeata*). As the early settlers increase

[2] Prepared for Bureau of Ships, Navy Department, by the Woods Hole Oceanographic Institution, Contribution No. 580. Copyright 1952 by U. S. Naval Institute, Annapolis, Maryland.

[3] Navigation buoys come in many sizes and shapes according to the purpose for which they are used. In general, inshore buoys are made up of a float with or without a superstructure while buoys stationed further offshore have, in addition to a float and superstructure, a hollow, cylindrical stabilizer underneath (see Fig. 2).

in size, certain of the free-living annelids, crustaceans and echinoderms make their appearance. Secondary waves of spat, usually of barnacles, mussels, or jingle shells, are apt to settle on any available substrate including the shell surfaces of other early settlers.

Final settlement of organisms on the buoy is usually not at random. More will attach about slight protuberances such as bolt heads and welding ridges or in corners produced by metal flanges or collars. Examples of two extremes in settling habits are provided by the blue mussel and the sea scallop. The mussels settle at random with respect to one another, but soon tend to aggregate in persistent tight colonies. The scallop, on the other hand, while also settling at random, does not grow normally if in contact with other organisms including others of its kind and shows no tendency to form contact aggregations. Hence the sea scallop is not likely to be a dominant fouler.

Unusual phenomena are sometimes witnessed while collecting from buoys. In one case specimens of the soft-shell clam, *Mya arenaria*, a normally burrowing bivalve, were taken nestled in a growth of hydroids far up in a buoy stabilizer, having lived there for about two years. The importance of this find lies in the fact that this species not only lived and survived out of its normal habitat but grew faster than is usual. The collector is exposed to such odd and interesting discoveries with each buoy that he searches.

Collecting Data

If the investigator is able to spend some time aboard the buoy tenders he will be rewarded with many interesting observations denied to one who only examines buoys after they have been brought ashore. He can observe first-hand the ecological aspects of the living species. Fortunately, however, most buoy species are attached and usually still alive when a buoy is brought ashore. Many basic observations can therefore be made ashore as well as at sea.

After preliminary observations the buoys can be sampled according to the interests of the investigator. For quantitative studies, I restrict my collecting to the contents of a square foot of surface from a particular area on each buoy. For species studies I sometimes collect large numbers of individuals from several buoys. Another person might plan an experiment around an accessible species available through periodic removal from buoys. I have found that enough buoys are brought in each year to set up planned experiments involving the more common species from an area. And because live individuals of most attached forms can generally be obtained, anatomical or histological studies are practical.

Using the Data

Buoys are on station for known lengths of time, usually one to two years, although by accident or design some may be out for only a few weeks or months. Thus, when numerous buoys from an area have been examined, certain information such as definite limits of spawning seasons can be gathered for some species. It is obvious that single buoys out for short lengths of time can contribute especially good data on lengths of spawning seasons and on seasonal growth rates. Such buoys may also indicate seasonal variation of species and provide data for predicting seasonal abundances of certain larvae.

Length-frequency data of species collected from many buoys will fix modes and provide minimum growth rates. I say "minimum growth rates" because the precise time of setting of a species on a particular buoy cannot definitely be established even though the length of time a buoy is out is known. Generally, species that occur on buoys seem to grow more rapidly than in their natural habitats. This is probably a result of both temperature and current influences. Growth rates of

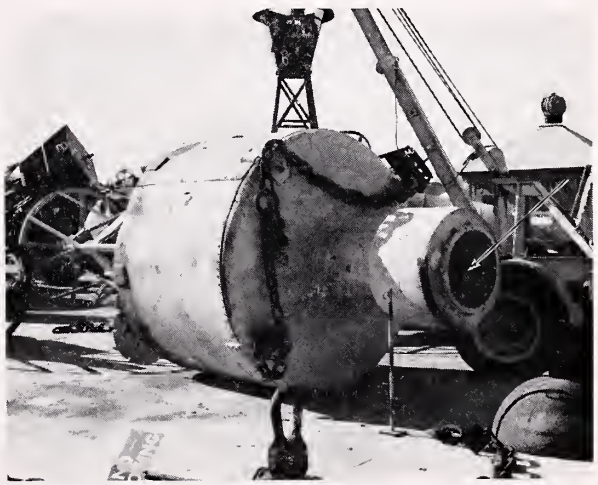

Fig. 2. Typical navigation buoy. Arrow indicates the sheltered inner portion of the stabilizer tube within which choice specimens can usually be taken.

organisms are known to vary with temperature of the water. Buoy organisms, being near the surface, are on the average exposed to warmer water than their fellows distributed on the bottom at varying depths. In like manner the circulation of the water is widely recognized as favoring the growth of sedentary species, and currents are known to be on the average more rapid at the surface than near the bottom, thereby making available more food materials. The biologist who makes a specific study of the effects of temperature, salinity, and tidal currents in relation to the growth of certain buoy species can verify or challenge the above statements.

I have found that the only satisfactory way to approach a growth problem is to compare material both from buoys and natural habitats if possible. In this way rates of growth can be established under different environmental conditions. Actually, we are doing this at the present time with the eastern oyster, *Crassostrea virginica*. The growth rate of oysters from buoys stationed at various locations in the Chesapeake Bay are being compared with the growth rates of those from the bottom. However, in the case of the sea scallop, *Placopecten magellanicus,* only occasional very young specimens are found in their natural habitat. What little is known of the early rates of growth for this species has been derived from numerous specimens taken from many buoys.

Lightships, stationed at intervals along the Atlantic coast, record certain hydrographic data daily, including bathymetric temperatures. Using these data, temperature tolerances can be approximated for species that normally settle and live in deep water but happen to settle and survive on buoys subject to greater temperature variation.

Under optimal conditions the shell surface sculpture of some organisms is more strongly expressed. Ideal conditions may exist on a buoy when a group of organisms, collectively, do not overpopulate the area; i.e., the buoy is not heavily fouled. In the Cape Cod area this condition sometimes is met when a buoy is placed in the water during the late fall months when fewer larvae are in the water to settle. If the buoy is removed in late spring or early summer the fall settlers have had a chance to grow rapidly without having been affected by the much heavier rash of late spring larvae.

The hollow inside of the buoy stabilizer is dark and offers a haven for many species (see arrow, Fig. 2). The enclosure decreases the stress of current action while at the same time the tube is continually flushed by wave action gently tossing the buoy. When examining buoys, I check the inside of the stabilizers very carefully for two reasons: 1, more kinds of organisms are usually represented there than elsewhere; 2, structural variations may be especially evident among the specimens found there. I have taken the Atlantic thorny oyster, *Spondylus americanus,* and the leafy jewel box, *Chama macerophylla,* both from tubes of surface buoys and from salvaged bottom wrecks at similar localities in the Florida Keys. The developing spines and foliations of buoy specimens are much more delicate and numerous than those from the usual habitat. I have found this to be true also with other species including several species of scallops which develop surface ornamentation.

Investigators are frequently handicapped by the lack of a series of specimens sufficient to show the extent of variation within a species. Because many thousands of a single species are often available from a buoy, variance within a population can easily be studied. Such studies are of special interest, since ecological factors are similar for all individuals, i.e., the microhabitat on the buoy is more uniform than the usual bottom environment. This is especially so when using material from buoys well offshore where silting is no problem.

Variation may be induced by environmental phenomena or it may be genetic. In a recent study of *Anomia aculeata,* some specimens were observed to have smooth shell surfaees, others spiny. It was possible to form a long series of specimens and see the intergrades between the extreme variants. However, of more interest and importance in this particular study is the fact that it was graphically demonstrated that the prickly jingle shell is a species whose full expression of inherent genetic variability for the character of spinosity might be expressed any time during their life history after metamorphosis. Without a great number of specimens from several buoy populations, these observations could not have been made.

The thousands of specimens of some species that may be obtained permit detailed description

of the changing morphology during early development. The sea scallop is a deep water form which so far has not been maintained through these early stages in the laboratory. With the aid of material from buoys, it has been possible to describe and figure fully the development of shell characters in the early stages of this species.

Theoretical Problem

Indirect issues such as the whereabouts of the spawning grounds, or the length of the larval period, or the direction and rate of speed of water currents can be given at least theoretical consideration as more and more information becomes available through studies of buoy material. However, a thorough background relative to the species in question is a prerequisite to the diligent consideration necessary in order to blend theory and fact. Some thought has been given this approach in an effort to learn more of the habits of the sea scallop. To illustrate: a buoy on station for seven months from October 1957 to May 1958 near the Nantucket Shoals Lightship (see chart, Fig. 3) contained a population of about 10,000 sea scallops, the modal size of which was 2.9 mm., the smallest being 0.5 mm., the largest 13.2 mm. Since none of these scallops could have been on the buoy longer than seven months, we know that they can grow as large as 13.2 mm. in a time not exceeding seven months after setting. Using temperature data collected by the nearby Lightship we find that the sea scallops had survived the coldest surface temperature of 37.3°F recorded for February 19, 1958. The data collected from the Nantucket Shoals Lightship buoy will allow a rather simple problem to be formulated: when and where were the sea scallops spawned which set on this buoy? Before attempting an answer one must have at least partial knowledge of the time of spawning, of the duration of the pelagic state, and of the direction and velocities of surface currents in the general area. Through field collecting we know that sea scallops spawned off Cape Cod during the autumn of 1958 from about September 15 to about November 15. Through laboratory experiments using various pelecypod species it is generally assumed that completion of the pelagic state takes from 10 days to 2 weeks, depending in part on water temperatures. Recent laboratory experiments indicate that the larval period for the sea scallop might be somewhat longer. Direction and velocities of currents have been plotted by oceanographers over a large area off the New England coast using, in part, information gathered by dropping drift bottles at prearranged points. Data from the returns indicate the greatest possibility of a current flow in this area during the late summer and fall months to be from a northerly direction (arrows in Fig. 3) at the average rate of 3 miles per day.[4] Thus, the minimum and maximum distance the pelagic larvae might have traveled can be approximated with a fair degree of certainty. Postulation of at least 2½ miles per day for 10 days for a total of 25 miles, and at most 3½ miles per day for 21 days, totalling 72½ miles, seems in order. In Fig. 3 circles represent the minimum and maximum distance possibly traveled by the larval scallops. We have a mass of data relative to scallop density north of the buoy which has been acquired through port interviews of fishing captains. These data indicate a heavy concentration of scallops at this time from 25 to 45 miles northeast of the buoy, with the heaviest concentration about 35 miles north-northeast. Other data from dozens of buoys have already allowed us to fairly well establish the growth rate of zero year scallops. The mode of six-month-old scallops from buoys averages 3.0 mm. which is

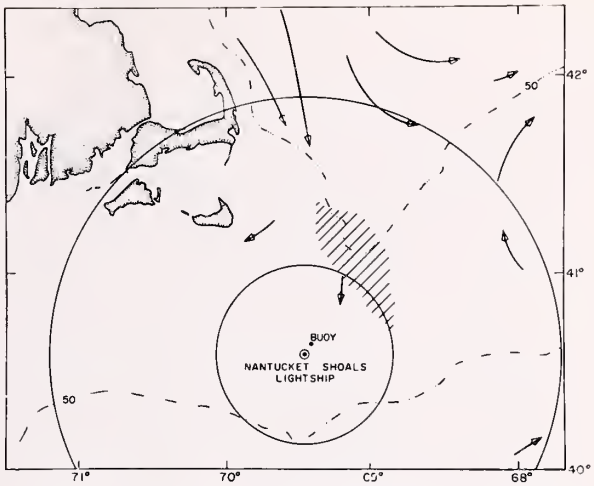

Fig. 3. Chart illustrating hypothetical problem. Circles represent possible minimum and maximum distance larval scallops traveled before settling. Hatched area positions heavy concentrations of adult scallops. Arrows indicate direction of current flow during the fall months in this area.

[4] Dean Bumpus, Woods Hole Oceanographic Institution, personal communication.

just over the mode in the Nantucket Shoals buoy. Since the buoy was placed on station October 10, the scallops must have settled on it almost immediately to attain this size. Allowing 3 weeks in the pelagic state the scallops probably spawned in the first part of October 1957 in the area about 35 miles north-northeast of the buoy. This conclusion, based in part on several suppositions, cannot be proved or disproved with certainty. It is simply a reasonable attempt to fill in some of the gaps in our present knowledge. Anyone with a sufficient background in a particular species and area will appreciate the intriguing aspects of such theoretical consideration.

A quote from the fouling monograph mentioned earlier (see footnote 2) might be appropriate in closing. This excerpt followed and summarized the development of the thesis that a given fouling community on a particular exposure follows a complicated pattern:

> The variation in detail which is possible through the operation of local and biotic factors is enormous. Only a beginning has been made on its analysis. Fortunately, the complexity of the local variations is somewhat offset by their accessibility for study, and progress in understanding them therefore can be expected.

The quote calls attention to the complexities of fouling and emphasizes the accessibility of material for study. This is particularly true of buoy material. Not only is material from buoys easily attainable but each buoy has its own community structure, an entity at the time of capture, available in a totality of related parts. Scientific contributions resulting from planned marine research using buoy harvests cannot help but further progress toward a better understanding of some of the biological intracacies involved.

The CUEBS Southeastern Regional Conference

The Commission on Undergraduate Education in the Biological Sciences (CUEBS) is sponsoring a Southeastern Regional Conference on Undergraduate Courses and Curricula in Biology in conjunction with the ASB Meeting in Charlottesville next April. The Conference sessions will be held during the mornings and afternoons of Thursday and Saturday, April 15 and 17, thus permitting the Conference participants to attend the Association sessions on Thursday evening and Friday.

In order to keep the Conference to a manageable and effiicient size, attendance will be limited to fifty participants. These will be selected by CUEBS from among the applicants for participation. Applications must be submitted to: CUEBS, The George Washington University, Washington, D. C., 20006, no later than March 15, 1965, to be assured of consideration. Applicants will be informed of the action of the Selection Committee by March 22. Participation in the Conference will be limited to no more than one individual from any department so that as many colleges and universities as possible can be represented. A department may, therefore, wish to select one person to be its applicant rather than to leave the decision up to the CUEBS Selection Committee. It will, of course, be impossible to include participants from all colleges and universities in the Southeast.

Applications are solicited from biologists involved in undergraduate education in the Southeast, whether or not they are members of ASB. The states included in this region are: Maryland, District of Columbia, West Virginia, Kentucky, Louisiana, and the states to the south and east of these.

CUEBS will pay for the lodging, meals, and other essential living expenses of participants who are unable to secure such support from their institutions, but CUEBS is not able to pay travel expenses.

The Regional Conferences are designed to provide biologists from a wide variety of colleges and universities throughout the country with the opportunity of becoming acquainted with new course and curriculum developments in the biological sciences, suggesting other new approaches to course and curriculum improvement, and discussing course and curriculum problems with colleagues from other institutions. The program of the Conference will include both small discussion groups of ten to twelve people and plenary sessions attended by all participants.

About the Charlottesville Meeting

Gilmer Hall — University of Virginia

The Association of Southeastern Biologists will hold its 26th annual meeting April 15-17, 1965, at the University of Virginia, Charlottesville, Virginia. The meeting will commence on Thursday afternoon, April 15, with a meeting of the Executive Committee at 1:00 P.M. in Room 65 of the Life Sciences Building, Gilmer Hall. Except for the Banquet, which will be held in Newcomb Hall, activities will be held in Gilmer Hall — registration, exhibits, smoker, evening programs, and paper sessions.

Registration will be from 4:00 P.M. until 7:15 P.M. on Thursday, and from 8:00 A.M. until 11:00 A.M. Friday in the lobby of Gilmer Hall. The program Thursday evening will begin at 7:30 in the auditorium of Gilmer Hall, to be followed by the smoker to be held in the lobby of the same building. Exhibits will all be on display in an adjoining wing of Gilmer Hall. Paper sessions and the annual business meeting will occupy Friday. Friday night activities include a banquet, the retiring President's address, and presentation of awards.

GENERAL INFORMATION AND ACCOMMODATIONS

Charlottesville is on the Piedmont Plateau by the Blue Ridge Mountains. It lies about 650 feet above sea level. Cool winters alternate with mild summers, the daily summer maximum for the most part being in the low nineties. April weather is usually delightful with flowering trees and shrubs approaching the height of bloom. The residential area in which the University is located is widely known for its massed flowers of dogwood and azaleas. Information on Charlottesville and its various attractions, especially for wives and families, will be distributed at time of registration.

Monticello, the home of Thomas Jefferson, is something that no one should miss seeing. It is located about five miles from the University, and transportation will be provided for those who require it.

Except for beer, alcoholic beverages are sold only by the bottle in the Charlottesville area. Beer and wine can be obtained in a variety of stores. "Hard" liquors are sold through "ABC Stores," outlets of the Virginia Alcoholic Beverage Control Board.

Travel to Charlottesville

The intersection of the two major highways serving Charlottesville (U. S. 29 and U. S. 250) adjoins the grounds of the University of Virginia.

To reach Charlottesville by air one must fly on Piedmont Airlines. Several flights a day enter and leave the Charlottesville-Albemarle Airport. Limousine fee is $1.50.

Charlottesville is also on the Chesapeake and Ohio Railroad.

Dining

Members of the Association and their guests will find it convenient to use the main cafeteria in Newcomb Hall, or the new Glass Hat Snack Bar which is across the street from Gilmer Hall. Several commercial dining facilities are located in the immediate vicinity of the University.

Field Trips

Plans are being made for a Saturday morning field trip to several points of interest in the Blue Ridge Mountains.

Registration

Registration will begin Thursday, April 16, and continue through Friday morning in the main lobby of Gilmer Hall (the Life Sciences Building). A $1.00 registration fee will be charged.

Local Arrangements Committee

Co-Chairman	J. N. Dent
Co-Chairman	J. L. Riopel
Housing	J. J. Murray
	M. Garrick
Finance	D. Mellon
Registration	E. W. Lautenschlager
Food Services	S. P. Maroney
Smoker	R. D. McKinsey
Exhibitions	J. Rappaport
Field Trip	H. G. M. Jopson
Program	H. L. Hamilton
	D. E. Smith
Meeting Rooms	L. Husted
Transportation	R. L. Searls

Accommodations

AT THE UNIVERSITY:

Two types of accommodations are available. At the William Faulkner House (staff club) twenty-two double and two single rooms are available. All have private baths except two which share a bath. In addition to these, twenty double rooms are available in the dormitories with communal facilities. Send requests for any of these rooms to: J. J. Murray, Jr., Department of Biology, University of Virginia, Charlottesville, Virginia. Rates are as follows:

William Faulkner House	
Double Rooms	$9.00-$14.00
Single Rooms	$7.00-$10.00
Dormitory Rooms	$3.00—(1.50 per person)

PUBLIC ACCOMMODATIONS:

The Monticello Hotel and a number of motels have agreed to reserve rooms for the meeting. Since April is a busy month, it is advisable to make reservations at least by the end of March.

Please write directly to hotels and motels for reservations.

Monticello Hotel, 5th and Jefferson Sts., N. E.
30 double (twin-bedded) rooms and 10 single rooms.
Single with half bath $4.00, with bath $5.50-9.00.
Double $10.00-14.00. Downtown.

Holiday Inn, Rt. 29 N.
75 double rooms at $14.00; 25 single rooms at $8.00.
Children under 12 free; over 12, $2.00 extra.

Mount Vernon Motel, Rt. 29 N.
50 double rooms at $14.00 double or $10.00 single.

Gallery Court Motor Hotel, Rt. 29 N.
22 double rooms from $12.00-$14.00; 8 single rooms from $8.00-$10.00.

University 14th St. Motor Inn, 207 Fourteenth Street
10 double rooms at $12.50.

Cardinal Motel, Route 29 N.
10 double rooms at $12.00; extra cot at $4.00.

Colony Motor Court, Rt. 29 S.
25 double rooms from $6.00-$12.00. 8 with private baths, others with adjoining baths. 2 efficiency apartments at $12.00.

Meritorious Award Nominations

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)
1961. Dr. Warren Deacon (Vanderbilt)
1962. Dr. Septima C. Smith (Univ. of Alabama)
1963. Father Patrick H. Yancey (Spring Hill College)
1964. Dr. Ruskin S. Freer (Lynchburg College)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting materials to *Dr. W. E. Brillhart, Dept. of Biology, Emory University, Atlanta, Ga., 30322* by 29 March 1965.

COMMITTEE
PERRY C. HOLT
JULIAN T. DARLINGTON
W. E. BRILLHART, *Chairman*

Association Research Prize

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Papers submitted in competition are judged by eminent scientists in the various fields of biology. These individuals are selected by the Research Committee and are from schools outside the Southeast. Every effort is made by the Research Committee to keep the authors of submitted papers anonymous. Criteria for the award are left to the discretion of the judges' panel, who may withhold said award if no paper is considered to have sufficient merit.

5. Papers must be submitted *in triplicate* and in their entirety not later than March 1, 1965, to *Dr. Burton J. Bogitch, Box 1733, Station B, Vanderbilt Univ., Nashville, Tenn., 37203.* One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Ivey F. Lewis Fellowship at Mountain Lake Biological Station

A Research Fellowship of $150.00 for summer course study or research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. This fellowship, formerly known as the *Phipps and Bird Research Fellowship,* was re-named at the request of the Phipps and Bird Company. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and especially in the case of younger workers, by references and educational data. Applications should be sent to *Dr. Burton J. Bogitch, Box 1733, Station B, Vanderbilt University, Nashville, Tenn., 37203* not later than 29 March 1965. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE
Edward E. C. Clebsch
Raymond T. Damian
Burton J. Bogitsh, *Chairman*

Mary Glide Goethe Travel Awards

For the eighth year there will be funds available through the generosity of Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year at the University of Virginia, Charlottesville, Va. Approximately $300 will be available from the contributions of Mr. Goethe, and it is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from Charlottesville.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe Committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1965 meeting of the Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Indicate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.
2. Give information as to whether or not a paper is being presented by the applicant.
3. In a paragraph, give a brief history of your education to date, of how many years you have been — and plan to be — in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.
4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.
5. Have your major professor or departmental head write a letter supporting your application.
6. Applications and supporting letters, both in triplicate, should be in the hands of Dr. Richard E. Garth, Dept. of Biological Sciences, Northwestern State College, Natchitoches, Louisiana, by 1 March 1965. Applicants will be notified of the decision of the Committee during March.

COMMITTEE
Thomas Daggy
Grover C. Miller
Richard E. Garth, Chairman

DIRECTORY OF ASB MEMBERS

The following directory is, to the best of our knowledge, correct as of 1 December 1964. Because some mistakes invariably find their way into listings such as this, the Editor would greatly appreciate it if members who note omissions and mistakes would call them to his attention.

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Books and Periodicals

The University of South Carolina Press has recently published, "Wild Flowers of South Carolina" by Wade T. Batson. Dr. Batson is Professor of Biology at the University of South Carolina. Presented in the book are descriptions and habit photographs in color of two hundred wild flower species. Identification keys are provided for these and for other conspicuous species not illustrated.

During the past semester Dr. Albert E. Radford, Dr. C. Ritchie Bell, and Mr. Harry E. Ahles, of the Department of Botany of the University of North Carolina at Chapel Hill, have visited and studied all of the North and South Carolina material at the herbaria of Duke University, North Carolina State of the University of North Carolina at Raleigh, the University of South Carolina, the Charleston Museum, Furman University, Clemson University, Western Carolina College, East Carolina College, Coker College, Wake Forest College, and Appalachian State Teachers College. The purpose of the study was to complete the county by county distribution data for the vascular plants of the two Carolinas. These data, in the form of over 3,200 "dot maps" will be published early in 1965 as an *Atlas of the Vascular Flora of the Carolinas.* It will be available from the Department of Agricultural Information of the North Carolina Agricultural Experiment Station in Raleigh, which is publishing the "Atlas" as a Technical Bulletin, and from several South Carolina State agencies.

The material in the "Atlas" and in the recently published *Guide to the Vascular Flora of the Carolinas* (see below) are components in the final preparation of the complete *Manual of the Vascular Flora of the Carolinas.*

The University of North Carolina announces the publication of a *Guide to the Vascular Flora of the Carolinas,* by Albert E. Radford, Harry E. Ahles, and C. Ritchie Bell. This guide, with distributions by states for the southeastern states, is based on nearly 200,000 recent collections, treats 179 families, 941 genera, and over 3200 species of ferns, conifers, and flowering plants. Its 392 pages are available in two bindings — plastic treated paper, $3.95; standard hard binding, $6.30. The book may be obtained from the Book Exchange, University of North Carolina, Chapel Hill, N. C.

THE LOWER METAZOA: COMPARATIVE BIOLOGY AND PHYLOGENY. E. C. Dougherty, Z. N. Brown, E. D. Hanson, and W. D. Hartman (editors). University of California. 1963. Pages I-VIII, 1-478. $17.50.

Here is a book every invertebrate zoologist and all who are interested in the evolutionary origins of the Metazoa will want, in spite of the fact that it is another volume of symposium papers with some of the faults of such works, not the least of which is the price. There are thirty-four papers by thirty-two contributors, many of whom are famous students of the morphology and phylogeny of the lower invertebrates. These papers are divided into three sections: twenty-one papers and 304 pages to "Comparative Morphology and Phylogeny," six papers and 71 pages to "Comparative Physiology," and seven papers and 104 pages to "Other Disciplines of Comparative Biology."

With perhaps no more than four exceptions, which could have been incorporated into the first section of the book, the thirteen papers of the last two sections could better have been omitted entirely.

The exceptions are Ernest Baldwin's strong call for more truly comparative biochemical studies; Robert W. Pennak's consideration of the origin of freshwater lower metazoan faunae by a passage from marine habitats by psammolittoral forms through a narrow brackish zone into the phreatic (groundwater) zone; and two papers on the embryology of sponges and acanthocephalans. The other nine papers of these sections, though they would make excellent journal articles, serve here to make the point that biochemistry and physiology, to a lesser extent, ecology, have not, as yet, made the contributions to phylogenetic studies that we hope for from them.

The bulk of the book, the first section on "Comparative Morphology and Phylogeny," is strong. All the interesting and conflicting theories of metazoan origins are here in the twenty-one papers, which, regrettably, are too many to review individually. It is a pity not to mention well done papers such as that by R. B. Clark on the origin of the coelom and metameric segmentation; nor to call attention to what one hopes is the facetious suggestion by Donald D. Jensen that the vertebrates owe their origin to the nemertines, but if space forbids a discussion of papers by E. D. Hanson, Cadet Hand, Adolf Remane, T. G. Karling, Peter Ax, Otto Steinbock, W. D. Hartman, and others, it must be done. The invertebrate morphologist will read all these and others with pleasure.

In attempting to reflect upon the meaning of all these arguments for conflicting theories of lower metazoan relationships, I am driven back upon a theory and a dictum. The theory is Simpson's (1953) that an early "great adaptive radiation" of the primitive (?) precoelenterate metazoans led to the past and present number and diversity of animal phyla; the dictum is Hyman's (1959), which Hartman quotes in his contribution, that questions as to the origin of the Metazoa from the Protozoa, of the Bilateral and of modes of entoderm, mesoderm, and coelom formation are insoluble on the basis of present information. Perhaps Hand's argument that the "early worm" was a planula and Hartman's and Clark's studies of the origin of the coelom, agree most closely with these views. And Beklemishev says much the same, and expresses the conclusion I reach from reading all these papers, if one reads "early metazoan" or "planula" for "Coelenterata": . . . "though the lower Turbellaria are the most primitive of the Bilateria, they are in no way at the base of all their lineages. . . . And though these lineages have split from the Coelenterata at

different stages of the latter's evolution by means of various adaptations and transformations, still the Bilateria form a consistent group and are a striking example of the fact that reasonable taxonomic treatment is far from always coinciding with the best phylogenetic reconstruction, and that not all seemingly homologous similarities have been inherited from common ancestors." There is, after all, a wide area of agreement, and for the present, at least, I shall base my teaching on these views. But regardless of his phylogenetic beliefs, every teacher of invertebrate zoology will find much of interest and material for lectures in this book.—PERRY C. HOLT, DEPARTMENT OF BIOLOGY, VIRGINIA POLYTECHNIC INSTITUTE.

PHOSPHOLIPIDS: CHEMISTRY, METABOLISM AND FUNCTION, BBA Vol. 3, G. B. Ansell and J. N. Hawthorne, Elsevier Publishing Co., N. Y., 1964, vii + 439 pp., #20.

The primary function of the authors in writing this volume is to present the biochemistry of phospholipids in an up-to-date manner. Over 80% of the references have been published since 1951. The earliest references (in the early 1800's) are found in the brief historical introduction.

The treatment of the subject is limited to animal tissues with particular emphasis on mammalian tissues. Although clinical applications are included, the chapters dealing with phospholipid analytical methods, biosynthesis, catabolims, organelle composition, genesis, and transport mechanisms would be of value to any experimenter directly or indirectly concerned with lipid research.

The frequent references to reviews and current research articles give the reader ample bibliographic material for delving into more specific areas of investigation. A limited number of cross references within the text tend to decrease the prolixity which could result in such a comprehensive treatment of the subject. In addition to the value of this volume as a research tool, there are stimulating suggestions for further study of particular problems in the genesis and function of phospholipids in animal tissues. Suffice to say that a quotation included in the text is becoming more and more meaningful as research progresses "Phosphatides are the centre, life and chemical soul of all bioplasm whatsoever, that of plants as well as animals" (J. L. W. Thudichum 1884). — John F. Dimmick, Wake Forest College.

News of Biology in the Southeast

Beginning in April, the *News of Biology in the Southeast* section of the ASB Bulletin will be under the editorship of Dr. David J. Cotter of Alabama College, Montevallo, Alabama. Dr. Cotter has volunteered to seek information on the activities of the ASB members on an individual basis, thereby supplementing the work of the state correspondents who, it is hoped, will continue to gather news from institutions in their states and be on the lookout for items of potential interest to ASB members and Bulletin subscribers. This step was taken in order to increase the news coverage of the Bulletin, and has become necessary because of the mobility of "southeastern" biologists — who have moved to almost all of the fifty states and several foreign countries, but who happily still regard themselves as part of the southeast.

About People

C. Ritchie Bell of the Department of Botany of the University of North Carolina has been awarded a research grant of $4,250 from the North Carolina Board of Science and Technology for beginning evolutionary studies on weedy and non-weedy "species pairs" in the Convolvulaceae, Scrophulariaceae, and Apiaceae.

Robert W. Kelley, Professor; **William P. Pielou,** Associate Professor; and **Gilbert W. Fairbanks,** Assistant Professor, are new members of the Biology Dept. of Furman University, Greenville, S. C.

Helen Churchill of Hollins College is on Sabbatical Leave working on parasitology problems in Manila.

G. Thomas Riggin, Jr. has been appointed Acting Head of the Biology Dept. of Newberry College, Newberry, S. C.

Stefan O. Schiff, who received his doctorate from the Institute of Radiation Biology of the University of Tennessee in August, 1964, is now Assistant Professor of Zoology at the George Washington University.

Hugo L. Blomquist, Professor Emeritus in the Department of Botany at Duke University, died on 28 November 1964 after a prolonged illness.

At a recent meeting of the American Society of Ichthyologists and Herpetologists, **Coleman J. Goin** of the University of Florida was elected President-elect of the Society.

The appointment of **Elizabeth M. Zipf** as supervisory editor and head of the Editorial Department at Biological Abstracts is announced by Mrs. Phyllis V. Parkins, director *pro tem.* Dr. Zipf joined the staff at Biological Abstracts in 1957 as an assistant editor, was named associate editor in 1959 and senior associate editor in 1962. Prior to joining the BA staff, she served as a research assistant in the Biology Department at Princeton University from 1956-57. She received the A.B. degree in biology and chemistry from Mary Washington College of the University of Virginia, the M.A. in zoology from the University of Pennsylvania, and the Ph.D. in biology from the University of Virginia. Her publications include articles on embryology and neurosection in Crustacea.

Luckett V. Davis and **Richard D. Houk** have joined the Biology Department at Winthrop College as Associate Professor and Assistant Professor, respectively. Dr. Davis, who received his Ph.D. in zoology from Duke, was most recently at the University of the Pacific, Stockton, California. Mr. Houk is from the Botany Department at Florida State University where he is completing his doctorate program.

New faculty members in the Department of General Biology, Vanderbilt University, are **Terrill J. Long,** Assistant Professor in Plant Physiology, and **William M. Clement, Jr.,** Associate Professor in Cytology. Dr. Long was formerly associated with the Biology Division, Oak Ridge National Laboratory. Dr. Clement was formerly Assistant Professor of Agronomy and Plant Genetics at the University of Minnesota. **R. B. Channell,** Associate Professor of Biology, has been appointed Chairman of the Department of General Biology. **Burton J. Bogitsh,** Associate Professor, has received a two-year grant from N.I.H. for continuation of his histochemical studies of host-parasite relationships.

Willie M. Reams, formerly at Louisiana State University, has joined the Biology Department at the University of Richmond. Dr. Reams will teach histology and embryology at the undergraduate level and conduct a course in experimental embryology for graduate students.

Nolan E. Rice, Professor of Biology at the University of Richmond, will be on sabbatical leave the second semester to travel in Europe.

Charlotte P. Mangum has joined the faculty of the College of William and Mary as an Assistant Professor of Biology. Dr. Mangum received her Ph.D. degree from Yale University and has recently completed a one year Post-doctoral Fellowship at the Plymouth Marine Laboratory in England.

William S. Woolcott, Associate Professor of Biology, University of Richmond, received a research grant from the Virginia Academy of Science to aid in the study of variation in populations of certain species of fishes in the tributaries of Chesapeake Bay. He will be assisted by **William T. Hogarth,** a graduate student at the University. **Willie M. Reams, Jr.,** Associate Professor of Biology at the University of Richmond, is conducting research on pigment cell behavior in the leg muscles of mice. The research is supported by a grant from the National Science Foundation for $8,100 for this academic year.

Stephen W. Gray and **Betty F. Edwards** of the Anatomy Department, Emory University, Atlanta, Georgia have been awarded a contract by the National Aeronautics and Space Administration to support a program entitled, "The Effect of Weightlessness on the Growth and Orientation of Roots and Shoots of Monocotyledenous Seedlings." This program will be carried out when the first Biosatellite orbits the earth in the Spring of 1966.

Michael David Garrick has joined the staff of Biology at the University of Virginia as Assistant Professor. Dr. Garrick received his Ph.D. from the Johns Hopkins University in 1963 and spent last year as a post doctoral research fellow with Dr. S. H. Boyer. His research interests lie in the fields of biochemistry and genetics and he is currently concerned with the inheritance of hemoglobin types in man, and gene products in *Neurospora.*

Larry T. Wimer has been appointed Assistant Professor of Biology at the University of South Carolina. Dr. Wimer, who received his Ph.D. degree at the University of Virginia, was formerly Instructor of Biology at Northwestern University. His field of major interest is insect physiology.

Roy Hunter, formerly of the Morehouse College faculty, has joined the staff of Atlanta University as Associate Professor of Biology. Dr. Hunter's teaching and research interests are in developmental embryology. **Johnny Jackson** has also joined the Atlanta University staff to augment the developing graduate program in the botanical sciences. Dr. Jackson recently received his doctorate degree in plant physiology from the University of Oklahoma where he was a student of Dr. Lawrence M. Rohrbaugh. **Luther Williams,** formerly instructor of biology at Atlanta University, is currently studying for the doctorate degree in the Department of Biological Sciences at Purdue University. **Lafayette Frederick,** Professor and Chairman of the Department of Biology at Atlanta University was the recipient of the second annual Board of Trustees Excellence-In-Teaching Award of $1000.00 at the annual Charter Day Banquet.

George H. M. Lawrence of the Hunt Botanical Library, Pittsburgh, has been elected President of the American Society of Plant Taxonomists for 1965, and **Robert K. Godfrey** of Florida State University, Tallahassee, has been elected to serve a seven year term on the Council of the Society.

Other officers appointed by the Council for 1965 are: Lawrence R. Heckard (University of California, Berkeley), Secretary; Richard W. Pohl (Iowa State University), Treasurer; **Robert W. Long** (University of South Florida, Tampa), Treasurer-elect.

Other appointments made by the Council are: Peter H. Raven (Stanford University), Editor-in-Chief of *Brittonia;* Jonathan Sauer (University of Wisconsin, Madison) and William Weber (University of Colorado) to serve on the editorial board of *Brittonia;* Henry J. Thompson (University of California, Los Angeles), Representative of the Society on the editorial board of the American Journal of Botany; **Robert B. Channell** (Vanderbilt University) and **Robert K. Godfrey** (Florida State University), Representatives of the Society on the Council of the American Association for the Advancement of Science; **Richard S. Cowan** (U. S. National Museum), Representative of the Society on the Governing Board of the American Institute of Biological Sciences; **Walter H. Hodge** (National Science Foundation), Representative of the Society on the National Research Council.

The $500 George R. Cooley Award of the American Society of Plant Taxonomists for meritorious work published on the flora of the Southeastern United States has been given to **Ruth S. Breen,** Florida State University, Tallahassee, for her recent book, *Mosses of Florida.*

The $100 Cooley Award for the best paper presented at the annual meeting of the society at the University of Colorado, Boulder, in August went to **Jacques Kagan** for a paper (with **Ralph E. Alston, T. J. Mabry,** and **H. Rosler,** all of the University of Texas) on the Flavonoid Components of *Baptisia* species.

Carl J. Kuipers, Professor of Biology at Middle Georgia College, has been appointed Chairman of the recently organized Division of Natural Sciences of the college.

Mississippi State College for Women

Raymond Kisner joined the staff of MSCW this year as Associate Professor of Biology. Before coming to MSCW, he was at Martin Branch, University of Tennessee. **Franklin Brewer** came this year as Assistant Professor of Biology. Mr. Brewer came from LSU, where he had been enrolled in the Ph.D. program in zoology. **Eugene Strobel** is on sabbatical leave and is currently enrolled in the Ph.D. program in zoology at LSU. **Mona Whitson** is on sabbatical leave and is currently enrolled in the Ph.D. program in botany at Mississippi State University.

Eugene Strobel was awarded a grant of $1500 by the MSCW RESEARCH COMMITTEE for work on sponges of Mississippi. **Harry Sherman** was awarded a grant of $1000 by the MSCW RESEARCH COMMITTEE for work on vaseular plants of Mississippi. **James C. Wilkes** was awarded a grant of $1000 by the MSCW Research Committee for work on mosses of Mississippi.

Virginia Institute of Marine Science

Edwin B. Joseph addressed the District T Teachers of the Virginia Education Association recently at the Woodrow Wilson High School. The title of his talk was "Sound Production in the Sea."

William J. Davis presented a program on commercial fishing in the Chesapeake Bay at a meeting of the Gloucester Woman's Club, Gloucester, Virginia.

Morris L. Brehmer talked with the biology club of William and Mary on "Pollution and the Role of Research."

Robert E. Stevenson of Florida State University spoke to the faculty, staff and graduate students of the Virginia Institute of Marine Science on October 19, 1964. The title of his talk was "The Influence of Hurricanes on the Ocean Temperature." He visited the Institute from the Department of Geology, College of William and Mary where he was sponsored by the American Geophysical Union as part of the series of lectures at colleges and universities throughout the eastern United States.

William J. Hargis, Jr., Director of the Virginia Institute of Marine Science, spoke to the Accomac Farmers Club on "Marine Research and the James River Problems" Tuesday, November 17, 1964.

William J. Hargis, Jr., Morris L. Brehmer, Maynard M. Nichols and **Robert L. Ellison** attended the AERS meeting in Baltimore, Maryland, November 6-7. Dr. Ellison of the University of Virginia and associate faculty member of VIMS presented a paper titled "Diversity of Foraminifera in the Rappahannock River" a study begun while he was a participant of the NSF Research Participation for College Teachers summer program at VIMS.

Jay D. Andrews, Head of Malacology Department at the Virginia Institute of Marine Science, has completed a final report on the proper management of stored water for biological purposes with reference to the proposed Salem Church Dam Project. This is a project designed to reduce or eliminate oyster pests such as drills, *Dermocystidium,* MSX, *etc.* from the Rappahannock River. The report is being sent to the Bureau of Sport Fisheries and Wildlife, U. S. Wildlife Service and the Corps of Engineers. Dr. Andrews served as a member of the Textbook Selection Committee for the State Board of Education in selecting biology textbooks for students in Virginia.

Dana Eldridge of VIMS, under the supervision of Dr. Andrews, has finished a successful summer's work on breeding of progeny of selected MSX-resistant oysters. Some 15 different lots of oyster progeny are now available for testing. A rather enthusiastic quarterly progress report has been sent to the U. S. Fish and Wildlife Service which administers a federal grant on this project.

Ten students in Biological Oceanography at the Virginia Institute of Marine Science got to take a long look at the subject of their chosen careers November 23-25. The subject was the sea, specifically the Atlantic Ocean, on which they ranged beyond the Gulf Stream aboard Duke University's new research vessel EASTWARD. The VIMS graduate students received training on the cruise from Mr. Langley Wood and Dr. Maynard Nichols, of the Institute research staff, instructors in biological and physical oceanography, respectively. The cruise aboard the EASTWARD was a part of a Cooperative Research and Training Program in Biological Oceanography sponsored by the National Science Foundation.

Old Dominion College

Old Dominion College, Norfolk, Virginia, has added the following people to the staff in biology: **Irma E. Bowers,** who comes to us from the Medical College of Virginia; **Joseph Q. Heplar,** from Hampton Institute; **Kent S. Price, Jr.,** from the University of Delaware; **Nancy L. Wade,** from East Carolina College, and **James R. Wells,** from East Carolina College.

Jacques S. Zaneveld left October 2 for Antarctica, where he will continue his algae studies, begun last year, in the Ross Sea and along the coast of Ross Island and the shore of Victorialand. These studies are made possible by a NSF grant. Dr. Zaneveld has also received a NSF grant for Undergraduate Research Participation Projects.

Daniel Sonenshine presented a paper at the First International Congress of Parasitology held in Italy in September.

Harry Marshall will take part in a three-week cruise aboard the vessel "Eastward" of the Duke University Marine Laboratory in Beaufort, N. C. Dr. Marshall is engaged in a project involving marine plankton.

Robert Puyear has completed his requirements for his Ph.D. degree at Oregon State College. Dr. Puyear's work was with glucose metabolism in crayfishes.

Shorter College

Mary Catherine Dunn, Associate Professor of Biology at Shorter College, Rome, Georgia, has been elected a Fellow of the American Association for the Advancement of Science. Dr. Dunn received her B.S. from Winthrop College; her M.S. from the University of Michigan; and her Ph.D. from the University of Georgia. She joined the Shorter College faculty in 1963.

Melvyn Ottinger, an alumni of Shorter College, has returned there to teach after studying at Clemson University for his M.S. **William L. Threlkeld,** head of the Biology and Earth Science Department resigned last spring because of serious illness. Named acting head to replace Dr. Threlkeld is **Philip F. C. Greear,** who has been on the science faculty since 1961. Mr. Greear holds his bachelor and masters degree from the University of Georgia.

The University of North Carolina

V. A. Greulach, Professor, Botany Department, U. N. C., Chapel Hill, is on leave this year from his post as Chairman of the Department. He is in Washington, D. C., serving as Executive Director of the NSF CUEBS program. In his absence **Dr. A. E. Radford,** Professor, is acting Chairman of the Department.

J. Frank McCormick joined the faculty of the Botany Department at U. N. C., Chapel Hill, in September, 1964, as Assistant Professor. Dr. McCormick will develop graduate and research programs in Ecology. He has a grant from AEC in the amount of $30,000 for the first year of a continuing study of the effects of ionizing radiation on vegetation. Some of the work will be done at AEC's Savannah River Plant at Aiken, S. C.

A. J. Domnas will arrive in Chapel Hill in February to assume duties as Assistant Professor of Botany at U. N. C. Dr. Domnas is a biochemist, and was recently at Michigan State University where he was studying the physiology and biochemistry of the fungus, *Blastocladiella.*

Max H. Hommersand, Assistant Professor of Botany at U. N. C., Chapel Hill, has been awarded a grant of $22,572 by the North Carolina Board of Science and Technology for the purchase of a Cary Recording Spectrophotometer and associated equipment. The equipment will be used for pigment studies and other physiological and biochemical investigations in the various kinds of plants being studied in this department.

Northeast Louisiana State College

Two new members have joined the staff of the Biology Dept.: **David T. Kee,** Assistant Professor, and **Harold C. Bounds,** Instructor. Dr. Kee received his Ph.D. from Michigan State University in 1964; Mr. Bounds received his M.S. from Louisiana State University in 1964. During the past summer **William C. Mobberly,** Assistant Professor, received a grant of $6200 from the NSF to aid in the study of the moulting hormones in the crayfish. Also during the summer of 1964, **Charles E. DePoe,** Assistant Professor, was at Oak Ridge under an AEC research participation grant studying the ecology of *Ceratophyllum* and its uptake of radio-nuclitides.

Northwestern State College
Natchitoches, Louisiana

Northwestern State College's Departments of Biological Sciences and Microbiology have recently received a research grant totaling $25,560 from the National Institutes of Health. The grant, entitled "Some Species Inter-relationships in a Bee Cell Microhabitat," is expected to run for three years. **Dr. Earle A. Cross** of the Department of Biological Sciences is principal investigator, and **Dr. Rene J. Bienvenu** of the Department of Microbiology is co-investigator. Studies will center around inter-relationships of two species of mites, at least one kind of bacillus, and a ground-nesting bee. The latter, *Nomia melanderi,* is the alkali-bee, one of the most important pollinators of alfalfa in the United States. Numbers of this bee have recently dwindled greatly in some areas, causing a corresponding drop in seed yields. Causes of this decline are unknown but may be due to a bee disease which is prevalent in the areas of decline. It is possible that the two mites mentioned may be instrumental in spreading this disease.

The Department has also received an Undergraduate Instructional Scientific Equipment Grant from the National Science Foundation. The amount received was matched by NSC, giving a total of $10,620.00. Items purchased with the funds from this grant are designed to initiate teaching areas in plant physiology and plant pathology, and to expand teaching efforts and to broaden student research interest in the field of environmental biology. Also, the Department has received an Institutional Grant from the National Science Foundation totaling $3,930, which will be used to purchase equipment designed to further improve the instructional and research programs in biology.

Recently the State Board of Education approved the setting aside of an 84 acre tract of forest as a natural history area. This tract, which is to be called the Northwestern State College Natural History Reservation, is located on the northeast corner of the campus approximately one mile from the Biology Building. The vegetation of the area is comprised of shortleaf-loblolly-mixed hardwoods, but has a variety of habitats including a fine beech ravine and several acres of cypress swamp. Plans are under way to build a research laboratory on the Reservation.

A new passenger "carryall" was recently purchased by the Department. It will fill an urgent need for transporting students on field trips and will also be used for undergraduate and graduate research, thus augmenting our emphasis on environmental studies.

A fifth consecutive National Science Foundation Summer Science Training Program for Secondary School Students was conducted by the Department during the past summer. A grant of $8,840 funded instruction, supplies and subsistence for 24 students. The theme of the program was developmental biology. **Mr. Dwayne N. Kruse** directed the program and was assisted by **Dr. Hugh C. Land.**

Earle A. Cross and three biology students were on a 9-day field trip early in September to the Arapahoe-Shoshone Indian Reservation in Central Wyoming to collect mites and bacteria associated with an important native pollinator of alfalfa, the alkali bee. These organisms are subjects of an investigation supported by a National Institutes of Health grant mentioned above. **Dr. Cross** is president of the Northwestern State College Sigma Xi Club, which was organized last year.

During the past year, **W. G. Erwin** served as director of the Undergraduate Research Participation Program replacing Dr. Garth who was on leave-of-absence. Ten students in the Department of Biological Sciences and two students in the Department of Microbiology are participating in this program.

Richard E. Garth, Associate Professor of Biological Sciences, has returned to Northwestern State College following a year's leave-of-absence. During the past 12 months he has served as an Assistant Program Director on the staff of the National Science Foundation. His primary area of responsibility was with the Summer Science Training Program for Secondary School Students, The State Academy of Science Programs and the Cooperative College-School Science Programs. Dr. Garth has recently been appointed chairman of the Travel Awards Committee of the Association of Southeastern Biologists. This committee is responsible for the making of travel grants to graduate students to attend the annual meeting, using funds provided by Mr. Goethe of California.

Dr. Garth is resuming his research on hypothalmic-pituitary relationships with respect to gonadotrophic hormones. This research is supported by a grant of $11,000 from the National Institutes of Health. Mr. Daniel J. Brupbacher, a graduate student, is working with Dr. Garth on this project.

Virgil K. Howe joined the staff September 1. Dr. Howe received the Ph.D. from Iowa State University in August. He is a plant pathologist and mycologist. The staff in Biological Sciences now includes ten members, eight of whom hold the Ph.D. Degree.

During August, 1964, **Dr. Hugh C. Land,** accompanied by two undergraduate research partieipants in a program sponsored by the National Science Foundation, traveled from Northwestern State College to the American Museum of Natural History in New York City. Dr. Land and his students were comparing a series of bird specimens, which Dr. Land collected in Guatemala in three expeditions from 1958 to 1963, with birds in the Museum. The identification of these specimens to subspecies, plus the gathering of data on plumages and ecology, is all part of the work Dr. Land is doing in the preparation of a monograph to be titled "Birds of Guatemala."

George Ware taught plant ecology during the summer in an NSF Ecology Institute at the University of Oklahoma at Norman. Traveling by chartered bus, the group studied physical geography and ecology throughout Oklahoma.

Dr. Ware is serving his second year as Treasurer for the Southwestern Association of Naturalists. This group, known as SWAN, will hold its 1965 meeting at New Orleans.

Institutions and Organizations

The Department of General Biology, Vanderbilt University, has received a grant from the National Science Foundation to conduct a three-week College Conference on Histochemistry from August 1-21, 1965. Application forms may be obtained from Dr. Burton J. Bogitsh, Department of General Biology.

The Biology Department at the University of Richmond is celebrating its 50th anniversary. It was established in 1914, when the University moved to its present campus, and plans are underway for a commemorating program in the spring. The graduate program of the Biology Department has been revised so as to be more with the practices standard at other universities. Graduate seminars and formal graduate courses are now offered in the two-year Master program, in addition to the requirement of a thesis.

The Botany and Zoology Departments of Tulane University have been combined to form the Department of Biology, offering a new undergraduate curriculum in the biological sciences. Consolidation will go into effect July 1, 1965.

Dr. E. Peter Volpe, Professor and former chairman of the Department of Zoology at Newcomb College, women's liberal arts division of Tulane, has been named chairman of the new department. A feature of the new curriculum will be an introductory course for all students, with no distinction between the premedical student, the economics major, and the humanities student.

The new program replaces three courses in biology, one in botany, and one in zoology formerly offered.

The Department of Biology at Atlanta University has been awarded a matching funds Graduate Research Facilities grant of $167,000.00 from the National Science Foundation for the addition of a second story to the recently constructed biology building. The new facilities will include an electron microscope laboratory and a radiation research laboratory. It is anticipated that these new facilities will become available in September, 1965.

An appropriation of $300,000 has been provided by the State Building Commission for an addition to the biology building at **Mississippi State College for Women.**

Thelma Howell, Executive Director of **Highlands Biological Station,** Highlands, N. C., announces that the Station has recently received two grants from the National Science Foundation. One grant of $94,800 is

for a continuation of the study of the ecology of the gorges of the southeastern escarpment of the Blue Ridge Mountains. Proposals for support of work in the gorges are invited. For further information and application blanks, write the Executive Director of the Station. A grant of $67,400 from the National Science Foundation provides for a garage-warehouse and an extension to the Coker Laboratory Building.

Florence State College, Florence, Alabama, is offering a National Science Foundation supported Institute for junior high school teachers, Summer, 1965. Areas of study are mathematics and general science (biology and physical science). The Director of the Institute is Dr. Joseph C. Thomas. The Staff includes Dr. Thomas—physical science, Dr. Locker and Dr. Wooldridge—mathematics, and Dr. Keys—biology. Fifty stipends for junior high school teachers are available.

The Department of Zoology, **Mississippi State University,** has been awarded $13,780.00 in matching funds for a two-year-period by NSF under its Undergraduate Instructional Scientific Equipment Grant Program. These funds are being used to purchase new and modern teaching equipment suited to modern biology.

Ninety-eight **University of Kentucky** faculty members received summer research fellowships in 1964, having a total value of $115,200, Dr. John W. Oswald, President of the University, announced today. The grants were authorized by the Board of Trustees, Dr. Oswald said, "to provide stimulus, encouragement, and additional opportunities for research to members of the University faculty" who have no other research or teaching assignments during July and August. Recipients of the fellowships, which have a full value of $1,200 each, were selected by the University Research Committee. They represent 23 departments and schools in the College of Arts and Sciences, four departments in the College of Engineering, the Colleges of Law, Education, Commerce, and Pharmacy, the School of Architecture, and the Southeast Community College. Each person receiving a fellowship devoted not less than two months in full-time research between Commencement last May 18 and the beginning of the fall semester September 1.

The Department of Botany of the University of North Carolina has been awarded funds by the National Science Foundation for a **Summer Conference for College Teachers.** The three week Conference, scheduled for June 14-July 2, will deal with aspects of plant classification and will show the developing interrelationships between the various aspects of taxonomy and our changing methodology and interpretations.

Within the formal title of "Methods of Botanical Investigation and Classification" the lecture series will cover Chemotaxonomy, Numerical Taxonomy, Paleobotanical Studies, Phylogeny, and Population Structure. Laboratory and field studies will supplement the lecture material.

The Conference is open to college teachers of general botany, general biology, taxonomy, or ecology -- and is designed to give a group of 30 such teachers valuable background information as well as currently useful material to make their teaching and research programs more valuable and effective.

Application forms and more detailed information concerning the Conference may be obtained from the Director, Dr. C. Ritchie Bell, Department of Botany, University of North Carolina, Chapel Hill, North Carolina. All applications are due 1 March 1965 and the selection of participants will be announced about 15 March.

A Summer Institute in Introductory Biology for College Teachers will be held in the Thompson Biological Laboratory of **Williams College** between July 5 and August 14, 1965. Endorsed by the Commission on Undergraduate Education in the Biological Sciences (CUEBS) and supported by the National Science Foundation, the Institute is intended for college teachers of biology who are instructing in courses at the introductory or general level. Forty participants will study a common program consisting of a number of topics in areas of biology that have been extremely active within recent years. Participants will receive a stipend of $450, an allowance of $90 per dependent (to a maximum of four), and a travel allowance of $.04 per mile to a maximum of $80. No tuition will be charged, nor will any credit or degree be given. Information and application blanks may be obtained from the Director, Professor Allyn J. Waterman, Department of Biology, Williams College, Williamstown, Massachusetts.

The Department of Science and Mathematics at Greensboro College announced that two of its students have received undergraduate research grants from the North Carolina Academy of Science. The research will be conducted under the direction of Dr. Arnold Van Pelt, Professor of Biology. A grant of $203 has been awarded to **Buddy Watson,** who will run unrinanalyses for amino acid residues on hairless and hairloss mice. **Robert Knorr** received a grant of $135 with which he will continue his work on a histological comparison of the integument of normal mice and that of hairless and of hairloss mice.

NSF Awards 15 Grants in Southeast for High School Science Teaching Improvement

The National Science Foundation has awarded 46 grants to provide training for 1,565 secondary school teachers, and 2,182 high-ability secondary school students through NSF's Cooperative College-School Science Program.

Grants totaling $903,000 were made to educational and research institutions as part of this program to improve the teaching of science and mathematics in the nation's high schools.

The grantees use their facilities and faculties to assist teachers and students from schools planning improvements in their science and math courses. In some cases the grantee institution works with school administrators to plan introduction of new course material.

Improvement of high school science education usually calls for additional training of teachers, and special in-

struction is given for selected teachers, sometimes followed by a year or more of regular consultations.

In some programs students are chosen to participate in the training programs, partly to show the teachers how modern science and mathematics can be presented in the high school classroom or laboratory, and partly to give the teacher actual experience in meeting the challenge of bright pupils.

Most programs limit participants to the immediate geographical region and each institution plans its own activities with the particular needs of local school systems in mind.

Of the 46 programs supported by NSF under the nationwide CCSS Program, 20 will be conducted during the summer of 1965, 16 will be held during the 1965-66 school year (generally on Saturdays), and 10 will be conducted both during the summer and the school year.

Some of the programs concentrate on one field of science, but many others include courses in several disciplines. The course resembles a regular class, but is conducted on a significantly higher level than that in the average high school. Several of the programs are oriented toward research rather than formal course work, with teachers and students joining faculties to attack scientific problems.

Institutions awarded grants under the CCSS Program select teacher and student participants, and further information and application forms can be obtained by writing the director of each institution; inquiries should not be sent to NSF.

A list of institutions, program directors, and other information pertinent to biology programs in the southeast appears below:

Alabama

ALABAMA ACADEMY OF SCIENCE (to be held at selected high schools in Alabama); *Biology, Chemistry, Physics, or Mathematics;* 43 weeks, September 1965-June 1966; 400 teachers; 60 students; Dr. Ruric E. Wheeler, Dept. of Mathematics, Howard College, Birmingham 9. $10,500

District of Columbia

HOWARD UNIVERSITY, Washington; *Biology (BSCS)*; academic year: 8 meetings, February 1-May 2, 1965; also summer: 4 weeks, August 2-August 26, 1965; 40 teachers, commuting only; Dr. Marie C. Taylor, Dept. of Botany. $12,725

JOINT BOARD OF SCIENCE EDUCATION, Washington (to be held at Montgomery Junior College); *Biological Sciences (BSCS)*; 4 weeks, June 21-July 16, 1965 and 8 meetings, October 1965-May 1966; 24 teachers; commuting only; Mr. Robert B. Nicodemus, Dept. of Biology, Montgomery Junior College, Takoma Park, Md. 20012. $16,995

Florida

BREVARD ENGINEERING COLLEGE, Melbourne 32902; *Biological Sciences, Chemistry, Physics or Engineering (Research)*; 38 weeks, August 24, 1965-May 27, 1966; 3 teachers and 25 students, 10th-12th grades; all commuters; Dr. J. P. Keuper, President. $11,230

CAPE HAZE MARINE LABORATORY, Sarasota 33581; *Marine Zoology and Ichthyology;* 8 weeks, June 14-August 6, 1965; 5 teachers and 11 students, 10th and 11th grades; Mr. John D. Woolever, 4850 Lords Avenue. $11,460

Kentucky

CENTRE COLLEGE OF KENTUCKY, Danville 40422; *Mathematical Methods of Science, Introduction to Molecular Structure or Introduction to Molecular Biology;* 7 weeks, June 14-July 31, 1965; 8 teachers (several from each school) and 45 students, 10th and 11th grades; Dr. Charles E. Whittle, Jr., Dept. of Physics. $17,250

Louisiana

LOUISIANA STATE UNIVERSITY, Baton Rouge 70803 (to be held at Gulf Coast Research Laboratory, Ocean Springs, Mississippi); *Marine Zoology;* 6 weeks, July 12-August 20, 1965; 6 teachers and 30 students, 10th and 11th grades; Dr. Harry J. Bennett, Dept. of Zoology. $16,735

NORTHWESTERN STATE COLLEGE, Natchitoches 71475; *Biology (BSCS)*; 9 weeks, June 8-August 7, 1965 with academic year consultations; 12 teachers and 24 students, 10th grade; teaehers from Louisiana high schools; Dr. William G. Erwin, Dept. of Biological Sciences. $26,300

North Carolina

EAST CAROLINA COLLEGE, Greenville 27835; *Biology (BSCS)*; 6 weeks, July 14-August 24, 1965; 8 teachers and 32 students, 10th grade; Dr. Patricia A. Daugherty, Dept. of Biology. $11,835

NORTH CAROLINA ACADEMY OF SCIENCE, Raleigh 27602 (to be held on various college campuses throughout the state); *Biology (BSCS)*; 18 weeks September 1965-June 1966 with follow-up; 48 North Carolina teachers of biology; Dr. John A. Yarbrough, Meredith College. $16,485

NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH, Raleigh 27607; *Biology (BSCS)*; 6 weeks, June 14-July 23, 1965; 8 teachers and 32 students, 10th grade; Dr. W. A. Reid, Institute of Biological Sciences. $13,620

WAKE FOREST COLLEGE, Winston-Salem 27106; *Biology (BSCS)*; 6 weeks, June 21-July 30, 1965, 8 teachers and 32 students, 10th grade; Dr. John F. Dimmick, Dept. of Biology. $11,795

Virginia

VIRGINIA INSTITUTE OF MARINE SCIENCE, Gloucester Point 23602 (to be held at Norview High School, Norfolk); *Oceanography;* 8 weeks, June 14-August 6, 1965; 3 teachers and 15 students; commuters only; Mr. Robert S. Bailey, Dept. of Marine Science. $8,245

VIRGINIA POLYTECHNIC INSTITUTE, Blacksburg 24601 (to be held at Thomas Jefferson High School, Richmond); *Matrix Algebra, Statistics and Computers;* 7 weeks, June 14-July 30, 1965; 8 teachers and 24 students, 11th grade; Dr. Svend T. Gormsen, Dept. of Mathematics. $13,600

VIRGINIA STATE COLLEGE, NORFOLK DIVISION, Norfolk 23504; *Mathematics and Biology, Chemistry or Physics;* 6 weeks, June 14-July 23, 1965; 4 teachers and 48 students, 10th and 11th grades; Dr. Clyde McDaniel, Dept. of Mathematics, 2401 Corprew Avenue. $18,130

ASB's January Placement Service

Name.—**John R. Holsinger**
Institution (mailing address).—Department of Zoology, University of Kentucky, Lexington, Ky.
Permanent address.—106 Pleasant Hill Rd., Harrisonburg, Virginia.
Field of specialization.—Invertebrate zoology with emphasis on fresh-water crustaceans.
Degrees.—B.S. from Virginia Polytechnic Institute, 1955; M.S. from Madison College; Ph.D. (Biological Sciences) from University of Kentucky, hopefully in summer of 1966.
Experience.—Military service, 1955-58; biology instructor in Fairfax County, Va. public schools, 1958-63; graduate teaching assistant, Univ. Ky., 1963-64; research assistant, Univ. Ky., 1964-present.
Research includes invertebrate faunal survey of Appalachian caves; ecology of cave eco-systems; systematics and evolution of cavernicolous faunas, especially mites and amphipods (latter is dissertation topic).
Preference.—Teaching and research.
I am interested in developing a research program in biospeleology, primarily devoted to studies on ecology and systematics of subterranean and subterranean-related crustaceans.

Name.—**Shelton E. Stewart**
Address.—Department of Botany, University of Georgia, Athens, Georgia.
Position desired.—Teaching and part-time research.
Specialized field.—Experimental plant taxonomy.
General field.—Botany.
Date of graduation.—June, 1966.

Name.—**Douglass H. Morse**
Address.—Museum of Zoology, Louisiana State University, Baton Rouge, La., 70803.
Permanent address.—Star Route, Lisbon, Maine.
Institution granting degree.—LSU (Ph.D.).
Field of specialization.—Ornithology. Prefers teaching with opportunity for research.

Name.—**John G. Turnbull**
Address.—Dept. of Zoology, Louisiana State University, Baton Rouge, Louisiana, 70803.
Permanent address.—Care Mrs. C. L. Parks, Gotebo, Oklahoma.
Institution granting degree.—LSU (Ph.D.).
Field of specialization.—Reproductive physiology. Prefers teaching/research combination.

Seal Recommended for Adoption by ASB in April

The anonymously submitted design shown below has been recommended by the Executive Committee for adoption as the official seal of the ASB. Membership approval of this design will be sought at the business meeting next April in Charlottesville, Virginia.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Act of October 23, 1962; Section 4369, Title 39, United States Code)

Publisher: file two copies of this form with your postmaster

1. DATE OF FILING: 17 November 1964	2. TITLE OF PUBLICATION: The ASB Bulletin
3. FREQUENCY OF ISSUE: Quarterly (January, April, July, and October)	
4. LOCATION OF KNOWN OFFICE OF PUBLICATION (Street, city, county, state, zip code): Academy of Natural Sciences, 19th & The Parkway, Philadelphia, Pennsylvania 19103	
5. LOCATION OF THE HEADQUARTERS OR GENERAL BUSINESS OFFICES OF THE PUBLISHERS (Not printers): Florida Institute for Continuing University Studies, Box 1562, Tallahassee, Florida	

6. NAMES AND ADDRESSES OF PUBLISHER, EDITOR AND MANAGING EDITOR

PUBLISHER (Name and address): Association of Southeastern Biologists, Inc., Chapel Hill, North Carolina

EDITOR (Name and address): C. W. Hart, Jr., Academy of Natural Sciences, 19th & The Parkway, Philadelphia, Pa.

MANAGING EDITOR (Name and address): none

7. OWNER (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.)

NAME	ADDRESS
Association of Southeastern Biologists, Inc.	Chapel Hill, North Carolina. (Dr. William J. Koch, Associate Professor, Dept. of Botany, University of North Carolina -- Agent.)

8. KNOWN BONDHOLDERS, MORTGAGEES, AND OTHER SECURITY HOLDERS OWNING OR HOLDING 1 PERCENT OR MORE OF TOTAL AMOUNT OF BONDS, MORTGAGES OR OTHER SECURITIES (If there are none, so state)

NAME	ADDRESS
none	

9. Paragraphs 7 and 8 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner. Names and addresses of individuals who are stockholders of a corporation which itself is a stockholder or holder of bonds, mortgages or other securities of the publishing corporation have been included in paragraphs 7 and 8 when the interests of such individuals are equivalent to 1 percent or more of the total amount of the stock or securities of the publishing corporation.

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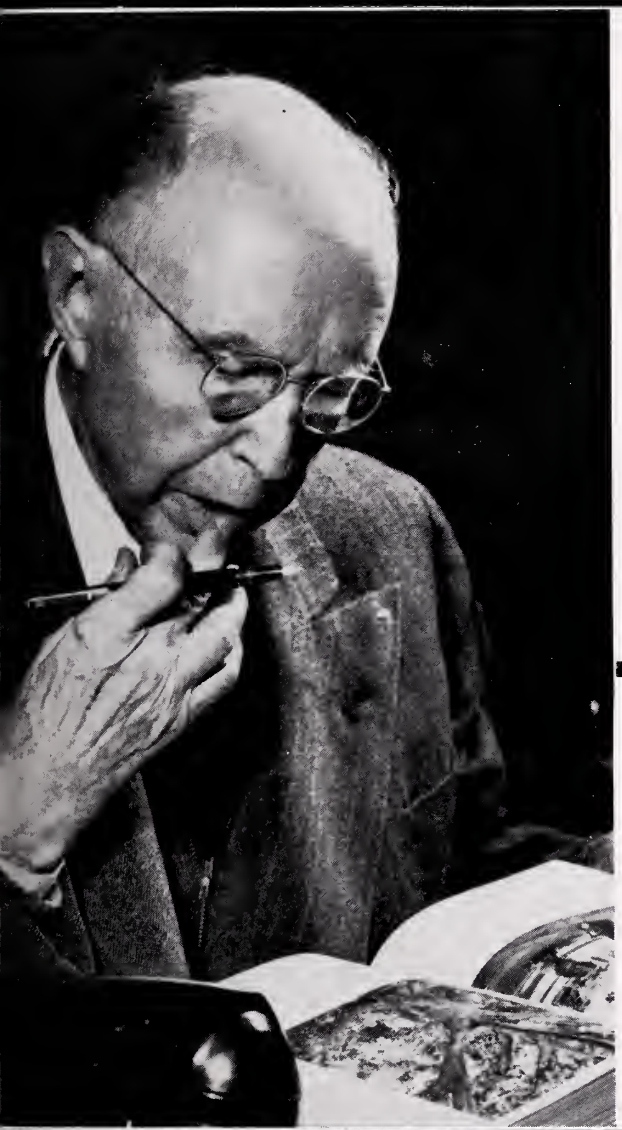
I certify that the statements made by me above are correct and complete. (Signature of editor, publisher, business manager or owner) C. W. Hart Jr. Editor

POD Form 3526 Aug. 1963

The ASB BULLETIN



Volume 12 No. 2
April 1965

Program and Abstracts for the Charlottesville Meeting

The photograph on the left is of Dr. C. M. Goethe of Sacramento, California. Dr. Goethe, who celebrated his 90th birthday on 28 March 1965, is familiar to ASB members because of the Mary Glide Goethe travel awards to assist graduate students in attending ASB meetings. An article summarizing the history of these awards — as well as other aspects of Dr. Goethe's long and many-faceted career — will appear in the July ASB Bulletin.

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 12, Number 2 - April 1965

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Pa. 19103. Change of address should be sent promptly to the Secretary of the ASB, Dr. Margaret Y. Menzel, Dept. of Biological Sciences, Florida State Univ., Tallahassee, Fla. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. Leland Shanor, Department of Biological Sciences, Florida State University, Tallahassee, Florida. Subscription rate for non-members of the ASB: $4.00 per year. Printing and typography by the Fulton Press, Inc., Lancaster, Pa.

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CONTENTS

ASSOCIATION AFFAIRS

Proposed Amendments to Constitution and By-Laws

In accordance with the instructions from the Executive Committee, the Committee on Constitution and By-Laws will submit the following proposed amendments to the Constitution and By-Laws at the annual meeting in Charlottesville on April 15-17. These proposals are presented in order to give the required notice to the membership. The Constitutional amendment cannot be acted on until the 1966 annual meeting. — E. Ruffin Jones, Chairman, Julian Darlington, Dolores S. Dundee.

PROPOSED AMENDMENTS
to the Constitution and By-Laws

CONSTITUTION —

ARTICLE IV. Officers

Change to provide for an Archivist. It would then read:

ARTICLE IV. Officers

The officers of the Association shall be (A) President, (B) President-Elect, (C) Vice-President, (D) Secretary, (E) Treasurer, and (F) Archivist.

BY-LAWS —

ARTICLE II. Election of Officers

After Section 3 which provides for the election of a Secretary and a Treasurer add a new Section 4.

(NEW) — Section 4. The Archivist shall be a member of the Association and shall be selected and appointed by the Executive Committee for a term of three years. The Archivist shall be eligible for reappointment for any number of successive three year terms.

(RENUMBER) — Present Section 4 — to become Section 5. Present Section 5 — to become Section 6. (No change in the wording of either.)

BY-LAWS —

ARTICLE III. Duties of Officers

Add a new Section 6.

(NEW) — Section 6. The Archivist shall be custodian of the permanent records or Archives and shall with the approval of the Executive Committee make such arrangements as may seem appropriate for the collection, care and maintenance of such records.

BY-LAWS —

ARTICLE VI. Executive Committee

Section 3. — Amend to make the Archivist an Ex-Officio Member of the Executive Committee with same status as the Editor of the Journal. It should then read:

Section 3. The Editor of the A.S.B. Bulletin and the Archivist shall be Ex-Officio Members of the Executive Committee with the power of discussion and privileges of proposing motions but shall not have the right to vote.

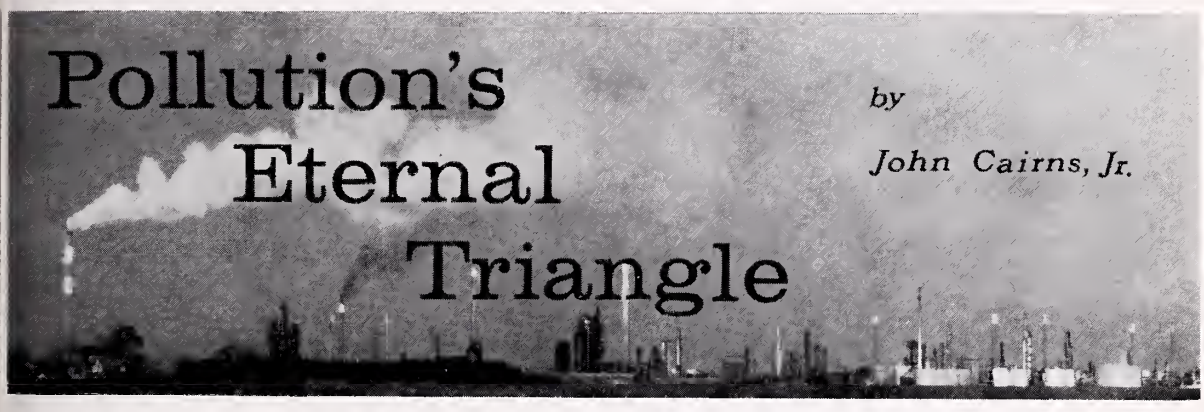
(Continued on page 56)

The Executive Committee of the Association of Southeastern Biologists has initiated a series of three annual symposia on the general subject of MAN'S POLLUTION OF HIS ENVIRONMENT. *The first seminar is scheduled for Thursday evening, April 15th, at 8 p.m. in the auditorium of Gilmer Hall at the University of Virginia. Dr. Frank E. Egler of Aton Forest, Inc., Norfolk, Connecticut, will give the principal address, "Communications — Sound and Unsound — On Problems of Pollution." Discussants are Dr. John Cairns, Jr., Acting Chairman and Curator, Department of Limnology, Academy of Natural Sciences, Philadelphia; and Mr. Lawrence S. Givens, Regional Supervisor, Branch of Natural Life Refuges, Bureau of Sports Fisheries and Wildlife, Atlanta, Georgia. The program is being arranged by Dr. Robert B. Platt of Emory University, who will serve as moderator.*

Since the problems of communication are central to problems of pollution, this is a particularly appropriate subject to initiate the series. The formal presentation will be kept within one hour, so as to provide ample opportunity for audience participation.

Dr. Egler is especially well known for his pioneering work in problems of pollution, including extensive research on the use of herbicides on rights-of-way, and provocative essays on vegetation, pesticides, ecosystems, and communications. Recent articles by him have appeared in the March, 1964, issue of THE AMERICAN SCIENTIST and the November, 1964, issue of BIOSCIENCE.

POLLUTION'S ETERNAL TRIANGLE, *by John Cairns, Jr., is a summation of Dr. Cairns' feelings on the communications problem in relation to stream pollution.*



During the last ten years our society has become increasingly aware of the water pollution problem, and there is now general agreement that enlightened self interest — as well as an ethical and moral obligation — requires adequate waste treatment and pollution abatement. Formulation and implementation of effective abatement programs will depend upon a rapprochement of the members of pollution's eternal triangle: the ecologists, the sanitary engineers, and the regulatory agencies. Each of these groups has problems which it feels are not fully appreciated by the other two groups, or by the general public.

The ecologists are cognizant of the vast number of species, each with its own particular requirements, that they are trying to protect. They also know that the response of an organism to one environmental factor is influenced by other environmental factors as well as the varying physiological conditions within that organism. Recognition of biological and environmental *variability* are fundamental to this point of view.

In contrast, the sanitary engineers are oriented toward *specific* parameters, and the plant managers with whom they work have a way of insisting upon precise figures. Even the most flexible waste treatment system must be based upon a realistic estimate of the range of effluent quality

and quantity which will not degrade the receiving stream. Since waste treatment personnel are charged with producing an effluent which meets certain standards, they wish these to be precisely defined and subject to as little change as possible.

In the middle, trying to reconcile these conflicting demands, are the legislators and regulatory agencies. Most of the latter have many streams to supervise — ranging from cold mountain streams with low mineral content to warm, hardwater streams. If, for instance, they prohibit a specific zinc concentration which has proven toxic in soft water streams, it may be non-toxic in a hardwater stream (Table 1), thus penalizing the users of the hard water stream. In turn, if the standards are based on average results for a range of hardness, there is a distinct possibility of damage to the aquatic organisms in soft water streams. A further complication arises from interactions between the components of a waste which may be synergistic, antagonistic, or additive. For example, Doudoroff (1952) found that although fish could survive for 8 hours in water containing 8 mg./1. of zinc alone, and for 8 hours in water containing 0.2 mg./1. of copper alone, most fish died within 8 hours when exposed to a mixed solution containing only 1.0 mg./1. of zinc and 0.025 mg./1. of copper.

Present knowledge usually does not permit one to predict, *a priori,* what the toxicity of any given mixture of waste components will be, but bio-assays with composite waste samples will furnish functional parameters for waste disposal. Successful operation within these parameters appears relatively simple if the entire operation is controlled by a single organization, but unfortunately this is rarely the case.

If, for example, a nearby city housing a plant's employees places sewage with an oxygen demand into the stream used by the plant for waste disposal, there may be occasional periods of low dissolved oxygen concentration during warm weather and low flow conditions. But periodic low oxygen will alter the sensitivity of some aquatic organisms to zinc (Table 2). Now, multiply this problem at least a hundred fold and one has a fair estimate of the regulatory complications existing in many lowland industrial drainage basins.

In addition to the above, one might list a host of subsidiary problems such as lack of trained personnel, the expanding population, the influence of dams, the penalization of new industry by requirements demanding almost complete waste treatment because of stream degradation created by currently operating industries, problems resulting from variations in individual state laws in drainage basins that cover more than one state, the conflict for older industries between adequate waste treatment and economic survival, etc.

However, it is my conviction that these problems can be resolved once the basic communication barriers have broken down and goals have been established that reflect the major needs of all three groups. My own experience in working as an ecologist and dealing with members of the other two groups bears this out, since an awareness of the needs of these other groups, and the practical limitations which must be met by each, has always produced a workable practical solution.

Surely the best aid to a working relationship is a common goal, and it is abundantly clear that the basic goal of all three groups should be to preserve a functional ecosystem. To paraphrase Ben Franklin: *If we know where we are and where we want to go, the problem of getting there is half solved.* To put it more bluntly, enlightened self interest should prevent us from poisoning our environment.

Our recent experiences with pesticides, detergents, and other micro-chemical contaminants have resulted in considerable enlightenment of the industrial and regulatory groups — as well as of the general public — regarding the complex inter-relationships of an ecosystem. And there is an increasing general awareness that substantial damage to one part of the system will send a shock wave throughout the remainder of the system. Even people without formal biological training have realized that one of the characteristics of a natural system is a great diversity of species — and that the response to restricting and unfavorable factors in the environment is a simplification of the system which is reflected by the decreased diversity of species. Spokesmen for industrial groups, regulatory agencies, and open-space planners have now turned to biologists and ecologists for parameters within which they may operate without substantial damage to natural systems. Essentially they are saying that they recognize the need to preserve and protect natural ecosystems and that those systems should be de-

TABLE 1. — A summary of test results on the effects of water temperatures and hardness upon the toxicity of zinc ions to the bluegill sunfish, *Lepomis macrochirus* Raf. (From Cairns and Scheier, 1957a)

Temp.	Dilution	Concentration of Zn^{++} allowing		
° C	water	100% survival	50% survival	No survival
18	Soft	1.59- 2.25 ppm	2.86- 3.78 ppm	4.80- 5.80 ppm
30	Soft	0.90- 2.10 ppm	1.93- 3.63 ppm	4.00- 5.81 ppm
18	Hard	6.60- 9.47 ppm	10.13-12.50 ppm	12.60-14.10 ppm
30	Hard	6.18- 9.50 ppm	10.15-12.30 ppm	13.50-14.10 ppm

fined in more specific terms so as to give some guidelines for safe operation. This places the responsibility to provide workable parameters squarely upon the biologists. Instead of generalizations, we must provide specific answers to such questions as whether a "natural" area must have a minimal size in order to be functional. What is the degree of dependence of a natural area upon the surrounding areas, and what degree of control over these is necessary. If an area has been inadvertently or deliberately damaged, how long does it take to regain a natural state, and are there any ways in which this recovery may be hastened. How does one distinguish between natural population changes and "unnatural" changes resulting from the effects of civilization. How can one realistically estimate the value of a natural area in order to choose between its retention as such and its use for other purposes. What degree of control should be exercised over populations of pest species. Recognizing that man is dependent on his environment, is it realistic to make any plans that do not include population control for man.

One could go on with such questions for several additional pages. It is obvious that these are basically biological problems that should be resolved by professional biologists. Failure to do so will not stop civilization's impact upon the environment; it will only alter the nature and intensity of the impact — presumably for the worse.

The Secretary of the Interior, Stewart L. Udall, has suggested that history will name our time "The Era of Ecology." If we ecologists are to save Secretary Udall from the fate of a false prophet, we must forsake the rear-guard mentality which fights a delaying action against civilization's impact, and become instead a group which furnishes the guidelines and methods that will enable man to use, but not abuse, his environment. Above all, the guidelines and methods must be in terms that are understandable and workable for our colleagues in the regulatory agencies and in the field of waste treatment, for without their assistance we will never achieve our goal.

Literature Cited

Cairns, J., Jr., and A. Scheier. 1957a. The effects of temperature and hardness of water upon the toxicity of zinc to the common bluegill (*Lepomis macrochirus* Raf.). — *Notulae Naturae, Academy of Natural Sciences of Philadelphia,* No. 299, 12 pp.

————. 1957b. The effects of periodic low oxygen upon the toxicity of various chemicals to aquatic organisms. — *Proceedings of the 12th Industrial Waste Conference, Purdue University Engineering Bulletin,* No. 94, pp. 165-176.

Doudoroff, P. 1952. Some recent developments in the study of toxic industrial wastes. — *Proceedings 4th Annual Pacific N.W. Industrial Waste Conference, State College (Pullman, Washington),* 21.

Udall, S. L. 1964. A message for biologists. — *Bioscience,* 14(11): 17-18.

TABLE 2. — The effects of periodic low oxygen upon the toxicity of various chemicals to the bluegill sunfish, *Lepomis macrochirus* Raf. and to the snail, *Physa heterostropha* (Say). (From Cairns and Scheier 1957b)

RESULTS WITH "NORMAL" OXYGEN

Chemical	High Threshold Concn. (ppm)	Concentration % Survival	96-Hour TLm* (ppm)	Low Threshold Concn. (ppm)	Concentration % Survival
			Fish		
Zinc chloride	12.5	5	8.02	6.0	75
Naphthenic acid	7.0	0	5.6	3.5	100
Potassium cyanide	0.62	0	0.45	0.175	100
Potassium dichromate	420	35	320	137	100
			Snail		
Naphthenic acid	10.0	25	6.6-7.5	0.75	90
Potassium cyanide	1.87	5	1.08	0.13	90

RESULTS WITH PERIODIC LOW OXYGEN

Chemical	High Threshold Concn. (ppm)	Concentration % Survival	96-Hour TLm* (ppm)	Low Threshold Concn. (ppm)	Concentration % Survival
			Fish		
Zinc chloride	6.5	20	4.9	3.7	90
Naphthenic acid	3.2	10	2.0	1.0	80
Potassium cyanide	0.2	10	0.12	0.087	80
Potassium dichromate	420	40	320	155	100
			Snail		
Naphthenic acid	5.6	30	2.0	0.56	90
Potassium cyanide	1.0	10	0.48	0.24	80

* The 96-hour TLm (50 per cent survival) is the critical value for comparative purposes. The threshold concentrations were included in order to delimit the range between complete survival and complete death.

Program of the 26th Annual Meeting of the Association of Southeastern Biologists

A Joint Meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Regional Section of the National Association of Biology Teachers, and the Southeastern Region of Beta Beta Beta National Honorary Biological Society.

THURSDAY, APRIL 15

1:00 p.m. **Executive Committee Meeting, Association of Southeastern Biologists:** Room 65, Gilmer Hall.
4:00-7:45 p.m. **Registration:** Lobby, Gilmer Hall.
7:30 p.m. **General Session:** Auditorium, Gilmer Hall. William D. Burbanek, Presiding.
Address of Welcome: Joseph L. Vaughan, Chancellor for Community Colleges, The University of Virginia.
Response: William D. Burbanck, President, The Association for Southeastern Biologists.
Invitational Symposium: *Communication — Sound and Unsound — on Problems of Pollution.* Frank E. Egler, Aton Forest, Inc., Norfolk, Connectieut.
Moderator: Robert B. Platt, Department of Biology, Emory University.
Diseussants: John Cairns, Jr., Department of Limnology, Aeademy of Natural Sciences, Philadelphia, Pennsylvania.
Lawrenee S. Givens, Regional Supervisor, Branch of Natural Life Refuges, Bureau of Sports Fisheries and Wildlife, Atlanta, Georgia.

Smoker and Exhibits: The symposium will be followed by a smoker to be held in the lobby of Gilmer Hall. Refreshments will be served. The exhibits will be on display in the same building.

FRIDAY, APRIL 16

MORNING

8:00 a.m. **Breakfast, Southern Appalachian Botanical Club,** Thomas Jefferson Inn.
8:30 a.m.-11:00 a.m. **Registration:** Lobby, Gilmer Hall.
8:30 a.m.-12:00 noon **Exhibits:** Gilmer Hall.
9:00 a.m.-11:36 a.m. **Paper Sessions:**
Plant Taxonomy and Morphology — Room 114, Gilmer Hall.
Animal Ecology — Room 150, Gilmer Hall.
Animal Development, Cytology, and Cytogenetics — Auditorium, Gilmer Hall.
9:00 a.m.-12:00 noon **Beta Beta Beta General Meeting and Paper Sessions:** Room 110 and 111, Gilmer Hall.
11:45 a.m.-12:30 p.m. **Business Meeting: Association of Southeastern Biologists,** Auditorium, Gilmer Hall.
1:00 p.m. **Luncheon Meeting, National Association of Biology Teachers,** Region 6.

FRIDAY AFTERNOON

1:00 p.m.-5:00 p.m. **Exhibits:** Gilmer Hall.
2:00 p.m.-4:36 p.m. **Paper Sessions:**
Plant Ecology — Room 114, Gilmer Hall.
Plant Physiology — Auditorium, Gilmer Hall.
Invertebrate Zoology — Room 150, Gilmer Hall.
Vertebrate Physiology — Room 160, Gilmer Hall.
2:00 p.m.-5:00 p.m. **Beta Beta Beta General Meeting and Paper Sessions,** Rooms 110 and 111, Gilmer Hall.
3:45 p.m.-5:00 p.m. **Tour of Monticello for any who are interested.** Details at Registration Desk.

FRIDAY EVENING

7:00 p.m. **Banquet:** Ballroom, Neweomb Hall.
ASB Evening Program: Ballroom, Newcomb Hall.
Presentation of Awards and Prizes:
Ivey F. Lewis Fellowship at the Mountain Lake Biological Station.
Sponsored by Phipps and Bird, Inc.
Association Research Prize.
Sponsored by Carolina Biological Supply Company.
Meritorious Teaching Award.
Sponsored by Will Scientific, Inc. (Ga.).
Past President's Address: E. Ruffin Jones, University of Florida — "Biology and a Liberal Edueation."

SATURDAY, APRIL 17

8:30 a.m. **Field Trip:** Shenandoah National Park and vicinity. Col. Robert P. Carroll, Professor of Biology, Virginia Military Institute, and J. James Murray, Jr., Director of the Mountain Lake Biologieal Station, in eharge. Co-sponsored by the Southern Appalaehian Botanical Club. Details at the Registration Desk.
9:00 a.m. **Executive Committee Meeting, Association of Southeastern Biologists:** Room 65, Gilmer Hall.
9:00 a.m. **Tour of Monticello for any who are interested.** Details at Registration Desk.

SCHEDULE OF PAPER SESSIONS

FRIDAY MORNING — APRIL 16, 9:00 A.M.

The Southern Appalachian Botanical Club is co-sponsor of the sessions on Plant Ecology and Plant Taxonomy and Morphology.

PLANT TAXONOMY AND MORPHOLOGY

Room 114, Gilmer Hall

Presiding: James W. Hardin, North Carolina State

9:00 1. MILLER, CHARLES E. (University of Maine). Some Incompletely Known Aquatic Phycomycetes.

9:13 2. PATTERSON, PAUL M. (Hollins College). John Clayton's Moss Collection.

9:26 3. ADOTEY ADDO, P. E. AND LAFAYETTE, FREDERICK (Atlanta University). Chromatographic Patterns from Tubers of Varieties of *Cyperus esculentus* L.

9:39 4. RILEY, HERBERT P. (University of Kentucky). Taxonomic Studies of *Astroloba* by Paper Chromatography.

9:52 5. HINDS, HAROLD ROYAL (Smith College). A Preliminary Investigation of a New *Trillium* Hybrid.

10:05 6. BROWNE, EDWARD T., JR. (University of Kentucky). Floristic Studies in Pike County, Kentucky.

10:18 7. REYNOLDS, JOHN D. (University of South Carolina). The Chromosome Number of *Pyxidanthera brevifolia* Wells.

10:31 8. CONSTANTIN, MILTON J. AND RICHARD H. MULLENAX (University of Tennessee). The Morphology of the Dormant Epicotyl in *Lactuca sativa* L.

10:44 9. REMBERT, DAVID H., JR. (University of Kentucky). The Development of the Ovule and Megagametophyte in *Wisteria sinensis* Sweet.

10:57 10. BEATTY, A. V. AND J. W. BEATTY (Emory University). Presence of Radioactivity from Phosphorus-Labeled ATP in the Protoplasm of *Tradescantia* Microspores.

11:10 11. DAVIS, HERBERT L., JR. (Emory University). Reduction of X-ray Induced Chromosomal Aberrations in *Tradescantia paludosa* Microspores Following Treatment with Cupferron.

11:23 12. STRICKLAND, PRISCILLA L. (Emory University). The Effect of Low Oxygen Tensions on Chromosome Aberrations in *Tradescantia.*

ANIMAL ECOLOGY

Room 150, Gilmer Hall

Presiding: J. J. Murray, Jr., The University of Virginia

9:00 13. BAMFORTH, STUART S. (Tulane University). Teaching Ecology in a General Biology Course.

9:13 14. LINTON, THOMAS L. (University of Georgia, Marine Institute). The Influence of Storms and Hurricanes Upon Certain Estuarine Organisms.

9:26 15. FRANKENBERG, DIRK (University of Georgia, Marine Institute). The Marine Animal Community from a Coarse Sand Environment on the Continental Shelf off Georgia.

9:39 16. WASS, MARVIN L. (Virginia Institute of Marine Science). Study of a Soft-bottom Community in the Lower York River, Virginia.

9:52 17. FOIN, THEODORE C., JR. (University of North Carolina). Distribution Pattern of the Pleurocerid Snail, *Goniobasis proxima* (Say).

10:05 18. DUNDEE, DEE S. (Louisiana State University). An Introduced Gulf Coast Mollusk. (No Abstract).

10:18 19. STIVEN, ALAN E. (University of North Carolina). The Efficiency of Growth of *Chlorohydra viridissima.*

10:31 20. SATTERFIELD, JAMES D. (Georgia State College). Some Aspects of the Life-history of *Fundulus stellifer* (Jordan).

10:44 21. DUKE, THOMAS W., JAMES H. WILLIS AND THOMAS J. PRICE (Bureau of Commercial Fisheries, Beaufort, North Carolina). Cycling of Zinc in Experimental Marine Environments.

10:57 22. JACKSON, CRAWFORD G., JR. (University of South Alabama). Biometrical Studies of Growth in *Pseudemys concinna suwanniensis* Carr (Order: Testudinata).

11:10 23. WHARTON, C. H. (Georgia State College). The Red Squirrel, *Tamiasciurus hudsonicus abieticola* (A. H. Howell), in Georgia.

11:23 24. TERMAN, C. RICHARD (College of William and Mary). Population Fluctuations of *Peromyscus maniculatus* and Other Small Mammals as Revealed by the North American Census of Small Mammals.

ANIMAL DEVELOPMENT, CYTOLOGY, AND CYTOGENETICS

Auditorium, Gilmer Hall

Presiding: A. A. Humphries, Jr., Emory University

9:00 25. STERN, SAMUEL (University of Miami). Physical and Chemical Studies on Univalent and Multivalent Fertilizin.

9:13 26. FREEMAN, JOHN A. (Winthrop College). Carbonic Anhydrase and Growth in the Snail, *Physa heterostropha.*

9:26 27. DAVIS, J. E., JR. (Wake Forest College). Effects of Low Level Radiation on the Embryonic Coronary Vessels of the Chick.

9:39 28. RAY, CHARLES, JR. (Emory University). Microscopic Changes in the Macronucleus of *Tetrahymena* During Division.

9:52 29. RINALDI, ROBERT A. (University of Tennessee and Duke University Marine Laboratory). Endoplasmic Reticulum, Its Form and Behavior *in vivo* of *Arbacia punctulata* ova.

10:05 30. Rinaldi, Robert A. (University of Tennessee and Duke University Marine Laboratory). Cleavage and biosynthesis in enucleate and nucleate halves of *Arbacia* ova.

10:18 31. Jones, Duvall A. (University of Florida). Observations of Sperm Development Among Gymnolaemate Ectoprocta.

10:31 32. Brown, George Gordon (University of Miami). Ultrastructural Studies of Sperm Morphology and Sperm-egg Interactions in the Decapod, *Callinectes sapidus*.

10:44 33. Whiting, P. W. (Biology Division, Oak Ridge National Laboratory). Complexity of the *R* Region in *Mormoniella*.

10:57 34. Parker, Bobbye C. and Roy Hunter, Jr. (Atlanta University). Histochemical Studies on the Notochord of *Rana catesbeiana* Larvae.

11:10 35. Ford, Lee (Companion Collie Research Laboratory). A Possible Sex-Linked Lethal in Collie Dogs.

11:23 36. Humphries, A. A., Jr. (Université libre de Bruxelles and Emory University). Uptake of Tritiated Uridine and Cytidine by Oocytes of *Xenopus laevis*.

FRIDAY AFTERNOON — APRIL 16, 2:00 P.M.

PLANT ECOLOGY

Room 114, Gilmer Hall

Presiding: A. W. Cooper, North Carolina State

2:00 37. Welch, Bruce L. (College of William and Mary). Seral Development of the *Thalassia* Community on Sediment in the Caribbean.

2:13 38. Welch, Bruce L. (College of William and Mary). Seral Development of the *Thalassia* Community on Solid Substrate in the Caribbean.

2:26 39. Williams, Richard B. (U. S. Bur. Comm. Fisheries). The Interrelationship Between Phytoplankton and Zooplankton in Inshore Waters Near Beaufort, North Carolina.

2:39 40. Kerwin, James A. (Virginia Institute of Marine Science) and Robert A. Pedigo (College of William and Mary). Synecology of a Virginia Salt Marsh.

2:52 41. Whitford, L. A. and G. J. Schumacher (North Carolina State). Studies in the Ecology of Some Species of Fresh-Water Algae.

3:05 42. Barclay, Frank H. (East Tennessee State University) and the late Royal E. Shanks (University of Tennessee). Pollen Analysis and a Radiocarbon Date for Shady Valley Bog.

3:18 43. DeSelm, H. R. (University of Tennessee). Growth of *Andropogon* in an Experimental Garden.

3:31 44. Edmisten, Joe A. (University of Georgia). The Autecology of *Ormosia krugii*.

3:44 45. Burk, C. John (Smith College). Rainfall Periodicity and Flowering Race Formation in Camphorweed (*Heterotheca subaxillaris*).

3:57 46. Pittillo, J. Dan and Gayther L. Plummer (University of Georgia). Fallout Radionuclides in *Juniperus virginiana*.

4:10 47. Helseth, Frank A. and Gayther L. Plummer (University of Georgia). Movement and Distribution of Radionuclides on Granitic Outcrops.

4:23 48. Cetter, David J. (Alabama College) and John T. McGinnis (University of Georgia). Some Aspects of Recovery of Hardwood Stands 3 to 5 Years Following Acute Radiation.

FRIDAY AFTERNOON — APRIL 16, 2:00 P.M.

PLANT PHYSIOLOGY

Auditorium, Gilmer Hall

Presiding: G. R. Noggle, North Carolina State

2:00 49. Waldrep, Margaret J. (University of S. Alabama). Effects of Nitrate on Growth and Chlorophyll Production of a Marine Diatom, *Cyclotella caspia* Grun.

2:13 50. Bacon, Charles W., Frank Rusinko and John D. Withers (Clark College). The Influence of Insulin on Glucose Intake and Cellular Growth of *Chlorella vulgaris*.

2:26 51. Mullins, J. Thomas (Harvard University). The Genetic Basis of Sexuality in Biflagellate Aquatic Fungi.

2:39 52. Morrison, Ralph M. and Julia A. Doolittle (University of North Carolina at Greensboro). Conidia of *Erysiphe cichoracearum:* A Bioassay.

2:52 53. Drescher, Robert F. and John Miles Sharpley (Sharpley Laboratories, Fredericksburg, Virginia). Accumulation of Metals by Fungi.

3:05 54. Walker, Alma Toeve (University of Georgia). Lichen Acids of *Cornicularia*.

3:18 55. Sims, Asa C., Jr. (Southern University). Enzymes and Toxins of *Pellicularia filamentosa*.

3:31 56. Chadwick, C. S. (Emory and Henry College). A Collodion Membrane-Dialyzable, Osmosis-Inducing Substance from Commercial Yeast.

3:44 57. Terry, Claude E. and H. Branch Howe, Jr. (University of Georgia). Effects of Acriflavine on Repair Mechanisms in *Neurospora crassa*.

3:57 58. Hull, H. L. (Berea College). A Soil Test for Available Nutrients.

4:10 59. Riopel, James L. (University of Virginia). Origin of Lateral Roots.

4:23 60. Ball, Ernest A. and P. C. Joshi (North Carolina State). Growth and Division of the Isolated Palisade Cell of *Arachis hypogaea*.

4:36 61. Jackson, Johnny and Lawrence M. Rohrbaugh (University of Oklahoma). Effect of Ethanol on the Metabolism of γ-Aminobutyric Acid in the Leaves of Victory Oats.

4:49 62. Wiles, Edwin L. (Southern Pilgrim College) and Ralph D. Amen (Wake Forest College). The Mechanism of Seed Dormancy in the Alpine Rush — *Luzula spicata*.

INVERTEBRATE ZOOLOGY

Room 150, Gilmer Hall

Presiding: Burton J. Bogitsh, Vanderbilt University

2:00 63. Tenney, Wilton R. and William S. Woolcott (University of Richmond). Environmental Factors Related to the Distribution of Freshwater Bryozoans in the Vicinity of Highlands, North Carolina.

2:13 64. Bogitsh, Burton J. and David A. Nunnally (Vanderbilt University). Succinic Dehydrogenase in *Hymenolepis microstoma*.

2:26 65. McCrone, John D. (Florida Presbyterian College). A Toxicological and Biochemical Comparison of the Venoms of the North American Species of the Black Widow Genus *Latrodectus*.

2:39 66. Tisdale, Sue and Howard M. Field (Florida Southern College). The Ecology and Life History of *Latrodectus bishopi*.

2:52 67. Wimer, Larry T. (University of South Carolina). The Carbohydrate Composition of the Fat Body of *Phormia regina* (Meigen) During Larval Development.

3:05 68. McCrary, Anne B. and Charles E. Jenner (University of North Carolina). Feeding Patterns in Diapausing and Developing Larvae of the Mosquito, *Toxorhynchites rutilus*.

3:18 69. Willard, William K. (University of Tennessee). Long Term Effects of Acute Low-Level X-rays on Laboratory Populations of *Aedes aegypti*.

3:31 70. Liles, James N. and James D. Stidham (University of Tennessee). Preliminary Investigations Concerning Amino Acid Metabolism in Aging Female *Aedes aegypti* (L.)

3:44 71. Kriegsman, Carolyn O. and Paul E. Lutz (University of North Carolina at Greensboro). Life-History of *Anax junius* Drury (Odonata).

3:57 72. Barr, Thomas C. (University of Kentucky). The Sphodrines: A Subtribe of Carabid Beetles Newly Recorded from North America.

4:10 73. Woodmansee, Robert A. (Virginia Institute of Marine Science). Time of Oviposition and Hatching in the Planktonic Sergestid Shrimp, *Lucifer faxoni*.

4:23 74. Holsinger, John R. (University of Kentucky). Some Aspects of Evolution and Speciation in the Subterranean Amphipod Genus *Stygonectes* (Gammaridae).

4:36 75. Prins, Rudolph (University of Louisville). Notes on the Habits of *Orconectes rusticus rusticus* (Girard) in a Spring Stream in Kentucky.

4:49 76. Forthofer, David and John B. Funderburg, Jr. (Florida Southern College). Variation in *Gambusia affinis*.

VERTEBRATE PHYSIOLOGY

Room 160, Gilmer Hall

Presiding: Ernest L. Hunt, Emory University

2:00 77. Thomson, J. Richard (Midwest Research Institute, Kansas City, Mo.). Bionics: A Challenge to Biologists.

2:13 78. Maroney, S. P., Jr. (University of Virginia). Ultraviolet-Induced Hemolysis of Frog Erythrocytes.

2:26 79. Hunt, Ernest L. (Emory University and The Gatty Marine Laboratory, University of St. Andrews, Scotland). Effects of Cytotoxic Agents on the Endocrine Pancreas of *Cottus scorpius*.

2:39 80. Hennessy, Joseph P. (College of William and Mary). Prenatal Environmental Effects on Development of Monoamine Oxidase and O-Methyl Transferase Activity in Foetal and Neonatal Mouse Brain.

2:52 81. Welch, Annemarie S. (College of William and Mary). Effect of Isolation on the Metabolism of Brain Norepinephrine.

3:05 82. Tate, George W., Jr. and George C. Kent, Jr. (Louisiana State University). Effect of Deciduomata on the Life Span of the Corpora Lutea of Pseudopregnancy in the Hamster.

3:18 83. Gatipon, Glenn B. and George C. Kent, Jr. (Louisiana State University). Effect of Hysterectomy on the Life Span of the Corpora Lutea of Pseudopregnancy in the Hamster.

3:33 84. Lytle, James B. (Maryville College). A Study of the Mitotic Effects of the Radiation Protective Drug, AET.

3:44 85. Hundley, Louis R. (Virginia Military Institute). Changes in Bone and Muscle Composition in the White Rat Due to Fat Accumulation and Age.

3:57 86. Smith, Michael H. (University of Florida). Oxygen Concentration as a Cue for Reduction in the Rate of Metabolism in the Old Field Mouse, *Peromyscus polionotus*.

4:10 87. Rovee, David T. (Brown University). Relation of Cell Size to Cell Density in the Melanocyte System of the Mouse.

4:23 88. Dimmick, John F. (Wake Forest College). The Utilization of Legume Protein.

4:36 89. Vandiviere, H. M. and M. R. Vandiviere (North Carolina Sanatorium System). The Enigma of Tuberculin Reactivity.

Abstracts of Papers Presented at the 26th Annual Meeting of the Association of Southeastern Biologists

Chromatographic Patterns from Tubers of Varieties of *Cyperus esculentus* L.

P. E. Adotey Addo and Lafayette Frederick, *Atlanta University*

Tubers obtained from Ghana and the southeastern United States, representing two varieties and four clones of *Cyperus esculentus*, were chromatographically analyzed, in one and two dimensions, for their ninhydrin-positive and ultra-violet-positive compounds. Surface pigmentation of the tubers represented the principal taxonomic difference distinguishing the varieties. Profiles of the ninhydrin-positive substances were found to be similar on the basis of the number, shape, and distribution of the spots obtained. This feature held true in both one- and two-dimensional chromatograms. The one-dimensional profiles of the ultra-violet positive substances revealed stable similarities between two of the stable differences between the other clones. Further substantiation of these observations was provided by their two-dimensional chromatograms. In the ultra-violet-positive chromatograms, one spot at the same Rf value consistently appeared in all profiles. No such uniform occurrence of any of several other spots appeared in either one- or two-dimensional chromatograms of the tubers analyzed. These studies provide further evidence of the role chromatographic data may play in elucidating taxonomic affinities.

The Influence of Insulin on Glucose Intake and Cellular Growth of *Chlorella vulgaris*

Charles W. Bacon, Frank Rusinko and John D. Withers, *Clark College*

The special effect of light on the growth rate of *Chlorella vulgaris* has been elucidated by Killam and Myers (1956). This observation is being carried further in the present work which involves the influence of varying concentrations of insulin on the glucose intake and growth of *Chlorella vulgaris* Beijerinck. The basic premise is that if insulin operates as a part of the glucose transport mechanism, its presence should accelerate the glucose intake and ultimately the growth rate of this unicellular alga.

Growth and Division of the Isolated Palisade Cell of *Arachis hypogaea*

Ernest A. Ball and P. C. Joshi, *Dept. of Botany, NCS of the Univ. of North Carolina, Raleigh*

One of the types of isolated cells which Haberlandt in 1902 attempted to culture was the palisade parenchyma cell of the leaf. Such cells, along with all the other types with which he worked, failed to divide. This led him and his contemporaries to suggest that the isolated cell of the higher plant body was incapable of division. Our experiments show that the isolated palisade cell of the peanut leaflet divides in sterile liquid culture after undergoing a preliminary phase of division and then systrophy of the chloroplastids around the nucleus. The medium contains minerals, an appropriate source of organic nitrogen, and an auxin. This growth and division has been recorded by time-lapse through a phase-contrast microscope, and small masses of callus of up to 20 cells have been achieved. In shake cultures the calli grow to large spherical masses of small cells.

Teaching Ecology in a General Biology Course

Stuart S. Bamforth. *Tulane University*

If a general biology course begins with the cell, energetics considerations can be extended through the organ and organism levels to introduce the energy flow concept to furnish the basis for trophic relationships. Abiotic (*e.g.*, light, temperature) and biotic (symbiosis, succession) factors can then be introduced to illustrate conditions that influence the distribution of organisms. If the origin of life is included, the evolution of trophic levels can be illustrated through heterotrophs living on organic matter, addition of autotrophs (with production of aerobic environment), and consumers (holozoic nutrition). Simple but effective laboratory exercises might include drawing transects of the vegetation of a woodland or pond area, classifying organisms of infusion successions by size and feeding mechanisms, and plankton sampling accompanied by simple chemical analyses of shallow aquatic habitats.

Pollen Analysis and a Radiocarbon Date for Shady Valley Bog

Frank H. Barclay, *East Tennessee State University*, and the late Royal E. Shanks, *University of Tennessee*

A fossil pollen profile from northeastern Tennessee indicates an Appalachian climatic history like that of the glaciated region to the north. Successively later radiocarbon dates for corresponding spectra in a series of bogs from North Carolina to Maine show that climatic and vegetation zones followed the receding glaciers.

The Sphodrines: A Subtribe of Carabid Beetles Newly Recorded from North America

Thomas C. Barr, *University of Kentucky*

Beetles of the subtribe Sphodrina (Carabidae: Anchomeninae) have previously been reported only from Eurasia and New Zealand. In the spring of 1964 three specimens of an undescribed genus and species of sphodrine were collected from a deep limestone pit in central Vera Cruz, Mexico. A second genus, also undescribed, has been recognized in collections of cavernicoles from San Luis Potosí, Nuevo Leon, and south Texas. Both genera, compared with Eurasian sphodrines, are extremely primitive, in this respect similar to the recently described *Prosphiodrus*, from New Zealand. The diagnostic character of a sharply truncate intercoxal process of the prosternum is well developed, but the male genitalia are anchomenine. The Mexican and New Zealand genera are apparently relicts of an early wave of dispersal from a central Asiatic point of origin. It is postulated that ancestors of the Mexican sphodrines entered North America via an early Tertiary Bering Bridge.

Presence of Radioactivity from Phosphorus-labeled ATP in the Protoplasm of Tradescantia Microspores

A. V. Beatty and J. W. Beatty, *Emory University*

The data which we have accumulated during the past eight years indicate that microspores treated in solutions of ATP, either before or after X-radiation, showed a

phenomenal recovery from radiation damage. The facts concerning passage of exogenous ATP into the microspores needed clarification. Carbon-labeled ATP had been used in previous experiments, resulting in radioactivity in the microspores, and currently radioactivity from phosphorus-labeled ATP was found in the protoplasm of the microspores, indicating the utilization of an exogenous supply. After using phosphorus-labeled ATP, the highest degree of radioactivity was found in the mucilagenous material surrounding the pollen inside the anthers. The protoplasm of the microspores showed the next highest degree of activity and the pollen grain walls the lowest. The radioactivity in the walls seemed to be so incorporated in the wall that it was not removed by successive washes. The washes showed no radioactivity beyond background count.

Succinic Dehydrogenase in *Hymenolepis microstoma*

BURTON J. BOGITSH AND DAVID A. NUNNALLY, *Vanderbilt University*

Reduction of neotetrazolium in the presence of succinate was used as a quantitative assay for succinic dehydrogenase activity in homogenates of *Hymenolepis microstoma*, and vitro blue tetrazolium was employed with cryostat sections for its histochemical localization. The highest concentrations of the enzyme occurred in the anterior region of the worm (solex, neck, and immature proglottids), lesser amounts in the region of mature and early gravid segments, and least amounts were found in the gravid region of the strobila. Primary sites of succinic dehydrogenase activity were the mitochondrial layer of the cuticle and the cells of the subcuticle. In the anterior region, the entire parenchyma showed uniformly high concentrations of enzyme activity. This reaction decreased posteriorly until, in the gravid region, only the subcuticle and the mitochondrial layer of the cutiele displayed activity. Intense activity was also noted in the layer just under the shells of the eggs. The ovary and immature testes showed high enzyme concentrations, but, in the latter organs, this diminished as they matured. In the scolex, the rostellum and the muscles of the suckers showed higher enzyme activity than the surrounding tissues.

Ultrastructural Studies of Sperm Morphology and Sperm-egg Interactions in the Decapod *Callinectes sapidus*

GEORGE GORDON BROWN, *University of Miami*

Ultrastructural studies supported by phase-contrast optics and cytochemistry have been carried out on morphological and functional aspects of the *Callinectes sapidus* sperm. The complex acrosome is a 2.5-3.0 spherieal organelle. It encloses the acrosomal tubule in a decp adnuclear indentation. Periacrosomal material completely surrounds the acrosome except for the distally located acrosomal cap. The nuclear cup and the nuclear radial processes surround this acrosomal region. In sperm penetration, the sperm acrosomal cup attaches to the egg chorion and probably initiates the acrosome reaction. As a result, the acrosomal region is everted through the chorion causing a cup-shaped depression in the egg plasma membrane. The preformed acrosomal tubule is in direct contact with this membrane and may fuse with it. The aspects studied present basis for homologizing the *C. sapidus* sperm (previously regarded as atypical) with conventional spermatozoa (i.e. *Hydroides-Saccoglossus* system, Colwin and Colwin, 1964).

Floristic Studies in Pike County, Kentucky

EDWARD T. BROWNE, JR., *University of Kentucky*

Pike County is the largest county in the state with an area of 779 square miles. It is the easternmost county, and it is situated entirely in the Cumberland Plateau Province. Like many of the 125 counties in the state, it is very incompletely known botanically. A project was undertaken in 1964 to study the vascular plants of this area, and at the time this is written 283 species have been collected and identified. This number will be somewhat larger when all collections have been identified. Some of the collections represent new state records, and one may be a new species. Altitudes vary from less than 870′ at Boldman to over 3040′ on Pine Mountain. Variation in altitude and the associated ruggedness of the terrain combine to produce one of the most interesting botanical areas in the state and one with some of the most spectacular scenery to be found in Kentucky. Continuing studies are expected to reveal further plants of interest in areas which have not been adequately explored.

Rainfall Periodicity and Flowering Race Formation in Camphorweed (*Heterotheca subaxillaris*)

C. JOHN BURK, *Smith College*

Plants of camphorweed (*Heterotheca subaxillaris*) were raised from seed taken from nineteen sites throughout the range of the plant in a uniform garden at Northampton, Massachusetts. Definite flowering races were observed. Flowering time was correlated with rainfall periodicities at the seed source. The earliest-flowering plants were obtained from areas where above-average amounts of rainfall occur in spring, while the later-flowering plants came from sites where above-average rainfall occurs in mid to late summer. Other workers have observed a correlation between the frost-free season and flowering race formation in prairie grasses, *Eupatorium rugosum*, and other plants. There is no correlation between the frost-free season and flowering race formation in *Heterotheca* and it is postulated that, within the range of camphorweed, rainfall periodicity is a more critically limiting factor.

A Collodion Membrane-Dialyzable, Osmosis-Inducing Substance from Commercial Yeast

C. S. CHADWICK, *Emory and Henry College*

The experiments were performed with a collodion bag osmometer, a new bag made for each experiment. Living, or autoclaved, yeast cells were introduced into thc bag, the bag sealed, except for a lead-off tube, and thc bag lowered into pure water. Osmosis of water into thc bag invariably occurred and pressure was created insidc the bag which caused a rise of fluid in the lead-off tube. The rise in millimeters per unit of time was recorded for each experiment. As water moved into the bag, a rich bacterial nutrient substance dialyzed from the yeast through the membrane into the water compartment. As this material dialyzed out the rise of the fluid ceased and its level finally dropped to zero. Renewal of the water in the outer compartment caused another fluid rise, which was counterbalanced by further dialysis of the nutrient. When osmosis ceased, no further dialysis of thc nutrient occurred. The dialyzable substance seems to be an osmosis-inducing material. It is present also in potato scrapings, carrot scrapings, and in pinto bean meal. Experiments are being continued to identify this substance.

The Morphology of the Dormant Epicotyl in *Lactuca sativa* L.

MILTON J. CONSTANTIN AND RICHARD H. MULLENAX, *University of Tennessee*

Shoot apices in dormant embryos are usually dome-shaped and extend above the base of the last formed primordial leaf or leaf-pair. However, at least three genera (*Drimys*, *Helianthus*, and *Rauwolfia*) are recorded as having flat or depressed shoot apices.

The dormant embryo of lettuce (*Lactuca sativa* L.) is frequently cited as an example of embryonic simplicity in dicotyledonous plants, having only a small, convex, growing point with no leaf development. Our histological observations, however, on five cultivators ("Black Seeded Simpson", "Bibb", "Grand Rapids", "Great Lakes", and "Imperial 847") reveal a minute dormant epicotyl possessing two embryonic leaves and a slightly *concave* epicotylar apex. Shoot apices of germinating achenes were examined histologically to confirm the interpretation of dormant epicotyl morphology.

Some Aspects of Recovery of Hardwood Stands 3 to 5 Years Following Acute Radiation

DAVID J. COTTER, *Alabama College*
JOHN T. MCGINNIS, *University of Georgia*

An analysis was made of the degree and type of recovery exhibited by an upland mixed pine-hard forest exposed to 11,000 to 47,000 rads from an unshielded nuclear reactor. The major form of recovery of the irradiated forest was by sprouting from protected underground tissues. Yearly growth of sprouts decreased with time so that three years after radiation the amount of yearly growth no longer reflected the damage received. As a measure of cumulative growth, the height of the tallest stem was found to be the most significant factor expressing the recovery of the plants and was related to the radiation dosage if age was considered. Understory plants demonstrated a much greater resiliency than overstory species. Radiation stopped reproduction, and the character of the early recovery forest will be controlled largely by the rate of sprout growth and the time it takes for the species to resume normal reproduction. The resulting community could be called a radiation sub-climax.

Reduction of X-ray Induced Chromosomal Aberrations in *Tradescantia paludosa* Microspores Following Treatment With Cupferron

HERBERT L. DAVIS, JR., *Emory University*

One of the reported effects of cupferron (the ammonium salt of nitrosophenylhydroxylamine) treatments in plants is the inhibition of respiration. However, it has been reported that when cupferron is applied through the petioles of leaves of *Hedera*, *Aucuba*, and *Euonymus*, respiration is increased, but when injected into the leaves respiration is non-specifically inhibited. Experiments with *Tradescantia paludosa* inflorescences, using various concentrations of cupferron applied through the stem prior to irradiation with 400 r. of x-radiation, resulted in the reduction of chromosomal aberrations. It could be interpreted from this that cupferron is stimulating respiration in these experiments, and that the resulting energy is contributing to the lowering of the aberration frequency. The optimum concentration of cupferron for the greatest effect was 0.001 M. Concentrations above or below this optimum concentration resulted in less reduction of the aberration frequency. The decreased effect of the higher concentrations may be due to the toxicity of cupferron in high concentrations.

Effects of Low Level Radiation on the Embryonic Coronary Vessels of the Chick

J. E. DAVIS, JR., *Wake Forest College*

Microcurie amounts of P^{32}, Na^{22}, Fe^{59}, and Cl^{36} in normally occurring compounds were injected into the yolk mass or directly into the vitelline vessels of developing embryos at stage 24. The surviving embryos were sacrificed at stage 41. Hearts were removed and examined intact or sectioned for later examination. Coronary vessels were identified, counted, and measured, and histological changes in the walls of the vessels were noted. Resulting changes were (1) increase in number of small vessels, (2) general increase in diameters of vessels and (3) minor histological changes in the walls of vessels. Variations in the coronary vessels also were correlated with the radioactive element used.

Growth of *Andropogon* in an Experimental Garden

H. R. DESELM, *University of Tennessee*

Stools of Little Bluestem (*Andropogon scoparius* Michx.) and relatives, obtained in the summer of 1962 and 1963 and spikelets obtained in 1963, were planted in an experimental garden at the Agricultural Experiment Station at Knoxville. Growth of culms of stools and seedlings reached heights at early anthesis inversely proportional to the latitude of origin. Date of early anthesis was also inversely related to the latitude of origin. Date of early anthesis of seedlings was not so related. Other observations are being made but continuation includes the confirmation from other year's data and computer analysis of the results.

The Utilization of Legume Protein

JOHN F. DIMMICK, *Wake Forest College*

Various effects concerning the utilization of legume protein have been studied. The increase in flatulence in man and the decrease in growth rate in the rat as a result of the ingestion of legumes will be reported. Controlled legume protein diets have been fed to male human subjects with rectal flatus collected and analyzed. Minimal protein containing diets have been fed to three week old rats. The feedings and weights were recorded daily over a two weeks period. These were followed for one more week with all rats ingesting a commercial laboratory chow diet. A fifty percent death (four of eight) resulted in nine days amongst rats ingesting a 70% legume protein which had been alcohol extracted. No deaths occurred in 10 days of feeding a 98% legume protein diet.

Accumulation of Metals by Fungi

ROBERT F. DRESCHER AND JOHN MILES SHARPLEY
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It is well known that fungi require various metals for metabolic processes. However, there appears to be little or no information concerning the maximum quantities of metal that may be bound within or adsorbed on the mycelia. For purposes of definition, metals bound by fungi are those metals which cannot be removed by repeated washing of the mycelial harvest with deionized water. In work here reported several species of fungi were grown in liquid cultures containing various concentrations of metals and analyzed for metal content. Preliminary results are reported.

Cycling of Zinc in Experimental Marine Environments

THOMAS W. DUKE, JAMES N. WILLIS AND THOMAS J. PRICE, *Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina*

The cycling of zinc, an essential trace element for the growth and development of marine organisms, was followed in experimental marine environments. A radioisotope of this element, zinc 65, was used as a tracer in these studies. Under controlled conditions in the laboratory, filter-feeding molluscs accumulated more zinc 65 and contained more stable zinc than other members of the community. Zinc 65 added to two experimental ponds moved rapidly from the water to sediments and biota. After 100 days, over 98 percent of the zinc 65 and stable zinc in the pond was in the sediments. Seaweed which entered one of the ponds 45 days after the experiment was started accumulated zinc 65 even though no detectable radioactivity was in the water.

The Autecology of *Ormosia krugii*

JOE A. EDMISTEN, *University of Georgia*

As a part of a more extensive study of a Puerto Rican rainforest, the germination and seedling growth of *Ormosia krugii* is being studied. Two thousand seeds of this hypogeal legume were obtained from the El Verde forest area near San Juan. After 4 germination treatments it appears that the action of bacteria and/or fungi on the hard seed coat is needed before germination is successful. Seeds sterilized in chlorox and treated with a commercial preparation of bacteria yielded the best germination results. Seedlings from the germination tests are being used in 3 other experiments. Experiments are being carried out with the driptip leaves of *Ormosia krugii* to test the hypothesis that the drip-tips prevent leaching of nutrients. A second experiment is designed to elucidate the formation and function of root nodules. The third area of seedling investigation deals with growth responses to light intensity.

Distribution Pattern of the Pleurocerid Snail, *Goniobasis proxima* (Say)

THEODORE C. FOIN, JR., *University of North Carolina*

Laboratory studies on the distribution of the pleurocerid prosobranch *Goniobasis proxima* have demonstrated that the populations are distributed contagiously in accordance with the negative binomial model. Snails in some of the local streams exhibit the same pattern; they are aggregated on rocks, leaves, alongside strong current flow, and in shallow water moving along shorelines. The results of experiments in a simulated stream and of field studies on substrate preference indicate that an interaction of current velocity, oxygen tension, and substrate particle size is important. Snails aggregate to areas where the current velocity is greater than zero but less than that which would dislodge the snail; where the substrate is stable relative to water movement; and where maximum flow of oxygenated water occurs.

A Possible Sex-Linked Lethal in Collie Dogs

LEE FORD, *Companion Collie Research Laboratory, Box 2001, Parkland, Washington*

Analysis of 49 litters with a total of 349 pups showed 161 males and 188 females in toto, which is not significant from an expected 1:1 ratio of males and females. However, when the matings are broken down into genetic types, type 1 shows 38 males : 58 females which is significant by X^2; and type 2 shows 23 males : 40 females which is also a significant deviation. This could indicate a sex-linked lethal in the common germ plasma pool of the two types.

Variation in *Gambusia affinis*

DAVID FORTHOFER AND JOHN B. FUNDERBURG, JR., *Florida Southern College*

The gonopodial structure of *Gambusia affinis* of west-central Florida is compared to that of *G. affinis* populations from other parts of the species range. Taxonomic implications of the differences in gonopodial elements between these populations are discussed.

The Marine Animal Community from a Coarse Sand Environment on the Continental Shelf off Georgia

DIRK FRANKENBERG, *University of Georgia Marine Institute*

Two major marine environments occur on the continental shelf off Georgia, a nearshore environment typified by turbid water of variable salinity with a bottom of fine sand, and an offshore environment typified by clear water of high salinity with a bottom of coarse sand. Different benthic animal communities occur in these two environments. A description of the benthic animal community from the offshore environment will be presented in this paper. Typical inhabitants of this community include an amphioxus, *Branchiostoma caribaeum*, and several species of amphipod crustaceans and polychaete worms. This community will be compared with similar ones from other parts of the world, and some unusual features of the Georgia community will be discussed.

Carbonic Anhydrase and Growth in the Snail, *Physa heterostropha*

JOHN A. FREEMAN, *Winthrop College*

A study of the daily growth of individual snails from day of hatching to near-cessation of growth, with a feeding regime for maximum growth rate, indicates a period of very slow growth up to age five days, acceleration of growth from ages 5 to 8 days, and no difference between controls and experimental snails in which carbonic anhydrase was inhibited by Diamox (5 mgm/1). At greater ages and lengths above 1.5 mm, control snails without the drug consistently grew more rapidly than those treated with the drug. Maximum average lengths, achieved in about ten weeks, were approximately 10 cm for snails in which carbonic anhydrase was active and 6.5 cm in those in which it was inhibited.

Effect of Hysterectomy on the Life Span of the Corpora Lutea of Pseudopregnancy in the Hamster

GLENN B. GATIPON AND GEORGE C. KENT, JR., *Louisiana State University*

The average duration of pseudopregnancy in hysterectomized hamsters was 16 days whereas that in sham operated animals was the usual 8 days. The hamster thus resembles the rat, guinea pig, rabbit, heifer, gilt and ewe in exhibiting a "luteolytic effect" of the uterus. The corpora lutea of pseudopregnant females hysterectomized either before sterile mating or up to and including the fifth day of pseudopregnancy remained hyperemic until 268 hours after sterile mating and were pink an additional 68 hours. Those of sham operated pseudopregnant females exhibited ischemia 146 hours after sterile mating and were pink an additional 8 hours.

These observations indicate a possible relationship between non-deciduous uterine tissue and stasis of the vascular channels of the corpora lutea of pseudopregnancy.

Movement and Distribution of Radionuclides on Granitic Outcrops

FRANK A. HELSETH AND GAYTHER L. PLUMMER,
Department of Botany, University of Georgia, Athens

Gamma-ray spectometric analyses were made on soil and plant components of upland and lowland communities on a granitic outcrop ecosystem in Georgia where fallout, compared to other areas in the United States, has been relatively high.

Soil at the water inlet of a small pit community contained more radioactivity than the soil at the water outlet. The top 1-2 inches of soil contained more fallout radionuclides, specifically Cs-137 and Mn-54, than the 6-8 inch layer. Upland soils contained more fallout radioactivity than lowland soils.

The natural radionuclides (Th, K-40) were uniformly distributed within the soil profile. Fallout nuclides appear to be moved more readily within the habitat than the natural radionuclides.

Generally, plants in lowland communities contained more radioisotopes than those in upland communities. Accumulation of radiocesium may be associated with a nutritional requirement and possibly a potassium deficiency in the habitat.

Increased radioactivity in the lowland plants has been associated with the transport of nuclides in runoff water from upland communities and their soil components.

Prenatal Environmental Effects on Development of Monoamine Oxidase and O-Methyl Transferase Activity in Foetal and Neonatal Mouse Brain

JOSEPH P. HENNESSY, *College of William and Mary*

Recent investigations indicate that stimulation of the pregnant female rat can influence behavior patterns exhibited by her offspring. This stimulation may be in the form of population density increases, electroshock, epinephrine injection or nonspecific handling. Increased environmental stimulation releases stored catecholamines into the systemic circulation, a marked portion of which one expects to pass through the uterus and placenta. There is evidence that catecholamines may cross the placental barrier and enter the foetal circulation. Present studies have been undertaken to determine the possible adaptation of monamine oxidase and O-methyl transferase, enzymes catabolizing catecholamines, in brain tissue from foetal and neonatal mice as a result of increased catecholamine levels in the foetus following maternal environmental stimulation.

A Preliminary Investigation of a New *Trillium* Hybrid

HAROLD ROYAL HINDS, *Smith College*

A small population of hybrids between *Trillium cernuum* and *Trillium erectum* has been observed along a railroad embankment in Amherst, Massachusetts. The hybrids occur with both parents and are intermediate in all aspects but petal color which is white. The presence of many plants of the white form of *Trillium erectum* in the population has led to the hypothesis that the hybrids are a result of a cross between this white form and *Trillium cernuum*. This would account for the white petals of the hybrid and the breaking of the most important barrier to cross pollination in the typical parents, that of dissimilar pollen vectors, i.e., flesh flies in *Trillium erectum* and moths in *Trillium cernuum*. It is believed that the two white flowered entities are cross pollinated by moths.

Some Aspects of Evolution and Speciation in the Subterranean Amphipod Genus *Stygonectes* (Gammaridae)

JOHN R. HOLSINGER, *University of Kentucky*

Stygonectes is one of seven genera included in the *Crangonyx* section of the family Gammaridae in North America. Presently this genus contains 15 species, eight of which are in the process of being described for the first time, and all of which are associated to one degree or another with subterranean waters, i.e., seeps, spring outlets, wells, and caves. *Stygonectes* is distributed as follows: Appalachian region (7 species); Ozark-Ouachita-Arbuckle region (3 species); Edwards Plateau region (5 species).

Patterns of speciation appear to be closely correlated with geological barriers. Those species associated primarily with epigean habitats such as seeps and springs have much wider ranges than those associated with deeper subterranean waters found in caves and wells. In the Appalachians, non-cavernous sandstone ridges could easily provide effective barriers to dispersal, but in the Edwards Plateau such barriers apparently result largely from faulting and stratigraphic differentiation.

A Soil Test for Available Nutrients

H. L. HULL, *Berea College*

Chemical tests on some Kentucky soils do not indicate what plant nutrients are available. A "T. Z." test has been developed which probably measures bacterial digestion and respiration. A mixture of several chemicals, one teaspoon of soil, and water, will in five days show certain color changes which could be interpreted as an indication of the general nutritional level of certain soils. These test results show a high correlation to the general growth patterns of the vegetation.

Uptake of Tritiated Uridine and Cytidine by Oocytes of *Xenopus laevis*

A. A. HUMPHRIES, JR., *Université libre de Bruxelles* and *Emory University*

Adult *Xenopus laevis* females were injected intracoelomically with tritiated uridine or cytidine, usually after egg deposition had begun in response to injection of gonadotropin. After five hours the animals were decapitated, and coelomic, oviducal, and uterine oocytes, plus ovarian fragments, were fixed by freeze-substitution. Alternate sections were placed on slides and treated with cold perchloric acid, or exposed to ribonuclease, or left untreated. Slides were coated with Ilford G5 emulsion and exposed for two or three weeks. Autoradiographs revealed uptake only in oocytes within the ovary. In hormone-treated animals most of the label was removable by ribonuclease and was concentrated in the nuclei of the smallest oocytes and the nucleoli of small yolky oocytes, with light label in the largest oocytes. In animals not treated with hormone the largest oocytes showed a concentration of label (ribonuclease-resistant) in the animal cortex after injection with cytidine, but not after uridine injection. (Supported by Euratom, The McCandless Fund of Emory University, and Grant GM 09878 from the U. S. Public Health Service.)

Changes in Bone and Muscle Composition in the White Rat Due to Fat Accumulation and Age

Louis R. Hundley, *Virginia Military Institute*

Data presented indicate that an increase in an animal's fatness is accompanied by an increase in the strengthening constituents (bone ash and protein) of the vertebrae, the part of the skeleton of a quadriped most involved in the carrying of additional weight. As fatness increases, there is a decrease in the percentages of water and ash in muscle and of water in vertebrae. The decreases in parts per cent of water and ash in muscle reflect the highly significant increase in parts per cent of fat in muscle, and the decreased amounts of protein and ash.

As the fat-free body weight increases, the fat-free dry weight of muscle and two of three skeletal components increase; i.e., there is an increase in the strengthening constituents of the locomotor and sustentacular structures.

Effects of Cytotoxic Agents on the Endocrine Pancreas of *Cottus scorpius*

Ernest L. Hunt, *Department of Biology, Emory University and The Gatty Marine Laboratory, The University of St. Andrews, Scotland*

The principal islets of the marine teleost, *Cottus scorpius*, provide exceptionally favorable material for *in vitro* procedures in that relatively large masses of endocrine tissue, a mixture of alpha and beta cell types, can be obtained free of exocrine pancreas. Using this system the effects of cytotoxic materials specific for certain cell types were observed during prolonged periods of *in vitro* incubation in an isotonic medium. The present report will be concerned mainly with the pattern and sequence of damage to beta cells after treatment with alloxan. (Supported in part by a grant from the McCandless Fund of Emory University.)

Biometrical Studies of Growth in *Pseudemys concinna suwanniensis* Carr (Order: Testudinata)

Crawford G. Jackson, Jr., *University of South Alabama*

A biometrical study of the growth pattern of *Pseudemys concinna suwanniensis* Carr was made of natural populations in north-central Florida. Between November, 1960 and May, 1964, 196 randomly collected individuals were measured, marked and released. Separate records for each individual were kept, and consisted of 6 linear measurements: carapace length, carapace width, plastron length, anterior plastron width, posterior plastron width, and width of bridge. During the 42-month period of investigation, 119 individuals (61%) were recaptured from 1 to 11 times. From original measurements and those obtained at subsequent recaptures, relative and absolute growth rate analyses were made with respect to age (size), season, and sex. The season of active growth appears to be from March through October, terminating in November. The possibility of an inherent growth rhythm is suggested. A progressive decline in growth rate accompanies increase in size, but much individual variation exists. With the available data, no sexual differences in growth rate with respect to carapace length and plastron length can be demonstrated. There is some evidence for a sexual difference in the rates of increase of plastral widths and bridge width. (Supported in part by a Sigma Xi - ReSA Grant-in-Aid.)

Effect of Ethanol on the Metabolism of γ-Aminobutyric Acid in the Leaves of Victory Oats

Johnny Jackson* and Lawrence M. Rohrbaugh, *Department of Botany and Microbiology, University of Oklahoma*

Selected leaves of 14-day-old Victory oat plants, *Avena sativa* L., were allowed to fix $C^{11}O_2$ photosynthetically after being pretreated with distilled water, 1%, 4%, and 16% ethanol. These leaves were then extracted with ethanol and water. Separate chromatograms were prepared of the ethanol-water-soluble materials and developed two-dimensionally. The amount of C^{11} fixed into each intermediary metabolite, as a percentage of the total present, was calculated. From each chromatogram, γ-aminobutyric acid was separated and purified by rechromatography. The radioactivity and the amount of γ-aminobutyric acid as estimated colorimetrically with ninhydrin were determined. Subsequently, the specific activity was calculated.

The data show that the percentage of total C^{11} which was incorporated into γ-aminobutyric acid was greatly enhanced by increasing concentrations of ethanol. However, the quantity (weight) of γ-aminobutyric acid present in the leaves appeared not to be materially affected by the alcohol pretreatments.

In most cases the amount of C^{11} accumulated in this compound, and therefore its specific activity, was appreciably enhanced by the alcohol.

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Observations of Sperm Development Among Gymnolaemate Ectoprocta

Duvall A. Jones, *University of Florida*

Calcareous colonies of marine ectoproct species were fixed in Carnoy's fluid or neutral formalin and then hydrolyzed with hot hydrochloric acid to remove the opaque, calcareous zooecium. Integrity of the chitinous zooecium permitted removal of intact colonies to prepare whole mounts stained by aceto-carmine. These preparations were not satisfactory for chromosome study, but yielded notable observations concerning sperm morphology and development. Size, and to a lesser extent, form, of sperm appeared markedly different for closely related species.

In *Conopeum commensale*, an evidently unique phenomenon appeared to occur during spermiogenesis. The protoplasm of the spermatid appeared to condense about the periphery of the cell, rather than to elongate to form a flagellum. There developed a resemblance to a thick, worm-like structure coiled within the cell membrane. The head was tucked in toward the center, which was transparent except when the cell membrane was evident above and below the main protoplasmic mass. Apparently after rupture of the membrane, sperm were seen in various stages of uncoiling until they became straight.

Synecology of a Virginia Salt Marsh

James A. Kerwin, *Virginia Institute of Marine Science* and Robert A. Pedigo, *College of William and Mary*

In the spring and summer of 1964 a typical salt marsh in Gloucester County, Virginia was analyzed using random quadrate sampling. Synthetic treatments were employed to evaluate data and were correlated with differences in elevation. Floristic data indicate the Virginia marshes previously undescribed show closer affinity with marshes north of Chesapeake Bay than those south of Chesapeake Bay. Correlation of floristic data with dif-

ferences in elevation indicates that zonation in the marsh is dependent upon differences in elevation or some environmental factor correlated with these elevation differences. Observations of sedimentation and erosion in localized areas indicate that the marsh is in a constant state of change, with extensive areas undergoing both succession and regression.

Life-history of *Anax junius* Drury (Odonata)

CAROLYN O. KRIEGSMAN AND PAUL E. LUTZ,
University of North Carolina at Greensboro

The life-history of *Anax junius* was studied from September, 1963 through September, 1964. During this period of one year, 27 larval collections were made. Measurements of body length were recorded, and the larvae were then returned to their approximate habitats. From the extensive sampling data, it is evident that *A. junius* larvae over-winter in at least five different instars. Larval growth was arrested in October, was minimal during the winter, and was resumed early in April. Emergence began in early May and continued until the first of October. Peaks of emergence occurred in May and in June. From July through September, emergence was sporadic and followed no definite pattern. This extended emergence period reflects the lack of a diapause stage which would synchronize larval development. The data indicate that most larvae of *A. junius* have a one-year life-cycle. Certain precocious individuals may undergo their complete larval development and emerge in one summer. (Supported in part by grants from the Research Council, University of North Carolina at Greensboro.)

Preliminary Investigations Concerning Amino Acid Metabolism in Aging Female *Aedes aegypti* (L.)

JAMES N. LILES AND JAMES D. STIDHAM,
University of Tennessee

The results include qualitative and quantitative determinations of free hemolymph amino acids in young and aged female mosquitoes fed two different adult diets. The diets were sucrose alone, and sucrose and blood. Determinations were performed using paper chromatography and a recording and integrating densitometer, and an amino acid analyzer. A maximum of 19 ninhydrin-positive spots resulted with paper chromatography, while 30 peaks were recorded with the analyzer. The blood-fed insects had higher quantities of amino acids than did those fed sucrose alone, and the acids varied quantitatively with the age of the insect. Some results concerning the retention, utilization, and loss of C^{14}-labelled amino acids by the mosquitoes will be discussed.

The Influence of Storms and Hurricanes Upon Certain Estuarine Organisms

THOMAS L. LINTON, *University of Georgia, Marine Institute*

In studies conducted on Sapelo Island, Georgia, several behavior patterns and distribution anomalies observed in certain estuarine organisms appear to be related to storm and hurricane conditions. One to two days prior to the arrival of storms and hurricanes, animals being held in laboratory aquaria exhibited the following unusual behavior patterns: 1) Tarpon, *Megalops atlanticus*, stopped feeding; and 2) the white shrimp, *Penaeus setiferus*, became hyperactive and exhibited marked changes in body coloration.

Comparison of fish species, collected at weekly intervals for one year prior to a hurricane, with those taken afterwards, revealed the following: 1) Large numbers of recently metamorphosed tarpon and ladyfish, *Elops saurus*, within a size range which typically is found several months earlier, were present in tidal creeks: and 2) Numerous young-of-the-year common snook, *Centropomus undecimalis*, a species for which only two specimens have previously been taken north of Florida on the Atlantic seaboard, were present in each of four separate tidal creeks.

A Study of the Mitotic Effects of the Radiation Protective Drug, AET

JAMES B. LYTLE, *Maryville College*

Weanling rats of the Holtzman strain were injected with AET intraperitoneally and colcemid intravenously. The injections were given at as near the same time as possible. Preliminary studies indicated the range of AET that could be used: 200, 300 and 400 mg/kg of body weight. The six time intervals were 0, 15, 45, 75, 105, and 135 minutes. Five slides of bone marrow smears were prepared from each animal. The cells were stained using the Feulgen technique. This study demonstrated that the inhibition of mitosis was in direct proportion to the concentration of AET.

Ultraviolet-induced Hemolysis of Frog Erythrocytes

S. P. MARONEY, JR., *Department of Biology, University of Virginia*

Frog erythrocytes, washed and suspended in frog Ringer's solution, undergo what appears to be a form of colloid osmotic hemolysis following exposure to ultraviolet radiation. In the present experiments, the rate of this hemolysis (1/time for fifty percent hemolysis) was found to vary (1) as a function approaching the square of the ultraviolet dose, (2) with incubation temperature — the Q_{10} was 1.43, (3) as a function of pH.

Feeding Patterns in Diapausing and Developing Larvae of the Mosquito, *Toxorhynchites rutilus*

ANNE B. MCCRARY AND CHARLES E. JENNER,
University of North Carolina

In *Toxorhynchites rutilus*, a facultative photoperiodically-controlled diapause occurs in the fourth larval instar (Jenner and McCrary). Larvae are predacious. Diapausing larvae remain active and feed. The number of prey (fourth instar *Culex*) consumed each day, showed that definite patterns of feeding were associated with diapause and with uninterrupted development. The latter is displayed by fourth instar larvae reared on a long (14-hour) photoperiod. Such larvae show a steady increase in feeding until about two days before pupation when feeding declines abruptly. With this decline a killing behavior is initiated in which almost all available prey are killed but not eaten. Diapausing larvae (11-hour photoperiod) show an increase in feeding following entry into the fourth instar. A relatively high but erratic rate continues for about 20-30 days followed by a decline to a low but still irregular rate. As feeding declines, killing increases. Variations in these patterns were observed under different conditions.

A Toxicological and Biochemical Comparison of the Venoms of the North American Species of the Black Widow Genus *Latrodectus*

JOHN D. MCCRONE, *Florida Presbyterian College*

The venoms used in this study were lyophilized homogenates of venom glands taken from mature female *Latrodectus mactans, L. variolus, L. bishopi* and *L.*

geometricus. All four venoms are lethal to mammals, although there are species differences in venom lethality and the average amount of venom obtained. Each of the venoms also has a hypertensive effect on the mammalian systemic arterial pressure.

Qualitative neutralization tests showed that the commercial antivenin 'Lyovac', prepared against the venom of *L. mactans,* protected mice from the lethal effects of all four venoms. Micro double-diffusion tests, using 'Lyovac', were carried out on agar covered microscope slides. The venoms of *L. mactans* and *L. variolus* formed 8 precipitation lines, while those of *L. bishopi* and *L. geometricus* formed 7 and 5 lines respectively. The venom proteins of the four venoms were fractionated by means of disc electrophoresis. Ten major fractions were separated from *L. mactans* venom, 9 from *L. variolus* and *L. bishopi* venom and 6 from the venom of *L. geometricus.* Each venom had a distinct electrophoretic pattern. (Supported by Public Health Service Grant GM 11206, from the National Institute of General Medical Sciences.)

Some Incompletely Known Aquatic Phycomycetes

Charles E. Miller, *University of Maine*

Studies during parts of the last four summers on the lower aquatic Phycomycetes of water habitats immediate to the Mountain Lake Biological Station, Virginia, and from certain aquatic collecting sites in Maine have shown a similarity in the phycomycetous flora of these areas. All 27 Maine species recognized were also found during the survey at Mountain Lake Biological Station, where 69 species were identified. Among the many fungi studied were several members of the orders Chytridiales and Lagenidiales only tentatively identified or not identified at the generic or specific level. In some cases this was because insufficient specimens of the fungus were found preventing collection of enough taxonomic data to permit identification or to warrant description as a new taxon. Identification was frequently found to be very difficult or impossible because of a lack of stability in certain taxonomic criteria necessary for delimitation of the taxa.

Conidia of *Erysiphe cichoracearum:* A Bioassay

Ralph M. Morrison and Julia A. Doolittle,
The University of North Carolina at Greensboro

The nature and pattern of germination of the conidia of the powdery mildew, *Erysiphe cichoracearum,* has led to an experimental design for testing various growth regulating compounds alone and in combination with host plant extracts for the purpose of elucidating the problem of spore germination and the mechanics of germ tube growth of the reproductive units of an obligate parasite. Mildew conidia were obtained from two host plants, *Helianthus annuus* and *Zinnia elegans.* These plants were maintained in the greenhouse and were treated in such a way as to remove the nonviable conidia, and those that had germinated *in situ.* The conidia were dusted on 1% agar plates which contained coconut milk, colchicine, gibberellic acid, and kinetin separately and in combination with a standard mineral medium and host plant extracts. The plates containing the conidia were exposed to photoperiods of differing lengths, and the experiments were terminated at 24 hour intervals. The results were discussed in terms of germination rates and growth of the germ tubes. A marked difference in response to the growth regulator compounds was noted between conidia isolated from *H. annuus* and *Z. elegans.* These data were related to the problem of host specificity found in *E. cichoracearum.* (Supported by the Research Council, U.N.C.G., through grants 191 and 226.)

The Genetic Basis of Sexuality in Biflagellate Aquatic Fungi

J. Thomas Mullins, *Harvard University*

A unique pattern of sexuality characterizes the heterothallic members of the biflagellate aquatic fungi. These forms are sexually dimorphic, but the potentialities for differentiation as male or as female appear to be labile at the level of the individual. Thus, the sexual potential ranges from strongly male, through various sexual intergrades, to strongly female. The results of an extensive analysis of the progeny of crosses of male x female strains, in the typical heterothallic species, *Dictyuchus,* will be discussed in regard to the underlying genetic basis of sexual ambivalence.

Histochemical Studies on the Notochord of *Rana catesbeiana* Larvae

Bobbye C. Parker and Roy Hunter, Jr.,
Atlanta University

This investigation was designed to provide information about the chemical nature of the notochordal cells and their suspected involvement in collagen formation. Since the inner fibrous lamella of the notochordal sheath has been shown to be collagenous, and since it has been suggested that the notochord secreted this lamella, any other data about the synthetic possibilities of these cells would be a useful contribution. It was observed in tissue stained for phospholipids by the Nile blue sulphate method that the nuclei of the vacuolated and peripheral notochordal cells gave positive indications of their presence. No dye deposits were seen in the fibrous lamella. Tissue subjected to the oil red O method gave indications of neutral fats in the cytoplasm of the notochordal cells but not in the sheath. Lipase activity was detected in the notochordal cells and in the sheath by the "Tween" 80 method.

John Clayton's Moss Collection

Paul M. Patterson, *Hollins College*

Twenty-two of the thirty-two species of Clayton's mosses reported by Gronovius in the second edition of *Flora Virginica* (1762) have been examined and named.

Bioaccumulation of Fallout Radionuclides in *Juniperus virginiana*

J. Dan Pittillo and Gayther L. Plummer,
Department of Botany, University of Georgia

Leaves, twigs, bark, and wood samples of red cedar were collected and assayed from three areas: highland and lowland granitic outcrop communities and woodland or borderland communities. The samples were ashed and analyzed by gamma-ray spectrometry. Generally, fallout radionuclide activity was greatest in leaves, followed by twigs, bark and wood. Also, radioactivity diminished from highland to lowland outcrops and to woodlands. Cerium-praseodymium-144 was present in greatest abundance in external tissues (leaves, twigs, and bark), but cesium-137 was most common throughout all tissues. Manganese-54 was also prevalent in some samples.

It is suggested that higher activity of plants of highland outcrops is a reflection of their habitat. The lack of well developed soils and thus small mineral nutrient pools indicates lack of available nutrients. Frequent rains containing fallout nuclides may be the source of some deficient nutrients. Perhaps many of the nuclides are absorbed through the leaves, for trees having highest Mn-54 concentrations in leaves have highest concentrations in the sapwood. On the other hand, some

absorption may be through roots, for Cs-137 was relatively more concentrated in the sapwood of trees of lowest foliar concentrations.

Notes on the Habits of *Orconectes rusticus rusticus* (Girard) in a Spring Stream in Kentucky

RUDOLPH PRINS, *University of Louisville*

The ecology and life histories of *Orconectes rusticus rusticus* (Girard) and *Cambarus tenebrosus* Hay were investigated in a spring stream, Doe Run, Meade County, Kentucky, from September 1962 through September 1964. Various life-history and ecological aspects of *Orconectes r. rusticus*, which has a limited distribution in Doe Run, will be discussed.

Microscopic Changes in the Macronucleus of *Tetrahymena* During Division

CHARLES RAY, JR., *Emory University*

Although division of *Tetrahymena* macronuclei is not by mitosis, and neither condensed chromosomes nor spindles form, nevertheless microscopic observation reveals some intra-macronuclear structures that go through division-associated cyclical changes. To describe these macronuclear changes, living animals as well as killed and fixed animals have been observed by phase contrast and by fluorescent microscopy along with cytochemical tests for DNA, RNA, and basic protein. At least two kinds of intra-nuclear bodies associated with division stages have been distinguished. One kind appears to be nucleolar material; the other appears to be chromatin. The possibility is considered that each "chromatin" body is an association of one or more diploid chromosome complements in which the uncoiled chromosomes are held together by fusion of their heterochromatic regions. Should this be true, each such association would contain a complete and balanced set of genes. These "chromatin" bodies are distributed so that following nuclear division the two daughter macronuclei have received about equal numbers of the bodies. Some "chromatin" bodies fail to be included in either daughter nucleus; left in the cytoplasm, they gradually disintegrate. (Supported by the National Science Foundation. G-13198.)

The Development of the Ovule and Megagametophyte in *Wisteria sinensis* Sweet

DAVID H. REMBERT, JR., *University of Kentucky*

Eight campylotropous ovules initiate development from primordia on the placental ridge in the ovary of *Wisteria sinensis* Sweet. Either a single or multicellular archesporium may differentiate. In either event, only one megasporocyte is formed. At this stage the integumentary primordia arise from the nucellar mass and the ovules arch toward the stylar region of the ovary. Bisporic megagametogenesis occurs in *Wisteria sinensis* with the two nuclei moving to opposite ends of the embryo sac aided by enlarging and coalescing vacuoles. Subsequent development of an eight-nucleate megagametophyte occurs. Three antipodals organize in the chalazal region but rapidly disintegrate. The synergids, which form in the micropylar region of the embryo sac, undergo dissolution before fertilization leaving only the egg and the fused polar nuclei present at the time of fertilization. The ovule, at maturity, has a micropylar canal which consists of an exostome, a mesostome, and an endostome.

The Chromosome Number of *Pyxidanthera brevifolia* Wells

JOHN D. REYNOLDS, *University of South Carolina*

Baldwin (1939) described the somatic karyotype of certain members of the Diapensiaceae as 2 N=12, except in *Galax aphylla* L. (2 N=12; 2 N=24). Although *Pyxidanthera brevifolia* Wells was mentioned, no karyotype was reported. In the present work, the chromosome number, N=6, has been determined from the pollen mother cell. Young flower buds were fixed in Carnoy's fluid, and the acetocarmine squash technique (Darlington and LaCour, 1950) was used in determining the count. A typical meiotic I prophase was noted. Synchronization was lacking during late meiosis I and II. In diakinesis one bivalent was consistently associated with the nucleolus. Perhaps because of the short duration of anaphase I, this stage was not clearly evident. Microspore tetrad arrangement was isobilateral; however, prior to wall formation a decussate arrangement of microspore nuclei was sometimes noted. Many irregularities, such as lagging chromosomes in meiosis I and II, deletions (possibly B-chromosomes), and ring formation, were observed.

Taxonomic Studies of *Astroloba* by Paper Chromatography

HERBERT P. RILEY, *University of Kentucky*

Small pieces of leaves were smeared on to Whatman No. 1 filter paper and descending chromatograms were prepared with butanol-acetic acid as the solvent system. The patterns were examined under ultra-violet light, the spots were outlined, their colors were recorded, and R_f values were calculated. The species studied were *A. aspera, A. congesta, A. dodsoniana, A. foliolosa, A. herrei, A. pentagona, A. skinneri,* and *A. spiralis.* No two species had exactly the same patterns but many had one or more spots in common. This method seems promising as a taxonomic aid.

Cleavage and Biosynthesis in Enucleate and Nucleate Halves of *Arbacia* Ova

ROBERT A. RINALDI, *University of Tennessee and Duke University Marine Laboratory*

Arbacia ova were centrifuged into halves by the techniques of E. B. Harvey. Both halves are stimulated to cleave with hypertonic sea water. Tritiated thymidine, tritiated uridine, and tritiated leucine were applied in separate experiments to determine the pattern of synthesis of the cleaving nucleate and enucleate halves from ½ hour to 12 hours following parthenogenetic stimulation. Autoradiographs of the tritiated uridine and tritiated leucine have revealed that the "tracks" correspond to endoplasmic reticulum patterns as described in the other abstract for this meeting. There appears to be no difference in uridine incorporation in nucleate and enucleate halves, and this may indicate that this is an exchange rather than new biosynthesis. Other patterns and significance of synthesis in nucleate and enucleate halves will be discussed. (Supported by contract # AT-40-1-3149 from The United States Atomic Energy Commission.)

Endoplasmic Reticulum, Its Form and Behavior *in vivo* of *Arbacia punctulata* ova

ROBERT A. RINALDI, *University of Tennessee and Duke University Marine Laboratory*

Light microscopic investigations of sea urchin ova have revealed a cytoplasmic network which is similar in its

morphology to electron microscope studies of the endoplasmic reticulum (ER). One can observe from ciné films that the ER is dynamic and labile undergoing frequent breakdowns and reformations, vibratory movements, and other visible activities. In one example of movement the ER was found to be correlated with cleavage movements of the ova as the ER was observed to go towards the poles during anaphase. In addition, following centrifugation the ER appeared not to be displaced or disrupted. Upon centrifuging the ova into halves, the ER permeated without any deviations through all compacted phases of layered particulates in the red half, and the ER went through the hyaline zone and the oil cap in the white half. (Supported by Contract # AT-40-1-3149 from the A.E.C.)

Origin of Lateral Roots

James L. Riopel, *University of Virginia*

In angiosperms lateral roots commonly are initiated in the pericycle of the parent root. In the present studies with banana roots it may be shown that although all cells in pericycle are capable of meristematic activity, the formation of lateral root primordia is confined to regular positions opposite the protoxylem poles. Statistical studies which included measurements of nearest neighbor distances for lateral roots indicate that their distribution is in a non-random, dispersed pattern. Thus, in every instance, the mean nearest lateral distance exceeded the expected mean nearest lateral distance based on a random distribution of laterals. In addition, results are reported which show that successive laterals are normally formed at angles greater than 30° from the previously established one. Although values for dispersion are slight, it is concluded that sites for the origin of acropetally formed laterals are influenced by the position of the previously formed laterals.

Relation of Cell Size to Cell Density in the Melanocyte System of the Mouse

David T. Rovee, *Brown University*

Melanocytes generally appear at the dermo-epidermal junction of at least part of the tail-skin of pigmented mice. The purpose of this investigation is to determine whether or not there is a correlation between melanocyte population density and melanocyte morphology. To ensure maximum pigmentation of a given area, tail-skin of mice of the DS strain maintained at Brown University was UV-irradiated for two minutes on each of 16 consecutive days. One day after the last exposure the skin was split, and epidermal counts of melanocytes per mm^2 along with measurements of melanocyte diameters were then made. An inverse proportion of cell size to population density was found. Mobilization of melanin granules within the dendrites accounted for the variation in the observed melanocyte size. A discussion of the significance of these findings will be presented. (Supported in part by U.S.P.H.S. Grant CA-06097-04 from the National Cancer Institute.)

Some Aspects of the Life-history of *Fundulus stellifer* (Jordan)

James D. Satterfield, *Georgia State College*

Field observations on habitat, daily movements, feeding, and interactions with other species have been made on *Fundulus* of streams in Georgia and Alabama since July, 1964. The fish are found in shallow water with little current and at temperatures often in excess of 80°F. Movements are quite restricted; they may remain in an area of less than 20 square feet for hours, and less than 200 square feet for days. Adults and young usually feed from the bottom over a silt/sand substrate. Frequently small cyprinids feed in the same area. Age, length, and weight relationships have been determined. The oldest fish collected was in its fifth year. Specimens collected in late August ranged from 13 mm. to 100 mm. in standard length. A growth curve for weight *vs.* length was calculated.

Enzymes and Toxins of *Pellicularia filamentosa*

Asa C. Sims, Jr., *Southern University*

A selected number of mass and single spore isolates of *Pellicularia filamentosa* were screened for differences in the amounts and kinds of pectic and cellulolytic enzymes, as well as for toxin concentration, following their 14-day culture in a mineral medium. Culture filtrates were assayed for pectic methyl esterase (PME), polygalacturonase (PG), depolymerase (DP), cellulase (Cx) and for the concentration of the toxic metabolites. Mass isolates varied in their capacity for enzyme and toxin formation as did single spore isolates. When a comparison of enzyme formation and toxin concentration was made between mass and single spore isolates, it was found that a greater variety of pectic enzymes was present in filtrates of mass isolates, whereas among single spore isolates, only one and sometimes two enzymes appeared, with some exceptions. There were no differences in the range of toxin concentrations among mass and single spore isolates. Evidence is presented that there is no positive correlation between enzyme formation and toxin concentration between and among both single spore and mass isolates of *Pellicularia filamentosa*.

Oxygen Concentration as a Cue for Reduction in the Rate of Metabolism in the Old Field Mouse, *Peromyscus polionotus*

Michael H. Smith, *University of Florida*

At oxygen concentrations of 10% to 18%, *Peromyscus polionotus* reduces its metabolic rate to about 45% of the expected value for an animal of this size. Usually the metabolic rate increases above 45% of the expected value and then decreases as the oxygen concentration goes from 10% to 1%. Carbon dioxide concentration does not seem to affect the metabolic rate of *P. polionotus* at these oxygen concentrations. *Peromyscus leucopus* shows a continuous decline in its metabolic rate as the oxygen concentration goes down to the lethal point (about 4% for *P. leucopus* and below 2% for *P. polionotus*).

The air in the nest cavities of occupied burrows of *P. polionotus* varied from 15.2% to 20.6% oxygen. *Peromyscus polionotus* may use low oxygen concentration as a cue for dropping its metabolic rate to conserve energy during the day. The energy consumption of this primary consumer is probably much lower than previous studies indicated.

Physical and Chemical Studies on Univalent and Multivalent Fertilizin

Samuel Stern, *University of Miami*

Fertilizin from *Lytechinus variegatus* was obtained by acidification of a sea water egg suspension and subsequent precipitation with 5/4 volume 95% ethanol. Univalent fertilizin was prepared by 1.5% hydrogen peroxide treatment. Viscosity measurements indicate that the formation of univalent fertilizin is due to an extensive depolymerization of the native (multivalent) form. Ouchterlony immunodiffusion produces two precipitin bands with native material. One of these is shared with the univalent material. Preliminary studies indicate that the fucose and amino acid moieties of the

univalent fertilizin are identical with the native material. Model E ultracentrifugation patterns reveal only one component in each of the two materials. The s value of the univalent is roughly 60% of that of the multivalent. Electrophoresis on cellulose acetate strips indicates that the univalent material is composed of at least three fractions, at least two of which are absorbed by homologous sperm. Some univalent fertilizin is present in the native material.

The Efficiency of Growth of *Chlorohydra viridissima*

ALAN E. STIVEN, *University of North Carolina*

The gross efficiency of growth, defined as the percentage of energy consumed as food that is converted into new protoplasm, was determined for normal *Chlorohydra* and *Chlorohydra* deprived of their symbiotic algae. In terms of the numbers of artemia eaten and buds produced, normal Chlorohydras were significantly less dependent on food intake for growth than albinos. The ratio of numbers of Artemia eaten per bud produced was the same for normals and albinos in both light and darkness when food was offered once a day. When food was available once every two days, both forms required fewer Artemia per bud in light than in darkness. However, when intake and production were measured in energy units, the growth efficiency of normals was 40 to 60 percent greater than that of albinos under a frequent and infrequent feeding schedule respectively. Light also significantly increased the growth efficiency of normals. The differences in growth efficiencies between normal and albino hydras are considered to be measurements of the quantitative contribution of the symbiotic algae to the growth process in *Chlorohydra*, and to be of relevance to the high level of resistance of this hydra species to attack by the parasitic *Hydramoeba*.

The Effect of Low Oxygen Tensions on Chromosome Aberrations in *Tradescantia*

PRISCILLA L. STRICKLAND, *Emory University*

The effect of low oxygen tensions on X-ray-induced chromosomal aberrations was examined in the microspores of *Tradescantia paludosa*. Inflorescences were given a total dose of 400 r in 6 different percentages of oxygen: 0.25, 0.5, 1.0, 1.25, 1.5, and 2.0%. It was found that oxygen tensions less than 1.5% reduced the aberration frequency below that of the controls. In 1.5% and 2.0% oxygen the aberration count showed an increase over the control group. Since it is believed that any amount of oxygen present during irradiation will increase the damage, these results are inconsistent with the prevailing theory. This apparent incongruity is resolved by the dual role played by oxygen. While the presence of oxygen during irradiation does increase damage, its presence after treatment facilitates recovery. In this case the amount of recovery taking place exceeds the additional damage produced by low oxygen tensions.

Effect of Deciduomata on the Life Span of the Corpora Lutea of Pseudopregnancy in the Hamster

GEORGE W. TATE, JR. AND GEORGE C. KENT, JR., *Louisiana State University*

The average duration of hyperemia in intraocular autotransplants of corpora lutea of pseudopregnancy was 148 ± 1.6 hours (mean $\pm$ SE). The transplants remained pink an additional $8 \pm .54$ hours. In females subjected to unilateral uterine trauma the average duration of hyperemia was 165 ± 3.5 hours, and the transplants remained pink an additional 21.4 ± 3.5 hours ($p = <.001$). The difference in the duration of hyperemia was significant, but the duration of pseudopregnancy in the traumatized group was similar to that of the controls. That a decidual cell response cannot prolong pseudopregnancy has been previously demonstrated in our laboratories. The present work demonstrates that the presence of a decidual response can delay the onset of ischemia of the corpus luteum of pseudopregnancy, but that the delay is insufficient to affect the duration pseudopregnancy.

Environmental Factors Related to the Distribution of Freshwater Bryozoans in the Vicinity of Highlands, North Carolina

WILTON R. TENNEY AND WILLIAM S. WOOLCOTT, *University of Richmond*

Bryozoans were collected from 35 of 103 sites within a 25-mile radius of Highlands, North Carolina. The collections were made from July 22 to September 3, 1964 in montane and piedmont headwater streams of the Tennessee, Savannah and Saluda river systems. The species represented were *Plumatella repens* (Linnaeus), *Plumatella emarginata* Allman, *Fredericella sultana* (Blumenbach) and *Hyalinella punctata* (Hancock). The organisms were most abundant below impoundments where the plankton content was high and the water currents slow. They were attached almost exclusively to the undersides of dark-colored gneissic rocks but occasionally were present on other dark objects. Other physical and chemical factors did not vary enough to be considered limiting.

Population Fluctuations of *Peromyscus maniculatus* and Other Small Mammals as Revealed by the North American Census of Small Mammals

C. RICHARD TERMAN, *College of William and Mary*

Data collected in the "North American Census of Small Mammals" were analyzed to reveal evidence for fluctuations in local populations of several species of small mammals through successive years of trapping. *Peromyscus maniculatus* and *Blarina brevicauda* populations exhibited markedly smaller average ranges of population fluctuations than was true of *Microtus montanus*, *Microtus californicus*, *Microtus pennsylvanicus* and *Reithrodontomys megalotis*. These ranges in fluctuations between maximum and minimum population levels were evaluated according to the average number of years required for the change to take place. This evaluation was referred to as the Fluctuation Index (F.I.) and reflected the potential for a species to fluctuate in a short period of time. *Blarina brevicauda* (9.6) and *Peromyscus maniculatus* (10.6) exhibited the two lowest F.I. values while *Microtus montanus* and *Microtus californicus* exhibited the two highest (54.9 and 80 respectively). The data presented support the hypothesis that *Peromyscus maniculatus* and *Blarina brevicauda* may be more sensitive to factors controlling population growth and their growth is limited within a narrower numerical range of variability than is true for more widely fluctuating forms.

Effects of Acriflavine on Repair Mechanisms in *Neurospora crassa*

CLAUDE E. TERRY AND H. BRANCH HOWE, JR., *University of Georgia*

Treatment of *Neurospora crassa* conidia with light of long wavelengths following ultraviolet irradiation partially reverses (photoreactivates) lethal ultraviolet effects. Acriflavine, however, prevents photoreactivation

if added to ultraviolet-irradiated conidia prior to administering long wave light. This acriflavine effect does not appear to result from photosensitization by the dye, since unirradiated controls show no effects from the treatment used. If acriflavine is added to ultraviolet-irradiated conidia following treatment with long wave light, on the contrary, photoreactivation of lethal ultraviolet damage is not prevented, in agreement with the findings in *E. coli* by other workers. Addition of acriflavine to conidia prior to ultraviolet irradiation and long wave light treatment approximately halves ultraviolet killing.

Bionics: A Challenge to Biologists

J. Richard Thomson, *Midwest Research Institute, Kansas City, Missouri*

In recent years, biologists have been offered a formidable challenge. This challenge blends the talents and backgrounds of the biologist and the electronics engineer into the new interdisciplinary science called bionics. Briefly, bionics is man's attempt to duplicate or mimic certain desirable characteristics of the animal world with instruments and sensitive detecting devices, in order that he may better control his environment and his enemies.

The bionicist is concerned with such problems as building a more accurate vibrating gyroscope by using information obtained through the study of the vibratory mechanism (rods) behind the wings of certain insects; developing a more sensitive infrared detecting device by studying the physiological mechanisms of the facial pits of the pit vipers; developing an instrument that will discriminate particular odors (in aerial suspension at the molecular level) as detected by the olfactory cells of the bloodhound; or designing an echo-ranging mechanism as sensitive and immune to enemy jamming as is manifested by the bat and dolphin. Never before have biologists been challenged with such fundamental biological problems — problems which require a totally different orientation for their research. Some of these interesting problems and the avenues of their approach will be discussed.

The Ecology and Life History of *Latrodectus bishopi*

Sue Tisdale and Howard M. Field, *Florida Southern College*

The Red Widow spider, *Latrodectus bishopi*, is endemic to Florida scrub-oak: saw palmetto white sand ridges. Habitat observations and life history studies including mating behavior are illustrated and discussed. Comparisons with the common Black Widow, *Latrodectus mactans*, are made.

The Enigma of Tuberculin Reactivity

H. M. and M. R. Vandiviere, *North Carolina Sanatorium System*

Formerly, it was reasonable to interpret positive tuberculin reaction as an indication of active tuberculosis. This is not the case today. Testing is done with not one but several tuberculins from various sources. We identify reactions and cross-reactions. The tuberculin test has become progressively more a tool for epidemiologists and statisticians than a diagnostic test. Clinically, this does not destroy its usefulness. There is still value in detection of suspects as active cases of tuberculosis.

Despite the removal of emphasis on the clinical value of the test, we find experimentally in animals that, regardless of the source of tuberculin sensitivity, superinfection with a human strain of tubercle bacilli can be detected with human tuberculin. In experimental animals and human testing the results have been intriguing. It is desired that this presentation will clarify some of the interpretations and misinterpretations relating to the tuberculin test.

Effects of Nitrate on Growth and Chlorophyll Production of a Marine Diatom, *Cyclotella caspia* Grun.

Margaret J. Waldrep, *University of South Alabama*

The effects of enriching sea water with varying concentrations of nitrogen on the growth and chlorophyll production of a marine, centric diatom, *Cyclotella caspia* Grun., were determined. Nitrate was supplied from 20 to 800 mM. Optimum growth occurred at 200 mM; therefore at 0, 20, and 100 mM the amount of nitrogen present appeared to be the limiting factor. Additions of 800 mM inhibited growth. In addition to nitrate, uric acid and allantoin were supplied as nitrogen sources, but only nitrate was an adequate source of nitrogen for this diatom.

The amount of added nitrate supplied had a definite and direct relationship to the chlorophyll content of the cell. The amount of chlorophyll *a* per cell was lowest when cells were grown without added nitrate, and lower at 20 mM than at higher levels.

Lichen Acids of *Cornicularia*

Alma Toevs Walker, *University of Georgia*

In the arctic-alpine genus of *Cornicularia* of five species four, *C. aculeata, C. californica, C. divergens*, and *C. normoerica*, are North American; the fifth, *C. odontella*, is exotic. Their habit is fruticose, heavily pigmented dark brown to black. They respond weakly or negatively to chemical tests used by lichen taxonomists. Crystal-formation and paper chromatography of acetone extracts demonstrate proto-lichesterinic acid in *C. aculeata* and olivetoric acid in *C. divergens* in herbarium specimens (University of Wisconsin). Compounds of the other American species were not similarly detected in the material available. Bulk collections of these four species were made last summer in Oregon and in Colorado. Petroleum ether-, ethyl ether-, and ethyl acetate-soluble fractions of benzene and acetone extracts reveal compounds with distinctive crystal-forming and chromatographic properties for which no prior identification has been found to date. Descriptions of these compounds and their sources will be given.

Study of a Soft-bottom Community in the Lower York River, Virginia

Marvin L. Wass, *Virginia Institute of Marine Science*

A mesohaline site, depth 26 ft., was sampled with a Petersen grab from Nov. 3, 1963, to July 10, 1964. Samples were first screened to 1.0 mm, later to 0.5 mm. The 157 species taken were dominated by polychaetes (36%), crustaceans (26%) and molluscs (21%). Only about 50 of these were believed to belong to the community. Eight species were found to be characteristic members as determined by use of the 1.0 mm screen. For the nine dates when ¼ of a m^2 was sampled and contents of 2.0, 1.0 and 0.5 mm screens were separated, the means of numbers, in order, for each screen were 246, 278 and 431, and for species 21, 29 and 35. Species that occurred on at least 50% of the dates, when animals were analyzed separately by screen size, were numbered in the above order, 15, 20 and 24. Seasonal fluctuation occurred in all common animals. *Mulinia lateralis*, a pelecypod, exhibited population explosion and rapid die-off. Use of a screen less than 1.0 mm was

unnecessary to determine characteristic members of the community.

Effect of Isolation on the Metabolism of Brain Norepinephrine

ANNEMARIE S. WELCH, *College of William and Mary*

Mice kept under different conditions of social stimulation for one week have significantly different ($p=.001$) levels of brain norepinephrine. Isolated animals are more excitable than animals which have been grouped, and they have higher levels of brain norepinephrine. A possible relationship of brain noradrenaline to the hyper-excitability and aggressiveness induced in isolated mice, and the relative sensitivity of neurohumoral receptor sites in isolated and grouped animals, are discussed.

Seral Development of the *Thalassia* Community on Solid Substrate in the Caribbean

BRUCE L. WELCH, *College of William and Mary*

The first significant initial colonizers on solid substrate are filamentous-like algae which have a considerable ability to trap fine sediment. *Jania capillacea* is the most consistent of these on all exposures. It is commonly accompanied by *Gelidium*, *Digenia* and *Spachelaria* on exposed surfaces; by *Digenia*, *Spachelaria*, and *Polysiphonia* on moderately exposed surfaces; and by *Polysiphonia*, *Boodleopsis* and *Lophosiphonia* on more protected surfaces.

Mat-forming calcareous algae, most frequently *Halimeda opuntia*, and, less often, *Amphiroa fragilissima*, commonly succeed the sediment-trapping algae. *Thalassia testudinium* becomes established over these as the terminal submerged dominant. It, in turn, may be replaced by mangrove.

Seral Development of the *Thalassia* Community on Sediment in the Caribbean

BRUCE L. WELCH, *College of William and Mary*

Initial colonization on sediment is largely determined by substrate stability. On shifting substrate *Diplanthera wrightii* is the most common colonizer. On moderately stable substrate either *Diplanthera*, algae of the *Halimeda incrassata* complex or *Cymodocea manatorum* may be initial colonizers. On stable substrate any of the above or *Thalassia testudinum*, itself, may colonize. Successional dominance goes from Halimeda, to Diplanthera, to Cymodocea, to *Thalassia*. *Thalassia*, the terminal marine dominant, tends to be succeeded by mangrove.

The Red Squirrel, *Tamiasciurus hudsonicus abieticola* (A. H. Howell), in Georgia

C. H. WHARTON, *Georgia State College*

Five skins and numerous reliable sight and kill records indicate that the red squirrel is apparently confined to the mountainous northeastern Georgia counties of Rabun, Towns, Union, Habersham, and White. It is recorded as far south as Yonah Reservoir and Pigeon Creek (Habersham County, 34 degrees 41 minutes N. Latitude), and as far west as the Union County line at Jack's Gap. The lowest recorded altitude is 255 meters. This squirrel is not uncommon on the Blue Ridge between the Rabun Bald and Dick's Gap and on the headwaters of the Tallulah River. It occurs in an oak-hickory forest and is reported feeding on a variety of fruits and nuts. A possible nest cavity has been observed at Clayton, and the squirrel is often seen feeding in dense stands of Virginia pine within the city limits. Logging of the original hemlock in northern Georgia is thought to have drastically reduced the abundance of the boomer whose predilection for boreal conifers has been well documented. A possible trend of adaptation to more southern conifers for food is suggested.

Studies in the Ecology of Some Species of Fresh-water Algae

L. A. WHITFORD AND G. J. SCHUMACHER, *N. C. State, University of North Carolina*

An apparatus for the laboratory study of respiration rate and of the uptake of radioactive phosphorus, and also for an artificial stream for the comparison of the effects of light, temperature and current speed is described. Data are presented on rates of respiration and of phosphorus uptake for species of algae in the Chlorophyceae, Rhodophyceae, Xanthophyceae and Bacillariophyceae; and on the limiting effect of light, temperature and current for certain species.

Lotic species have higher metabolic rates than closely related lenitic species as indicated by higher rates of respiration and of phosphorus uptake in a current as compared to still water. Some species require low light for survival and growth, others low light and temperature. Still others require high light and medium to low temperatures, and some high light and temperature. In the field, responses to light and temperature may be confused. Species which have a marked response to one of these factors are named.

Complexity of the *R* Region in *Mormoniella*

P. W. WHITING, *Biology Division, Oak Ridge National Laboratory*

The reputed complexity of the *R* region may be due to the high mutation frequency of the complementary alleles, scarlet and oyster-white eyes. By mating X-rayed wild-type (+.+) to peach scarlet (pe.st), eye-color mutants can be identified in F_1 females. After exposures (1,000-5,000 r), 242 of these were found among 14,661 gametes tested, 1.65%. Of the 183 eye color mutants successfully tested, 179 were scarlet or oyster. Among the 242 total *R*-locus mutant genes, tested and untested, there were six new eye colors and about 136 associated deleterious factors. It has been suggested that proximity of factors *O* (oyster) and *S* (scarlet), between which no recombinations have been found, is essential for aiding interaction of their products. High metabolic activity may be causally related to high mutation rate. A similar situation appears to obtain in the wasp *Pachycrepoideus*, in which scarlet and oyster are complementary alleles. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

The Mechanism of Seed Dormancy in the Alpine Rush, *Luzula spicata*

EDWIN L. WILES, *Southern Pilgrim College*
RALPH D. AMEN, *Wake Forest College*

Germination studies were conducted on the dormant seeds of the alpine rush, *Luzula spicata*. The negation of the dormancy was accomplished by scarification of the micropylar end, indicating a dormancy due to a condition of the seed coat. Tests revealed no seed sensitivity to red, far-red, or white light. The presence of germination inhibitors was suggested by the inhibition of germination in another alpine species with *Luzula* seed homogenates. Although no water impermeability was indicated, a greater oxygen uptake by the micropylar scarified seeds suggested a partial permeability of the seed coat to oxygen. The sequence of events eliciting germination appear to be: 1) removal of the micropylar tip, relieving any restraint on the embryo, allowing increased supply of oxygen to enter, and the possible removal of an inhibitor; 2) entry of free oxygen, stimulating germination by oxidation of an inhibitor or by utilization in the embryo's metabolism. Or the inhibitor might be rendered ineffective by being leached away after the seed coat (presumably impermeable to the inhibitor) is removed.

Long Term Effects of Acute Low-Level X-Rays on Laboratory Populations of *Aedes aegypti*

WILLIAM K. WILLARD, *University of Tennessee*

Effects of acute low-level X-rays on major life history stages (eggs, larvae, pupae and adults) of yellow fever mosquito populations were determined through three generations. Population egg production, average number of eggs produced per female, egg viability, mean longevity and the rate of larval and pupal development were parameters utilized in evaluating effects of X-rays on the populations. Effects were most strongly exerted in the first generation and subsided with each succeeding generation until, in the third generation, effects were not significantly different from the controls. In order of sensitivity, with respect to reproduction, pupal populations were most resistant followed by larval or egg populations with adults being the least resistant. In the first generation the lower doses utilized (100r-400r) resulted in small increases in population egg production and in mean longevity, while with larger doses (800r and above), a decrease occurred. Effects on the viability of eggs produced by irradiated populations was in a nearly linear relation while the viability of eggs stored to perpetuate the following generation was higher in the treated groups than in the controls in most of the doses utilized.

The Interrelationship Between Phytoplankton and Zooplankton in Inshore Waters Near Beaufort, North Carolina

RICHARD B. WILLIAMS, *U. S. Bur. Comm. Fisheries, Beaufort, N. C.*

A yearlong study was made of plankton in Core Sound and adjoining embayments, an area of 400 km^2 with a mean depth of only 1.2 m. Average values for phytoplankton production and zooplankton standing crop were obtained at 5-week intervals for the entire area. Net production of phytoplankton ranged from 41 to 310 mg $C/m^2/day$ and had a pronounced seasonal cycle paralleling that of water temperature. The zooplankton (exclusive of ctenophores and large medusae) was chiefly copepods and fluctuated irregularly between 0.022 and 0.258 ml/m^2. The organic carbon needed to support this zooplankton was estimated to comprise from less than 0.1% to 1% of the daily net production. These data suggest that in the area studied, the supply of phytoplankton never limited the production of zooplankton, and that the grazing of zooplankton never controlled the abundance of phytoplankton.

The Carbohydrate Composition of the Fat Body of *Phormia regina* (Meigen) During Larval Development

LARRY T. WIMER, *University of South Carolina*

Fat bodies were obtained from larvae at different stages of third instar development. The fat body dry weight increased from 0.64 mg in the early third instar to 5.21 mg in the prepupa. Carbohydrates were extracted with 10% trichloroacetic acid at 0°C. The TCA was removed with diethyl ether and glycogen was precipitated with 70% ethanol. Purification of the supernatant containing the non-glycogen carbohydrate was accomplished by the use of ion exchange resins. The amount of glycogen and total non-glycogen carbohydrate was determined by the anthrone method. The fat body was found to contain 57 μg of glycogen in the early instar and 491 μg in the prepupa. During the same period, non-glycogen carbohydrate increased from 4 μg to 39 μg. The carbohydrates were separated by thin layer chromatography and detected with anisaldehyde and anthrone sprays. Trehalose and glucose were the only sugars detected and trehalose predominated. These results show that the fat body accumulates 434 μg of glycogen in about 3.5 days. Much of this glycogen is undoubtedly utilized during metamorphosis.

Time of Oviposition and Hatching in the Planktonic Sergestid Shrimp, *Lucifer faxoni*

ROBERT A. WOODMANSEE,
Virginia Institute of Marine Science

Two 24-hour series of collections of the sergestid shrimp, *Lucifer faxoni* were made in the northern Gulf of Mexico with Clarke Bumpus Plankton Samplers. The size and structure of the eggs permit one to separate the mature females into the following five categories: those with no eggs or with immature eggs in the ovary, those with partly mature eggs in the ovary, those with mature eggs in the ovary, those with undeveloped eggs attached to the periopods and those with eggs in the naupliar stage. By comparing the occurrence in time of these five categories as well as the occurrence of attached spermatophores one may ascertain with varying degrees of certainty, (1) when the ova first begin to mature in the ovary, (2) when the eggs are fully matured, (3) when oviposition occurs, (4) when naupliar hatching occurs and (5) when copulation occurs. The depths at which these processes occur may also be determined.

(*Continued from page 34*)

Treasurer's Report January 1, 1964-December 31, 1964

SAVINGS ACCOUNT			
Balance December 31, 1964:			
Regular Savings Acct. #90 856 6		$1,216.06	
Contingency Savings Acct. #91 375 6:			
Goethe Travel Fund	$ 395.50		
Other Contingency Savings	1,198.42		
		1,593.92	
			$2,809.98
CHECKING ACCOUNT			
Balance on hand January 1, 1964		$ 232.09	
Receipts:			
Dues and subscriptions	$2,927.00		
Exhibit fees	550.00		
Registration fees	388.70		
Carolina Biological Supply Co.	100.00		
Will Scientific, Inc.	100.00		
Sale of reprints and bulletins	186.75		
C. M. Goethe	400.00		
		4,652.45	
			$4,884.54
Expenditures:			
General:			
Secretary's expense	$ 28.35		
Goethe Travel Awards	511.75		
Meritorious Teaching Award (R. S. Freer)	100.00		
Research Award (A. V. and J. W. Beatty)	100.00		
Annual meeting expenses (April 1964)	246.27		
Treasurer's expense (incl. clerical assistance)	207.33		
Transfer from Checking Account to Contingency Savings Acct. #91 375 6	800.00		
		$1,993.70	
Bulletin:			
Printing, addressing, mailing Jan., April, July, Oct. 1964 issues	$1,768.54		
Other printing costs — reprints, announcements	335.30		
Travel—Editor—to annual meeting and Executive Council meeting	200.00		
Clerical assistance	50.00		
Halftones and plates	321.88		
Misc. — envelopes, labels, etc.	161.30		
		$2,837.02	
			$4,830.72
Balance as of December 31, 1964			$ 53.82
Goethe Travel Funds in Contingency Savings Acct. #91 375 6			$ 375.00
Balance in Goethe Travel Fund after 1964 awards			20.50
Total on hand			$ 395.50

On February 5, 1965, the financial records and statements of the Treasurer were examined and found to be complete and correct for the period January 1, 1964-December 31, 1964. Since this marks the end of his term of office, the Treasurer, Dr. Leland Shanor, deserves an expression of appreciation and commendation for a job well done. — Ralph W. Yerger, *Chairman,* Grace C. Madsen, and Anne L. Pates.

Nominees for 1965 Elections

The following slate of nominees is submitted by the Nominating Committee for consideration at the 1965 meeting:

PRESIDENT

Elsie Quarterman
Leland Shanor

TREASURER

John Carpenter
Harry Wheeler

VICE PRESIDENT

B. Theodore Cole
Perry Holt

EXECUTIVE COMMITTEE

Julian T. Darlington
William W. Norris
Robert B. Short
Howard J. Teas

Alvin V. Beatty, George C. Kent, Jr., and E. Ruffin Jones, Chairman, Nominating Committee.

Books and Periodicals

The final portions of the "Flora of West Virginia," by P. D. Strausbaugh and Earl L. Core, of West Virginia University, have just appeared. The final part contains a comprehensive index to the entire work of more than 1,000 pages.

The work includes all species of vascular plants known to occur in a wild or naturalized state in West Virginia, and represents the results of field, herbarium, and library studies of the authors' extending over a period of more than forty years. In these studies, every county in the State has been explored in detail. Descriptions and illustrations of more than 2,000 species are given, including ecological and geographical data, plus other information, especially that of local interest. There is also a comprehensive bibliographic treatment, with hundreds of references to pertinent literature particularly that dealing with species that have their type localities within the present boundaries of West Virginia, and species that are rare or for other reasons are of unusual interest in the state.

There are diagnostic keys for genera and species, and these supplement the descriptive matter itself. The keys and descriptions often omit features that can be better presented in the line drawings. The sketches, numbering over 2,000 in all, and mostly the work of William A. Lunk, are placed as close to the descriptions as possible, usually on the page opposite the description or on the page preceding.

The work has been published in parts, the first part (Ptridophyta to Orchidaceae, pages 1-274) appearing in 1952, the second part (Saururaceae to Leguminosae, pages 275-570) in 1953, the third part (Linaceae to Plantaginaceae, pages 571-860) in 1958, and the fourth part (Rubiaceae to Compositae, pages 861-1075) in 1964. An appendix at the end of the final part includes a large number of supplementary notes and these are listed in the index along with the treatments in the main body of the work.

In addition, an Introductory Section, published as a separate 31-page pamphlet in 1964, treats the General Features of the vegetation of West Virginia and provides a key to the families.

The parts were published as bulletins by West Virginia University and may be purchased from the University Bookstore.

Books received recently

The following books have been recently received by the ASB. Should any member of the ASB wish to review one of these books in return for the review copy, please write to *Mrs. Betty Ursomarso, Assistant Editor, Academy of Natural Sciences, 19th & The Parkway, Philadelphia 3, Penna.*

DOVER PUBLICATIONS
180 Varick St., New York 14, N. Y.

Maier, N. R. F. and T. C. Schneirla. 1964. *Principles of Animal Psychology.* (paper). A Dover reprint of the book originally published in 1935. 683 pp. $3.00.

Ribbands, C. R. 1964. *The Behaviour and Social Life of Honeybees.* (Paper) A Dover reprint of the book originally published in 1953. 352 pp. $2.00.

Saunders, A. A. 1964. *An Introduction to Bird Life for Bird Watchers.* (Paper). A Dover reprint of the book originally published in 1954. 256 pp. $1.00.

JOHN WILEY & SONS, INC.
605 3rd Ave., New York 16, N. Y.

Good, Ronald. 1964. *The Geography of the Flowering Plants* (3rd Ed.). 518 pp. $13.00.

PRENTICE-HALL, INC.
Englewood Cliffs, N. J.

Hadon, N. (ed.). 1964. *Selected Papers on Virology.* 363 pp. $7.50.

Hartman, P. E. and S. R. Suskind. 1965. Gene Action. (Foundations of Modern Genetics Series.) 158 pp. $2.95, paper; $4.95, cloth.

THE BACTERIAL CELL WALL. Milton R. J. Salton. American Elsevier Publishing Co., New York. June, 1964. 293 pp. $14.50.

Material presented in this book is based entirely on results of work performed since 1950 when the first attempts to obtain direct information about the chemical composition of bacterial cell walls were made in several laboratories. The eight chapters of this book dealing with bacterial cell walls touch on their anatomy; isolation; electron microscopy; physical and chemical properties and composition; biochemistry; as well as on the structure and occurrence of cell-wall glycosaminopeptides, and teichoic acids; and on cell-wall antigens and bacteriophage receptors. A glance at the references occurring at the end of each chapter, totalling approximately 900, show the important interest and contributions of the author to each phase of the work, as well as the rather tremendous number of contributions to this new field over the span of a very few years.

Study of the microbial cell has played an important part in recent cellular biology in general, and especially in the securing of present information about ways of RNA, DNA and protein biosynthesis. It is probable that "many of the properties mapped in detail with bacteria are — common to all types of living organisms." On the other hand it is now known that compounds such as muramic acid, diaminopimelic acid and teichoic acid are "unique" to the bacterial cell wall and "can

now be used in defining our concepts of bacterial cells and certain closely related groups of organisms such as the blue-green algae and rickettsias."

The volume summarizes a tremendous amount of work. It is basic work, much of it with wide implications and value for all cell biologists. The compact volume is most attractive and usable, the paper and figures are excellent and the 67 Tables are collected and arranged on 50 pages following the text.

The author points out that much less is now known about bacterial cell membranes, and of cell membranes in general, than about cell-walls. His suggestion of advantages to cell biology in proceeding from a position of knowledge concerning structure of cell walls *and* cell membranes seems prophetic of the direction of future emphasis in this field. — Walter S. Flory, Wake Forest College.

MOLECULAR BIOLOGY: GENES AND THE CHEMICAL CONTROL OF LIVING CELLS. J. M. Barry. 1964. 139 pp. Concepts of Modern Biology Series. Prentice-Hall.

The purpose of this book, according to the preface, is to introduce, in a simple way, discoveries in molecular biology which show precisely how inherited differences are founded on differences in the structure of chemical molecules.

This purpose is largely realized by the book. The non-chemist and the individual whose formal exposure to chemistry is somewhat dated or scanty will be able to follow this logical and lucid presentation. The reader is not overwhelmed by formulae and cant. The format stimulates and holds interest.

Chapter one deals with the experiments that led to the discovery of the structure of proteins and of ribose and deoxyribose nucleic acids. Chapter two contains, in addition to a digression on vitalism, an account of the parts of the cell as revealed by the electron microscope, the location of the nucleic acids in the different parts of the cell, and the techniques used to isolate and study these structures. Chapter three deals with Mendel's theory of inheritance and is somewhat unnecessary, since the person who reads this book should already have at least this simple knowledge; and chapter four contains enough pertinent information to develop the concept. Chapters four, five, and six dealing, respectively, with the molecular structure of genes, the replication of genes, and the action of messenger and transfer RNA, are quite good. The reader is able, in this account, to share some of the excitement experienced by these now famous scientists as they made their discoveries, developed their theories, and devised the experiments which revealed the relationship between inherited differences of living organisms and the peculiar structure of these chemical molecules.

Mr. Barry maintains a high level of readability with but few exceptions. The explanation of the theory of the triplet genetic code is not as clear as would be preferred. The example on pages 104, 105 concerning sickle-cell anemia is misleading when it states "If a person with sickle-cell anemia marries a normal person, the red blood corpuscles of their children all contain roughly half the normal hemoglobin and half sickle-cell hemoglobin." The statement, of course, is true, but it should be noted that this is a highly problematical "if" — since a sickle-cell anemic rarely, if ever, lives to sexual maturity (page 127, Sinnott, Dunn, and Dobzhansky *Principles of Genetics,* Fifth Edition). It is unfortunate that lines 14 and 13 (from the bottom) on page 105 are out of the proper order and should be put in correct order in future printings.

Other than the above, there are no critical complaints. In fact, it is a joyful experience to find, with but one exception, that all the questions occurring as one reads the book are soon answered in the next paragraph or within a few pages. The exception, why two of the 10 bonds involving lysine in the ribonuclease molecule are not broken by trypsin, still remains a mystery, however. — M. L. STIFF, University of Southwestern Louisiana.

ANIMAL SPECIES AND EVOLUTION, Ernest Mayr. Harvard University Press. 1963. 797 pp. $11.95.

In his well-organized and exceptionally well-written new book Ernest Mayr presents a careful analysis of present knowledge concerning the nature of animal species and of the role they perform in the processes of evolution.

Indirectly, by comparisons between certain phenomena in animals and plants (as for example by discussions showing that hybridization, and consequently "hybrid swarms," and polyploidy are much rarer in animals than in plants) there is considerable carry-over from this book into the whole field of organic evolution.

The first chapter skillfully traces development of the modern synthetic theory of organic evolution. Unlike the earlier single-factor theories the present synthetic one is not the work of any single author. Rather, it has been synthesized over the past quarter century from the careful work of many biologists — which work was based upon developments of the preceding seventy-five or eighty years.

Mayr emphasized the importance to the development of this synthetic theory of the discarding of two incorrect concepts: performism and typology. Modern evolutionary synthesis was not possible until performism was replaced by concepts based upon knowledge that adult form results from interactions between processes. The replacement of typological thinking by population thinking is perhaps the greatest conceptual revolution that has taken place in biology.

The emphasis of the volume is on those aspects of evolution that involve the species. Chapters 1-6 deal with characteristics of species. The structure and genetics of populations are covered in Chapters 7-10, and the (population) structure and variation of species in Chapters 11 to 14. Chapters 15 to 18 are concerned with the multiplication of species. Chapter 19 is devoted to considering the role of species in transpecific evolution, and Chapter 20 to a review of the possible consequence of the findings for man.

Throughout the book emphasis is placed on those findings from higher animals which are directly appli-

cable to man, and these are considered in detail in the final chapter. Here the phylogeny of man is traced. It is pointed out that there are no genetic isolating mechanisms separating any present races of mankind. Present day man is not speciating due to man's great ecological diversity, and also due to the fact that isolating mechanisms develop only slowly in hominids (for example, man's great mobility and independence of environment have made perfect geographic isolation impossible; etc.).

Mayr presents a masterfully written guide to an understanding of the problems involved in this field, as well as to the evolutionary facts as now understood.

An excellent glossary and an extensive bibliography of over 1800 references add to the value and usefulness of the book. — WALTER S. FLORY, Wake Forest College.

News of Biology in the Southeast

About People

Leland Shanor was appointed Division Director, Division of Undergraduate Education in Science, National Science Foundation on January 1, 1965. Prior to this assignment, he had served as Head, Undergraduate Education in the Sciences Section, Division of Scientific Personnel and Education, NSF, since January 5, 1964.

Harry L. Holloway, Jr., head of the Department of Biology at Roanoke College, Salem, Va., has returned from a four-month collecting project at McMurdo Station, Antarctica. Working under a grant from the National Science Foundation to further the U. S. Antarctic Research Program, he is concentrating on endoparasites of antarctic vertebrates, and will continue work on samples collected at the U. S. Navy site. A Roanoke College senior, **Thomas Capraro** of McLean, Va., accompanied Dr. Holloway to the South Pole. Also working on the project is **Ansar Husain,** Research Associate in biology at Roanoke College.

Joseph H. Waters has joined the Department of Biology at Roanoke College, Salem, Va., as an Assistant Professor. Also new to the department this session is **Henry B. Robinson,** Instructor.

Denzel E. Ferguson, Professor of Zoology at Mississippi State University, has been awarded a three-year grant totaling $59,000 by ORD, Bureau of State Services (Environmental Health), USPHS, to continue his investigations of vertebrate resistance to insecticides. Several graduate students and their research will be supported by the grant.

Mason E. Hale, Division of Cryptogams, Smithsonian Institution, Washington, D. C., has spent the past year in the Pacific region and Japan. This work has been supported under the U. S.-Japan cooperative science program of the National Science Foundation, and involves a study of the evolution and distribution of the lichen genus *Parmelia.* Field work has been carried out in the Philippines, Sabah, Sarawak, and Malaya, and the materials are being studied at the National Science Museum in Tokyo, Japan, in collaboration with S. Kurokawa. Dr. Hale expects to return to Washington in July.

James A. Miller, Jr., Chairman, Department of Anatomy, Tulane University, was a guest lecturer at the American Academy for Cerebral Palsy on December 10, 1964, and spoke on the subject, "Is Cerebral Palsy Preventable." His address was summarized in the December 25th issue of *Time Magazine.*

Jacob Yelverton, graduate of the Biology Department of Northeast Louisiana State College, has accepted a position as pollution biologist at the Fish and Wildlife Station on Black Bayou Lake near Monroe, La. He moved from a position with the Bernstein Park Zoo in Monroe.

George Kent, Professor of Zoology at LSU, Baton Rouge, has cut a VideoTape entitled "The Theory of Organic Evolution," for broadcast throughout Louisiana on "Pursuit of Learning," produced by LSU and WBRZ-TV, Baton Rouge. The program, which occupies 15 minutes, is for the general public, but it is also suitable for beginning students of biology at the high school and college freshman level. Dr. Kent's "Textbook of Comparative Vertebrate Anatomy" will be published by the C. V. Mosby Company in April. The book has 344 illustrations, two-thirds of which are new or extensively redrawn. Since his earlier book, which has been used by 36,000 students, many advances have been made including new insight into the pineal body, thymus, median eminence, hypothalamic-hypophyseal portal system, and the influence of environment on endocrine secretions. Dr. Kent is also celebrating the printing of the 12,000th copy of his "Practical Anatomy of the Dogfish, *Necturus,* and Cat" (William C. Brown).

Paul Saeeo, Professor of Botany and Pharmacognosy of the Xavier University of Louisiana, College of Pharmacy, was the recipient of a grant from the Cancer Association of the Greater New Orleans, Inc., for the continuation of a research project. For several years, Dr. Sacco has pursued studies involving toxin production and fatty acid metabolism in several Pseudomonad bacterial species. The grant will make possible the acquisition of appropriate instrumentation.

William Burbanek, Dept. of Biology, Emory University, has received $33,200 for a 3-year renewal of his grant to study the ecology and evolutionary implications of estuarine crustacea. This is a continuation of field and laboratory studies on factors effecting the speciation of isopods and associated macrofauna.

Bernard Lowy of the Mycological Herbarium at Louisiana State University will be in Brazil for the next year on a Fulbright Grant for teaching and research. His address from June 1965 until June 1966 will be: Instituto de Botanica, Caixa Postal 4005, Sao Paulo, Sao Paulo, Brazil.

Institutions and Organizations

Mississippi State University has just established an interdisciplinary program leading to the degrees of Master of Science and Doctor of Philosophy in Physiology. Students desiring such a degree will register in an appropriate department and then will participate in an interdepartmental curriculum. Assistant Professor C. R. Sadler of the Department of Zoology has been named chairman of the program.

The fall meeting of the **South Carolina Association of Biology Teachers** was held in Columbia, S. C., on October 24, 1964, at A. C. Flora High School. Charles Winter, Consultant for the Biological Sciences Curriculum Study, University of Colorado, was guest speaker.

The **1965 Officers of the Southern Appalachian Botanical Club** are: President—**Dr. James W. Hardin,** Department of Botany, N. C. State, Raleigh; Vice President—**Dr. Robert P. Platt,** Department of Biology, Emory University, Atlanta; Secretary—**Miss Elizabeth Ann Bartholomew**, Department of Biology, West Virginia University, Morgantown; Treasurer—**Dr. Roy B. Clarkson,** Department of Biology, West Virginia University, Morgantown.

The Pharmacy College of **Northeast Louisiana State College** delighted area biologists by acquiring a Beckman IR 8 Spectrophotometer costing about $7,500 for use in research.

In the symposium "Aspects of Evolution in North American Cave Faunas" sponsored by SSZ last December in Knoxville, Tennessee, the following Southeastern Biologists were invited to participate: **Thomas C. Barr** (U. Ky.), **Horton H. Hobbs, Jr.** (U.S.N.M.), **C. W. Hart, Jr.** (ANSP), **Harrison R. Steeves, III** (U. Ala. Medical Center), **Thomas E. Bowman** (USNM), **John R. Holsinger** (U. Ky.), and **Nell B. Causey** (L.S.U.). In the symposium "Zoogeography of the Invertebrates: Freshwater, Terrestial, and Parasitic Forms" sponsored by SSZ and ASZ, the following Southeastern Biologists were invited to participate: **Robert P. Higgins** (Wake Forest), **Charles F. Lytle** (*nunc* Penn State), **Bassett Maguire, Jr.** (U. Tex.), **Walter J. Harman** (L.S.U.), **J. F. Fitzpatrick, Jr.** (Miss. St. U.), **Perry C. Holt** (V.P.I.), and **Jacques Berger** (N. C. St. U.).

The **Department of Anatomy at Tulane University** has just received a training grant in Experimental Embryology which amounts to $105,800 for the first year and $49,800 for subsequent years. **Dr. S. Meryl Rose,** Professor of Experimental Embryology, is the Program Director of the grant. This is the second training grant for the Department. **Dr. James A. Miller, Jr.,** Chairman of the Department of Anatomy, is Program Director of their earlier grant in Anatomy. This has a current budget of $77,000 per year, and 17 Ph.D. candidates are enrolled.

The **15th Annual Wildflower Pilgrimage** will be held in the Great Smoky Mountains National Park April 22, 23, and 24, 1965. There will be the usual wildflower clinic, guided botanical hikes, motorcades, and bird walks sponsored by the Department of Botany, The University of Tennessee; the National Park Service; and the Gatlinburg Garden Club.

University of Southwestern Louisiana

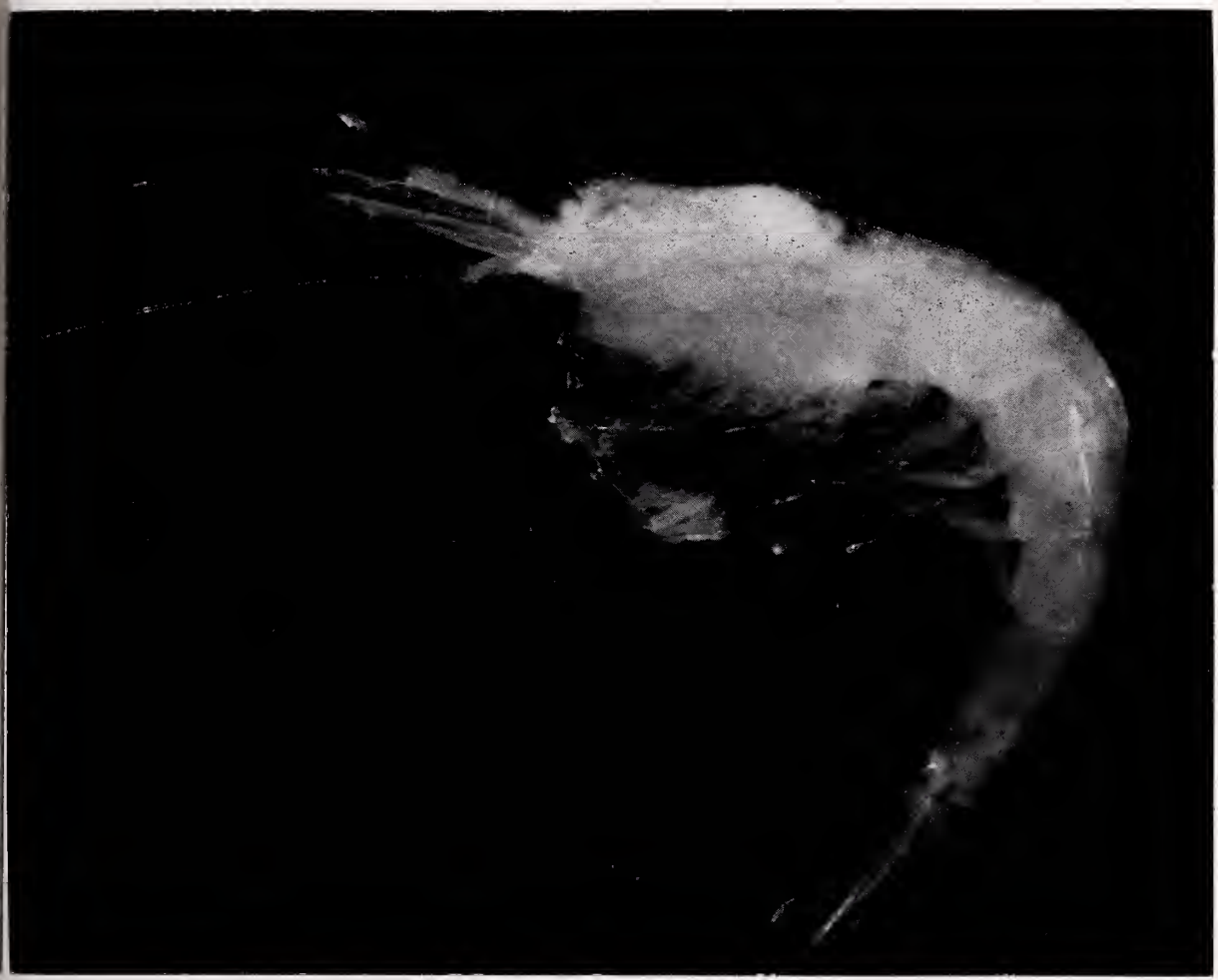
Charles W. Caillouet, Assistant Professor of Biology at the University of Southwestern Louisiana, is continuing his studies of post-larval commercial shrimp abundance and distribution in Vermilion Bay under the terms of a renewal contract from the U. S. Bureau of Commercial Fisheries. The contract, in the amount of $20,464, will run for 1 year. Information gained from the studies will be used in predicting subsequent commercial harvests of shrimp. Dr. Caillouet completed his graduate studies in 1964 at Iowa State University; his field is fisheries biology. Also at the University of Southwestern Louisiana **M. J. Fouquette,** Assistant Professor of Biology, is completing work on a National Science Foundation supported project on "Relationships and call variation in southeastern chorus frogs," and is also working along on several other projects concerning Middle American amphibians and reptiles. **A. G. Owens,** Biologist for the Louisiana Mosquito Control Association, Central Region, with offices at the University of Southwestern Louisiana, will administer a grant of $27,500 from the U. S. Department of Agriculture, for a study of the biology and ecology of salt marsh mosquitoes in the Cypremort Point area of South-central Louisiana. The aim of the investigation is to develop biological control measures for mosquitoes. One aspect of the investigation will be a study of the possibility of multiple usage of mosquito control impoundments. Field work has begun on a study of the use of such impoundments for fish farming and is being carried out with the cooperation of **Kenneth Lance,** Louisiana Wildlife and Fisheries Commission, and of **Dr. Caillouet** and **Donald Hoffpauir,** both of the University of Southwestern Louisiana Department of Biology.

University of South Alabama

The Biology Department of the **University of South Alabama** began operating this fall with three faculty members. **John M. Rawls,** Chairman of the department, from Lamar Tech, Beaumont, Texas, joined the institution as Associate Professor of Biology. His major field of interest is experimental invertebrate embryology. **Margaret Waldrep,** formerly of Roanoke College, Virginia, has accepted a position as Assistant Professor of Biology. Her research interest is in algal physiology. **James M. Boyles** joined the faculty as Instructor in Biology after being associated with the University of Alabama Mobile Center. His research at present is in biogeography. With the beginning of the winter quarter, a fourth member was added to the biology staff: **Crawford G. Jackson,** who recently completed his Ph.D. at the University of Florida was appointed Assistant Professor of Biology. His field of interest is the biology of reptiles.

The ASB BULLETIN

Volume 12, Number 3 July, 1965



Roger W. Barbour

Palaemonias ganteri Hay

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

Volume 12, Number 3 - July 1965

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Pa. 19103. Change of address should be sent promptly to the Secretary of the ASB, Dr. Margaret Y. Menzel, Dept. of Biological Sciences, Florida State Univ., Tallahassee, Fla. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. John Carpenter, Dept. of Zoology, Univ. of Kentucky, Lexington, Kentucky. Subscription rate for nonmembers of the ASB: $4.00 per year. Printing and typography by the Fulton Press, Inc., Lancaster, Pa.

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C. WILLARD HART, JR.
EDITOR

MARGARET Y. MENZEL
Associate Editor

BETTY URSOMARSO, Assistant Editor

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Your Zip Code, Please . . .

If your zip code number does not appear on the address used to mail this issue of the ASB Bulletin, please send it to us promptly. The day is not long off when the Post Office will not accept 2nd or 3rd class mailings that do not include zip code numbers – and before that time all ASB address stencils must be re-made, at considerable cost, in order to comply with this directive. Please help us by returning the label to us with your zip code included. *Betty Ursomarso, Asst. Editor, Academy of Natural Sciences, 19th and The Parkway, Philadelphia, Pa. 19103*

Ecological Studies in the Great Smoky Mountains

BY

Dorothy L. Crandall
Randolph-Macon Woman's College

Through the years the Southern Appalachians have attracted the interest of many scientists, — geologists, botanists, zoologists and naturalists. Andre Michaux, Asa Gray, William Bartram and Constantine Rafinesque all knew this wilderness. Several of the lofty peaks of the western section of the Southern Appalachians bear the names of these early explorers: Mt. LeConte, Clingmans Dome, and Mt. Guyot. In the mid 19th century Arnold Guyot of Princeton University wrote, "Although the high peaks of the Smoky Mountains are some fifty feet lower than the isolated and almost exceptional group of the Black Mountains, by their number, their magnitude, the continuity and general elevation of the chains and of the base upon which they repose, they are like a massive and high citadel which is the culminating region of all the Appalachian System."

The Great Smoky Mountains are included in the Blue Ridge Province and form part of the Unaka Mountains. In the Great Smokies are found some of the highest mountains east of the Mississippi with many of the peaks soaring to elevations of more than 6000 feet. Mt. LeConte rises more than 5000 feet from its base to its fir-clad summit with an elevation of 6593 feet. Along the Tennessee-North Carolina boundary the Appalachian Trail follows the crest of the ridge for 71 miles from the northeast at Davenport Gap to the southwest near Fontana Dam. Through a virtual wilderness for much of its length, this foot path traverses such peaks as Mt. Guyot, Mt. Chapman, Mt. Kephart, Mt. Collins and Clingmans Dome — all of these over 6100 feet in elevation.

The Great Smokies derive their name from the smoke-like haze or mist that rises almost continuously from the dense vegetation that covers the mountain sides and summits. So characteristic is this haze that before white man came, the Indians called these mountains Sha- cona- ge, meaning blue, like smoke (Fink 1956). Since its formal dedication in 1940, the Great Smokies have been visited by thousands who have come to study, to hike, to camp and just to stand in awe before some of the most impressive scenery in the east.

This area is a naturalists' paradise with more than 1300 varieties of trees, shrubs, and herbs; a greater variety than in any other area of comparable size in eastern North America. Many of the trees reach their maximum size within the Park boundaries and have been called "forest giants." Some of the records include a tulip tree, *Liriodendron tulipifera,* 23′8.5″ in circumference, a Canadian hemlock, *Tsuga canadensis,* 19′ 19″ in circumference, and a cucumber tree, *Magnolia acuminata,* 18′ 3″ in circumference. Oak forests, pine forests, cove hardwood forests, and hemlock forests occur in the ravines and on most of the lower and mid-altitude slopes while along the crest of the mountains is the most extensive stand of virgin spruce-fir in the east. The fir is Fraser fir, *Abies fraseri,* an endemic in the Southern Appalachians. The red spruce, *Picea rubens,* has a much greater geographical range, occurring from Nova Scotia to Maine and Southern Quebec to its southernmost limits in western North Carolina and eastern Tennessee. In the northern section of these forests, balsam fir replaces the Fraser fir as a codominant with the red spruce. In comparing the northern and southern spruce-fir forests Oosting and Billings (1951) considered these two forests as part of the boreal forest formation but with two distinct phases, the red spruce-Fraser fir and the red-spruce-balsam fir. In the Southern Appalachians spruce enters the canopy around 4500 feet and with increasing elevation fir becomes more important until on the highest summits and slopes there may be nearly pure stands of Fraser fir.

In 1936, Stanley Cain who was then a member of the Botany Department of the University of Tennessee, wrote a brief review of the ecological work in the Great Smoky Mountains Region (Cain 1936). Several of the early papers treated of geographic-floristic problems. Cain's papers on quadrat sampling techniques are well known. He also studied the heath balds and the cove hardwoods. The grassy balds attracted W. H. Camp, B. W. Wells and more recently A. F. Mark. A. J. Sharp is the author of several papers on the mosses of this area and L. R. Hesler has numerous publications on the fungi. A. Gattinger, H. M. Jennison and others contributed to our early knowledge of the vascular flora of the Great Smokies. Dr. Cain concluded his paper with a

general invitation to the ecologist and taxonomist to "work out the multitudinous and fascinating problems of the Smokies." Since this date innumerable investigators have been drawn to this expanse of unspoiled wilderness truly a limitless outdoor laboratory. When Dr. Royal E. Shanks came to Tennessee, he too, was challenged by the many unsolved problems of this region.

One of Dr. Shanks' first publications after joining the staff at the University was one published jointly with A. J. Sharp on the trees of Tennessee. This first appeared in the Journal of the Tennessee Academy of Science in 1947 and later, in 1950, as a separate contribution from the Department of Botany at the University and is available today from the University of Tennessee Press under the title "Summer Key to Tennessee Trees." This booklet has been found useful not only in the state but in the surrounding areas by botanists, students and others interested in the identification of the native trees.

In addition to floristic studies, Dr. Shanks did intensive research and published several papers concerning environmental studies. Royal Shanks and Fred Norris (1950) in a paper entitled "Microclimatic Variation in a Small Valley in Eastern Tennessee" discuss the results of a study of temperature variations on north- and south-facing slopes and the effect of slight differences in frost pattern and actual freezing damage to tomato plants which were used as phytometers in the experiment. In 1954 in his paper "Climates of the Great Smoky Mountains" (1954b) temperature and precipitation data are analyzed from four weather stations, at Park Headquarters, 1460 feet in elevation, at Alum Cave parking lot, 3800 feet, at Newfound Gap, 5000 feet and at Forney Ridge parking area on the southerly slope of Clingmans Dome at 6300 feet. Precipitation in the spruce-fir zone averaged over 90 inches for the five year study and for the summer months the temperatures at the highest elevation were 10 to 15° lower than at the base of the mountain, a drop of two to three degrees for each 1000 foot increase in elevation. From these data he concluded that the spruce-fir forest region of the Southern Appalachians was both warmer and more moist than the taiga spruce-fir forest and that the mountain climates "above an altitude of 2000-2500 feet are extremely humid, falling into the rain forest or perhumid class: at spruce-fir altitudes they fall near or outside the super-humid edge of the 1931 Thornethwaite graph, exceeding the highest moisture values reported for comparable forests." He recommended on the basis of his data that there is a need for revision of the Southern Appalachian portion of Thornethwaite's 1948 maps to include a moisture sequence up to perhumid (A) and a thermal efficiency sequence up to microthermal (C'_2) in the Great Smoky Mountains.

In a later paper, 1956, on "Altitudinal and Microclimatic Relationships of Soil Temperature under Natural Vegetation," he evaluated several types of instruments and measurement procedures. The dial type thermometer was found to be adequate in revealing microclimatic differences between vegetation habitats such as beech gaps and spruce-fir forests in the Smokies. He noted temperature differences between two such adjacent habitats equivalent to as much as 2000 feet of altitudinal temperature difference.

In addition to climatic studies in the Smokies, Dr. Shanks was interested in different methods of sampling vegetation. Many of his students were early introduced to a variety of ecological techniques. I well remember plots laid out on the lawn of the University of Tennessee for grass sampling studies and the many hours we spent on hands and knees comparing point samplings, line sampling etc., and the strange looks less ecologically oriented students would turn our way as they passed by those peculiar biologists intent upon counting each spear or clump of grass or weed.

Royal Shanks was one of the pioneers in the use of witness trees from early land survey records to describe the original vegetation. In his 1953 paper "Forest Composition and Species Association in the Beech-Maple Region of Western Ohio", he concluded "that random pairs of trees constitute an especially useful tool for the analysis of organizational pattern in the forests of a region. They provide an efficient basis for composition inferences and at the same time yield information on habitat ranges of participating species and competitive inter-relationship among species."

The Great Smoky Mountains was the region that Royal Shanks selected for a comparison of conventional plot sampling with variable-radius plotless sampling described by Grosenbough and the random pairs method of Cottam and Curtis. As a result of his research in high altitude spruce-fir and mid-altitude buckeye - basswood - sugar maple forest types he concluded that with appropriate handling of the data the various methods studied lead to very similar vegetation inferences. The random pairs method yields useful information on species association and on details of tree spacing in a forest stand and the variable-radius method is most suitable for reconnaissance sampling.

One area in which Dr. Shanks was interested and which drew him to view and study its spectacular Azalea flora was Gregory Bald, one of the several so-called bald areas in the Smokies, this grass and shrub covered summit rising from Cades Cove to an elevation of 4948 feet. Several theories have been proposed in an attempt to explain the origin of these non-forested summits but none are completely satisfactory. This is not a timber-

line condition as the much higher surrounding mountain peaks are heavily forested with spruce and fir. A. F. Mark (1958) discusses the possible origin and maintenance of these balds in a recent paper. Following the elimination of spruce-fir forests from these peaks during a warmer interval, in the ensuing period of cooler climate the bald developed and since tree seedlings were unable to become established, herbaceous vegetation invaded the area. Several factors have helped maintain these summits in a non-forested condition, severity of the environment to tree seedlings, lack of spruce-fir seed source, grazing and browsing etc. Today on some of these balds spruce and fir are invading more rapidly than hardwoods and perhaps many years from now these summits may again be forested.

National Park Service Photograph

MT. LECONTE — GREAT SMOKY MOUNTAINS NATIONAL PARK

The eleven mile round trip to Gregory Bald is one of the most rewarding experiences that I have enjoyed in the Smokies. During the latter part of June the hybrid population of azaleas presents a vivid display of color that is unrivaled in beauty. Scattered over the Bald and around its margin are masses of brilliant flame, clear yellow, delicate pink and deep crimson. Some flowers are pleasantly fragrant, others odorless, some corollas viscid with glandular hairs, others smooth a seemingly endless variation in characters. For a moment visualize a splash of flame colored azalea outlined against the bright blue of a recently rain-washed sky.

I have only touched upon some of Dr. Shanks' early work and interests in the Great Smoky Mountains and perhaps more important than his published achievements is the inspiration he gave to those who had the privilege of working with him. Under his leadership many of his students chose problems centered in the Smokies and have been stimulated to carry on further research in these and other areas.

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C. M. Goethe

One of the nation's leading conservationists, philanthropists, and humanitarians, Charles M. Goethe was honored on the occasion of his 90th birthday, March 28, 1965. It is doubtful that anyone has been the contributor to as many professional organizations and other civic, religious, and fraternal groups as has Mr. Goethe.

Mr. Goethe first gained national prominence during World War I, when he was appointed by President Woodrow Wilson to handle the matter of morale on the home front. In connection with this work, he was instrumental in drastically reducing the incidence of prostitution around military bases, and even managed to close down San Francisco's notorious Barbary Coast area. But, even before this Presidential appointment, he was well known to scientists, conservationists, and politicians.

An investment broker at the turn of the century, Goethe was independently wealthy by the time he was 27. He then met Mary Glide, the daughter of a wealthy pioneer ranch family. From the day they were married until her passing in 1946, Mr. and Mrs. Goethe dedicated their time, effort, and fortune to work in the life sciences, social sciences, education, and the Protestant ecumenical movement — each characterized by action on their part to elevate mankind. Mrs. Goethe, whom he always refers to as "my sweetheart," was a constant companion who shared in all of his adventures prior to her death. When speaking of their activities together, he always refers to the work of himself and his wife as the work of "We-2." He has continued to this day with projects that they started together at the turn of the century.

Shortly after their marriage, he sought to end the exploitation of child labor by lobbying a law through the California Legislature to cut down the hours a child could legally work. This was the forerunner of our "child labor laws" of today. The public playgrounds that abound in most cities across the nation today owe their existence largely to Goethe, who laid out the first such areas in Sacramento and then went on to promote the idea nationally. It was one of the first attempts to combat juvenile delinquency. The idea spread rapidly throughout the United States, and eventually around the world. The Goethes personally financed trips to the Philippines, Japan, China, and Hindustan to set up model playgrounds in these countries. Mr. Goethe's interest in and support of the gifted child movement in America also goes back some fifty years.

In 1919, Goethe went to Switzerland to observe that nation's practices in conservation. He returned to initiate the idea of Guides in United States National Parks. This concept formed the basis for what is now known as the Naturalist Interpretive Movement.

Among Mr. Goethe's several titles are Honorary Chief Park Naturalist of the National Park Service, and Chairman Emeritus of the Sacramento State College Advisory Board. Included in a long list of recognitions, he has already received the following: The Department of Interior Conservation Award, The Distinguished Service Award of the National Association of Biology Teachers, The Patriotic Service Medal of the American Coalition of Patriotic Societies, the honorary status of "Governor Emeritus" of the Nature Conservancy, a Fellowship in the Royal Society of Arts of Great Britain, and the honorary 33rd degree of the Masonic Scottish Rite fraternity. He holds honorary degrees of Master of Science from Sacramento State College, Doctor of Law degree from the University of Pacific in Stockton, and from the McGeorge College of Law in Sacramento.

Mr. Goethe's contacts with the ASB began in 1948, when he wrote to Dr. George Kent, Jr., of Louisiana State University and enclosed a check

to be used by the Louisiana Academy of Sciences in whatever way it saw fit.

Later, as President of the ASB, Dr. Kent urged the establishment of a trust fund to be used to stimulate research in the Southeast, and expressed the hope that fifty individuals or industries would contribute $100 each. Since he had been corresponding with Mr. Goethe, he sent him copies of the ASB Bulletin in which these thoughts were expressed (Vol. 3, No. 4, p. 64, December 1956). In response, Mr. Goethe sent, before the end of March, 1957, a check for $100. He asked that this not go into a trust fund at that time, but that it be used as soon as possible. Immediately after the Athens meeting in 1957, he generously sent a second check for a like amount; and on September 9, 1957, he sent a third check. In the meantime the executive committee decided to use the funds to stimulate research among younger southeastern biologists. Exactly when or where it was decided to use the money to send young people to the ASB meetings cannot be determined, but the decision was made and H. K. Wallace, who took over as President in Athens, and asked Dr. Kent to assume responsibility for making the awards for the Tallahassee meeting. The first thing Dr. Kent did was to ask Mr. Goethe for permission to call this the Mary Glide Goethe Award, in honor of his wife and constant companion. Announcement of the first Mary Glide Goethe Award thereupon appeared in the December, 1957, issue of the ASB Bulletin (Volume 4, Number 4, page 50), and thus the first awards were made for the 1957 meeting in Tallahassee.

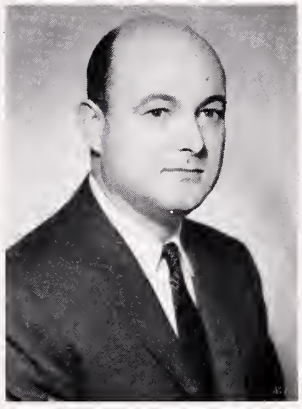
Since the inception of these awards, Mr. Goethe has contributed over $3,000 to the ASB to insure that some 99 young and promising students have been able to attend the annual meetings. Each year an appointed committee selects a number of students from applications submitted in February, and awards are made to help defray travel and living costs.

Reinhold Elects James B. Ross New Vice President

At its annual meeting, Philip H. Hubbard, Sr., President, announced that the Board of Directors has elected James B. Ross as Vice President of the Reinhold Publishing Corporation. Mr. Ross has been General Manager of the Reinhold Book Division since January, 1963. In addition to his new corporate responsibilities, Mr. Ross will continue to be responsible for the over-all direction of Reinhold's book publishing programs — which include technical and professional books and college textbooks in science, engineering, management and architecture, and popular books in art instruction, crafts, design, gardens, and interiors.

Before joining Reinhold in 1957, Mr. Ross was a college editor for the W. B. Saunders Company of Philadelphia. He received an A.B. from West Virginia University (1948) and an M.S. in Biology from the University of Pittsburgh (1949). He also served with the USNR from 1943 through 1946. At the present time he resides at 18 Lake Drive in New Hyde Park, New York.

Mr. Ross is a Fellow of the American Association for the Advancement of Science, a past president (1958-1960) and member of the Board of Governors of The Nature Conservancy, and is currently a member of the American Chemical Society, The Chemists' Club (New York), American Society for Engineering Education, American Institute of Biological Sciences, New York Academy of Sciences, Sigma Xi, Ecological Society of America, and the Association of Southeastern Biologists.



James B. Ross

American Tables Committee Reviewing Applications for Naples Zoological Station

The American Tables Committee is now reviewing applications for laboratory space at the Naples Zoological Station, Naples, Italy. This Station, offering opportunities in behavioral, physiological, biochemical, and radiological research, is supported in large measure by various institutions throughout the world. The United States has supported the Station in recent years by buying ten of these "tables"; each table providing all of the logistic support for the researcher during the year. The Tables Committee of the American Institute of Biological Sciences, sponsored by a grant from the National Science Foundation, accepts and reviews applications and makes selections of scientists.

Applications must be submitted at least six weeks prior to the date for beginning research. Requests for forms should be made directly to Richard J. Burk, American Institute of Biological Sciences, 3900 Wisconsin Avenue, N. W., Washington, D. C. 20016.

Books and Periodicals

A recently published book on the deep sea by a biologist at the Institute of Marine Science, University of Miami, has just been named one of the "Notable Books of 1964" by the American Library Association. The book, entitled "Abyss," was written by **Dr. C. P. Idyll**, Chairman of the Institute's Division of Fishery Sciences, and deals with life in the abyssal depths of the oceans. Published in July, 1964, by Thomas Y. Crowell Co., "Abyss" was acclaimed by the American Library Association as a "fascinating exposition on the mysteries of the ocean depths."

Lepidoptera of Florida, by C. P. Kimball, has been released for distribution. This publication is to be the first of an irregularly appearing series relating to the insects and other arthropods of Florida and neighboring land areas — the southeastern United States, the Bahama Islands, the Greater and Lesser Antilles, and the coastal land areas around the Gulf of Mexico — with emphasis on taxonomy, ecology, biology, and zoogeography. Special emphasis in this series, to be published by the Division of Plant Industry, Florida Department of Agriculture, will be placed on the Florida arthropod fauna. The files and preserved specimens of the Florida State Collection of Arthropods will provide a basis for many of the records of this and subsequent publications in the series.

Lepidoptera of Florida, Volume 1 of *Arthropods of Florida and Neighboring Land Areas*, contains 363 pages, 26 plates (the first 6 in color), an annotated bibliography, a gazatteer, an index of food plants, an index of common names, and an index of genera, species and subspecies. The introduction contains discussions of the objectives of the publication, geography, topography, climate, vegetation, food plants, distributional areas, collectors and collections, literature, and other pertinent information. Copies may be obtained for $5.00 per copy

from the Librarian of the Division of Plant Industry, Florida Department of Agriculture, Gainesville, Florida 32601. Checks should be made payable to "Division of Plant Industry" and a notation should be made on the check, "for *Lepidoptera of Florida*."

A SELECTED GUIDE TO THE LITERATURE ON THE FLOWERING PLANTS OF MEXICO. Ida Kaplan Langman. University of Pennsylvania Press, Philadelphia, 1964. 1015 pp. $25.00.

A tremendous amount of work by a dedicated bibleographer has produced this massive, impressive and valuable book at a most opportune time. As more and more botanists follow their research interests south of the Rio Grande across artificial political boundaries they often soon encounter a boundary — no, a barrier — that slows further progress to a discouraging pace. This barrier is the "resources barrier" and it is automatically reached in taxonomic work when the search for an appropriate monograph, article or other reference takes twice as long as does the identification once the reference is discovered. With this excellent annotated bibleography, containing some 22,000 rather thoroughly cross-indexed references, the identification and classification of Mexican plants will be a much quicker and more enjoyable task. And through proper use of the various cross listings in the index the "Guide" also functions as an interesting source book for information on the history, agriculture, ethnobotany, drug plants, indians, plant collectors, and botanists of Mexico. In the 28 pages of "Journal Titles Cited" are given the full title of each periodical *and* a valuable note as to where some of the more obscure of these publications may be found.

From an *Errata* sheet (kindly supplied by the author) and from my personal perusal of the book, it seems to be about 99% perfect. Although an occasional typographical error in a date (e.g. "1950" for "1960") may cause a temporary question in the mind of a research worker other "errors" are only relative. Considering the problems of transliteration and of orthographic variants involved with many Aztec and Mexican common names, the change of "Citzotzel" to "ci-tzotzil" (on page 894, in the index) and the change from "Amarillo" to "Amarilla" (on page 864, in the index) are certainly of no consequence other than to those who seek perfection, over utility, for perfection's sake alone.

More books such as this, that add significantly to our research resources on tropical botany, are sorely needed. Perhaps now that the way has been shown others may follow. — C. RITCHIE BELL, Department of Botany, University of North Carolina.

NEW PERSPECTIVES IN BIOLOGY. Michael Sela, Editor. (Vol. 4, BBA Library). American Elsevier Publishing Co. New York. December, 1964. 285 pp. $14.50.

This compact volume contains twenty-one addresses presented, by as many eminent scientists, at the inauguration of the Ullman Institute of Life Sciences at Rehooth, Israel in June, 1963. The unifying concept of these contributions is their effort to understand biological phenomena on a molecular level. In addition to the main papers the book contains a Preface by the Editor, and Concluding Remarks by J. C. Kendrew, as well as the inaugural address by E. Katchalski.

The outstanding group of contributors — biologists, biochemists and biophysicists, including two Nobel laureates, and workers from 7 countries — presented papers at six sessions illustrating the present state and future prospects of the following aspects of biology: I. New Perspectives in Protein Research (6 papers); II. Structure and Function of Nucleic Acids (4 papers); III. Organization and Function of Enzyme Systems and Subcellular Units (4 papers); IV. New Antibiotics (1 paper); V. Chemical Approaches to Immunology (2 papers); and, VI. Cellular, Subcellular and Molecular Aspects of Differentiation (4 papers).

In his final remarks Kendrew, in considering the appropriateness of the title ("New Perspectives in Biology") assigned to the meeting, said "the essential point can be put very briefly — that in our various ways we are all trying to interpret the working, the behaviour and the reproduction of living organisms in the simplest terms of physics and chemistry appropriate to various levels of complexity. Many of these levels have been discussed here this week — the protein molecule, the genetic apparatus, virus replication, the immune response, the processes of control and of differentiation, and the incidence of pathological conditions." Kendrew further pointed out that the symposium marked the reunification of the "protein and the nucleic acid wings" of molecular biology. Further, that it was evident that "the concepts developed in either wing are now becoming important, rather than simply interesting, to workers in the other."

The series of papers in this volume offer an up-to-date summary of the most pertinent topics having to do with understanding biological phenomena at the molecular level. — WALTER S. FLORY, Wake Forest College.

Books received recently

The following books have been recently received by the ASB. Should any member of the ASB wish to review one of these books in return for the review copy, please write to *Mrs. Betty Ursomarso, Assistant Editor, Academy of Natural Sciences, 19th & The Parkway, Philadelphia 3, Penna.*

LANGLEY, L. L. AND E. CHERASKIN. 1965. *Physiology of Man.* Reinhold Publ. Co., N. Y. 658 pp. $8.50

WHITTINGHILL, M. 1965. *Human Genetics.* Reinhold Publ. Co., N. Y. 431 pp. $8.95

WOOD, E. F. FERGUSON. 1965. *Marine Microbial Ecology.* Reinhold Publ. Co., N. Y. $7.50

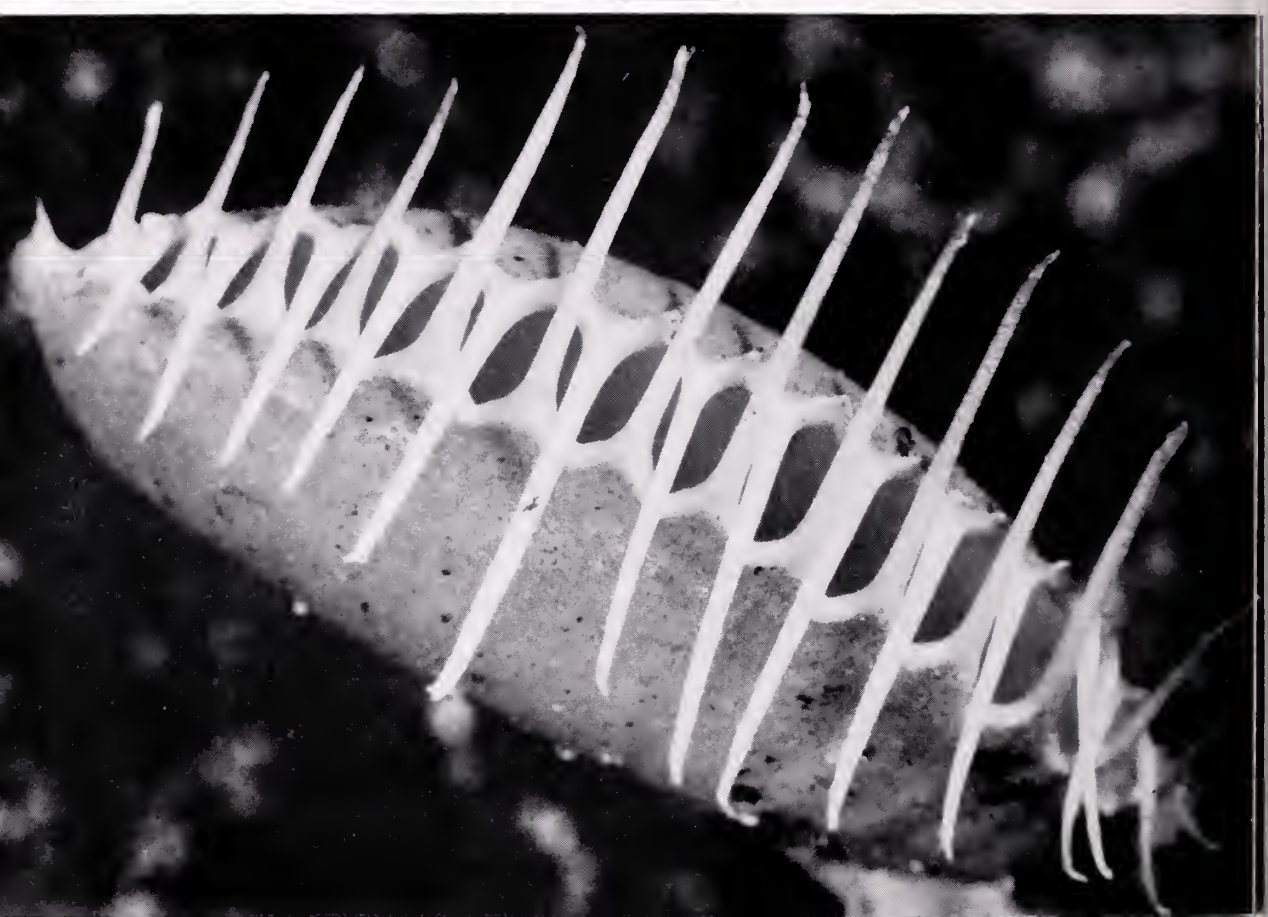
MILNE, LORUS J. AND MARGERY MILNE. 1965. *The Biotic World and Man,* 3rd Ed. Prentice Hall, Englewood Cliffs, N. J. 665 pp. $8.95

WANG, C. H. AND D. L. WILLIS. 1965. *Radiotracer Methodology in Biological Science.* Prentice Hall, Englewood Cliffs, N. J. 382 pp.

Sundew

Photographs by Ruth McVaugh Allen

Venus Fly Trap



Your Zip Code, Please . . .

If your zip code number does not appear on the address used to mail this issue of the ASB Bulletin, please send it to us promptly. The day is not long off when the Post Office will not accept 2nd or 3rd class mailings that do not include zip code numbers — and before that time all ASB address stencils must be re-made, at considerable cost, in order to comply with this directive. Please help us by returning the label to us with your zip code included. *Betty Ursomarso, Asst. Editor, Academy of Natural Sciences, 19th and The Parkway, Philadelphia, Pa. 19103*

News of Biology in the Southeast

Compiled by David J. Cotter

Grants

C. L. Baker, Southwestern College, Memphis, Tennessee, received a $7,080 grant from the Public Health Service for the Taxonomy, Ecology, and Cytology of the Amphiumae.

Buena S. Ballard received a $1,000 grant from the Mississippi State College for Women research committee for a preliminary study of changes in blood concentration of the blue crab, *Callinectes sapidus,* as the salinity of the environment changes, with special reference to sexual differences.

Stuart S. Bamforth, Tulane University, is the director of a three year NSF Undergraduate Science Education Grant, supported by $5,600 yearly.

C. Ritchie Bell, University of North Carolina, is directing the summer Botany Conference for College Teachers with support of $17,790 from NSF. He also received a $4,250 grant from North Carolina Board of Science and Technology for studies on plant variation.

K. E. Chernetski, University of Florida, will study autonomic modulation of somatic sensory input with the support of a grant of $24,335 from the National Institute of Mental Health.

Albert Collier, Director of the Oceanography Institute of Florida State University, received a $27,378 grant for laboratory and field study of "slicks" produced by plankton organisms. He also received a $20,000 grant from the Florida State Board of Conservation for an assay of sea water with *Gymnodinium hovere.*

I. E. Gray, Duke University, is completing a three year study supported by NSF on the distribution and abundance of fauna in marine habitats, with special reference to Cape Hatteras.

Mason E. Hale, Smithsonian Institute, received an NSF grant to study the evolution and distribution of *Parmelia* in eastern Asia and the Pacific region.

Kenneth F. Hancock will supervise a NSF $4,850 Undergraduate Instructional Equipment grant to Berry College.

J. W. Hardin, North Carolina State, received a five year grant from the North Carolina Agricultural Experiment Station for a study of the taxonomy of woody plants.

Reinhard Harkema and **Grover C. Miller** are joint recipients of an $18,407 NIH grant to study parasitic helminths of wild mammals.

L. R. Hesler, University of Tennessee, is working under a three year NSF grant, ending December, 1965, on a taxonomic study of the Agarieacae of the Southeast.

L. A. Hetrick, University of Florida, will study pine defoliating sawflies with the assistance of $2,400 from the Southern Forest Disease and Insect Research Council.

Don W. Hickman, New York State University at Potsdam, received a $700 grant from the Research Foundation of the State University of New York to study quantitative microelement requirements of selected species of aquatic Hyphomycetes.

Robert P. Higgins, Wake Forest College, received an NSF grant of $24,500 for a systematic study of Indian Ocean Kinorhyncha, and a $325 Sigma Xi- RESA grant for the redescription of *Echinoderes steineri* Chitwood from the Texas Gulf Coast and investigations of other regional kinorhynch fauna.

Arthur W. Cooper, North Carolina State, is the recipient of the following grants: 1) National Park Service, $15,000 for three years, for a study of the effect of mosquito control procedures on saltmarsh biotic communities in Bodie Island area, Cape Hatteras National Seashore, 2) $5,000 per year from the Department of Water Resources for the study of the ecology of dune-stabilizing plants on the North Carolina Coast, and 3) $1,500 per year from the North Carolina Agricultural Experiment Station for a study of the ecology of the hardwood forest of the lower Piedmont of North Carolina.

David J. Cotter, serving as director of NSF Multiple Fields Summer Institute for 60 high school science teachers, was supported by a $98,000 grant to Alabama College.

Temd R. Deason received a $1720 research grant from the University of Alabama Research Council to study ultrastructure and cell division in algae.

Urban L. Diener and **Norman D. Davis** were the recipients of a $36,958 grant from Public Health Service for research on growth and toxin production of food storage fungi, and $72,267 from the USDA for a study of the limiting environmental conditions for the elabora-

tion of Mycotoxin in peanuts, to develop information to assure the processing of the highest quality peanuts.

John F. Dimmick, Wake Forest College, will direct a cooperative college-high school science program for 8 high school teachers and 32 students supported by an $11,795 grant from the NSF.

Wayne R. Faircloth, Valdosta State College, received a $2000 NSF grant for Research Participation for College Teachers.

Charles W. Foreman, University of the South, received a $8,900 NSF grant for comparative studies of *Peromyscus* hemoglobins.

The **Highlands Biological Station** has received two NSF grants, 1) $94,800 for a study of the Ecology of the southeastern escarpment of the Blue Ridge Mountains and 2) $67,400 for construction of a garage-warehouse and an extension to the Coker Laboratory Building.

H. Branch Howe, Jr., University of Georgia, received a $41,960 grant from the Public Health Service for genetic studies on *Neurospora tetrasperma.*

Clyde E. Keeler, Georgia Department of Public Health, received a $1,985 grant from the National Institute of Mental Health.

Paul L. Kramer, Duke University, is the recipient of three grants: NSF, $88,800 for 3 years, for a study of water stress on plant process; $10,933 from AEC for study on the path of radial movement of minerals from soil to xylem in roots; and $11,619 from AEC on the relationship between plant water stress and sensitivity to ionizing radiation.

William Lazaruk, High Point College, received two grants from the Piedmont University Research Center: $500 to study effects of mineral compounds on algae, and $800 for classification of North Carolina green algae (Fresh Water). He also serves as liaison officer for a $16,000 NSF undergraduate equipment grant.

Ilda McVeigh, Vanderbilt University, will study the factors affecting the growth of *Histoplasma capsulatum* for a two year period under the terms of a NIH grant of $18,492.

R. W. Menzel, Oceanographic Institute of Florida State University, received the following grants: $500 from the Graduate Research Council for preliminary study of meiosis and mitosis in northern and southern quahog clams, their hybrids and back crosses; $8,500 NIH grant for the 6th year on the Control of *Democystidium marinum* in oysters; $1,950 from Sport Fisheries Institute for an analysis of changes in primary productivity on an artificial reef; and $3,000 for a two year study supported by the Bureau of Commercial Fisheries on the effects of electrical stimulation on benthic invertebrates.

Faith S. Miller, Tulane University, received a U. S. Public Health Service grant of $2,038 to study the effects of hypoxia and hypercaporia in deep hypothermia on cardial activity and blood pressure; and, with James A. Miller, a NIH $37,836 grant in the fourth year on asphyxial resistance in the newborn and prematures.

William C. Mobberly, Jr., Northeastern La. State College, received a $6,200 NSF grant to study the molting hormones in the crayfish *Orconectes clypeatus* (Hay) by filter paper electrophoresis.

A systematic study of species endemic to the granite outcrops of the Southeastern Piedmont, by **W. H. Murdy,** will be supported by a $14,000 NSF grant.

Gideon E. Nelson, University of South Florida, served as director of an NSF Summer Institute for 40 high school biology teachers.

Eugene P. Odum, University of Georgia, received the following grants: AEC, $94,375, Savannah River Grant; NIH, $34,366 Migratory Birds; NASA, $40,000, Microcosms.

Paul J. Osborne, received a $12,500 NSF grant for continued work on enzymes as markers in morphogensis of invertebrates.

Beverly A. Pleasants, Madison College, participated in a NSF Academic Year Institute at Syracuse University.

Thomas M. Pullen, University of Mississippi, received a $3,500 from the Faculty Research Committee for a study of the vascular flora of Mississippi.

S. Meryl Rose, Tulane University, received a $105,000 training grant in Experimental Anatomy from NIH, $50,000 of which was included for renovation of a building at Tulane's Riverside Research Laboratories.

Stefan O. Schiff received a grant of $1,600 from the research council of the George Washington University for studies on RNA synthesis in neuroblasts of *Chortophaga vividifasciata.*

Samuel R. Tipton, University of Tennessee, received a $23,032 AEC grant for studies on the effects of hormones, X-rays, and certain cerium compounds on mammalian cells and cell fractions from the zonal ultracentrifuge.

Greensboro College received a NSF $12,000 matching grant for undergraduate instruction. Arnold Van Pelt will serve as liaison officer. He also received a $750 matching grant from the Piedmont University Center for an analysis of ant host parasitization by *Cordyceps unilateralis.*

Alma T. Walker, University of Georgia, received a grant of $500 from Sigma Xi for study on lichen acids in North American *Comiulavia* species.

James C. Wilkes, Jr., Mississippi State College for Women, received a $1,000 grant from the college research committee to study the taxonomy and ecology of mosses of Mississippi.

William B. Wilson, Florida State University, received a grant of $16,344 from NIH for growth and nutrition of ultradiatoms in the laboratory.

Leslie L. Ellis, Mississippi State University, has received a grant of $6,900 from the Weyerhaeuser Co. for a biological and water quality survey of the Tombigbee River; and $13,700 from the NSF for the undergraduate institutional equipment program.

Denzel E. Ferguson, Mississippi State University, has received grants of $49,480 from Agricultural Research Service to study development of vertebrate resistance to insecticides; $42,761 from NIH to study crop pesticides as a factor in wildlife ecology; and $27,645 from NSF to study sun orientation and homing in anuran amphibians.

Robert B. Short, Florida State University, Tallahassee, will study the taxonomy of Dicyemid Mesozoans under an NSF grant of $18,300. He has also received a grant of $40,014 from NIH for taxonomic and life cycle studies on Mesozoans.

Herbert P. Riley, University of Kentucky, has received a two year grant of $23,400 from NSF for a genetical and cytological study of the tribe Aloineae.

Ellis R. Brockman, Winthrop College, reeeived a grant from the Winthrop Research Council for acquiring papers on the Myxobacterales, with special emphasis on physiological data on the group.

Harold J. Humm, Duke University, Durham, North Carolina, has received a grant of $11,659 to study the importance of substrate on the abundanee of marine algae of economic importance in North Carolina.

Robert A. Pedigo, College of William and Mary, Williamsburg, Virginia, has received a $7,000 grant from NASA to study biological effects of radiation; and an $11,000 instructional grant from AEC for the purchase of equipment for a graduate course in radiation biology.

Elton C. Cocke, Wake Forest College, Winston-Salem, North Carolina, has received a $750 research and publication grant from Wake Forest and the Piedmont University Center.

William H. Adams, Tennessee Technological University, Cookeville, Tennessee, has received a grant of $12,990 for the cooperative College-School science program from NSF. He has also received $16,000 from NSF for undergraduate teaching equipment at Tennessee Wesleyan College.

Dale H. Arner, Department of Zoology, Mississippi State University, has received grants of $3,500 and $1,000 from the U. S. Forest Service to investigate effects of deer and rabbit browsing on hardwood regeneration.

Paul E. Lutz, University of North Carolina at Greensboro, has been awarded a two-year research grant of $25,000 from the NSF to investigate the effects of temperature and photoperiod on rates of larval development in the Odonata. Prior support for this study was a grant of $900 from the American Philosophical Society.

William W. Miller, III, Howard College, received a $600 Sigma Xi grant for studies on the influence of central nervous stimulants and depressants on peripheral nerves.

Bruce L. Welch and **Annemarie S. Welch,** College of William and Mary, received an $18,000 grant from NASA for further research on the psychophysiological effects of prolonged confinement in small groups and in isolation.

New Appointments

Colin R. Austin, former lecturer at the University of Cambridge (England), has accepted a dual appointment as professor of Embryology at Tulane University and the Delta Regional Primate Center.

Jacques Berger was appointed assistant professor at North Carolina State.

Robert J. Beyers has joined the staff of the Institute of Radiation Ecology.

Franklin Brewer has been named instructor of biology at Mississippi State College for Women.

W. Newman Bradshaw has accepted a position at West Virginia University.

Kent E. Chernetski has left San Jose State College for the University of Florida.

Charles V. Corell is a new instructor at the University of Louisville.

J. T. Darlington, formerly of Furman University, is now associate professor at Southwestern College.

Jim Dobie is the new assistant professor at Howard College.

Aristotle Domnas was appointed assistant professor at the University of North Carolina.

W. G. Eden, Auburn University, was appointed head of the Department of Entomology in the Agricultural Experiment Station, College of Agriculture, and also of the Extension Service of the University of Florida.

Harold Eversmeyers is a new appointee at the Murray State College.

Gilbert W. Fairbanks is now assistant professor of Biology at Furman University.

W. D. Fattig has been appointed assistant professor at Southwestern College.

Henry J. Hurlbutt has joined the staff of West Virginia University.

David T. Kee has been appointed assistant professor of Biology at Northeast Louisiana State College.

Robert W. Kelley has been named a professor at Furman University.

Raymond Kisner has been named professor of Biology at Mississippi State College for Women.

Martin LaBar has been appointed associate professor and chairman of the Division of Natural Science and Mathematics, Central Wesleyan College.

Harry Lane has joined the Boll Weevil Research Laboratory.

J. Frank McCormick was appointed assistant professor at the University of North Carolina.

James F. Mathews has moved to Charlotte College as an assistant professor.

Carl D. Monk has joined the staff of the Institute of Radiation Ecology.

Larry E. Neff has been named assistant instructor at V.M.I.

Carl Oppenheimer has been appointed professor and research associate at the Florida State University Institute of Oceanography.

James F. Parnell has been appointed assistant professor at Wilmington College.

Ronald Peterson will serve as assistant professor of Botany at the University of Tennessee.

Kay Phillips has been appointed assistant professor at High Point College.

William P. Pielou has been named associate professor of Biology at Furman University.

Daniel Plyler has accepted a position as assistant professor at Catawba College.

John Plymale has been appointed assistant professor at Howard College.

Stefan O. Schiff has been appointed assistant professor of Zoology and director of Radiation Biology at George Washington University.

Roberto Varela, formerly chief surgeon and chief of staff at El Sagvado Corazon Hospital in Havana has been named assistant professor of Anatomy at Tulane University.

Fred H. Whittaker has been appointed assistant professor at the University of Louisville.

E. Wiedeman Varley is now assistant professor at the University of Louisville.

James D. Yarbrough has been named assistant professor at the University of Alabama.

William S. Hooks and **James Carico** have accepted positions with the Biology Department, Lynchburg College.

Ruskin Freer, Lynchburg College, has retired and is currently engaged in herbarium work and writing.

Gary E. Dillard has joined the staff of the Department of Botany and Bacteriology at Clemson University as an Assistant Professor. He is currently completing work for his Ph.D. at North Carolina State, Raleigh.

Mrs. E. Gibbes Patton and **Mrs. Frank Eastes** join the staff at the Department of Biology at Converse College in September.

Robert K. Burns, Interim Professor of Biology at Bridgewater College, taught the spring semester at the University of California at Santa Barbara.

Warwick R. West, Associate Professor of Biology, University of Richmond, has been appointed Chairman of the Department.

Gerald C. Sehaefer has been appointed Instructor of Biology at the University of Richmond and will teach general biology at the new urban Junior College of the University.

At Tennessee Technological University, the following have joined the staff: **Elmo S. Dooley,** Chairman and Professor of Biology; **William H. Adams,** Professor of Biology and Dean of the School of Arts and Sciences; **Mark Anthony,** Assistant Professor; **Skikrishna Ballal,** Assistant Professor; **Ralph W. Dimmick,** Assistant Professor, and **Dan Stern,** Assistant Professor. Dr. Dimmick is conducting research on mammals of the upper Cumberland region, and Dr. Stern is studying the microbiota and aquatic invertebrates in three mountain streams.

John R. Freeman has been appointed head of the Biology Department at the University of Florida. Also joining the department are: **Charlotte C. Freeman, Betty Powell Lackey, R. Gary Litchford,** and **N. Gene Vredeveld.**

Fuah M. Hahhas has accepted a position as Research Associate in Parasitology at Florida State University.

E. Morton Miller, Dean, School of Arts and Sciences, University of Miami, announced the appointment of **W. Henry Leigh** as Chairman of the Department of Biology.

Gerald Esch and **Dale Hein** have accepted positions as Assistant Professors at Wake Forest College.

Harold J. Humm has accepted the position of Professor of Biology at Queens College, Charlotte, North Carolina.

Samuel K. Laffoday and **Lewis S. Shelton** have joined the Biology Department at DeKalb College, a new junior college in Clarkston, Georgia.

Alice Louise Bull, formerly Assoc. Professor of Zoology at Wellesley College, has aceepted a position as Associate Professor at Hollins College.

Recent Appointments and Elections to Offices and Committees

Howard I. Adler, Oak Ridge National Laboratory, has been named councilor to the Kentucky-Tennessee branch of the American Society for Microbiology.

R. D. Amen, Wake Forest College, has been named program co-chairman for the Society of the Sigma Xi.

George H. Board, Dean Emeritus of the graduate school of the University of Georgia, is serving as chairman of the Athens Unit of Recording for the Blind, Inc.

W. D. Burbanck, Emory University, has been named to the Board of Trustees of the Highlands Biological Station.

Arthur W. Cooper, North Carolina State College, has been named chairman of the Conservation and Legislative Committee of the North Carolina Academy of Science.

David J. Cotter, Alabama College, has been elected chairman of the Biology Section of the Alabama Academy of Science. He has served as editor of the Academy's Newsletter for the past three years.

Urban L. Diener, Auburn University, has been appointed representative of the American Phytopathological Society to the Food Protection Committee, Food and Nutrition Board, National Research Council.

Wilbur H. Duncan, University of Georgia, is president of the Georgia Academy of Science, and chairman of the Southeastern Section of the Botanical Society of America.

A. A. Foster, Tennessee Valley Authority, has been named chairman of the Southern Forest Tree Improvement Committee.

F. C. Galle, Calloway Gardens, Pine Mountain, Georgia, has been elected president of the American Association of Botanical Gardens and Arboretums, and secretary-treasurer of the Georgia Horticultural Society.

C. O. Grogan, Mississippi State University, is chairman of the Southern Corn Improvement Conference.

J. W. Hardin, North Carolina State College, is the president and chairman of the Board of Trustees of Highlands Biological Station, and president of the Southern Appalachian Botanical Club.

Robert P. Higgins, Wake Forest College, is program officer of the Invertebrate Zoology Division, American Society of Zoologists, and vice president of the Bowman Gray School of Medicine Sigma Xi Club.

John R. Holsinger, University of Kentucky, is on the Board of Governors of the National Speleological Society.

H. Branch Howe, Jr., University of Georgia, is editor of the Bulletin of the Georgia Academy of Science.

Jacqueline E. Jacobs, has been named state director of the Outstanding Biology Teacher Award Program, by the South Carolina Association of Biology Teachers.

Clyde E. Keeler, Georgia Department of Public Health, is serving on the Georgia Subcommittee on Etiology and Prevention of Mental Retardation.

George C. Kent, L.S.U., has been named chairman of the Local Arrangement Committee of the Louisiana Academy of Science.

Paul J. Kramer, Duke University, has been elected president of the Botanical Society of America and of AIBS.

Grover C. Miller, North Carolina State College, is secretary of the Zoology Section of the North Carolina Academy of Science.

James A. Miller, Tulane University, has been elected to the Executive Committee of the Southern Society of Anatomists.

Jack H. Moore, Southern Research Institute, has been elected vice-chairman of the Biology Section of the Alabama Academy of Science.

W. H. Murdy, Emory University, is serving as secretary-treasurer of the Southeastern Section, Botanical Society of America.

Eugene P. Odum, University of Georgia, has been elected president of the Ecological Society of America, and to the governing board of AIBS.

George K. Reid, Florida Presbyterian College, has been elected president of the Florida Academy of Science, and named chairman of the Aquatic Ecology Section of the Ecological Society of America.

Donald Stone, Duke University, is a new member of the Activities Section of the Southeastern Section of the Botanical Society of America.

H. P. Sturdivant, Western Maryland College, has been elected national president of the Beta Beta Beta Biological Society.

Arnold Van Pelt has been named chairman of the Department of Science and Mathematics at Greensboro College.

James C. Wilkes, Mississippi State College for Women, has been named to the Research Committee of the Mississippi Academy of Science.

Louis G. Williams, R. A. Taft Sanitary Engineering Center, has been appointed a panel member of the Board of Examiners of the U. S. Civil Service Commission.

Martin D. Young, Director of the Gorgas Memorial Laboratory, Canal Zone, has been elected president of the American Society of Parasitologists.

Samuel L. Meyer, University of the Pacific, has been elected president of Ohio Northern University.

Honors and Awards

C. L. Baker, Southwestern College; **John Yarbrough,** Meredith College; and **E. Ruffin Jones,** University of Florida, received Distinguished Service Awards from the Academy Conference of the AAAS.

Wilbur H. Duncan, University of Georgia, was elected to membership in Phi Kappa Phi.

Jacqueline E. Jacobs received the Outstanding Biology Teacher Award for 1963-1964 in South Carolina by the National Association of Biology Teachers.

Ruth McClung Jones, Winthrop College, was named a fellow of the Royal Microscopical Society of London.

Robert A. Kuehne, University of Kentucky, was a summer, 1964, participant in the NSF-AEC Radiation Ecology Institute at Oak Ridge, and under a NSF Faculty Fellowship for 1965 will study at the Freshwater Biological Association, at Windermere Laboratory, Ambleside, England.

James F. Parnell, Wilmington College, was elected to membership in the Society of the Sigma Xi.

Te-Hsui Ma, Western Illinois University, was elected a Fellow in the AAAS.

Joseph F. Fitzpatrick, Mississippi State University, received the Andrew Fleming Award in Biology from the University of Virginia.

Stuart S. Bamforth, Tulane University, spent the academic year as Professor-in-charge of a Junior Year Abroad Program in Great Britain where he coordinated study programs of selected students working at British Universities.

Consulting Positions

George R. Bernard, Medical College of Georgia. — Consultant, Eugene Talmadge Memorial Hospital, Augusta, Georgia.

C. Ritchie Bell, University of North Carolina, is serving on the consultant bureau for CUEBS.

Albert Collier, Florida State University, was named to the Board of Advisors of the Florida State Board of Conservation.

David J. Cotter, Alabama College. — Science Consultant, Board of Education of Montgomery, Shelby, and Talladega Counties, Alabama.

Fred C. Galle, Callaway Garden, Pine Mountain, Georgia, is serving as a member of the U. S. National Arboretum Advisory Council and also on its subcommittee on Public Education.

Robert P. Higgins, Wake Forest College, has been appointed a member of the Advisory Committee for Annelida, Smithsonian Oceanographic Sorting Center.

Harold J. Humm, Duke University, has been appointed to the Advisory Committee on Algae, Smithsonian Oceanographic Sorting Center.

George C. Kent, Jr., L.S.U. — Consultant, Commission on Undergraduate Education in Biological Sciences.

Grover C. Miller, North Carolina State College. — Consultant, North Carolina High School Biology Teachers Program.

Eugene P. Odum, University of Georgia. — Consultant, Oak Ridge National Laboratory, Health-Physics Division and, Consultant, U. S. Bureau of Commercial Fisheries.

H. P. Sturdivant, Western Maryland College. — Science Consultant, Ministry of Education of India. This appointment was made through AID for the summer months.

James T. Tanner, University of Tennessee. — Ecological Consultant, Oak Ridge National Laboratory, Health-Physics Division.

Samuel R. Tipton, University of Tennessee. — Consultant, Oak Ridge National Laboratory.

James C. Wilkes, Jr., Mississippi State College for Women. — Consultant, NSF Visiting Scientists Program, jointly sponsored by the Mississippi Academy of Science.

Alfred M. Wolfson, Murray State College. – Consultant, Kentucky Visiting Scientist Program.

Martin D. Young, Director, Gorgas Memorial Laboratory, Canal Zone. – Consultant, Health Department, Panama Canal Zone, Malaria Commission, Armed Forces Epidemiological Board.

Dale H. Arner, Mississippi State University. – Wildlife Management Consultant, Weyerhaeuser Co.

Leslie L. Ellis, Mississippi State University. – Aquatic Biology Consultant, Weyerhaeuser Co. and Allied Paper Corp.

Miscellaneous

A. J. Sharp (University of Tennessee), accompanied by his wife, has, during the past few months, taken part in the NSF supported U.S.-Japan Cooperative Science Program. During that time he worked with Dr. Sinske Hattori and Dr. Zennoske Iwatsuki of the Hattori Botanical Laboratory in Nichinan, Japan; taught a short course at the National Taiwan University; collected in the mountains around Shillong, Assam, and Darjeeling; and spent several weeks in the Philippines. In mid-June he and his wife returned to Japan, but they expect to be back in the United States in time for the AIBS meetings. Before going to Japan in late October, Dr. Sharp studied bryophytes with Dr. Wilf Schofield of the University of British Columbia, and worked with Dr. Elva Lawton and Mr. Robert Ireland of the University of Washington, Seattle.

Louisiana State University

Walter J. Harman, Chairman, Department of Zoology, LSU, was appointed Research Council Faculty Fellow for the Spring Semester of this year. He will continue to serve as Chairman of the Department, but will devote the remainder of his time to research on oligochaetes.

D. A. Rossman, Nell B. Causey, and **W. J. Harman,** Dept. of Zoology, LSU, attended the American Society of Zoologist meeting at Knoxville. Drs. Causey and Harman participated in symposia on Speciation of Cave Fauna and Invertebrate Zoogeography, respectively.

H. J. Bennett, Professor in Zoology at LSU, attended the AAAS meeting in Canada during the Christmas vacation.

George H. Lowery, Boyd Professor in Zoology, LSU, spent three weeks in January and February in the vicinity of Lake Titicaca in Peru. Dr. Lowery and two of his graduate students are working on the neotropical bird fauna there.

D. A. Rossman, Ass't. Professor in Zoology at LSU, has received a grant from the NSF to work on the snakes of Mexico. He and a graduate student, **E. D. Keiser,** will spend the summer in the Mexican highlands.

Virginia Institute of Marine Science

William J. Hargis, Jr., Director of the Virginia Institute of Marine Science has announced receipt of grants approved by the National Science Foundation totaling $41,985 for three summer research and training programs: Research Participation for College Teachers, Undergraduate Research Participation and the Cooperative College-School Science Program. Six college teachers at the doctoral level will be sponsored for a 12-week program of research this summer at the Institute's Gloucester Point facilities under the RPCT grant. Ten college undergraduate students will be sponsored for 10 weeks of research at the Institute. Each will be directed and assisted in individual research projects by a VIMS scientist.

Fifteen high-ability secondary students will be sponsored in the CCSS program at Norview High School. **John I. McClurkin,** Head of the Biology Department at Randolph-Macon College in Ashland, will be the instructor. The program is a joint effort of the Norfolk City School Board and the School of Marine Science to challenge exceptional secondary school students to higher achievement and introduce facets of the marine environment into the science curriculum of the city schools.

The Virginia Institute of Marine Science, Gloucester Point was host to the seventh annual Shellfish Mortality Conference on Monday and Tuesday, Jan. 25-26. Dr. J. D. Andrews, head of the Institute's Malacology Department was in charge of the program and other arrangements.

Robert S. Bailey, coordinator of National Science Foundation sponsored summer research programs at the Institute, attended the Director's meetings for the CCSS and RPCT programs in Washington, D. C. in January. Many items were discussed at these meetings aimed toward improving the effectiveness of the programs so that both short-term and long-range goals may be achieved.

A new amino acid analyzer has been added to the Physiology laboratory.

Dexter S. Haven of the Virginia Institute of Marine Science's Applied Science Section held a seminar on biodeposition of filterfeeding organisms at the Biological Laboratory, Oxford, Maryland, in February.

VIMS was awarded a renewal grant of $16,915 by AEC to continue Mr. Dexter Haven's study on disposal of radioactive wastes and a continuation of study of role of filter feeding organisms in concentrating radioaetive wastes from the water and depositing them on the bottom.

William J. Hargis, Jr., Edwin B. Joseph, and **William J. Davis** attended the annual meetings of the National Menhaden Association at Hotel Chamberlain, Hampton, Virginia. **Marvin L. Wass** spoke to the Gloucester Lions Club on features of his Indian Ocean Cruise last year, illustrating the talk with color slides that showed harbors, ships, men and other features of the area.

William J. Hargis, Jr., Edwin B. Joseph, Maynard M. Nichols, and **John J. Norcross** of VIMS attended meetings of COMMITTEE in Washington Feb. 15 and 16. Discussed present and planned research along continental shelf. Dr. Joseph gave a paper on distribution of eggs and larval stages of gadid fishes in Virginia coastal waters.

The ASB BULLETIN

Volume 12, Number 4 October, 1965

"It's pollution all right, but it's pollution of rather a high order."

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

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C. WILLARD HART, JR.
EDITOR

MARGARET Y. MENZEL
Associate Editor

BETTY URSOMARSO, Assistant Editor

JOHN CARPENTER, Business Manager

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ASSOCIATION AFFAIRS

SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

PRESIDENT-ELECT .....

VICE-PRESIDENT .....

EXECUTIVE COMMITTEE MEMBERS (2 for 3-year terms) .....

.....

Deadline: January 1

Mail to: DR. ALVIN V. BEATTY
Dept. of Biology
Box 15272
Emory University
Atlanta, Georgia 30322

The following paper is based on a symposium entitled "Communication — Sound and Unsound — on Problems of Pollution," presented April 15, 1965 at the 26th Annual Meeting of the Association of Southeastern Biologists in Charlottesville, Virginia. Included also are some materials presented by Dr. Egler on April 29 at the annual meeting of the Lehigh University Chapter of the Sigma Xi, and on May 1 in a lecture to a group of selected high school students in a program of the Board of Cooperative Educational Services of Orange and Ulster Counties, New York.

This paper is the third in a series on the flow of SOUND AND UNSOUND *pesticide knowledge between and among the social units of the human ecosystem. It supplements the first (Egler, 1964a) and second (Egler, 1964b) papers, and reviews selected recent developments in the field.*

PESTICIDES IN OUR ECOSYSTEM: Communication III

Frank E. Egler
Aton Forest, Norfolk, Connecticut

As stated in my first article on this theme (Egler, 1964a), "The problem of pesticides in the human environment is 95% a problem — not in the scientific knowledge of pesticides, not in the scientific knowledge of the environment — but in the scientific knowledge of human behavior. . . ." Since writing those words in the autumn of 1963, there have been many developments on all fronts. Some are expressive of a greater ecological literacy within our society. On the other hand, there are undercurrents of action and reaction which are both ominous and foreboding. They are ominous because they indicate power-plays by both the uninformed citizenry and by the scientific specialists who may be eminent experts in "parts," but indubitably are not when it comes to ecological "wholes." The undercurrents are foreboding because even some of our most distinguished ecologists, conservationists, and the organizations they represent, are so unsophisticated in the realities of human behavior that they become unreliable in dealing with people outside their own circles of often starry-eyed idealists.

. . . . . .

Recent events involving the communication of knowledge from conservationists and ecologists to other segments of society alarm me as to the naivete of the former, and the astuteness of the latter.

To quote further from the previous papers:

. . . . . .

"The science of communications studies the movement of that knowledge into and among the facets of society. Unfortunately, 'communication specialists' have too often limited themselves to theoretical and actual studies of communication media, of retrieval systems for libraries and published material, of radio, television, and the press. . . ."

They are "communication technologists," interested in *how* information is moved, but blandly indifferent to what information is so moved.

. . . . . .

"It is the concept of the ecosystem which lies at the core of all the misunderstanding, bickerings, distrusts, and failures of coordination in the field of pesticide science and pesticide technology. Ecosystemic thinking coordinates the entire world — its plants, animals, soils, climate, man, and other elements — as a single integrated whole which, though it must be "managed," must also remain in relative balance if the human race is to persist in a healthy and cultural rich existence.

"Ecosystemic thinking is a late development in the field of science. It has no segregated body of literature. It has no formal departments of education and training at our universities. It has no accepted methodology. Its best analog is a spider web, where each strand is intimately connected with and dependent upon every other strand. . . ."

. . . . . .

More than ever before, the world is realizing that the pesticide problem is not a problem of what happens today on the immediate place sprayed, or on the target organism. The problem is what happens tomorrow, with the pesticide that moves, often for thousands of miles; how another organism may accumulate it, from minute undetectable quantities in its environment to many thousand fold; how it may build up through food chains; how it may react with other chemicals to form even more poisonous compounds; and how it may affect the long-term health, even of succeeding generations. Enough is known to make these possibilities very real and frightening.

. . . . . .

The changing relationship between science and technology is a case in point, where the view of the historian adds much to the understanding of contemporary conditions. At the end of the 19th century, basic and fundamental science was always one, two, or three decades ahead of technology and applied science. Consider Faraday's research in electro-magnetic induction. It was three or four decades after this research that electric

generators came into use. As history moved on, the time lapse between research and its application, between science and technology, became shorter and shorter. Before World War II, they were running abreast of each other. Today, technology is at least ten years ahead of basic science in several fields. We lose persistent broad-spectrum biocides into the atmosphere. DDT is now found in duck eggs north of the Arctic Circle, probably brought there by the ducks themselves. It is found in penguins and seals in the Antarctic, probably brought there by migrating fishes and plankton; it is even found in the ice itself, by which that ice may now be dated. It is taking at least ten years, not only for such booboos as the U.S. Department of Agriculture's fire ant control on the Gulf Coast, and the gnat control of Clear Lake, California, *simply to reveal themselves* as undesirable ecosystem upsets, but for science *to interpret* such upsets. By the time science has marshalled the evidence to ban such actions, and society has accepted such information, technology is already off in a new direction with new pesticides, once again years and even decades ahead of science. Such reckless speed on the part of technology is amply justified in the short-term exigencies of American "economic health," and the demands of our Affluent Society. That these hazards are not justified in terms of our species, our culture, our society, our civilization, is what is everywhere implied in the AAAS's special committee report on "The Integrity of Science."

More specifically, the problem between contemporary science and technology is a problem between and amongst four major strands of the American human ecosystem web: academia, industry, government, and the military. The plays and counterplays, the fronts and false-fronts amongst these groups are as yet a largely undescribed field of animal behavior. As already indicated, the ivory tower of academia is itself divided, between a minority of ecosystem ecologists on the one hand, and a majority of vocal non-ecological specialists on the other hand. The result leaves the public baffled and confused. Industry, government, and the military are the three leading power blocks of our society. I am not saying this is "wrong," nor that it could be either better or worse. I am saying that the present result leaves much to be desired in the long-term ecological stability of the man-plus-his-environment ecosystem.

Communication

"The "Social Units" of the ecosystem web are of little significance in the functions and processes of society unless they serve as sources, or way stations, or end receivers of knowledge. It is the study of this *knowledge-flow, of both sound and unsound knowledge,* which is one of the ecosystematist's contributions to the pesticide problem."

Specific case histories were discussed in Parts I and II of this series of articles. Among the many available, certain others will now be presented.

A View from the U. S. Public Health Service. One of the most quoted voices of the Public Health Service of the Department of Health, Education, and Welfare is that of Dr. Wayland J. Hayes, Chief of the Toxicology Section, Communicable Disease Center, Atlanta. He is known chiefly for his study in feeding human volunteers relatively large quantities of DDT, and not finding undesirable effects within the scope of his study. I have seen no objective analysis and review of this research, within a larger ecological context and in respect to other questions that were not asked. It is this study which lies at the root of the innumerable chain-effect public utterances claiming that DDT is harmless to man, and which seems to dominate PHS philosophy at least as it is quoted by the pro-pesticide Social Units, and not repudiated by other branches of PHS itself.

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A View from the U. S. Department of Agriculture. A significant incident involving the communication of sound and unsound pesticide knowledge is linked with a talk given by Dr. Clarence Hoffman of the Agricultural Research Service, USDA, before a group at the University of Maryland. This talk appeared in the newspapers, headlined, "Scientist sees no peril in dispersal of DDT," stating that "excellent studies have yielded no scientific evidence whatsoever that DDT has caused any damage to human beings." Dr. Hoffman is a sound scientist in his own field, and such statements are at variance with what I would expect from him as an individual.

I wrote to the Secretary of Agriculture, asking whether this AP release had his, the Secretary's, approval, and represented official policy. If it did not represent official policy, I asked whether any rectifying statement was issued. I pointed out that "the AP release referred to seems to embody much that has been openly and seriously criticized in recent years within the USDA, by scientists, scientific groups, and government bodies, concerning the continued introduction of persistent biocides into the ecosystem. With the evidence available, this instance would appear to be one in which a specialist-scientist, an agriculturist, is making sweeping statements to the public concerning fields in which he is neither trained nor competent, that of medicine and public health, and of ecosystem ecology, in both of which there are rapidly amassing bodies of scientific data and opinion that, if known to Dr. Hoffman, can only reflect unworthy reasons for his failing to acknowledge them, reasons which do no justice to the Department of Agriculture, and its role in serving the American public."

As an eminent colleague wrote me on the same matter: "I can't help but feel that this is indeed indicative of an unyielding rigidity within that Department and particularly within the ARS of Agriculture. It shows without doubt that this bulging bureaucracy is blinded by its own past mistakes and obviously officials in that

agency feel that if they deny they have made mistakes long enough the American public will believe them. That part would be forgiveable if we didn't have to tolerate a continuation of the same boners they have been making for the past decade."

I eventually received a reply from the office of the Secretary of Agriculture, in which I was informed that this particular release was not a good indication of the entire talk given by Dr. Hoffman, that it was not reviewed or cleared by the Department of Agriculture, etc. etc. etc., even to tracing the "no peril" line to the above-mentioned study of Wayland J. Hayes.

I mention this episode only as a case history, from which I would omit names if I did not feel the parties would be readily recognized. The procedure is representative of a fairly standardized and planned communications technique (even if it was not so planned in this instance). A man gives an address, which in the whole could not be criticized. The full address is not taped, nor is any copy available. Then perhaps he talks to a reporter, and they both agree on what is important. The reporter prepares his copy. The scientist is "blameless" for what appears in the newspapers. Neither he nor his agency chooses to rectify the situation by a repudiating and correcting release. The line of communication is from the scientist to the reporter in private conference, and thence to the public, (with the actual lecture to fall back upon in case there is trouble). It is these unofficial, uncleared, out-of-context, blame-unpinnable newspaper articles that may comprise the most important single communication medium that molds public opinion in the pesticide problem.

Another view from the U. S. Department of Agriculture. Far more significant than an isolated news release of a single lecture would be the role given to pesticides in the USDA's *Yearbooks of Agriculture.* Consequently we look with interest to the Yearbook for 1964 called "Farmer's World," feeling sure that this will represent official policy and pronouncement.

Except for a sound but minor expression of biological control research by entomologist Paul Oman, we find but one article dealing with pesticides, boldly called "The Place of Insecticides," appearing in the first section of the book called "Perspectives." It is by Stanley A. Hall, Chief of the Pesticide Chemicals Research Branch. This article is of immense interest, and should be spotlighted as expressive of USDA philosophy and policy, of the philosophy and psychology of its personnel, and of all that has made the USDA the focal point of one side of the pesticide problem. Dr. Hall opens his article with the indisputable statement that "No country can have an efficient agriculture without the use of insecticides and other pestkillers." His field of knowledge is (1) argriculture, (2) chemistry, and (3) pesticide residues and trace amounts. He admits that DDT can be detected "in tiny amounts." He continues that "This would be a worrisome situation if there were any evidence that DDT *in trace amounts* (italics by Egler) had any adverse effect on the health of people and animals, whether wild or domestic. But we have no evidence of any adverse effects whatsoever." Having dispensed with this supposed ogre, he is chiefly concerned with the growing resistance of insects to chemical insecticides, and thus comes the search for new and more effective controls. He is not unaware of such ecosystem breakdowns as the elm-Dutch Elm disease-beetle-DDT-earthworm-robin sequence, and the gnat-DDT-plankton-fish-grebe problem of Clear Lake. But of these, he blandly says "Our growing knowledge will help us foresee and avoid such unfortunate happenings."

Dr. Hall is an eminent specialist-scientist. Insofar as he is the voice of the Department of Agriculture on this subject, that department must be considered a specialist-science branch of the government. To consider the Dutch Elm to robin and gnat to grebe cases as unfortunate accidents that can be carved out and avoided in the future, rather than as researched instances of scientific generalities, is a degree of ecologic unsophistication so shocking as to warrant, almost, the uncomplimentary labels that one hears more and more applied to the Department of Agriculture. I would vigorously oppose such labels, for I know too many scientists within the Department who think differently. The fact remains, however, that the role of science in society is based — not on what individuals *think* — but what social units *communicate.* What the U. S. Department of Agriculture communicates on the subject of pesticides is as ecologically unsophisticated as that which the Department of the Interior, under Secretary Udall, communicates *is* sophisticated. Although the Department of Agriculture is buoyed by extremely powerful specialist interests in Congress and industry, its pronouncements in these fields have been so strongly opposed by some of America's most influential ecologic voices that I am surprised that the non-Agriculture-dominated segments of Congress have not called for special hearing.

Trends in 1965 Pesticide State Legislation. Successes in 1963 and 1964 on the part of ecology-oriented groups in stopping unsound and unwarranted aerial spraying with broad-spectrum biocides is having its expected reactions. Legislators and government "service" groups handling such "specialist" interests as agriculture, forestry, and parks, are being pressured by irate and uninformed citizens to "do something." Legislators survive by obeying their constituents. Government service groups survive, and grow, by creating the need for the services which they supply. The communication of ecologic knowledge to these groups (notwithstanding the high-minded idealism of professors and professoroids) would not help these individuals and groups (save for such outstanding exceptions as Senator Ribicoff and Secretary Udall). It would be as lethal to them as DDT is to gypsy moths.

I find certain interesting, but extremely ominous, trends in legislation being proposed. I refer to such clauses in proposed bills as those which give full authority to a state employee such as a state entomologist to exterminate (sic) an insect here declared to be a public nuisance, in any manner in which he wishes, by declaring the situation an emergency, and asking for a special appropriation of funds. The un-American part of some of this legislation is that clauses are written into the bill whereby anyone who wilfully hinders or obstructs such "extermination" activities, or tries to prevent the trespass of his personal property for such "extermination" activities, shall be subject to a heavy fine.

There are two extraordinarily significant aspects of such legislation, both of which I predict, if they are ever voted into law by governors who may not be aware of their implications, will eventually be brought to the attention of the Supreme Court.

The first aspect carries certain elements which would appear to be in direct contradiction to the Fifth Amendment. I refer not to the self-incrimination clauses of that Amendment, but the clauses involving a citizen's right to the protection of his own property. When it is known that these lethal biocides cannot be aerially applied with any precision, and even if applied from the ground with precision are known to move with surface and ground waters and in the bodies of animals, the protection of private property is involved. When there is sound scientific opinion that if the insect "pest" is on one's property — but does not constitute a social menace, such as a case of the Plague would have been in the Middle Ages — and that the remedy has an effect on the entire local ecosystem, then an individual's right to protect his own property is clearly being transgressed.

The second aspect is two-pronged. One prong has all the overtones of a police state, and will surely be picked up by our ideological adversaries. One cannot even hinder, or obstruct — despite the overwhelming evidence on his own side — without being fined. The other prong is that the "policemen" of this incipient police state, involving the many-stranded webs of a total ecosystem, are only but one-strand specialists. This is as if dentists — albeit very fine dentists — were suddenly to be made policy-making and police-control dictators of our hospitals and of all private medical practice. In this case, entomologists may be given comparable authoritarian positions on total-ecosystem matters, involving the food we eat, the water we drink, and the air we breathe, even the DDT-content of the cleaned clothes we wear. One has only to read *BioScience* 15(2): 158-159 to be aware of the potential Lysenkoism of the Entomological Society of America. I have had too many fine unsolicited letters from entomologists to make sweeping statements about them, even the majority of them. Troubles can arise however from an organized minority, if the majority allows it. The Russian geneticists who did not survive Lysenkoism — were they here — would back me up.

To return to the problem of pesticide legislation, I am developing an increasing number of contacts. There are of course all degrees of every human attribute involved. The incident now to be mentioned, I do not consider atypical: The legislator involved gave no indication that he had any scientific knowledge of the insect pest involved, of the effects of similar legislation — or of any legislation — in other states, or the indirect and side effects of the control treatment. Nor did he give any indication that he wished to know.

His entire philosophy seemed to be dominated by the fact that some of his constituents were "on his neck" "to do something." So he was doing something. And his second obligation was to convince his fellow-legislators in the appropriate committee to vote for his bill. Period.

I offered to visit some of his constituents (not to influence them, I assure you, but simply to observe them, and to try to understand their belief systems). I was denied that privilege. The legislator wrote me, "Perhaps some fine day, I'll take you up on your offer to meet some of my angry constituents who want action and not theoretical words. I'll be happy to witness how you fare. But I warn you, you had better come up with a solution better than that which has thus far been offered by the scientists." In another communication, he says "I happen to be somewhat of an engineer myself, and I believe that theory comes first. But I am a most practical man, and never indulge in day-dreaming. I should love to take you and your colleagues to talk to some of the wives, mothers, and children who have felt the impact of little or no protection from gypsy moths last summer. Here is what they would tell you: worms crawling into the house, through doors and windows; into newly-washed clothes; into dishes; under furniture and rugs; covered houses by the thousands; sweeping brought mangling and unbearable smears; many women and children left their homes, hysterical and terrified; worms found in baby cribs and playpens; barren trees, shrubbery, and lawns; no birds, because without leaves, they will not nest; etc. One first selectman testified that, "I don't mind sanding in the wintertime, but it is ridiculous when I sand roads in the summertime, over slippery pavements covered with worms." (I have never been able to verify this oft-heard story, on the part of Town Selectmen. It makes a good story.) "I should like your ornithologists, ecologists, botanists, naturalists, conservationists, and members of the Audubon Society to *really* live under the terrible conditions above expressed, and then see what you would have to say. It is alright (sic) to theorize, but it doesn't sell to the general public if you do not have the ready remedy." (Clearly his constituents belong to small-lot suburbia, reminding me of a population of what I have elsewhere described, in all seriousness, as lawn lizards and barbecue pit vipers. His legislation however involves thousands of acres of uninhabited forest land.)

It may or may not be significant that the per capita cost of education in his town is the lowest of his entire state, and is very close to that of the state which has the lowest of the entire nation.

The Pennsylvania Department of Forests and Waters. The behavior pattern of the social unit called the Pennsylvania Department of Forests and Waters during the last two years, and reactions to it, have been extremely illustrative of some of the problems in the communication of sound scientific knowledge involving pesticides in the ecosystem. Actually two episodes are involved: I. The 1964 gypsy moth problem, and II. the 1965 canker worm problem.

I. — A gypsy moth outbreak the previous year in certain areas of Pennsylvania had the expectable results amongst the populace. There are citizens who get frightened at the temporarily — and surely undesirable — bare forest, and want "to do something." There are those whose private interests are benefited by actual pest control activities. And there are those non-ecosystem-informed people whose science involves two strands of the web, the gypsy moth and timber. In the case of a government agency responsible by statute for the well-being of the forests, this is an emergency. Technology to the rescue! That the "emergency" was forseeable, and could have been anticipated by a broad program of ecosystem research in previous years is illogical hindsight. It is like the man whose cluttered attic and cellar will turn a minor fire into a conflagration, where only complete ruin of the house by water will "save" that house. I am not aware that these outbreaks have resulted in any increased research or planning on the ecosystem level.

The Department of Forests and Waters published Forest Pest Report No. 15 "Statements on the Use of Pesticides," on February 7, 1964, a paper which was still being distributed as of July 31, but was withdrawn soon after. This is an extremely interesting document in that it takes no stand itself, but "deals exclusively with statements and resolutions made by various organizations on the "pesticide controversy." It should help to clear up any misunderstandings which may now exist." We thus find that the Department of Forests and Waters serves only as a channel into which certain waters are selected to enter, and out of which those same waters gush with the stamp of official and collective "approval." These phenomena are of great interest to the observer and reporter of science communication, if only on the ageless adage that birds of a feather flock together, regardless of the names they call themselves, or of the artificial feathers with which they plume themselves.

In this instance, ecosystematists jumped to fill the gap (though I regret to say that those who made the critical moves were not government or university scientists). For March 25, 1964, at the "Natural Resources Conference" of the Garden Club Federation of Pennsylvania, Mrs. Ruth Scott, Conservation Chairman, invited National Audubon Society, Staff Biologist, Roland C. Clement, to discuss this report. His own statement (Clement, 1964) is a contribution of permanent and lasting merit. The combination of the two are worthy of study by all who are interested in the social problem.

Roland Clement, whose discussion was also presented on television, considers point by point, the "authorities" adopted by the Pennsylvania Department of Forests and Waters. He gives credit where credit is due. For example, he refers to the long December 12, 1963, release of the Entomological Society of America as "As the most sophisticated statement of the lot," but adds that "the Society avoids posing as the defender of the public's health and diet, as it did in a February 20, 1963, statement." "It does not appear to concern the drafters of this statement that they make economic entomology appear the sole concern of their Society." About others he is less charitable. On the *Sports Illustrated* article by one of its lady staff writers, he says "One cannot avoid wondering whether some clever PR man planted this with its authoress so that the fair sex might seem to help "right the record" against Rachel Carson." (This is no unfair surmise.) The practice is probably fairly common. I have a case on record where the PR representative of a major New England power company had wined, dined, and cadillac-ed a well-known garden club lecturer and writer, and effectively insulated her from the three scientific sources in the state. When I first contacted her, unfairly *sans* wine, etc., she gushed praise of these industrial St. Georges of conservation, and spoke of a major manuscript soon to be finished for them. (To my knowledge the manuscript was never finished.) Concerning "Reader's Digest account of "The Great Pesticide Controversy" by Strohm and Ganschow, — (it) turns out on careful reading, to be another assurance that everything is all right by authors who don't know how to ask questions." This is hardly surprising, for the predilections of these writers is already known, and role of Reader's Digest was well established when, on considerable soul-searching supplemented by effective outside influences, they chose to let lapse an option to publish a condensation of *Silent Spring,* and instead reprinted the famous *Time* article (Vol. 80, No. 13, Sept. 28, 1962), itself a coup for the chemical industry, that appeared right after *Silent Spring* was published.

Roland Clement continues, "The next item tries, again, to pass off Mr. Edwin Diamond as an early collaborator of Miss Carson's, and one who left her in disillusionment. Even though the September 28, 1963, Saturday Evening Post made this claim for Mr. Diamond, the facts seem to be otherwise. Yes, the matter should be set straight. I recall talking to Miss Carson on this subject. Even in a matter that was so unfairly unfavorable to her, she showed neither anger nor scorn, but only a wistful humor. Her reply was to the effect that Houghton Mifflin had employed him, to do research on the subject for her, but that he simply was not turning up anything new to her, and that any continuation of the relationship was redundant. This view is supported

by a letter dated October 4 from Houghton Mifflin to the Saturday Evening Post, stating that Mr. Diamond was employed by Houghton Mifflin from March to June, 1958. It includes a copy of a letter from Houghton Mifflin to Mr. Diamond, as follows: "I am returning under separate cover the envelope of magazine articles, news releases, extracts from the Congressional Record, etc. . . . I have not sent this to Rachel Carson or her agent; in fact, I am sure that Miss Carson already has this material in her files."

I wrote to the Pennsylvania Department of Forests and Waters on August 21, 1964, asking if there had been any subsequent public statements on the use of pesticides. I received an undated brief reply to the effect that the Department "has made no public statements on the use of pesticides, neither has the State Pesticide Committee. In view of the touchy nature of the subject, I do not believe we wish to make any comments at this time." To whom should the citizens turn for sound information, when those scientists who *should* know and talk, go dumb, in the face of a controversy created originally by the non-scientific technologists of industry?

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Problems with editors, anonymous reviewers, and publishers are serious enough in the scientific world, in contrast to the immediacy of mass communication commanded by industry through their advertising agencies.

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II. — The 1965 canker worm problem. In justification for my concern for the inadequate communication of sound scientific knowledge in Pennsylvania, the storms that arose and are still blowing in 1965 are far worse than in 1964, involving the same people, in the very same roles. This time it is a canker worm infestation in certain counties, for which the same Department of Forests and Waters decided to spray aerially with DDT. This time supporting legislation has been introduced deliberately designed to curb the ecological opposition by police-state tactics. As of this writing, the end result is not known. Certainly something should be done for peak canker worm infestations. Certainly something *should have been done,* years ago, by the research branch of the state department charged with the well-being of the forests. The areas were sprayed with DDT. Pennsylvania State University, through its chemical pesticide laboratory and through a chemist (not a biologist), has taken a most non-ecological view that such action will not change the "balance of nature." As a hush-puppy for the ecologists, 1,000 acres were sprayed with Sevin (here said not to harm any insects other than canker worms!), and another 1,000 acres sprayed with *Bacillus thuringiensis.* Regardless of the desirability, or the elaboration. of research on these 1,000 acre study areas (I hear of no unsprayed check area), the myopia of this research leaves unresolved, un-sensed even, the most important concern of the ecologists. That concern is that the sprayed areas are themselves but strands in the total ecosystem web. It is what happens on those *other* strands that concerned Rachel Carson and that concerns the many other all too silent ecologists, what happens to the woodcock that accumulate pesticides at both ends of their migratory ranges, to the duck eggs in the Arctic, and to the seals and the penguins of the Antarctic. . . .

It is a satisfaction to report that other individuals in Pennsylvania very vigorously fought, even if unsuccessfully, the engrained stubborn, dangerous, and ecologically ignorant views of the Pennsylvania Department of Forests and Waters. It is a pleasure to report that amongst the many papers in my files concerning this case, I find repeatedly the names of Professor Francis J. Trembley of Lehigh University, and of Maurice Broun of Hawk Mountain Sanctuary Association. Nevertheless, I find no releases under the aegis of Lehigh University, and Dr. Broun's release makes no mention of Hawk Mountain Sanctuary. It is a pleasure to report that Mrs. Ruth Scott, as Natural Resources Consultant for the Garden Club Federation of Pennsylvania wrote a three page letter to the Department of Forests and Waters that would have done credit to a scientist, and effectively shredded every inadequate "scientific" reason that the Department had used to support its program. I wait to see whether this letter remains a private communication between two individuals, in which role it will undoubtedly have no influence whatever, or whether the Federation gives it wide publicity, in which case it will have considerable influence.

It is not a satisfaction to be unable to report other well-known individuals and organizations who could have, who should have, who might have, played important public roles in this problem. Silence sometimes shrieks.

Conclusion

Lest it be thought that my contribution at this time is entirely "destructive," and not at all "constructive," I wish to close on two constructive notes. For the first, I am indebted to Red China (Lear, 1965), and for the second, I am indebted to an eminent mathematician, whose name I withhold, for I am sure he wrote me in confidence.

Chen Yung-kang was a peasant with two years of schooling, and a genius for developing improvements in rice agriculture. He was noticed by science and government. Once the professional scientists had analyzed and confirmed the integrity of his underlying science, Chen Yung-kang, as "the peasant scientist," was given full opportunity to develop his ideas with lands, laboratories, and personnel at his disposal. Even more importantly, he became the medium for communication from academia to the peasants, communicating not only his own ideas, but other scientific ideas as well, speaking to the peasants, as a peasant, in peasantese. In support of this program, Chen Yung-kang was given enormous publicity, unquestionably linked with politics and propaganda worthy of P. T. Barnum. Even further, other

peasant "scientists" were recruited who, trained suitably in minimum scientific information, could communicate to the crop-growing peasants in language they could understand. I see certain analogies to our own Agricultural Extension Services, although both our American . . . scientists and their superiors are often criticized, apparently on valid grounds, for being "specialists," without adequate ecological breadth. I also see analogies with the sweeping campaigns (not yet described by a sociologist) mounted by industry, to discredit Rachel Carson's *Silent Spring*. I would like to see American ecologists do half as well.

My second constructive suggestion is a two-part story. My mathematician friend, knowing my approach to these problems in terms of human sociology, urged me to get acquainted with the anthropologists instead. It seems that an anthropologist colleague of his was describing some African experiences. When it seems desirable to make some changes in the behavior of a native tribe (as in disease control), it should be done with the least possible changes in their belief systems, rather than by hoping they would digest a capsule version of several centuries of accumulated Western medical knowledge. The given example involved the taking of a poison antidote, under circumstances where the natives believed the poison traveled up the tendons. It seems that the native could be induced to take the antidote, while still believing that the poison traveled up the tendons. Do you see the similarity with our own natives and peasants?

The second part of this story relates to the fact that this same anthropologist was engaged in a project for the Army Quartermaster Corps. He reported much discomfort in trying to convert the quartermaster colonels to the anthropologist's viewpoint for their army project. My mathematician friend spotted the similarity, and urged his anthropologist friend to treat his colonels as members of a native tribe. Word comes back to me that the anthropologist has had increased success with his colonels, and a very great increase in his own piece of mind.

I present these stories without facetiousness, and with all seriousness. It is my opinion that until ecologists learn to communicate, not only to their specialist colleagues, but to the people, native tribes, Army officers, and other segments of our society — without undue disturbance to their simple belief systems — the "Revolution in our Environment" which the pesticide technologists are precipitating, even if with the self-righteous fervor of an ancient Medicine Man, may well be more than that to which the human race may be able to adjust.

Discussion

John Cairns, Jr., (Academy of Natural Sciences of Philadelphia.) Dr. Platt and I agreed at dinner that the best thing we could do was to cut my comments to three or four minutes, and move right into the audience participation. My comments will therefore be brief.

Surely, we all agree that our "management" of our environment might be improved. We biologists will fulfill much of our social responsibility if we provide useful alternatives to the people polluting the environment.

First, biologists must communicate the value of adequate pollution abatement to both industrial and civic groups. We must not be ashamed to mention money — communications will be more effective if some portion is devoted to economic aspects of pollution. In industry, safety programs have been successful because they have had both financial and humanitarian values. Since the results of pollution abatement may be seen by stockholders in terms of reduced dividends, or by consumers in terms of increased product cost, they must indeed be unusual people if they do not ask what personal benefits the alternative of better pollution abatement will bring.

Second, biologists must take their place with the chemists and sanitary engineers in the assessment of pollution. We need not be intimidated because their data may be expressed numerically — so may biological data! But more important is the fact that ultimately we must know the effect of pollution upon life's processes. A chemical determination is of real value only when it can be related to an effect. In short, chemists, biologists, and sanitary engineers must communicate with each other to establish a meaningful program of pollution abatement.

Finally, we biologists must learn to study the ecology of our entire environment — the garbage dumps, the sewer outfalls, the urban areas, and the abandoned lots — as well as responding to the lure of the natural undisturbed areas. Only then will the information and techniques for rehabilitation of damaged areas be available.

Audience Participation

Jesse C. Thompson, Jr. (Hampden Sydney College): It just occurred to me that this seems to be a one man crusade, and I think it such a good one that it should shame all of us that we haven't offered some help. I think that scientific groups such as the ASB, state academies, and associations of this type should take a more active role in supporting some of the issues that the speaker has mentioned tonight.

I would like to ask the speaker if he feels that his colleagues are "four-legged, crooked-tailed lizards" [1] for not serving as allies.

Egler: I appreciate your comments. I honestly did not wish to imply that each and everyone of you have other obligations within your professional connections. I think it's excellent if we all recognize that we belong to a "social unit," and are an integral part of it. On the

[1] Reference to "lawn lizards and barbecue pit vipers," page 82. — Ed.

other hand we are not completely free creatures, and cannot, understandably, talk out on certain matters. In short, I feel that there are missing links in the social system. It is not part of your job to come down and speak at certain legislative hearings. In fact, many professional men are forbidden to speak at hearings for state and federal legislatures. I don't know — I'm not quite sure — what the answer is. To some extent I feel that most scientists can speak out if they so chose. Bear in mind that every time you are involved in a "system," an "ecological unit," you loose some of your freedom. I've been muzzled and taped also. I have the good fortune, for the last twenty years, of being in a position where no one can fire me. That is something that most of you don't have. Of course I "paid up for it," as by keeping cars for twelve years, and things like that. Recently there has been more and more recognition of the social limitation of scientists. But let's put it this way: We scientists are working at a disadvantage. We don't have the money to compete with other segments of society that are influencing the public. State agricultural experiment stations, for example, take our tax money to convince the taxpayers that they should support the experiment station. And this ecosystemic feed-back goes round and round and round, a self-perpetuating system. I did not wish to insinuate that scientists are to blame. I feel that if we recognize the social situation, something new and constructive will evolve. Now do any of you have an idea of what might evolve?

William J. Hargis, Jr. (Virginia Institute of Marine Science): I would suggest that one thing that can be done is that academic biologists can introduce concepts of ecology and of society's environmental problems into the courses being presented to all undergraduates. They can also attempt to impress biology majors with the various important natural resource problems that exist, and with their obligations to society and to reduce, somewhat, the emphasis on the "ivory tower" approach to biological science. Twenty years ago, when I was taking general biology, I do not recall that these problems or the responsibilities of the student, potential biologists, to society were stressed by my teachers. I would suspect that this is still a characteristic of most undergraduate biology courses and programs.

One further comment — you suggest that we have to adopt the communications techniques of the nonscientific segment — the citizenry, of society, in order to sell them on the importance of natural resources and their preservation, and I agree with you. This is perhaps the most successful approach, but when one does this he must realize that he is adapting to the requirements of the situation. This may at times bring guilt feelings to the scientist because he is not presenting the full story — the complete facts. This is the "Madison Avenue" approach and is a necessary imposition and adaptation, but it is not the fully scientific approach. One must be satisfied to bear this guilt if one is going to make headway in this fashion. One has to be a salesman and be prepared at times to feel something less than a scientist.

James B. Ross (Reinhold Publishing Corp. and The Nature Conservancy.): It is quite apparent that there are many things wrong with what biologists and environmental scientists in general have done in this area. Or there have been many things wrong in that we have not done enough. I would be interested, Dr. Egler, in your making a few suggestions to us, positive constructive suggestions of things that might be done by people such as those of us in this room tonight. For example, what is your attitude and what suggestion do you have on the use of biological controls, or "natural" controls, in the cast of the lady that does have bugs on her plants.

Egler: I would like to start one step back. The preceding gentleman pointed out the two facets of the picture that I believe we should all follow. One is to accept the citizen as a citizen, to talk in his language. The other facet is to try to educate the general public. This education must happen in our general biology courses, in our high school biology. It will take at least a generation, in my opinion, until the voters become ecologically literate. I'm greatly interested in knowing of any general biology course at the university level which has integrated a large amount of ecological thinking into it. I've been trying to make a survey of this field; and the results to date have been essentially nil. If any of you are teaching general biology that is strongly ecology-oriented, I would hope to talk to you during the next day or so.

On the subject of biological controls, which I confess I had not touched upon before: It is a tremendous field, which will surely be exploited in the future more and more. It's one of those developments that progresses more slowly. There are many complicated angles: The matter of predators of undesirable insects; of diseases; the various techniques for finding a weak link in the life cycle; sex attractants. The Gypsy Moth lure has been synthesized, a sort of entomological version of My Sin perfume, which can be extremely effective. It attracts males even from extremely long distances. In other cases, insects come and get electrocuted, or are killed off in some other way. But bear in mind, these fields of knowledge involve a critical sociological hiatus that requires unusual efforts to push it forward. Who is going to pay for the development of research in this field, if for example the screw worm of Florida is eradicated? What future business is there, if no screw fly exists, to be eradicated by the eradicators? Bear in mind that control people like to control. They really don't like to eradicate. "Eradicate" is only the word they use to sell the public on their technique. On the other hand, we have Lester Swann's book on *Beneficial Insects*. In my opinion (insofar as I've gone through

it — its been on my desk only a week) it seems to me an extremely sound compilation of most important information. Here is a field where we might well influence our government agencies to carry on far more research. I feel that professors and scientists can effect such influence. Are you involved yourself in biological controls? [To Ross.]

Ross: No, Dr. Egler, I'm Jim Ross of the Nature Conservancy, [apology from Dr. Egler for not catching the name] and I think what I was getting at was are we approaching this on the defensive, or are we trying to find a positive scientific approach. Are we saying to the world "you are damned unscientific in what you do," without offering this world scientifically acceptable means for solving their practical problems?

(*Tape change here, about two minutes lost.*)

Egler: To the contrary, when we assume that we, as human beings, are not intelligent, much of the behavior of society makes much more sense. This very day there are floods sweeping through parts of the country. Immediately we are using the taxes of everybody else to rebuild in the very same places. Now if ants did that, we would say they were decidedly stupid, victims of blind instinct. Acting on the assumption that not only science, but intelligence itself, may be a human rationalization, it seems to me that we can then approach some of these social problems more effectively. You might then say we can help mankind despite himself, not because of himself.

Now in a sense I haven't answered your question. There is no answer to it. But simply thinking about it is a help. I've never gotten very far, nor felt very satisfied, when I've assumed that man acts like an intelligent organism.

Joe A. Edmisten (University of Georgia.): Last year at the annual meeting I reported on my research with ABS [*ASB Bulletin*, 11(2): 42], the active ingredient of the hard detergents, and no one was really surprised when I found that this detergent killed vascular plants, and killed many fish and insect larvae at 20 ppm and 10 ppm. My question is: I've recently repeated these experiments in my lentic ecosystems with Tergitol, a new soft detergent, and I found that it is bio-degradable as they claim, but it has quite toxic effects on many organisms in the first few days. Now this I think is valuable information; how do I get this information to the [citizens], when I'm overloaded with teaching and there's a backlog in *Ecological Monographs*?

Egler: Am I supposed to answer what only God can answer?

I appreciate your bringing up the important information about detergents; I was unaware of the detail. I think it simply shows again that our scientific knowledge is far behind the knowledge communicated to the public. At the present time there is a tendency, effort, to use Sevin instead of DDT. Those of you who want to know something more about Sevin, write to the Connecticut Citizen-Scientist Committee on Pesticide Use, (R.F.D., Morris, Conn.). I have a paper here giving some data on it. It is not all it's cooked up to be, by any means. Although Sevin is not long lasting, it has been closely related to a case of leukemia, it affects other parts of the eco-system, especially bees; it is possibly preferable to DDT. But after all murder in one way or another is still murder. Upsets to the eco-system are still possible, but it will take another five or ten years to find out what Sevin does do. By that time the technicians will be up with something else. It's a problem in our society. I'm not suggesting a solution to it. I think if we are all aware of it, we'll be far better able to act in those instances when we can act. Do you have any information on the detergents that you would like to add here [aside to Cairns]?

Cairns: We have carried out some work with linear sulfonates which indicates they are definitely more degradable than the old ABS, but are of comparable or perhaps slightly greater toxicity to aquatic organisms. Swisher *et al* [R. D. Swisher, J. T. O'Rourke, H. D. Tomlinson. 1964. J. Am. Oil Chemist's Soc., 41: 746] have shown that the toxicological effects of the degradable detergents are remarkably similar to the comparatively non-degradable prototypes. However, there is an even more important aspect to Dr. Edmisten's question, and that is that even if we get the research information to the public, it should not be used directly — especially by those with no ecological background. The complex interactions of a natural environment may cause a response to a toxic material to differ appreciably from the laboratory response. This does not mean that laboratory bioassays are useless, but rather that they should be coupled with field observations and ecological common sense.

Egler: Two other little episodes come to mind that are apropos here, on the slowness with which we are developing our knowledge. If I understand correctly, there is a sunfish in the lower Mississippi that has developed a massive resistance to Dieldrin, to the point, I believe, of 40 ppm in its blood. Now, if this is so — and this is a projection of information — that in the flesh would be about four times that quantity. This situation means that about one pound of sunfish should, according to our present knowledge, kill a man. But we do not have the scientific "evidence" for that. We're a little bit slow on man himself.

Similarly, just two weeks ago, in *Science* magazine (I believe most of you've seen it), there was another DDT story, out of Dartmouth. The most interesting point, in my opinion, is almost lost in the whole paper. It would appear that the use of DDT there is not affecting the insects, the target organisms. They have developed a resistance. The birds that migrate in sev-

eral weeks later feed on the DDT-loaded insects. Result: feet up.

Our spraying now is not affecting the target organism, but affecting other organisms for which it was never intended! Bear in mind that the pesticide problem is not a matter of what gets killed right away, or what the residue is. We should be concerned about what is not residue. That "not-residue": Where it moves, how much accumulates, with what it interacts, and how it concentrates — sometimes seventy thousand times, in a relatively short period. Those are the ecological problems!

William D. Burbanck (Emory University.): I'd like to have your comment on two points. One of them Gene Odum made in a talk at a similar time on a similar subject, about the plant food of Man. He raised the interesting question: One of our problems is that we are developing food that is not only palatable to man, but also to insects. If we would grow food not palatable to insects, but which we could process for human consumption, we might, in one fell swoop be able to take care of one of our greatest problems.

The other thing that perhaps you would comment upon is the statement made, I think, by an English biologist that their testimony is accepted in court on legal cases dealing with fish-kills and other such havoc in nature. I don't believe this is the case in this country. If it were perhaps we could take a giant step forward if we could gain that sort of status.

Egler: Your comments bring up a good many points, more than I can answer right now. I have a high respect for both Odums. From the standpoint of foods, finding materials which are not palatable to insects of course is a type of "biological control." Again, this requires vast amounts of money for research. Industry will not put money into this type of research as readily as in other types. When it comes to palatability of food: Of course I like food. If it's going to taste all right to me, I may go along with it. Otherwise I'm not, regardless of what an insect thinks. On the subject of the legal situations: every state, every nation, is different. Some literature has come recently from England and Sweden on the subject. In New Jersey the attempts of a group of landowners to stop the spraying of their lands for Gypsy Moths has apparently foundered. I did not choose to be in on the court case, for I wished to be an "observer." (There are some advantages you know.) It seems that in New Jersey if a private owner suffers damage, "too bad"; it was a mistake. Unless he can prove without doubt that he is going to be damaged, he can't stop it. This was the decision of the judge. Now you add that up, and see where you get. It was Roland Clement who brought up the fact in another New Jersey situation that the Fifth Amendment might be of importance here, not to the extent of not incriminating oneself, but that there should be no due process of law that would deprive a private citizen of his property or rights, or damage to them. He feels that the Fifth Amendment will soon be applied for the benefit of those private owners who do not wish their property invaded, altered, affected, such as by aerial spraying. The spray moves. In such an instance, we may have a legal claim. Bear in mind that "bio-politics" is another field I should like to talk about at some length. The knowledgeability of our legislators is something that should start in the grade schools; but in many instances it hasn't started yet.

Arthur W. Cooper (North Carolina State College.): I have a couple of observations, and I'd like to make a point relative to Dr. Burbanck's question. It doesn't seem to me that the case is quite so glum with respect to acceptance of biological data in court cases. There is on record a case in Massachusetts where a program to halt dredging and spoiling on a given salt marsh was upheld on the basis of purely biological data. These data were accumulated by a scientist at Woods Hole and given as testimony by him in the case. I have read a copy of the judge's findings and it is very interesting reading for biologists. He was thoroughly convinced of the importance of the salt marsh in question to fisheries, and he was convinced by the biological data presented. This brings me to the other points I wished to raise. I would like to take some exception to one of the points you made, Dr. Egler. As scientists, I think we have much more of an obligation to speak out than you communicated to us. I think the very kind of position we hold, and the training we have had, virtually demand that we speak out when we are able and when the circumstances permit doing so in an effective manner. The other point I want to make is that many times our research is directed in such a way that it doesn't provide data that are useful in arguments with laymen, [and] in some cases, they're a hell of a lot smarter than we are. The question of value of marshlands is a good case in point. Although a great deal of data have been accumulated about marshes, very little data have been accumulated which might suggest the value of an acre of marshland and what you are losing economically if you destroy this. If we could in some way get into the "numbers racket," which the Corps of Engineers and developers play regularly, if we could perhaps prostitute ourselves somewhat, we might just be a good deal more effective in our discussions with laymen.

Hargis: It's still prostitution, and you have to recognize it.

Cooper: That's possible, yes, but I think that in some cases, for example in the case of a salt marsh, you might be able to live with your value numbers a little bit better than you could in some other cases. Would you agree or not [to Hargis]?

Hargis: I would object to it.

Egler: Would you [Cooper] care to comment on why

C. H. W. Foster, the Commissioner of Natural Resources in Massachusetts, was going to spray with DDT on Cape Cod despite all the scientific evidence; and after only one week of public resistance switched to Sevin? C. H. W. Foster is an interesting character — can you say anything about him?

Cooper: Yes, I know him reasonably well. I spent three days with him just about a month and a half ago. What I just said about the legal case involving salt marshes was based on that meeting.

Egler: Which comes first with him, politics or biology?

Cooper: As I am not Mr. Foster, I would not want to answer that question. I do think, though, that he is quite sympathetic to and cognizant of biological points of view. However, there is no question but that the position he occupies is a very difficult one.

Selected Annotated Recent Literature

American Institute of Biological Science. 1964. Some useful basic publications on pesticides. — BioScience, 14(11): 39. — An annotated list of 25 publications. This bibliography appeared in the special issue devoted to the pesticide problem, containing six invited articles.

Anderson, Jim. 1965. The fate of the predator — to be — or not to be — alive. — Defenders of Wildlife News, 40(2): 18-24. — This is a sound introduction to the predator control problem, in which government technology is several decades behind current ecologic knowledge. Predator control, receiving much attention in current magazines and journals, is handled in a division of the Department of the Interior, a semi-autonomous unit so dominated by the demands of western stockmen who believe that Uncle Sam should foot the bills for the destruction of that they think are pests in their own backyards, that the division has been immune to the ecologic thinking of Secretary Udall. I find it interesting that a bill has been introduced in Congress that would transfer Predator Control from Interior to Agriculture, where presumably its now-threatened activities would be made safe by the one-strand-specialist-thinking of that Department. It remains to be seen how many Congressmen fall for this anti-ecologic ploy.

Anderson, Mabry I. 1964. The Case FOR Pesticides. — Field & Stream, September, 1964: reprint, 4 pages. — This article is subtitled "There are two sides to every story. Here a lifetime sportsman, conservationist, and crop sprayer presents some interesting evidence for the defense." This is what one would expect from a sportsman-cropsprayer (though not from Field & Stream), and is the best expression of its kind. It should be in the hands of every biology graduate student, as a whetstone on which to sharpen his scientific acuity.

Biological Sciences Curriculum Study, AIBS. 1963. High School Biology-Green version. — Chicago, Rand McNally. 749 pp. — The ecology-oriented green version will probably do more than any other single publication in bringing ecosystem thinking to the American public, even if to the next generation. It, together with the yellow (conventional biology) and blue (molecular biology) versions were collectively reviewed by Frank E. Egler in Ecology, 46(2):

Cohen, Adolph I., Justin Frost and Malcolm L. Peterson. 1965. Pesticide Series No. 1 — Problems and Possibilities. — Scientist and Citizen (Greater St. Louis Citizen's Committee for Nuclear Information) 7(5): 1-14. — This, first in a series to appear in alternate issues, is a sound, sober, and dispassionate treatment of the total subject, with emphasis in this issue on agriculture. The many questions asked remain unanswered. The hazards are not minimized. The citizen should think twice before deciding.

Clement, Roland C. 1963. Memorandum on Papers in a "Symposium on Use and Effects of Pesticides, Albany, New York, September 23, 1963." — 4 pp. mimeographed. New York, National Audubon Society. — A candid and valuable analysis of the papers, classified as "1. Constructive, 2. Useful if Amended, and 3. Misleading."

————. 1964. Education in the Use of Pesticides. — 2 pp. mimeographed. New York, National Audubon Society. — A step-by-step reply to the February, 1964, "Statements on the use of Pesticides" issued by the Pennsylvania Department of Forests and Waters.

Commoner, Barry, et. al. 1964. The Integrity of Science. A report by the AAAS Committee on Science in the Promotion of Human Welfare. — 47 pp. replicated typescript. Washington, D. C., AAAS. — Certainly one of the most important scientific papers of the year. Except for a flurry of newspaper attention at the time of its presentation at the annual AAAS meetings, this document seems to have been passed by. In a carefully reasoned analysis on the Starfish experiment (high-altitude nuclear explosions in the Van Allen belts), the West Ford project (to encircle the earth with orbiting belts of fine copper wires, for military signaling), project Apollo (to land a man on the moon), and a variety of environment-affecting activities involving insecticides, herbicides, detergents, drugs, and radiations, this eminent AAAS committee came up with some extremely disturbing opinions on the imbalance between science and technology.

Connecticut Citizen-Scientist Committee on Pesticide Use. 1965. Fact Sheet on Sevin (carbaryl). — 3 pp. mimeographed. Distributed by Gordon Loery, R.F.D., Morris, Conn. — In the spring of 1965, Sevin is being used by aerial sprayers in instances where public opinion, or their own consciences, prevent the use of DDT. Sevin is less persistent, and less toxic to some

non-target organisms than DDT. On the other hand, it is highly toxic to honey bees. What happens to the numerous hymenopterous parasites of highly destructive forest insects is a question the foresters are not asking, or if asking, are not attempting to answer. Furthermore, recent evidence has been released by the Food and Drug Administration that Sevin and certain other pesticides produce birth defects in chick embryos of the thalidomide type.

Cottam, Clarence. 1964. The Ecologists' Role in the Problems of Pesticide Pollution. — 16 pp. mimeographed. Sinton, Texas, Welder Wildlife Foundation. — Text of a paper before the Ecological Society of America, representing its subcommittee on Environmental Pollution. A masterly presentation by an eminent ecologist, speaking for the leading ecological organization of America. That it has received no wider recognition or distribution than it has, even by the E.S.A. itself, is one more indication of the weakness of this group in American affairs. The fault is not entirely its own, for who would finance these matters? Compare, for example, the influence of the other E.S.A. (The Entomological Society of America).

Egler, Frank E. 1964a. Pesticides — in our Ecosystem. — American Scientist, 52(1): 110-136; and "Letters" in Sierra Club Bulletin, 49(8): 10, 50(1): 12.

————. 1964b. Pesticides in our Ecosystem: Communication II. — BioScience, 14(11): 29-36; and "Letters" in BioScience 15(2): 158-159.

Lear, John. 1965. How Red China is taking science to its peasants. — Saturday Review, 48(10): 45-46. — An illuminating contribution to the problems of communicating sound scientific information.

Morgan, Allen H. 1964. Memo Re: Traveling Symposium on Pesticides, sponsored by the National Academy of Sciences, November 15-21, 1964. Confidential. Lincoln, Mass.: Mass. Audubon Society. 8 pp. dittoed. — A candid documentary of this valuable symposium which brought together high-ranking scientists from industry, government, and citizen groups. Massachusetts Audubon Society triggered the symposium. National Academy of Sciences was the nominal sponsor. Costs were borne by Mass. Audubon ($500.) and the National Agricultural Chemicals Association ($50.000). The news releases I have seen are by Cynthia Westcott, who writes that it was her "good fortune to be invited for the gardening public," although her connections with the deluge of industry-disseminated pro-pesticide literature following the publication of *Silent Spring* made her one of the most important figures of her kind.

Ribicoff, Abraham. 1965. Hearings . . . Basic documents submitted by the Department of Agriculture relating to the use of pesticides, Appendix I to Part 1: 1-178. Current research in the area of Pesticides (Agricultural Research Service), Appendix II to Part 1: 179-563. Selected departmental activities relating to the use of pesticides, Appendix III to Part 1: 565-826. Information circulars of the World Health Organization and miscellaneous articles, Appendix IV to Part 1: 827-987. — Washington, D. C.: U. S. Government Printing Office. — These appendices contain an enormous amount of raw data, and thus Senator Ribicoff has performed an extraordinary service in making the information readily available. Appendix V, not yet received, will show the steps taken by executive branch agencies to implement the recommendations of the Wiesner Report, and will bring the view of Federal activities in pesticide technology up to date as of late summer 1964.

————. 1965. A letter to Commissioner Franklin Foote, Connecticut Health Department. — Associated Press release, May 21. — It appears that the Connecticut State Department of Health maintains a "Not Recommended" Reading List for schools in Connecticut. *Silent Spring* was placed on this list at the recommendation of a Harvard professor. Senator Ribicoff's letter, appearing under the heading of "Ribicoff Attacks Attempted Silencing of Silent Spring," vigorously criticizes the action. He writes that "Burning this book won't alter Miss Carson's and the nation's concern. Banning this book, like banning the work of any eloquent crusader, is a useless gesture. It will not restore the indifference and ignorance about environmental pollution that existed before "Silent Spring" was published."

Shaw, W. C. 1964. Weed Science — Revolution in Agricultural Technology. — Weeds (Journal of the Weed Society of America) 12(3): 153-162. — A valuable and instructive article, that clearly reveals the confusion in the mind of the technologist between "science" and "technology." "Weed Science — a new scientific discipline, has evolved and caused a revolution in agricultural technology" we read at the start. Has a new science caused a revolution in technology? Or has a new technology merely produced new data, much less a new "science?" This Presidential Address, closing with "A Look at the Future of Weed Science Technology," leaves me semantically puzzled. The only basic science (my sense) that I find in the entire address is a seven-line reference to "plant successions" and "climax," theory which has been vigorously criticized by ecologists themselves ever since it was introduced in 1916.

Swan, Lester A. 1964. Beneficial Insects. 429 pp. New York: Harper and Row. — An extremely valuable compilation of contemporary information on insects in their roles in animal predation, in parasitism, and as disease organisms. A most valuable contribution on the subject of "biological controls."

Whitten, Jamie L. 1965. Effects, uses, control, and research of agricultural pesticides. Pages 6-7, 28, 165-208 *in* "Hearings before a Subcommittee of the Committee on Appropriations" of the "Department of

Agriculture Appropriations for 1966 — Part 1." — This enormously interesting document hit the press under the caption of "Report hits book by Rachel Carson." Concerning it the New York Times editorializes "In his position as chairman of the subcommittee which passes on the billions spent in the Federal farm programs, Mr. Whitten has acted through the years as the Department of Agriculture's extension agent to Congress. The department's pest-control officials, already wounded by Miss Carson's barbs, have been hurt further by the mounting evidence . . . The findings of Mr. Whitten's investigators collide sharply with those of the White House Science Advisory Committee." In a signed article by Irston R. Barnes in the Washington Post, entitled "Hill Committee's Blast at Rachel Carson Deserves an Answer," we read that "first, the analysis and evaluation of "Silent Spring" is incompetent, showing much evidence that the investigative staff was not qualified to perform its task and that the Subcommittee did not act responsibly in accepting and publishing the report. Second, it is indicative that the problem of the highly toxic chemical pesticides is still unresolved and that the public cannot have confidence that the Government is yet acting to protect people as well as wildlife from the harmful effects of chemical pesticides. . . ." Sure enough, Velsicol Chemical Corporation grabbed the Whitten Report, and in a release from Selvage and Lee, Inc. gave the world a brilliantly worded two-page condensation of the "superficially scientific" hallucinations of "Miss Carson's nightmares." I seriously recommend it for consideration by all science students, for in a minimum of space, it includes more interesting interpretations of the reasons for the local present abundance of some forms of wildlife, and of the nature of the Balance of Nature, than of any other anti-scientific document I know, which communicates itself to the general public.

Wurster, Charles F., Jr., Doris H. Wurster, and Walter N. Strickland. 1965. Bird mortality after spraying for Dutch Elm disease with DDT. — Science, 148 (3666): 90-91. — It had long been thought that bird mortality from such spraying did not occur in northeastern states, perhaps because elms were not as solidly planted as in mid-western towns. In a careful scientific study of the sprayed town of Hanover, New Hampshire, and the unsprayed town of Norwich, Vermont, it was concluded that DDT caused severe mortality of both resident and migrant birds in Hanover. Even more significant, in my opinion, was the effect of pre-bird-migrant spraying, widely advertised as a means of avoiding bird mortality. It appears that DDT-carrying live insects survived the spraying. Insectivorous birds arriving several weeks later fed on these and died. We thus have an extraordinary and illogical miscarriage of intent, whereby the spraying does not affect the target organisms. The spray does kill other organisms not there at the time but arriving later, which other organisms are an integral part of the total ecosystem, feeding on — and now dying from — the very insects which the spray was supposed to kill.

Young, Wilfred B. 1965. Dean Young outlines long-range plans for the College of Agriculture. — Milestones in Connecticut Agriculture and Home Economics (University of Connecticut, College of Agriculture) 9(1): 2-3. — "The most erroneous statements currently made about colleges of agriculture . . . are that agricultural colleges are on their way out . . . Demographers predict a doubling of world population by the year 2000. Agriculture must continue to provide the "know how" and efficiency to meet the needs of food, feed, and fiber, and to keep up with the growth of the population . . . The revolution of change continues because of agricultural technology . . . The use of our natural resources — water, soils, forests, land, fish, and wildlife — is of more demanding importance each year . . . funds for a new research building are being requested from the 1965 General Assembly. Some time in the near future, consideration should be given to the establishment of a new department in the College of Agriculture dealing with basic or natural resources . . . There has been a growing interdependence among groups in our society which is creating a greater social conscience in our colleges and universities. Land-Grant colleges especially have an obligation to help people help themselves . . . There will undoubtedly be a need for new research institutes, plus furthering the ones we now have. The Institutes of Nutrition and Food Science and Water Resources are excellent examples of planning and developing research programs which cut across departmental as well as college and school lines. More work needs to be done to bring out the full potential of talent in areas such as plant and animal genetics, plant and animal breeding, plant pathology, entomology, use of open space land for recreation and sport, and many others. Institutes per se cannot be considered the answer to all problems . . . We therefore should go forward with further exploration and planning . . . The demand for food, feed, and fiber will continue to increase. Land-Grant colleges and universities per se will have to continue to meet these needs through what we now call agricultural programs . . . They may not always be called colleges of agriculture . . . But the service, not the label, is the significant fact recognized and believed in by those who know colleges of agriculture best. The need for their significant services will always exist."

Note: Because of space limitations, certain passages above have been deleted and, at the author's request, have been so indicated by full lines of periods. For any inconsistencies or non sequiturs resulting therefrom, the editor takes full responsibility. — Ed.

Books and Periodicals

Reprints of the papers of the late **Dr. Alfred C. Brauer** are available at the Department of Zoology, University of Kentucky, Lexington, Kentucky 40506. Dr. Brauer's extensive bibliography is concerned primarily with the physiology of development, especially with Bruchids (Coleoptera).

ENZYME NOMENCLATURE. The International Union of Biochemistry Commission of Editors of Biochemical Journals. Elvsevier Publishing Co., New York, 1965. 219 pp. $2.50.

The impetus for this publication resulted from the terms of reference laid down by the *ad hoc* Committee headed by Professor M. Florkin in 1956. The Enzyme Commission mandate was "to consider the classification and nomenclature of enzymes and coenzymes, their units of activity and standard methods of assay, together with the symbols used in the description of enzyme kinetics." The Council of International Union of Biochemistry approved the decisions made by the Enzyme Commission.

There is presently a Standing Committee on Enzymes which has the responsibility for the evaluation of comments and criticisms. Recommendations by the Standing Committee have included (1) listing new enzymes and sub-groups, (2) correction of errors, (3) changes in nomenclature when justified, and (4) addition of systematic names where the original report presented only trivial names.

The major contribution of this work is presenting a list of enzymes in which the chemical activity and the chemical description of enzymes are stated with their systematic name and recommended trivial name. The chapter dealing with the rules for systematic and trivial nomenclature would be of value to the searcher for new enzymes as well as for others in resolving old and new terminology.

The general confusion in enzyme nomenclature will be compounded and perpetuated, unless a "standard of reference" is established. The recommendations (1964) of the International Union of Biochemistry on the Nomenclature and Classification of Enzymes are a beginning in this direction. — JOHN F. DIMMICK, Wake Forest College.

RICE GENETICS AND CYTOGENETICS. R. Chandler, American Elsevier Publishing Co., New York. December, 1964. 274 pp. $14.50.

Rice is the principal food of over 60% of the world's people. Asia produces and consumes more than 93% of all rice grown, yet consistently has rice yields that are among the lowest in the world. Because of such facts the Ford and Rockefeller Foundations cooperated with the Philippines government in establishing, in 1960, the International Rice Research Institute at Laguna near Manila. The present Symposium volume records proceedings of the first of a series of international conferences sponsored by the Institute. The Symposium was devoted to discussions on rice genetics, cytogenetics, and taxonomy. Its sessions were attended by 102 persons from 26 institutions of 9 nations. The program consisted of 24 invitational papers, plus discussions at the end of each of six sessions, a seventh concluding Survey session, and an exhibit of *Oryza* species.

The first six sessions dealt, respectively, with Taxonomy (3 papers), Gene Symbolization and Nomenclature (4 papers); Chromosome Morphology in *Oryza* Species Relationships (7 papers); Nature of Intervarietal Hybrid Sterility in *Oryza sativa* (5 papers); and Inheritance Studies, Gene Markers and Linkage Groups (4 papers).

Appendices publish (1) the report of the Committee appointed to attempt a standard classification and nomenclature; and (2) Recommendation of the Committee on genome symbols for *Oryza* species. Ten areas of research meriting strengthened or new research are listed. A bibliography of over 400 references, and a subject index, complete the volume.

Significant achievements of the Symposium were resolution of problems of taxonomic and genetic nomenclature, and the stimulation of coordinate efforts in the collection of experimental plant material from Africa. This volume for the first time assembles in one place all the important studies concerning rice taxonomy, genetics and cytogenetics. This alone makes it an important work for all workers in the field. It will also be found to be a helpful reference work for all cereal geneticists, as well for geneticists and plant breeders of other crop plants. — WALTER S. FLORY, Wake Forest College.

THE ECOLOGY OF NORTH AMERICA, V. E. Shelford, University of Illinois Press, Urbana 1963, 610 pp. $10.00.

After awaiting the publication of this book for a number of years and following a careful reading of it, this writer is somewhat disappointed. How much more valuable this information would have been to the field of ecology twenty or thirty years ago. An amalgamation of the study of plants *and* animals in particular areas is necessary before one can say that ecology is being studied. The integrated information involving plant life forms, animal life forms, climate, soil, and topography is necessary for the development of the concepts of habitat, community ecosystem, and biome.

One must read carefully to keep oriented with conditions as projected into the past (1500 to 1600) and with conditions of more recent time. Some improvement in the organization of a more consistent treatment of time sequence would have relieved this difficulty.

The locality and species indexes increase the value of this work as a reference. The absence of a subject index is taken care of to some extent by the inclusion of a rather detailed table of contents. In any case the compilation of this information enables the ecologist to evaluate changes which have occurred in habitats, communities, ecosystems, and biomes during the time in which the effects of the Indians transcended to the state of affairs we have today in North America.

Most of the diagrammatic maps can be interpreted. However, there are some which have lost detail in the reproduction. This is particularly true for those areas of the maps in which there is blending or the superimposing of the characters used to denote specific areas. In some cases the choice of characters has led to confusion. For example, on page 198 in fig. 7-10 it is not possible to determine from the diagrammatic map which is the low tundra with hummock area from the patches of climax. In contrast, fig. 4-2 on page 92 is a superb reconstruction (projected back to the year 1600) of the vegetation of the Reelfoot Lake-Marston Missouri area.

Suffice to say that the pleasure of having this wealth of information in one volume outweighs the disappointment in organization and reproduction of some of the figures. — JOHN F. DIMMICK, Wake Forest College.

THE GEOGRAPHY OF THE FLOWERING PLANTS (3rd ed.). Ronald Good. Wiley. New York. 1964. XVI + 518 pp. $13.00.

At first glance, this third edition of an outstanding and well-known treatise on biogeography appears little different from the two earlier editions. Several of the chapters are quite similar, or almost identical, with those of earlier editions, while nearly all of the halftone plates have been reused, as well as the majority of the maps and other illustrations.

A closer look, however, shows at least one or two quite important additions or changes, as well as considerable revision. The up-dating of the book as a whole is indicated by the 838 bibliographic references, as contrasted with 629 in the 1952 (second) edition. Many of these additions, as indicated in the preface, are concerned with the results of investigations into paleomagnetism and related matters, and in the general attitude towards theories of continental movement. The more recent work is skillfully incorporated into the earlier text material with but little marked alteration at many points. Also, several significant new maps and text figures have been added, and some of the older ones have been altered so as to incorporate the ideas and thoughts of recent contributors.

There is one entirely new, and quite significant chapter in the new edition. This is chapter 12 which deals with "The Floras of the Southern Hemisphere." This chapter considers the floras of "Temperate South America," of "Temperate Southern Africa," of "The Madagascar Region" and is especially enlightening where it is concerned with the southwest Pacific area: Australia, New Caledonia, New Guinea, Fiji, New Zealand and "The Five Small Floras" of Juan Fernandez, St. Helena, Norfolk Island, Lord Howe Island and The South Temperate Oceanic Islands. The treatment of the southwest Pacific area is based on the author's own recent extensive field studies. New Guinea, only recently opened to botanical explorers, is indicated as being especially important not only in diversity of flora but in this flora furnishing leads to determining distributional problems with flowering plants. The 1,350 genera and 9,000 species of the New Guinea flora "consists very predominantly of genera of wide distribution or of Malaysian affinity" and "this Indo-Malaysian element as it may be called, is in terms of genera eight times and in terms of species fifty times, as large as the Australian element. . . ." Despite the size of the New Guinea flora there is no endemic family, and only about 140 endemic genera with about 350 species, "but the endemic species in total number at least 8,500."

Chapter 20 which had been largely rewritten for the second edition is here again revised in order to include considerable new material and especially to consider matters of special interest in relation to theories of continental displacement.

As in the preceding editions, Good still adheres to the theory of continental drift to explain the peculiarities and important features of flowering plant distribution. We may grant that the theory is a very convenient one to explain such distribution. It is also evident, however, that the theory has its shortcomings, and its opponents, and that it overlooks considerable evidence, including quite a bit from the field of biology, which would tend to favor other conclusions. — WALTER S. FLORY, Wake Forest College.

THE PHYSICAL AND CHEMICAL PROPERTIES OF RIBOSOMES. Mary L. Petermann. American Elsevier Publishing Co. New York. March. 1965. XII + 258 pp. $10.00.

In 1958, R. B. Roberts suggested the term ribosomes for particulate ribonucleoproteins of molecular weight 2.7-4.5 million, containing 40-65% RNA. This name is now rather generally accepted for these RNA-containing cell fractions which have also been designated as "ribonucleoprotein particles", "RNP", "microsomal particles", "macromolecular nucleoproteins", etc., as well as given numerous names by electron microscopists such as "small particulate components", "opaque particles", "150A granules", "Palade particles", etc.

This small volume, with only 221 text pages, covers

the history, occurrence, separation and purification, criteria of purity, chemical composition, and physical properties of ribosomes in separate concise chapters. Additional chapters deal with magnesium binding; the nature of the bonds holding RNA and protein together; the binding of other substances to the ribosomal core; and the binding of transfer RNA, messenger RNA and polysomes.

A bibliography of 796 references was included with the text as first completed in September, 1963. Clear cut summaries as to the nature of these references are given in the text. A 14-page Addendum to the book was prepared in May, 1964, adding material and references to six of the original chapters. The bibliography for the Addendum contains an additional 186 references which had appeared in the eight-month interval — giving an idea of the activity and interest in the ribosome field.

The mass of published work with ribosomes is here condensed with clarity. The book would seem an essential for those in, or those entering, the field, and it furnishes an excellent condensed account for those working in border line cases. — WALTER S. FLORY, Wake Forest College.

COMPREHENSIVE BIOCHEMISTRY. Vol. 6: Lipids — Amino Acids and Related Compounds. Ed. by M. Florkin and E. H. Stotz. American Elsevier Publishing Company, Inc. N. Y. 323 p. 1965. $17.00.

Volume six is part of section II of the series which deals with the Chemistry of Biological Compounds — this volume being devoted to the lipids and amino acids essentially. Like the other volumes in the series, each chapter is written by a specialist(s) which gives the volume an authoritative flavor, but as typical with such multiauthored works it is very encyclopedic. This volume is divided into two parts: part A dealing with Fatty Acids, Long-Chain Alcohols and Waxes; Neutral Fats and Oils; and Phosopholipids and Glycolipids; part B including General Chemistry of the Amino Acids; Nitrogenous Bases; Melanins; Peptides: Synthetic Methods and Applications; Capsular Polypeptide; and Syntheses of Bacterial Glutamyl Polypeptides. Chapters I, III, and IV (on Fatty Acids, Phosopholipids, and Amino Acids respectively) comprise over one half of the book.

The two major criticisms are the inclusion of several short, less basic, and seemingly overspecialized chapters; and the omission of titles from the bibliographies. The practice of omitting titles from citations, in the judgement of this reviewer, is not consistent with the premise of producing a helpful refcrence work, for this is a decided handicap to the student trying to find appropriate papers. Inclusion of titles would probably not increase the length of the bibliographies more than fifty per cent.

Although this volume is mostly organic chemistry it is highly informative especially for the biochemically oriented physiologist. The book presumes a theoretical knowledge of organic and biochemistry. However, anybody vitally interested in such a rigorous treatment of biochemical topics would want to acquire the entire series, as any one volume is incomplete in itself and consequently of limited usefulness. But the price is almost prohibitive for an individual. — RALPH D. AMEN, Wake Forest College.

HUMAN GENETICS. Victor A. McKusich. 1964. 148 pp. Foundations of Modern Genetics Series. Prentice-Hall.

The study of human genetics, while always interesting, has reached the level of a distinct discipline, if one may judge by the number of texts and smaller books on this subject that have appeared in recent years. This is a smaller book. However, the author must have intended to do more and has included too many aspects of genetics within its 148 pages. Consequently, some topics are so condensed as to be more confusing than enlightening. Particularly, the later chapters concerned with evolution, race, disease, and society. The first chapters proceed rather well, but the later chapters introduce topics abruptly, and continuity of discussion is lost.

While some sections and chapters, especially Chapter 2, The Chromosomes of Man, and Chapter 6, Genes In Families and In Populations, are interesting and informative, other sections are not. Those dealing with non-disjunction and translocations are confusing, if not in error. The statement on page 44 "Whereas segregation is the behavior of genes at the same locus (alleles), independent assortment is the behavior of genes at separate loci (non-alleles)" is startling. What does it mean? Figure 3.10, which illustrates the meaning of this concept, adds to the dilemma, the results of segregation and assortment both in coupling, and in repulsion are the same. Perhaps Mendel's laws have not been changed after all. A final comment concerning the statement on page 130 "The mutant gene should be viewed as an etiological agent in disease, comparable to a bacterium or a virus." While one may consider hereditary abnormalities a "disease" and genes in many respects are comparable to a virus, by no stretch of imagination can a gene be considered a bacterium.

In summary, "Human Genetics" does not meet the announced purposes of this series and is not recommended. — M. L. STIFF, University of Southwestern Louisiana.

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If your zip code number does not appear on the address used to mail this issue of the ASB Bulletin, please send it to us promptly. The day is not long off when the Post Office will not accept 2nd or 3rd class mailings that do not include zip code numbers -- and before that time all ASB address stencils must be re-made, at considerable cost, in order to comply with this directive. Please help us by returning the label to us with your zip code included. *Betty Ursomarso, Asst. Editor, Academy of Natural Sciences, 19th and The Parkway, Philadelphia, Pa. 19103*

The AAAS Berkeley Meeting

DECEMBER 26-31, 1965

THE 132nd MEETING of the American Association for the Advancement of Science will include sessions of 20 AAAS sections and of some 90 participating organizations. Programs of particular interest to biologists are:

Special and General Sessions

I. AAAS Committee on Science in the Promotion of Human Welfare: Two-session symposium "The Physiological Control of Conception and Its Implications." Speakers: Gregory Pincus, Stephen Plank, Martin Loeb, George Pollock, Rhoda Métraux, and Rene Duobs; Walter Modell, chairman; (Dec. 26)

II. Moving Frontiers of Science lecture by F. Clark Howell on "Significant Advances in Human Evolutionary Studies." (Dec. 26 eve.)

III. Two-session AAAS interdisciplinary symposium I: "Behavior, Brain, and Biochemistry," jointly sponsored by Section I-Psychology and the Western Psychological Association; arranged by David Krech (Dec. 27, 28 morns.). Parts and speakers are:

A. Behavior, Brain, and RNA — David Krech, Bernard W. Agranoff *et. al.*, Henry R. Mahler and Walter J. Moore, Joseph Altman, Stanley Batkin, J. Zemp *et. al.*, N. Plotnikoff *et. al.*, Lewis Petrinovich and Edward M. Eisenstein, Benson E. Ginsburg, V. J. Polidora, and Eugene Roberts.

B. Behavior, Brain Anatomy, ACh, and Other Chemical Mediators — Thomas H. Roderick *et. al.*, Paul D. Coleman, Guy M. Everett, E. Geller *et. al.*, Gordon T. Pryor and Leon S. Otis, Peter L. Carlton, J. Anthony Deutsch, Edward L. Bennett *et. al.*, and Mark R. Rosenzweig.

IV. Two-session AAAS interdisciplinary symposium II: "Recent Advances in Nucleic Acid and Protein Chemistry," arranged by Wendell M. Stanley *et. al.* Speakers are: R. D. Cole and Charles A. Dekker, chairmen, George Stark, Daniel Koshland, Ignacio Tinoco, Jr., Philip Hanawalt (Dec. 27 aft.); and Wendell M. Stanley, chairman, David Hogness, John Gerhart, Hugh Fudenberg, Allan Wilson (Dec. 28 morn.).

V. AAAS Distinguished Lecture, "Genetics and Cultural Change," by George W. Beadle (Dec. 27 eve.).

VI. Two-session interdisciplinary symposium, "Materials Science in Dentistry, Medicine, and Pharmacy," jointly sponsored by the AAAS sections named in the title, arranged by Col. Peter M. Margetis and John Autian (Dec. 28, 29 morns.).

VII. Seven-session symposium, "Ground Level Climatology," arranged by Robert H. Shaw for Section O-Agriculture. Among the cosponsors are the AAAS sections on Physics (B); Geology and Geography (E); Zoological Sciences (F); and Botanical Sciences (G); the American Meteorological Society; and the Society of American Foresters, Northern California Section. Note: Parts I and II (Dec. 27) are of particular interest to foresters, Part III (Dec. 28 morn.) has AAAS interdisciplinary symposium status, and Parts IV-VII (Dec. 29 and 30) are of particular interest to plant and animal ecologists and agriculturists, respectively.

VIII. Moving Frontiers of Science lecture by Jerome Y. Lettvin (Dec. 28 aft.), on "Physiological Basis of Mental Activity."

IX. AAAS Retiring Presidential Address by Laurence M. Gould on "Antarctica."

X. Joint address of the Society of the Sigma Xi and United Chapters of Phi Beta Kappa by J. Bronowski, Deputy Director, Salk Institute for Biological Studies.

Sectional Programs

AAAS Section on Chemistry. Symposium, "Nonprotein Neurotoxins," arranged by Harry S. Mosher (Dec. 27 morn.); two-session symposium on Energy Transfer, arranged by George C. Pimentel and H. W. Brown (Dec. 29).

AAAS Section on Zoological Sciences. Five-session symposium, "Molecular Mechanisms of Temperature Adaptation," (Dec. 27, 29), arranged by C. Ladd Prosser, who will give his Vice Presidential address, "Physical Factors in Speciation," following the Zoologists' Dinner, Dec. 29.

AAAS Section on Botanical Sciences. Two-session symposium, "Plant Biology Today: Advances and Challenges," a continuation of the review papers on basic topics found so helpful by teachers, cosponsored by the Botanical Society of America and by the BSA Pacific Section. Also sessions for contributed papers and a Botanists' Luncheon at which Ira L. Wiggins will give the Vice Presidential address, Dec. 30.

AAAS Section on Medical Sciences. Five-session symposium, "Mode of Action of Steroid Hormones," arranged by Henry Lardy (Dec. 29, 30). A. Baird Hastings will give the Vice Presidential address for Section N (Dec. 29 aft.). The section will also have a panel on Genetic Coding (Dec. 29 eve.) with Marshall Nirenberg and Gobind Khorana as speakers and I. R. Lehman as moderator.

AAAS Section on Pharmaceutical Sciences. Sessions for short papers and cosponsorship of symposia, also a distinguished lecture by Bernard B. Brodie, "Biochemical Aspects of Mental Disease."

AAAS Section on Statistics. Among the many sessions of the Section and of the Fifth Berkeley Symposium on Mathematical Statistics and Probability, there will be a number in biological areas.

Societal Programs

American Association of Bioanalysts. Sessions for papers, Dec. 29.

American Fisheries Society. Symposium on Sacramento-San Joaquin Estuary arranged by Harold K. Chadwick.

American Physiological Society. Symposium, "Oögenesis and Early Embryonic Development," arranged by Ray M. Iverson and Robert E. Smith, Dec. 28 aft. Speakers: Frank Moyer, R. G. Kessel, Kirby D. Smith, J. S. Clegg.

American Society for Microbiology, N. California Hawaiian Branch. Sessions for papers, Dec. 29.

American Society of Naturalists. Two-session symposium, "A Survey of Past Changes in the Biological Environment," arranged by Carl L. Hubbs, presidential address of Bentley Glass and business meeting, Dec. 27.

American Society of Zoologists. Among the 40-plus sessions, are multi session symposia on "Hypothalmic Control of the Anterior Pituitary" (Dec. 27), "Neurosecretion of Invertebrates" (Dec. 28-30), "Problems in Invertebrate Embryology" (Dec. 29 and 30), "Pituitary Gland: Comparative Aspects" (Dec. 30), and "The Vertebrate Ear" (Dec. 30). There will be 25 sessions for developmental biology, invertebrate zoology, endocrinology, comparative physiology, and vertebrate morphology.

Animal Behavior Society. Two-session symposium, "Experimental Analysis of Aggression" arranged by Roger E. Ulrich and an Animal Behaviorists' luncheon, Dec. 27; seven sessions for contributed papers on animal behavior and a business meeting are planned for Dec. 28-30.

Ecological Society of Ameriea. Sessions for contributed papers in animal, aquatic, and plant ecology, Dec. 26-28; symposia on "Primary Productivity and Mineral Cycling in Natural Ecosystems" and "Population and Community," Dec. 27, "Bioenergetics Diversity and Abundance in Natural Communities," Dec. 28; sessions for invited papers.

Herpetologists' League. Four sessions for contributed papers and business meetings, Dec. 29-30.

Mountain Lake Biological Station. Annual breakfast of former staff, students, and researchers, attending the Berkeley meeting, Dec. 29.

National Association of Biology Teachers. Annual meeting, Dec. 27-30, will include participation in joint sessions of the science teaching societies, Dec. 27; four society sessions, the NABT Luncheon Dec. 29, and a joint field trip with ANSS, Dec. 30.

Society for Experimental Biology & Medicine, Pacific Coast Section. Sessions for papers, Dec. 27, 28.

Society of Systematic Zoology. Sessions for papers, Dec. 27-29, business sessions, maintenance of the SSZ Book Lounge and the annual coffee hour.

Western Society of Naturalists. Two-session symposium, "Bays and Marshes: A Unique Environment," Dec. 27; two-session symposium, "Polar Lore Since Fifty-four," jointly with the Arctic Institute of North America, Dec. 29; four sessions for contributed papers and a business meeting, Dec. 30.

The **Biologists' Smoker**, sponsored by AAAS Sections F and G and all the biological societies will be 9:30-11:00 Dec. 27 eve. in the Hearst Gymnasium.

The AAAS Exposition of Science and Industry and the AAAS Science Theatre, with recent foreign and domestic films, both in the Student Center, will be prominent features of the meeting. Coupons for sleeping accommodations and advance registration will be found in SCIENCE at frequent intervals, beginning July 23.

News of Biology in the Southeast

About People

Erratum. – In Volume 12, No. 3, page 74, we stated that Dr. John Freeman had been appointed head of the Biology Department of the University of Florida, and that Charlotte C. Freeman, Betty Powell Lackey, R. Gary Litchford, and N. Gene Vredeveld had also joined the department. This should have read **University of Chattanooga,** not University of Florida, and we apologize for any inconvenience or confusion that this mistake may have caused. – Ed.

Richard T. Hanlin and E. S. **Luttrell,** Dept. of Plant Pathology, Georgia Experiment Station, have received a contract from the U.S.D.A. to establish a Central Mycology Laboratory for the identification and taxonomic study of fungi isolated from peanuts in the Southeast and Southwest.

G. Thomas Riggin, Jr. worked on marine tardigrades at the College of Charleston Marine Laboratory this past summer with the aid of a grant from the Board of College Education, Lutheran Church of America.

A. H. O'Bier has recently joined the Biology Department of Newberry College as Associate Professor.

Elisabeth M. Tripp, Greenville Senior High School, Greenville, S. C., recently received the 1965 Outstanding Biology Teacher Award of Region V. Mrs. Tripp helped organize the South Carolina Association of Biology Teachers, and is currently serving on the South Carolina Textbook and Evaluating Committee, and is Vice-President of the Greenville County Teachers Association.

Robert P. Higgins, Wake Forest College, received a NASA grant of $32,000 to be shared with **Harold Morowitz,** Yale University, for the development of techniques for use on rotifers, nematodes, and tardigrades in behavioral experiments, and the desiccation of appropriate species for extraterrestrial experiments.

Robert P. Higgins, Wake Forest College, is president of the newly established Wake Forest College Chapter of the Society of the Sigma Xi, and has been appointed an Associate Editor of the Transactions of the American Microscopical Society.

Robert Cowgil, Wake Forest College, Boman Gray School of Medicine, has been elected Vice-president of the Wake Forest College Chapter of the Society of the Sigma Xi.

Frank McCormick, Assistant Professor of Botany, University of North Carolina, received a U.S. Atomic Energy Commission research contract totaling $53,623 to conduct research in radiation ecology. During the previous year funds were used to acquire the necessary instrumentation and facilities which are currently being used by graduate students and a postdoctoral associate. Studies of the effects of ionizing radiation upon plant species, populations, and ecosystems are being conducted in cooperation with the Savannah River Ecology Laboratory operated by the University of Georgia.

Robert Rinaldi, Department of Zoology and Entomology, University of Tennessee, is project leader on an AEC researeh eontract recently extended to July 31, 1966, by the AEC's Oak Ridge Operations.

Joseph B. Harris has accepted a position as Associate Professor, Department of Biology, Wisconsin State University, Stevens Point, Wisconsin.

Lyle W. Phillips has been appointed Director of the Division of Undergraduate Education in Science at the National Science Foundation. He succeeds **Dr. Leland Shanor,** who is going to the University of Florida to accept a position as Head of the Department of Botany.

John A. Freeman, Biology Department, Winthrop College, participated in the Materials Identification Program (MIDPRO) sponsored by the Commission on Undergraduate Education in the Biological Sciences at Dartmouth College during June and July.

Loren D. Carlson, Chairman of the Department of Physiology and Biophysics, University of Kentucky, will also serve as Chairman of the Department of Zoology beginning 1 July 1965.

Eugene C. Crawford, Jr., and **Edwin Dale** have been appointed Assistant Professors in the Department of Zoology, University of Kentucky, Lexington, beginning September, 1965.

Robert A. Kuehne, Department of Zoology, University of Kentucky, Lexington, has been awarded an NSF postdoctoral fellowship to study for a year at the Freshwater Biological Association's Windermere Station, Ambleside, England, beginning in September, 1965. He will work closely with the Deputy Director of the Station, Dr. T. T. Macan.

Theodore R. F. Wright, formerly of the faculty of the Johns Hopkins University, has been appointed Associate Professor at the University of Virginia. Dr. Wright's research interests lie in the field of developmental genetics.

NIH postdoctoral fellows at the University of Virginia are: **Francis M. Butterworth, Averett S. Tombes,**

Saralee VanHorn, and Michael Berridge. Departmental postdoctoral fellows are: A. Clive Crossley, Brij Gupta, and Heinz-Werner Kuthe. Professor Tadao Sata is currently a Visiting Scholar.

Jackie Batson recently completed the requirements for the Ph.D. in Biological Sciences at the University of Kentucky. He has accepted a teaching position at Delta State College in Cleveland, Mississippi.

Arthur W. Cooper, Department of Botany, North Carolina State University, has received a grant to study primary productivity in North Carolina salt marshes. The work will involve mapping of vegetation types from colored aerial photographs and ground studies of plant productivity.

Eugene H. Schmitz is now Assistant Professor of Zoology at the University of Arkansas.

John R. Plymale, Howard College, reeeived a one-year leave to study parasites of the Antarctic.

Tommy E. Denton has been appointed Assistant Professor of Biology at Howard College.

J. F. Landt has joined the staff of the Biology Department at the Oxford College of Emory University as Associate Professor. He was formerly head of the Biology Department at the University of Alabama Center in Birmingham.

H. Branch Howe, Jr., University of Georgia, received the M. G. Michael Award for 1965. The award is given annually to some member of the Liberal Arts faculty for the purpose of stimulating and promoting research.

Thomas C. Barr, Department of Zoology, University of Kentucky, Lexington, has been elected President of the National Spelcological Society, 1965-66.

Ruth S. Breen, Professor of Botany, Department of Biological Science, Florida State University, retired as Professor Emerita on June 30, 1965. She will serve as Consultant in the Department, continuing research in the field of Bryology, directing graduate student programs, etc.

David L. Mulcahy, University of Georgia, has received a National Science Foundation grant of $14,000 to study the population structure of *Silene alba*.

Coleman J. Goin, Professor of Biological Sciences at the University of Florida, will assume office as President of the American Society of Ichthyologists and Herpetologists on January 1, 1966.

Norman E. Kowal, formerly on the faculty of the University of the Philippines, has been appointed Assistant Professor of Biology at Clark College, Atlanta, Georgia.

John D. Withers, Clark College, Atlanta, Georgia, received $1,303 from the Atlanta University Center Research Fund for studies on roach hemacytes.

Bruce L. Welch and Annemarie S. Welch, College of William and Mary, have received the following grants: Department of the Army, "Neuroendocrine Adaptation to Differeñt Environmental Conditions," $19,920; Air Force Office of Scientific Research, "Social Environment and Neuroendocrine Adaptation," $57,000; and the National Institute of Mental Health, "Stressors and Foetal and Neonate Catecholamine Metabolism," $4,200. The work is being carried out at the Laboratory of Population Ecology within the Department of Biology at the College.

Paul J. Osborne, Professor of Biology, Lynchburg College, Lynchburg, Virginia, is bringing a three-year NSF research grant to a close September 1. This has been a study on the lysosomal patterns as revealed by acid phosphatase activity under varying conditions, including both phylogenetic and ontogenetic approaches. Dr. Osborne has recently assumed duties as departmental chairman.

Charles E. Miller, formerly at the University of Maine, has accepted a position in the Department of Botany, Ohio University, Athens, effective September 1, 1965.

Helen M. Churchill, Associate Professor of Biology at Hollins College, Virginia, was on leave during the 1964-65 session. Her trip around the world included attendanee at the First International Congress of Parasitology in Rome, September 21-26, and three-and-a-half months working in the laboratory of Dr. Carmen C. Velazquez, Zoology Department, University of the Philippines.

Victor A. Greulach resumed his duties as Professor of Botany and Chairman of the Department of Botany at the University of North Carolina in Chapel Hill on September 1, following a 15 month leave of absence to serve as the first Executive Director of the Commission on Undergraduate Education in the Biological Seiences (CUEBS).

Leslie L. Ellis, Professor of Zoology, Mississippi State University, has been elected Chairman of the Biology Section of the Mississippi Academy of Sciences for the coming year. Dr. Ellis has also been appointed to serve on the NSF panel evaluating proposals in the College Teachers Research Participation program.

The Department of Zoology, Louisiana State University, has recently added to its staff the following individuals: Wilbur L. French, Genetics. Dr. French earned the doctorate at the University of Illinois, and has just completed three years of postdoctoral studies supported by the National Science Foundation. The first of the three years was spent at the University of Illinois, the second at the University of California, and the third in Mainz, Germany. He is interested in mosquito genetics. Katherine A. Benson, Physiology. Dr. Benson earned her B.S. degree at the College of William and Mary and her doctorate at the University of Virginia. Her research interests relate to developmental physiology. Don G. Benson, Jr., Embryology. Dr. Benson received his undergraduate degree at the Tulane University and his doctorate from the University of Virginia. He is primarily interested in developmental zoology. Kenneth C. Corkum, Parasitology. Dr. Corkum received his B.S. degree from Aurora College and the M.S. and Ph.D. from Louisiana State University. He

has recently completed two years of post doctoral studies at Tulane University with Dr. Paul C. Beaver. His research dealt with sparganosis in Louisiana. He would like to receive and/or exchange specimens. In particular, he would like to have information on larval infections in man, and would like to obtain adult specimens.

Rudolph Prins has been appointed Assistant Professor in the Department of Entomology and Zoology at Clemson University. He received his Ph.D. at the University of Louisville in June. **William K. Willard** has been appointed Assistant Professor in the Department of Entomology and Zoology also. He received his Ph.D. at the University of Tennessee in June.

Patricia Sarvella (formerly at Mississippi State University) has accepted a position as a Geneticist with Poultry Genetic Investigations, USDA, at Beltsville, Maryland.

C. O. Grogan, Mississippi State University and USDA, received $10,000 from the U.S. Department of Agriculture to install facilities for improving climate control in corn research.

A new appointment to the staff of the Department of Biology, West Virginia University, is **Dr. Gideon N. Louw,** formerly of the University of Pretoria, in South Africa.

Carolyn H. Hampton has been appointed Assistant Professor of Biology at Longwood College, beginning with the 1965-66 session. Mrs. Hampton is a native of North Carolina, and received the B.S. degree from Appalachian State Teachers College and the M.S. and Ph.D. degrees from the University of Tennessee. Before coming to Longwood she was a member of the faculty at Charlotte College, Charlotte, North Carolina from 1963 to 1965.

B. Theodore Cole, Head, Department of Biology, University of South Carolina, received a travel grant from the National Research Council, National Academy of Science, which permitted him to present a research paper at the XIII International Congress of Physiological Sciences, Tokyo, Japan, September 1-9, 1965.

Arnold Grobman, formerly at the University of Florida, and more recently Director of the Biological Sciences Curriculum Study at the University of Colorado, became Dean of the College of Arts & Sciences at Rutgers University on September 1.

John R. Paul has been appointed Assistant Professor of Biological Science at the University of South Florida and Henry C. Tipton has also received the same appointment.

Georgette Campbell has joined the faculty of Meredith College, Raleigh, North Carolina, as Instructor in Biology. Mrs. Campbell comes from Chowan College, Murfreesboro, North Carolina, where she has been on the faculty for two years. Mrs. Campbell was a participant in a NSF Summer Institute held at the University of North Carolina at Greensboro during the past summer.

David J. Cotter, Alabama College, received a grant of $1,200 from the Atomic Energy Commission to initiate a study of the effects of radiation on hardwood species at the Institute of Radiation Ecology, University of Georgia, Savannah River Plant.

Denzel E. Ferguson, Professor of Zoology, Mississippi State University, has been awarded a grant of $36,400.00 by the Psychobiology Section of NSF. The two-year project entitled "Ontogenetic and phylogenetic aspects of sun-compass orientation in certain amphibians" is a continuation of research presently supported by NSF. Two Ph.D. candidates are to be supported by the grant. Dr. Hobart F. Landreth will join Dr. Ferguson as an Assistant Investigator in June, 1966.

Louis R. Hundley was appointed Acting Head of the Department of Biology at Virginia Military Institute last February, and is now Professor of Biology.

A research contract with the University of Tennessee, Knoxville, Tennessee, in the Department of Zoology & Entomology, Dr. **Arthur W. Jones,** principal investigator, has been extended for an additional year by the Oak Ridge Operations of the U.S. AEC. The subject of Dr. Jones' investigation is a survey of the effects of radiation on host-parasite relations.

Fred J. Grundbacher has joined the faculty of the Department of Biology and Genetics, Medical College of Virginia, as Assistant Professor. Dr. Grundbacher received his Ph.D. degree from the University of California, Davis, and has recently completed a Post-doctoral fellowship in the Department of Human Genetics at the University of Michigan. His major interest is in the genetics of human antigens.

J. Ives Townsend, Medical College of Virginia, has received a research grant of $20,956 from NIH for a two-year study of gene flow in two sibling species of *Drosophila.*

Kenneth L. Webb, formerly Assistant Professor of Botany and Research Associate at the Marine Institute of the University of Georgia at Saplo Island, Georgia, has been added to the staff of the Virginia Institute of Marine Science where he will pursue research in environmental physiology.

William G. MacIntyre, a recent graduate of Dalhousie University, Halifax, Nova Scotia, became a member of the staff of the Virginia Institute of Marine Science in September. His fields of interest are chemical and physiological oceanography.

W. L. Mengebier, Head, Department of Biology, Madison College, Harrisonburg, Virginia, was a participant in the Research Participation for College Teachers program at the Virginia Institute of Marine Science during the summer of 1965 and has been studying the enzymes levels of normal and diseased oysters, hoping thereby to develop this procedure into diagnostic interpretation of the condition of oysters. He has been awarded an Academic Year Extension by the National Science Foundation to continue this study in his laboratories at Madison College.

Institutions and Organizations

The Department of Biology, **Millsaps College,** Jackson, Mississippi, has been awarded a grant of $7,000.00 by NSF in support of an undergraduate research participation program. Twelve students and four faculty under the general direction of Assistant Professor **Rondal Bell** will investigate the feasibility of using the mouse, *Peromyscus,* as an experimental animal in studies of the disease polyarteritis nodosa. Other faculty besides Dr. Bell, participating are **J. C. Perry, T. Cochis,** and **J. Bagwell.**

Cape Haze Marine Laboratory and **Riverview High School,** Sarasota, Florida, conducted their fourth summer program for high ability seeondary students and Biology teachers, from June 11 to August 6th, 1965. The students represented ten states, and many remained after the session to work on selected research problems. The major instructor and research director was **William Tavolga,** American Museum of Natural History, and the annual program was supported by the National Science Foundation. In addition to the Cape Haze Laboratory, the students used two marine laboratories operated by the Sarasota Board of Public Instruction. Director was **John D. Woolever,** Science Supervisor of Sarasota County, Fla.

At the annual meeting of the Botanical Society of America at Urbana, Illinois, on August 16, 1965, **Harold C. Bold,** Professor of Botany and Chairman of the Department at The University of Texas, was elected President of the Botanical Society of America for 1966. Dr. Bold has been serving as Vice-President during 1965, was Secretary from 1955 to 1958, and Editor-in-Chief of the *American Journal of Botany* from 1958 to 1965. **Professor Ralph Emerson,** Department of Botany, University of California, was elected Vice-President for 1966.

At the same meeting, **Professors R. E. Alston** and **B. L. Turner** of the Department of Botany, University of Texas, also received the New York Botanical Garden Award for their work in "Biochemical Systematics," and Dr. Bold received a "Certificate of Merit" from the Botanical Society of America.

A model of the James River from Richmond to the sea has been completed by the Army Engineers in Vicksburg, Mississippi, from data supplied by the **Virginia Institute of Marine Science** and compiled by Dr. Maynard M. Nichols, head of the Physical and Geological Oceanography Department, and scientists in the Department. The model includes a portion of the Atlantic Ocean and lower Chesapeake and all of the tidal James. In addition to shedding light on the effect of deepening the James River Channel from Hampton Roads to Richmond on the production of seed oysters, the model is expected to be useful in studying erosion control, current effects and pollution problems.

A **Water Resources Institute** has been established at Clemson University. Those from the Entomology and Zoology Dept. associated with the institute are **Drs. John Reed, Rudolph Prins,** and **Lamar Priester.**

University of North Carolina

The Department of Zoology at the University of North Carolina has just completed a new $1.6 million addition (60,000 sq. ft.) to its present building which will more than double its existing space.

In addition the following two new staff members received appointments at the rank of Assistant Professor beginning September, 1965. **John C. Lucchesi** received his A.B. at LaGrange College in 1955, and his M.A. at the University of Georgia in 1958. Since 1963, Dr. Lucchesi has been a Post-Doctoral Fellow in the laboratory of Professor E. Novitsk at the University of Oregon. **Darrel W. Stafford** received the A.B. degree at Southwest Missouri State College in 1959. His doctoral research was carried out at the University of Miami under the direction of Dr. Ray Iverson. Since receiving the doctorate in 1964, Dr. Stafford has been a Post-Doctoral Fellow with Dr. Harry Eagle at the Albert Einstein Institute of Medical Research.

Richard B. Terry joined the staff as Instructor in September 1965. He received the B.S. degree from the University of Idaho in 1961, and completed his Ph.D. work with Dr. Frank Moyer at the University of Illinois in 1965.

Howard T. Odum will join the staff of the Department of Zoology at the rank of Full Professor beginning September, 1966. He will also hold joint appointments with the departments of Botany and Environmental Science and Engineering (School of Public Health). Dr. Odum is a native of Chapel Hill and received the A.B. in zoology in this department in 1947. He received his doctoral training with Professor G. E. Hutchinson and obtained the Ph.D. at Yale in 1951. He has held academic appointments at the University of Florida, Duke University, and the University of Texas. He will participate in both undergraduate and graduate instruction.

Two National Science Foundation grants totaling $72,500 have been awarded to University of North Carolina Zoology department members.

A $25,000 grant in support of research entitled "Physiological Mechanisms in the Control of Histolysis During Insect Development" will be directed by **Donald W. Misch,** assistant professor.

The $47,500 grant will be under the direction of Dr. Misch and **Irvine R. Hagadorn,** and is to finance the purchase of an electron microscope. Dr. Misch will use the microscope for his study of changes in the fine structure of cells of the flesh-fly during growth and metamorphosis. Dr. Hagadorn's work involves the fine structure of the nervous systems in the leech and in mosquitoes with particular emphasis on special hormones secreted by certain cells.

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ASSOCIATION AFFAIRS

Many of you are probably wondering why I have been making such a fuss over the Zip Code business, and yet comparatively few of them have appeared on the address labels. The reason is simple, but not so evident on the surface. It is that *all* labels must bear the Zip Codes by 1 January 1967, but the cost to the ASB will be less if as many as possible are added at the same time. So if you have sent in your number and it has not yet appeared on the label, don't panic. I have it in my files and, hopefully, most of them can be added to the list by summer. If you haven't sent it in, please do. — C.W.H.

(*Continued on page 14*)

BIOLOGY AND A LIBERAL EDUCATION

E. RUFFIN JONES
UNIVERSITY OF FLORIDA

A very large percentage of us who are members of ASB are on the faculties of Colleges of Liberal Arts or of Arts and Sciences. These colleges constitute a part of a university system, or they may be independent four-year colleges. What are the aims of a university or, more particularly, of a College of Arts and Sciences?

Recently while reading a series of essays by Alfred North Whitehead on "The Aims of Education" I was much impressed by some of his ideas on this subject. For example: "The spirit of generalization should dominate a University. . . . Whatever be the detail with which you cram your student, the chance of his meeting in afterlife exactly that detail is almost infinitesimal; and if he does meet it, he will probably have forgotten what you taught him about it. The really useful training yields a comprehension of a few general principles with a thorough grounding in the way they apply to a variety of concrete details. In subsequent practice the men will have forgotten your particular details; but they will remember by an unconscious common sense how to apply principles to immediate circumstances. Your learning is useless to you till you have lost your text-books, burnt your lecture notes, and forgotten the minutiae which you learnt by heart for the examination. What, in the way of detail, you continually require will stick in your memory as obvious facts like the sun and moon; and what you casually require can be looked up in any work of reference."

Address of the retiring ASB president at the 1965 meeting in Charlottesville, Va.

In another essay he states: "The importance of knowledge lies in its use, in our active mastery of it — that is to say, it lies in wisdom. It is a convention to speak of mere knowledge, apart from wisdom, as of itself imparting a peculiar dignity to its possessor. I do not share in this reverence for knowledge as such."

"The universities are schools of education, and schools of research. But the primary reason for their existence is not to be found either in the mere knowledge conveyed to the students or in the mere opportunities for research afforded to the members of the faculty.

Both these functions could be performed at a cheaper rate, apart from these very expensive institutions. Books are cheap, and the system of apprenticeship is well understood. So far as the mere imparting of information is concerned, no university has had any justification for existence since the popularisation of printing in the fifteenth century. . . .

The justification for a university is that it preserves the connection between knowledge and the zest of life, by uniting the young and the old in the imaginative consideration of learning. The university imparts information, but it imparts it imaginatively. . . . A university which fails in this respect has no reason for existence. This atmosphere of excitement, arising from imaginative consideration, transforms knowledge. A fact is no longer a bare fact: it is invested with all its possibilities. . . .

Imagination is not to be divorced from the facts: it is a way of illuminating the facts. It works by eliciting the general principles which

apply to the facts, as they exist, and they by an intellectual survey of alternative possibilities which are consistent with those principles . . ."

Where does the College of Liberal Arts or Arts and Sciences fit into this picture? At the University of Florida we feel that the two most important objectives of our College of Arts and Sciences are:

1. To attempt to give our students a liberal education, and
2. To attempt to give them good sound preprofessional training.

Our philosophy is that a liberal education means a general education plus an extension in depth in one area, the major. We believe that liberal education should be emphasized at the undergraduate level and specialization should come at the graduate level. The number of hours which a student may take in his major field is therefore limited and each student averages at least one course per trimester in "cultural electives" — that is, courses completely unrelated not only to the department but to the broad area of his major. For example, a science major must take electives in Humanities or Social Sciences. I mention these policies of our College merely to establish a context. It is my personal conviction that a liberal education is one which trains the student to think for himself, teaches him where to go to find the facts he needs to help in his thinking, and gives him some understanding and some appreciation of Humanities, Social Science, Biological Science, Physical Science and Mathematics, or, in other words, of the broad basic areas which contribute to our culture.

Perhaps you would question our objectives or would wish to emphasize preprofessional training ahead of liberal education. Perhaps you would disagree with my definition of a liberal education or with the methods we are following to try to attain this, but certainly one important function of any College of Liberal Arts or Arts and Sciences is to provide a liberal education. If we concede this, then I think we need to ask ourselves two questions:

1. Is a knowledge of science and more particularly of biology important to a liberal education? and

2. If it is important, what should we as scientists (biologists) do about making such knowledge available in a form in which it can be understood by the non-scientist or non-specialist?

There would probably be general agreement on the first question. We live in an age of science. The statement by the President's Science Advisory Committee on "Education for the Age of Science" emphasizes the importance of science in these words:

"Science affects the life of every contemporary man every day. It conditions decisions that need to be made by his government on many matters, including national defense, foreign policy and public health. It affects the decisions made by individuals on business problems, on selecting a community in which to live, on choosing an automobile, a record player, or perhaps even a dentifrice. If an individual is ignorant of science he must guess what to do or else believe what he is told. Even if he is told what to do by an expert, he has no way to check on this advice or even to understand it. . . . Congress regularly appropriates huge sums for scientific research and even larger ones for engineering and development; yet a majority of the voters have little grasp of what this is all about. . . . The educational values in the study of science go far beyond the practical matters of a cold technological war or even those of the wise use of science in the service of society. The student of science quickly learns that all scholars seek the truth and that they must be critical and honest with each other."

Dael Wolfle, in an essay on "Science and Public Understanding", points out that:

"It is no longer true that most educated people can get along quite well without an understanding of science. It is as important for a Congressman to understand the impact of science on society as to understand the impact of nationalistic strivings on the stability of government. . . . It is as important for a citizen to understand the influence of scientific and technological developments on the economy of his country as to understand the historical influences that shaped that country. Science has become an instrument of such power in changing society — whether the change be good or bad — that no nation that pretends to have an

educated citizenry can neglect it." Science has penetrated all aspects of society as Bronowski indicates in an essay on "The Educated Man in 1984".

"Science was once the concern of specialists, and now enters into the life of everyone. The switchboard and the motor car, the treatment of flour and of cigarette paper, the building of a day nursery and of an atomic pile, are our daily concerns; by these we move and act and live. We simply cannot dissociate ourselves from the hot-water system and the air mail and frozen food and the linotype machine. A nation unskilled in these, a nation in which the screwdriver and the fuse-box are still handled with suspicion, is today a backward nation."

We come next, then, to this question, are we as scientists doing what we should to see to it that the non-science majors in our colleges of Arts and Sciences have an opportunity to obtain an understanding and appreciation of science. C. P. Snow in his book "The Two Cultures" has emphasized the difficulties of bridging the vast gulfs separating the cultural world of the sciences and of the humanities. Holton, in an essay on "Modern Science and Intellectual Tradition", states: "in a nationwide survey conducted in 1958, nearly 40% of the men and women who had attended college in the United States confessed that they had taken not a single course in the physical and biological sciences." He goes on to say: "The separation . . . between the work of the scientist on the one hand and that of the intellectual outside science on the other is steadily increasing, and the genuine acceptance of science as a valid part of culture is becoming less rather than more likely. Moreover, there appears at present to be no force in our cultural dynamics strong enough to change this trend. This is due mainly to the atrophy of two mechanisms by which the schism was averted in the past. First, the common core of their early education and the wide range of their interests was apt to bring scholars and scientists together at some level where there could be mutual communication of the subjects of their individual competence; and second, the concepts and attitudes of contemporary science were made a part of the general humanistic concerns of the time."

Those of us who are practicing scientists must accept much of the blame for this failure to communicate. We have lost sight of our role as teachers in liberal arts colleges and have come to look upon our students only as prospective scientists. In the physical sciences this has been the case for a longer period of time and to a greater degree than in biology. Chemistry, for example, has long been highly professionalized and physics is close behind. Ask any chemistry professor how he lists his occupation on his driver's license. I believe you will rarely find one who does not simply list it as: "chemist". In general, I suspect physics professors also list themselves as physicists. Among biology professors you will probably find a much larger percentage putting down "university professor" — in fact, 25 years ago I believe you would have found nearly all biology professors listed this way. Faculty members in non-science areas, such as history, English, etc., will, I suspect, nearly always designate themselves as university professors.

In many liberal arts colleges, the only chemistry major available is the curriculum prescribed by the American Chemical Society for the B.S. in Chemistry degree. Frequently the only chemistry courses offered at the freshman, sophomore and junior levels are the professional training courses of this same curriculum. Much the same kind of program is apt to be found in physics.

In biology, courses are often available for the non-specialist, and in some cases a student may even obtain a "cultural" major, that is, a major which is not designed to prepare him for graduate work; but this is seldom possible in the physical sciences. Recently however many biologists have been emphasizing professional training to the exclusion of liberal education. Beginning courses in biology are being revised so that they will provide a better foundation for professional training. In a good many instances at least a year of chemistry is prerequisite to the first biology course and there is talk of making organic chemistry at least a co-requisite. In addition, there is frequent pressure to drop "cultural" courses in biology so as to provide time for more professional courses and to make the program for a major in biology more rigid so that it will inevitably provide the average

student with an adequate background for graduate work in biology.

Let me make one point quite clear. I am not arguing that the student who is actually going into graduate work should not have a thorough professional grounding in science. In fact, for such a student I would strongly advocate, as a minimum: chemistry through organic; mathematics through calculus; a year of physics; a course in statistics; and a solid program of professionally oriented courses covering the major areas of biology; although I realize that he might not be able to get all of this into his undergraduate curriculum unless he knew what he wanted to do when he entered college and planned his program from the beginning of his freshman year. But how many of the students who take the first course in biology ever become graduate students in biology? In fact, while I have no statistics on the matter, I think it would be quite safe to say that considerably less than half of the students who major in biology ever go into graduate work in the field. Is there any reason why a pre-law student, a ministerial student, or a student who will go into business or politics after obtaining his college degree should not major in biology? I have had close personal contact with a number of clergymen who were closely associated with the education of young men for the ministry. On many occasions I have heard them emphasize the importance of a good background in science and particularly in biology for a clergyman. In fact, I have often heard biology recommended as an excellent major for a preministerial student. Or consider the young lady who comes to college, obtains her MRS. along with her bachelor's degree, and makes a career for herself as a housewife. Why wouldn't a biology major be just as appropriate for her as, let us say, an English major? Last evening we heard an interesting and provocative address by Dr. Egler. He emphasized the difficulties he has encountered in his crusade against pollution. The public is uninformed and apathetic. The politicans are swayed by the pressure tactics of special interests. To me this points up the desperate need for politicians and ordinary citizens who are biologically literate. Suppose that one or more good courses in biological principles and concepts had been included in the curriculum of many of these people. Suppose even that the percentage of "cultural" biology majors was as high among them as the percentage of sociology or history majors. There would then be a large cadre of ordinary citizens and politicians who instead of looking upon crusading scientists as crackpots living in ivory towers would understand what scientists were talking about and could appreciate its importance. If our society is to reap the full benefits of the scientific revolution; in fact, possibly if it is to survive, we must have citizens and politicians who have some understanding and appreciation of science in general and of biology in particular.

Further, while we tend to think of biology as a science, not as a humanistic discipline the eminent muscle physiologist and Nobel prize winner Albert Szent-Gyorgyi maintains that: "Science has two aspects: it has to be part of every education, of humanistic culture. But we also have to teach science as a preparation for jobs. If we distinguish sharply between these two aspects then the talk about the two cultures will lose its meaning."

René Dubos, in the annual Phi Beta Kappa-Sigma Xi address at the A.A.A.S. meeting in Montreal last Christmas, spoke on "Humanistic Biology" and I should like to quote a part of his conclusion:

"The role of the biologist is to study the raw materials of man's nature and the mechanisms through which each person uses them to create his own experiential individuality. This role is becoming of increasing importance as human life becomes more deeply influenced by technology and therefore more remote from man's evolutionary experience.

By adding to the knowledge of man's biological nature, science helps the humanist better to understand the human condition, and to define the good life. Unfortunately, while biological sciences have been immensely successful in describing the elementary structures and processes of the body machine, they have tended to neglect the study of living as experience. Indeed, it is commonly stated that biology has lost contact with the humanities because it has become too "scientific" and as a consequence no longer deals with the problems peculiar to the humaneness of man. There is no doubt, of course, about the

loss of contact, but the explanation of the difficulty, in my judgment, is that biology is not scientific enough.

By neglecting the study of a large variety of man's responses, biology is betraying one of the responsibilities of science — namely, the development of objective methods for describing all aspects of reality. Today, as in the past, the most compelling and interesting problems of human life come from the manner in which man reacts passively, and responds creatively, to the challenges of his total environment. Biology will once more become a complementary aspect of the humanities if it accepts the urgent social task to provide knowledge of the raw materials of experience out of which man creates himself."

This, however, raises some questions. Suppose we grant the appropriateness of one or more courses in biology, possibly even a biology major, for students who are definitely not headed for graduate work in biology. Do they need the same technical background that we expect of our graduate students, and even if we think they do will they take it? How many non-science majors will take the first course in biology if there is a prerequisite of a highly technical year of chemistry? In my opinion they will be few and far between. Some of my colleagues insist that no one can obtain an understanding or appreciation of modern biology without this minimum background in chemistry. Granted that the student may not follow the series of chemical reactions in the Krebs or citric acid cycle, nevertheless he can certainly be given some understanding and appreciation of the general concept of the storing of solar energy in the process of photosynthesis and its release in respiration. He can appreciate the stepwise nature of the process in each direction; and can recognize the familiar substances involved, such as starches, sugars, and citric acid and their relative complexity, without necessarily learning their chemical formulae. The idea of the energy involved in chemical bonds and the release of this energy when the bonds are broken can be understood without an extensive background in chemistry. In fact, I believe that any normal student can obtain a reasonable appreciation and understanding of the principles and concepts of modern biology without learning all of the technical details and without the chemical, physical, and mathematical background which is essential for the professional biologist. But many biology courses, including many of our supposedly nontechnical courses, suffer from far too much emphasis on the memorization and regurgitation of facts and far too little emphasis on the understanding of basic principles.

As Dale Wolfle has expressed it: ". . . many science courses are dry, dull, and crowded with inappropriate and sometimes incorrect subject matter; most college courses are designed almost exclusivcly for the future scientist, and at all levels science is too frequently taught as a collection of facts instead of as a method of gaining knowledge."

Along the same line, Bentley Glass, a distinguished biologist who has been intensely interested in teaching, says: ". . . our college training in the sciences tends to be far too narrow and too specialized. It turns out technicians of extremely circumscribed vision."

For a number of years as a member of the Medical Selection Committee at the University of Florida I have interviewed applicants for our medical school, from our own campus and from many other institutions. As a part of the interview, I nearly always ask questions about some of the basic principles of biology which they should have learned in the freshman course and I commonly draw a blank, but if I ask for the name of some muscle, nerve, or blood vessel the correct answcr will be forthcoming at least as often as and probably more often than when I ask about an important principle. Further, many of the examinations in biology courses which I have seen, examine the student solely or almost solely on his ability to recall specific facts; facts which often seem rather trivial to me. For some years I was one of a dozen or so biologists who constituted the staff of a course in general biology for the non-science major. We all presumably taught the same material and we each contributed a certain number of objective questions to the examination. I doubt seriously if we ever made out an examination on which most members of the staff — professional biologists teaching the course, mind you — could have made a perfect score. Yet, presumably we expected our students, most

of whom would probably never take another course in biology, to memorize the minutiae we couldn't remember ourselves. All of which leads me to feel that there is more than a little truth in the following statements which appear in an article by J. A. Gengerelli entitled "The Education of Future Scientists":

"Most science instructors, of course, are earnest, literal minded men who are fully cognizant of the ever mounting store of knowledge and feel that they should tell the student everything. In their panic they are guilty of what might be called a flight into complexity, and they saddle the student with great hunks of information and technique which he has no time to digest and absorb. . . . Thus, many university professors are not teachers at all; they do not explicate. They recite — and fast! . . . We stress *know*-how, not *think*-how. . . . The stress tends to be on methodology, gear, hardware, controls and precision of measurement rather than on the theoretical value of the results or their implications for the status of existing knowledge. Distressingly often, graduate instruction stops short with methodology. . . . our scientific education has its center of gravity in technology rather than in basic understanding of subject-matter."

Biology then may be important in a liberal education not only because of its practical value or because of its possible role as a representative of the sciences, but also because of its "relevance to the humaneness of man". It can be just as appropriate a major for a student who does not expect to make a professional career of science as any of the other arts and science disciplines. However, it is not only what we teach that is important but also how we teach it.

Albert Szent-Gyorgyi, in the same address from which I have previously quoted had this to say:

"There is a widely spread misconception about the nature of books which contain knowledge. It is thought that such books are something the contents of which have to be crammed into our heads. I think the opposite is closer to the truth. Books are there to keep the knowledge while we use our heads for something better. . . . In my own head any book knowledge has a half life of a few weeks. . . . I do not want to be misunderstood. I do not deprecate knowledge and I have worked long and hard to know something of all fields of science related to biology. Without this I would do no research. But I have retained only what I need for an understanding, an intuitive grasp, and in order to know in which book to find what.

. . . . the time spent in school is relatively short compared to the time thereafter. I am stressing this because it is widely thought that everything we have to know to do our job well, we have to learn in school. This is wrong because during the long time which follows school we are apt to forget, anyway, what we have learned there. . . . So what the school has to do in the first place, is to make us learn how to learn, to whet our appetites for knowledge, to teach us the delight of doing a job well, to teach us to love what we do and to help us to find what we love to do. . . .

It is a widely spread opinion that memorizing will not hurt, that knowledge does no harm. I am afraid it may. Dead knowledge dulls the spirit, fills the stomach without nourishing the body. The mind is not a bottomless pit, and if we put in one thing we might have to leave out another . . ."

As most of you know the Commission on Undergraduate Education in the Biological Sciences, more succinctly known as CUEBS is holding its Southeastern Regional conference in Charlottesville in conjunction with our meeting this weekend. Dr. Victor Greulach, a former president of ASB and a former editor of our Journal is Executive Director of CUEBS. This commission is concerned with education in biology at the undergraduate level. In the various conferences held thus far there seems to have been general agreement that all biology majors should have a common hard core of training in biology, chemistry, physics, mathematics and statistics regardless of their future specialities. Many of those attending the conferences here also apparently felt that even non-science majors taking biology as a part of a liberal education should have the first year or two of the same hard core, although there has not been general agreement on this point. I think the hard core for preparation for professional work in biology or in other words for graduate work is excellent. However, I feel very strongly that

biology should be a part of a liberal education and that when it is being offered in this context the courses should provide an understanding and appreciation of principles and concepts without overwhelming the non-science student with technical material. Please note that I said courses not just the beginning course. I would even hope that many institutions might offer a "cultural" major in biology for non-science students who may later become politicians, businessmen, clergymen, housewives, or just plain ordinary citizens.

It is my opinion, then, that we need to be much concerned about this problem of the two cultures. Science, or to make it more personal, biology should constitute a major component of a liberal education and a public understanding of science (biology) is essential to the continued welfare of our nation and in fact of the race. But we are so to speak, "pricing ourselves out of the market" by adopting a strong professional approach towards curriculum and class offerings, aided and abetted in many cases by poor teaching. Basically, the poor teaching is largely a matter of emphasizing rote memorization of masses of facts and failure to teach an understanding of fundamental principles. Many of the most eminent scientists, including for example Newton and Einstein, recognized the importance of a public understanding of science and spent a great deal of time and effort in attempting to explain their own work in simple language which the public could understand. It seems to me that we have a duty and an obligation to attempt to educate the non-scientist as well as the professional. We are citizens and members of society just as are non-scientists and we have an obligation to try to contribute to the improvement and betterment of society. But it goes much farther than that, for as Warren Weaver has said: "It is hardly necessary to argue these days that science is essential to the public. It is equally true, as the support of science moves more and more to state and national sources, that the public is essential to science."

In conclusion, I would like to quote two eminent biologists on the subject of teaching. First Bentley Glass — this time from an article in the A.A.U.P. Bulletin entitled "The Scientist and the Science Teacher":

"Of all the resources of a nation, its greatest are its boys and girls, its young men and women. Like other material resources, these can be squandered or dissipated. They are potential greatness, but they are only potentialities. Science creates knowledge and knowledge generates power, but knowledge resides only in the minds of men who first must learn and be taught, and power is tyranny unless it is guided by insight and wisdom, justice and mercy. The greatest of men have been teachers, and the teacher is great among men."

And finally Albert Szent-Gyorgyi: "In spite of its many chapters our teaching has essentially but one object, the production of men who can fill their shoes and stand erect with their eyes on wider horizons. This makes school on every level into the most important public institution and the teacher into the most important public figure. As we teach today so the morrow will be . . . ."

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THE ERDAHL-CLOYD UNION ON CAMPUS OF N. C. STATE UNIVERSITY

About the Raleigh Meeting

The Association of Southeastern Biologists will hold its 27th annual meeting April 14-16, 1966, at North Carolina State University, Raleigh, N. C. Activities will center in or near the Erdahl-Cloyd Union located on Hillsboro Street. The program Thursday evening will begin at 7:30 in the Nelson Auditorium of the Textile Building, to be followed by the smoker to be in the lobby of the Union. Exhibits will be on display in the ballroom of the Union. Paper sessions and the annual business meeting will occupy Friday. The Friday night activities, including the banquet, retiring President's address, and presentation of awards will be held at the Faculty Club west of the campus.

Dates of meeting — April 14-16.

Executive Committee Meeting.

1:00 P.M. Thursday (April 14), McKimmon Room, Williams Hall.

Registration

Time — 4:00 P.M. until 7:15 P.M. Thursday.
8:00 A.M. until 11:00 A.M. Friday.
Place — Front lobby, Erdahl-Cloyd Union.
Fee — $1.00.

Location of exhibits and paper sessions.

Exhibits — Ballroom of the Erdahl-Cloyd Union.
4-11 P.M. Thursday; 8 A.M.-11 P.M. Friday; 8-noon Sat.
Paper sessions — Erdahl-Cloyd Union or nearby buildings.

GENERAL INFORMATION

Raleigh is on the eastern edge of the Piedmont Province. Rolling topography from about 200-500 feet elevation, mixed pine and hardwood forests, pastures and cultivated fields lend contrast and interest to the surrounding countryside. April is one of the most beautiful months, with mild weather and a great display of flowering trees and shrubs. Raleigh, the Capital city, has a population of about 125,000. Museums, Legislative and Capitol buildings, campuses of five colleges and universities, the nearby Research Triangle Park are all within a few minutes drive. The campuses of Duke and the University of North Carolina are within a 40 minutes drive. Information on Raleigh and its various attractions, especially for wives and families, will be distributed at the registration desk.

Local alcohol mores

Beer and wine are sold in grocery stores and in most restaurants. "Hard" liquors are available only at "ABC Stores."

Travel to Raleigh

Highways passing through Raleigh are as follows: East-West U.S. 70 and U.S. 64; North-South U.S. 1, U.S. 50 and U.S. 401. Airlines serving the Raleigh-Durham Airport are: Eastern, United and Piedmont. Limousine fare one-way is $2.25. A representative from N. C. State will be glad to meet you at the airport if advised of your arrival time. The Seaboard and Southern Railroads, the Greyhound and Carolina Trailways Bus lines serve Raleigh. Correspondence concerning time of arrivals by plane should be addressed to Dr. R. Harkema, Department of Zoology.

The NCSU Campus is located on the west side of Raleigh, between Hillsboro Street on the north and Western Blvd. on the south.

Dining facilities

The Erdahl-Cloyd Union operates the State Room with buffet service at noon and in the evening. The Union snack bar also operates continuously during building hours and cafeteria service is provided for lunch and dinner. Both facilities are very crowded from 11:30 to 12:30 but not at other times.

There are two large university-operated cafeterias on the campus and a number of small private restaurants just to the north along Hillsboro Street. Two unusually fine cafeteria restaurants, the S and W and Ballentines, are located in Cameron Village Shopping Center about 1½ miles from the campus. Several of the nearby motels have their own restaurant facilities.

Parking

Parking on the campus will be difficult. Special arrangements will be made and will be publicized at the time of registration. An ASB sign for the car will be necessary for on-campus parking.

Field trips

Several field trips are being planned for Saturday, April 16. Plans are as yet tentative and final itineraries will await expressions of interest from the ASB membership. At this time, the following trips are planned:

1. Trip for phycologists to be led by Dr. L. A. Whitford. Saturday morning. Ecological and floristic aspects of stream and pond algae will be emphasized; some unusual algae will be seen.
2. Trip to Carolina Biological Supply Co., Elon College, to be led by Dr. T. L. Quay, Mr. Alva Harris and the personnel at the Company. The tour of the facilities will be Saturday morning and include the departments of protozoology and culture, prepared slides, preserved materials, and models and plastics. Transportation will be provided if necessary. Lunch will be provided by the Company. Elon College is east of Greensboro and those driving from the meetings could leave from there, or others could meet bus or plane connections in nearby Greensboro or Burlington. This tour is particularly interesting for teachers who use the materials from this Company.
3. Trip to the North Carolina coastal plain led by Dr. A. W. Cooper, Dr. W. E. Standaert, and Mr. E. D. Waits. This trip will emphasize plant communities and at present is planned to last all day Saturday. However, if sufficient interest is shown, the trip can be extended through to mid-day, Sunday. The following communities will be observed: salt marsh; dunes and live oak forest; pocosin (evergreen shrub bog); Carolina Bay; pine savanna; cypress swamp; longleaf pine-turkey oak on coarse sand; upland hardwoods. Collecting will be permitted.
4. In addition, if sufficient interest is indicated, a trip to observe plant communities in the lower piedmont in the vicinity of Raleigh will be arranged for Thursday afternoon, April 14. This trip will emphasize relations between hardwood forests and soil types. Several "relict" communities in the lower piedmont will also be observed. The trip will be led by Dr. A. W. Cooper.

Any persons interested in attending one or more of the field trips are asked to write to Dr. A. W. Cooper, Department of Botany, as soon as possible and indicate on which field trips they wish to go. In addition, individuals wishing to take the coastal plain field trip are asked to indicate whether they would prefer a single day trip or a trip lasting overnight.

Local Arrangements Committee:

Co-Chairmen	J. W. Hardin and G. C. Miller
Housing and Family Activity	G. R. Noggle
Banquet, Food Services	B. W. Smith
Smoker, Exhibits, Publicity	H. T. Scofield, J. F. Roberts
Meeting Rooms, Audio-Visual	E. A. Ball

Field Trips	A. W. Cooper
	T. L. Quay
	W. F. Standaert
	A. Harris
	E. D. Waits
Transportation	R. Harkema
Registration	E. O. Beal
	L. A. Whitford
	C. S. Keener
Finance	J. Yarbrough
Program	J. W. Hardin
	G. C. Miller
	R. T. Moore

Accommodations

It is advisable to make reservations at least by the end of March. Write directly to the hotel or motel.

Motels Within Walking Distance of N. C. State University Campus

College Inn Western Blvd. U. S. Hwy. 64 828-5711	120 rooms	Single $ 7.50-$ 9.00 Double $11, $12, $14
Velvet Cloak 1505 Hillsboro St. 828-0333	90 rooms	Single $12.50 Double $18.00 Three in room $20.00

Motels in Downtown Raleigh, Bus Service to N. C. State University

Downtowner Motel 309 Hillsboro St. 833-5771	81 rooms	Single $ 9.00-up Double $12.00-up
Raleigh Cabana Motel 514 S. Salisbury St. 828-0311	56 rooms	Single $ 7.00-up Double $10.00-up
Travelodge Motel 300 N. Dawson 828-9081	60 rooms	Single $ 7.00-$ 9.00 Double $10.00-$12.00

Hotels in Downtown Raleigh, Bus Service to N. C. State University

Andrew Johnson Hotel 100 W. Martin St. 832-4466	Single $ 4.50-$ 7.00 Double $ 7.00-$ 9.00
Carolina Hotel 228 W. Hargett St. 832-8811	Single $ 5.50-$ 7.00 Double $ 9.00-$10.00
Sir Walter Motor Hotel 400 Fayetteville St. 832-7711 *Free bus service to campus*	Single $ 7.00 Double bed $4.50/person Twin with roll-away for 3 $4.50/person Twin for two $5.00/person
YMCA 1601 Hillsboro 832-6601	Limited number of rooms Walking distance from N. C. State Univ. Campus

Motels in Vicinity of Raleigh

Alamo Plaza 1816 Louisburg Rd. 834-3438	60 rooms	Single $ 6.00 Double $ 8.50-up
Cadillac Inn Motor Lodge Raleigh-Durham Hwy. 70 787-2516	19 rooms	Single $ 6.00-up Double $ 8.00-up
Fairfield Motel 1817 Louisburg Rd. 834-0717	36 rooms	Single $ 6.00-up Double $ 7.00-up
Holiday Inn Hwy. U. S. 1 North 828-2561	104 rooms	Single $ 8.00-up Double $10.00-up
Howard Johnson's Motor Lodge Hwy. U. S. 1 North 834-0707	60 rooms	Single $ 8.00 Double $10.00
Plantation Motel Hwy. U. S. 1 North 828-8261	67 rooms	Single $ 7.50-up Double $10.00-up
Ranch Motel Raleigh-Durham Hwy. 70 787-3131	56 rooms	Single $ 7.00-up Double $10.00-up

A number of other motels are in the Raleigh area.

Camping Facilities

The Umstead State Park is on the Raleigh-Durham Hwy. 70, about 5 miles west of Raleigh. There are 28 family camping sites available. The Park will reserve campsites only for 5 or more days. For further details write to the Park, Rt. 8, Box 239, Raleigh, North Carolina. Telephone Raleigh (area 919) 787-3033.

POLLUTION SYMPOSIUM — PART II

Part II of the proposed three-part ASB symposium dealing with various aspects of man's pollution of his environment will have for its principal speaker Dr. John L. Buckley of the Office of Science Advisor to the Secretary of the Interior. Dr. Buckley's talk — *Restoring the Quality of Our Environment: What Needs to be Done and How We are Doing It* — will describe the constructive steps being taken by governmental agencies to meet the problems raised by environmental pollution. He will be speaking from his experience as a Technical Assistant in the Office

of Science and Technology, and not as a representative of the Department of the Interior, a position he has held since last November.

It is anticipated that there will be two discussants for Dr. Buckley's talk, but their names are yet to be announced. Dr. Stanley Cain has agreed to give the final talk in the pollution symposium series at the ASB meeting at Columbia, S. C. in April 1967. Arrangements for these last two symposia are being made by Dr. Arthur W. Cooper, School of Agriculture and Life Sciences, North Carolina State University, Raleigh, N. C.

Meritorious Award Nominations

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)
1961. Dr. Warren Deacon (Vanderbilt)
1962. Dr. Septima C. Smith (Univ. of Alabama)
1963. Father Patrick H. Yancey (Spring Hill College)
1964. Dr. Ruskin S. Freer (Lynchburg College)
1965. Dr. Harwell P. Sturdivant (Western Maryland College)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting materials to *Dr. Perry C. Holt, Dept. of Biology, Virginia Polytechnic Institute, Blacksburg, Virginia.*

COMMITTEE

H. Branch Howe, Jr.
Julian T. Darlington
Perry C. Holt, *Chairman*

Association Research Prize

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.
2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.
3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.
4. **Papers submitted in competition are judged by eminent scientists in the various fields of biology. These individuals are selected by the Research Committee and are from schools outside the Southeast. Every effort is made by the Research Committee to keep the authors of submitted papers anonymous. Criteria for the award are left to the discretion of the judges' panel, who may withhold said award if no paper is considered to have sufficient merit.**
5. Papers must be submitted *in triplicate* and in their entirety not later than March 1, 1966, to *Dr. Raymond T. Damian, Dept. of Biology, Emory University, Atlanta, Georgia 30322.* One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.
6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Ivey F. Lewis Fellowship at Mountain Lake Biological Station

A Research Fellowship of $150.00 for summer course study or research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. This fellowship, formerly known as the *Phipps and Bird Research Fellowship,* was re-named at the request of the Phipps and Bird Company. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a

list of important publications, and especially in the case of younger workers, by references and educational data. Applications should be sent to *Dr. Raymond T. Damian, Dept. of Biology, Emory University, Atlanta, Georgia 30322* not later than 29 March 1966. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE
R. W. HULL
EDWARD E. C. CLEBSCH
RAYMOND T. DAMIAN, *Chairman*

Mary Glide Goethe Travel Awards

For the ninth year there will be funds available through the generosity of Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year at North Carolina State University, Raleigh, N. C. Approximately $300 will be available from the contributions of Mr. Goethe, and it is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from Raleigh.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe Committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1966 meeting of the Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Indicate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.
2. Give information as to whether or not a paper is being presented by the applicant.
3. In a paragraph, give a brief history of your education to date, of how many years you have been — and plan to be — in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.
4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.
5. Have your major professor or departmental head write a letter supporting your application.
6. Applications and supporting letters, both in triplicate, should be in the hands of *Dr. Thomas Daggy, Box 626, Davidson, N. C., 28036, by 1 March 1966.* Applicants will be notified of the decision of the Committee during March.

C. J. UMPHLETT, GROVER C. MILLER,
THOMAS DAGGY, *Chairman*

Association Affairs (Continued from page 2)

REPORT OF THE COMMITTEE ON MEETING TIME

Ballots were mailed to virtually all members during late March and early April, 1965. By June 1, after which no additional ballots were received, the results were as follows:

In favor of traditional meeting-time	190
In favor of a change	67
No preference	11
Total ballots returned	268

The breakdown of those voting for a change in meeting-time was as follows:

In February or March	28
Some other time in April	18
Easter weekend	1
Summer	2
Some time in May	3
October or November	15

Many of those voting for some other time in April were interested in avoiding conflict with the Federation meetings, avoiding the Easter holidays, or both. Probably many of those voting for October or November represent members interested in avoiding conflict with the Federation meetings. A number of those voting for February or March indicated that the advantage would be that ASB meetings would then come before most of the many meetings held during the spring.

Seventy-five percent of the members voting favored the traditional meeting time. It appears, however, that enough members favor avoiding the Easter weekend, when the traditional time coincides with this period, to justify changing the traditional time each year that it coincides with the Easter weekend.

JOHN A. BOOLE, JR., PAUL J. OSBORNE,
HAROLD J. HUMM, *Chairman*

Constitution and By-Laws of the Association of Southeastern Biologists

ARTICLE I. Name

The organization shall be known as the Association of Southeastern Biologists.

ARTICLE II. Objectives

The objectives of the Association shall be to encourage in the broadest and most liberal manner the advancement of Biology as a science by the promotion of research in Biology; by the increase and diffusion of knowledge of Biology to the solution of biological problems; by the preservation of biological resources; and by its meetings, reports, discussions and publications to promote scientific interests and inquiry, thereby adding to the health, happiness and knowledge of all peoples.

ARTICLE III. Eligibility and Affiliation

Section 1. Members, in general, shall be residents of the Southeastern States and shall be known as (A) Active Members and (B) Emeritus Members.

Section 2. Any person is eligible for active membership in the Association who is engaged in (A) biological research, (B) the teaching of biological subjects, (C) graduate study in the biological sciences, or (D) work in the various fields of applied biology.

Section 3. Any member may be elected as Emeritus Member who has been a member of the Association for ten (10) or more years and who has retired from professional duties. An Emeritus Member shall have the same rights and privileges as an Active Member.

Section 4. Any individual or organization contributing one hundred (100) dollars or more per annum to the support of the Association shall be known as a Patron. Patrons will receive the publications and notices of the Association and may attend the annual meetings but shall not have the right to vote.

Section 5. Any organized group which is interested in biology may become an affiliate of the Association of Southeastern Biologists upon recommendation of the Executive Committee and approval of the Association at its annual business meeting. The purpose of affiliation is to promote communication and cooperation among the Societies involved but such affiliation does not confer the privilege of individual membership in the Association of Southeastern Biologists upon members of affiliated Societies. The terms of affiliation shall be arranged between the Executive Committee of the Association of Southeastern Biologists and each affiliate society.

ARTICLE IV. Officers

The officers of the Association shall be (A) President, (B) President-Elect, (C) Vice-President, (D) Secretary, and (E) Treasurer.

ARTICLE V. Annual Meeting

Section 1. The annual meeting of the Association shall be held in April at such place as may be recommended by the Executive Committee and approved by the membership at an annual business meeting. The date of the meeting shall be determined by the Executive Committee.

Section 2. In case of an emergency, the Executive Committee may change the time and place of the annual meeting or may call a special meeting.

ARTICLE VI. Quorum

Fifty (50) members of the Association shall constitute a quorum for the transaction of business.

ARTICLE VII. **Disposition of Property**

In the event of the dissolution or termination of the Association, title to and possession of all the property of the Association shall pass forthwith to the American Institute of Biological Sciences, Washington, D. C., if then in existence and qualified for exemption under the Internal Revenue Code of 1954 as amended, and otherwise to the American Association for the Advancement of Science, Washington, D. C.

ARTICLE VIII. **Incorporation**

The Executive Committee, with the approval of the membership in a vote at an annual meeting, may apply for incorporation of the Association as a non-profit scientific and educational organization without capital stock under the laws of any of the southeastern states within its area.

ARTICLE IX. **Amendments**

Section 1. This Constitution may be amended at any annual meeting by a three-fourths majority of those present, provided due notice of said amendment has been sent by the Secretary to each member at least thirty (30) days in advance of the meeting, and provided the amendment has been proposed by the Executive Committee or by a committee authorized by the Association at a previous annual meeting, provided that so long as the Association shall be or remain an organization exempt under Section 501 (c) (3) of the Internal Revenue Code of 1954, as amended, no amendment shall be made to Article II or Article VII of this Constitution without consent having been obtained from the Internal Revenue Service.

Section 2. Amendments to this Constitution shall become effective at the close of the annual meeting at which they were adopted.

BY-LAWS

ARTICLE I. **Membership**

Section 1. Membership shall be granted any person recommended and approved as being eligible by two active members in good standing.

Section 2. Such recommendations shall be submitted to the Treasurer of the Association and the new member shall achieve active status in the Association with all the rights and privileges pertaining thereto when his dues for the current year have been received by the Treasurer of the Association.

ARTICLE II. **Election of Officers**

Section 1. (A) Annually the nominating committee shall prepare a multiple slate of nominees for each office or vacancy to be filled. Members are privileged to recommend to the nominating committee persons for any or all offices.

(B) The slate of the nominating committee shall be presented to the membership on or before Thursday evening of the Annual Meeting, and the election shall be held at the following business session when nominations will be called for from the floor.

(C) The Secretary shall prepare ballots for distribution. These ballots shall be distributed and collected by three tellers appointed by the President. A majority vote will constitute election to office. Where more than one person is to be elected to a position (e.g., members of the Executive Committee) the two or more receiving the highest number of votes shall be declared elected.

(D) The results of the election shall be announced as soon as possible after the tellers have counted the ballots, and the successful candidates shall be presented to the membership. All ballots shall be deposited with the Secretary who shall retain them for one year.

Section 2. (A) A President-Elect shall be elected annually and shall become President at the close of the next annual meeting following election.

(B) A Vice-President shall be elected annually. Neither the President nor the Vice-President shall be immediately eligible for re-election.

Section 3. (A) A Secretary and (B) A Treasurer shall be elected for a term of three (3) years each, and they shall be eligible for immediate re-election to additional terms. The Secretary and Treasurer shall not be elected to office in the same year except to fill an unexpired term.

Section 4. Should an office other than that of President and that of President-Elect become vacant during the year, the Executive Committee shall appoint a member to fill that office until the next election.

Section 5. Newly elected officers shall assume the duties of their office at the close of the annual meeting in which they were elected.

ARTICLE III. **Duties of Officers**

Section 1. The President shall be the directing officer of the Association, shall perform the duties usual to that office, and shall appoint, with the advice of the Executive Committee, regular committees, special committees authorized by the Executive Committee, and a representative to the American Association for the Advancement of Science. Also, he shall appoint such other special committees as may be required.

Section 2. The President-Elect shall be responsible for organizing the program for the first evening session, and shall be responsible for promoting membership in the Association. In the

event of the resignation, death or incapacity of the President-Elect during his term of office the Executive Committee shall declare the person who received the next highest number of votes for the office to be President-Elect. If this individual is unable to accept, the Executive Committee shall nominate two members for the office, to be voted upon by the membership by mail ballots.

Section 3. The Vice-President shall be the public relations officer of the Association. In the absence of the President from any meeting the Vice-President shall discharge the duties of the office. In the event of the death or resignation of the President, the Vice-President shall become President of the Association.

Section 4. The Secretary shall keep records of the meetings of the Association and of the Executive Committee, conduct the routine business of the Association pertaining to the office, maintain a roster of the membership, issue a call for suggestions for nominations stating the time during which these suggestions will be received and listing names and addresses of all members of the Nominating Committee, issue a call for papers for the program and work with the Program Committee in arranging the program, attend to the preparation and distribution of ballots at elections, report the activities of his office to the Association at the annual meeting, notify Emeritus Members of their election, and give proper recognition to Patron Members. The Secretary of the Association shall be Ex-Officio Associate Editor of the A.S.B. Bulletin and shall be responsible for providing the Editor with all official announcements, documents, programs and abstracts of papers to be published in the Bulletin.

Section 5. The Treasurer shall receive and disburse all funds of the Association, keeping the necessary records of dues and funds expended. He shall at all times coordinate the efforts of his office with those of the offices of the Secretary and of the Editor, and shall report annually all receipts and expenditures to the membership. He is authorized to reimburse the Secretary for expenses incurred in attending the annual meeting of the Association and interim meetings of the Executive Committee. The Executive Committee may by special action also authorize the Treasurer to reimburse other officers of the Association for all or a portion of expenses incurred in attending interim meetings of the Executive Committee, not to exceed one per year. The Treasurer of the Association shall be Ex-Officio Business Manager of the A.S.B. Bulletin.

ARTICLE IV. Dues and Fees

Section 1. The annual dues of the Association for Active Members shall be two dollars ($2.00) for graduate and undergraduate students, four dollars ($4.00) for regular members, five dollars ($5.00) for contributing members, and twenty-five dollars ($25.00) for sustaining members. Emeritus Members shall be exempt from dues.

Section 2. The fiscal year of the Association shall be from January 1 to December 31.

Section 3. Any member in arrears in the payment of dues for two (2) years as of the close of the fiscal year shall be dropped from the membership roster at the close of the annual meeting for that calendar year.

Section 4. Delinquent members who desire reinstatement to membership shall pay a reinstatement fee of two dollars ($2.00) in addition to the regular dues for the current fiscal year.

ARTICLE V. The A.S.B. Bulletin

Section 1. The A.S.B. Bulletin shall be the official publication of the Association, and shall be published quarterly or at such other regular intervals as may be determined by a vote of the membership upon recommendation by the Executive Committee.

Section 2. The Editor of the A.S.B. Bulletin shall be a member of the Association, responsible for the editing and publication of the Bulletin, and shall be selected and appointed by the Executive Committee for a term of three years. The Editor shall be eligible for reappointment for any number of successive three-year terms. Upon the recommendation of the Editor, the Executive Committee may appoint a Circulation Manager for the Bulletin.

Section 3. The A.S.B. Bulletin shall be supplied to all members of the Association without charge beyond the stated annual dues. Organizations may subscribe to the A.S.B. Bulletin at a rate equal to the annual dues, but such subscriptions will not carry the privileges of membership in the Association. The Executive Committee, upon the recommendation of the Editor, may establish special prices for back issues or volumes of the Bulletin.

Section 4. Any major change in editorial policy proposed by the Editor shall be subject to the approval of the Editorial Board.

ARTICLE VI. Executive Committee

Section 1. (A) The Executive Committee shall be in charge of the affairs of the Association between the Annual Meetings. (B) This Committee shall be composed of the officers of the Association, the immediate Past President, and six (6) members elected from the membership.

Section 2. The six members of the Executive Committee elected as such shall serve for a term

of three (3) years, two members being elected each year. These members are eligible for re-election to the Executive Committee. Should a vacancy occur among these six members, the Executive Committee shall appoint a member to serve until the next election.

Section 3. The Executive Committee shall select and appoint an archivist who shall be custodian of the permanent records or archives and shall, with the approval of the Executive Committee, make such arrangements as may seem appropriate for the collection, care and maintenance of such records. The archivist shall serve for a term of three years and shall be eligible for re-appointment for any number of successive 3-year terms.

Section 4. The Editor of the A.S.B. Bulletin and the Archivist shall be Ex-Officio Members of the Executive Committee with the power of discussion and privilege of proposing motions but shall not have the right to vote.

Section 5. The Executive Committee shall serve as an Ex-Officio Editorial Board for the Bulletin and shall be responsible for determining the major editorial policies of the Bulletin in consultation with the Editor.

Section 6. A majority of the Executive Committee shall constitute a quorum, provided all members have been notified of the proposed meeting.

ARTICLE VII. Regular Committees

Section 1. The following regular committees shall be appointed by the President upon the approval of the Executive Committee:

A. Auditing Committee; B. Nominating Committee; C. Program Committee; D. Resolutions Committee.

Section 2. The duties of the regular committees shall be as follows:

A. The Auditing Committee shall examine the records of the Treasurer prior to the annual business meeting of the Association and shall report the condition of the accounts to the membership at this meeting.

B. The Nominating Committee shall, with due consideration of suggestions received from the membership, prepare a multiple slate of nominees for each office or vacancy to be filled.

C. The Program Committee shall have the power to accept or to reject papers for the programs, and shall work with the Secretary in arranging the program.

D. The Resolutions Committee shall formulate and present to the Association such resolutions as may be considered worthy of action by the Association.

Section 3. The Executive Committee may from time to time establish special ad hoc committees as needed. The members of all such committees shall be appointed by the President.

ARTICLE VIII. Papers

Section 1. All titles of papers submitted for the program shall be in the hands of the Secretary two (2) months before the date set for the annual meeting.

Section 2. Each title submitted shall be accompanied by two (2) copies of an abstract of not more than two hundred (200) words.

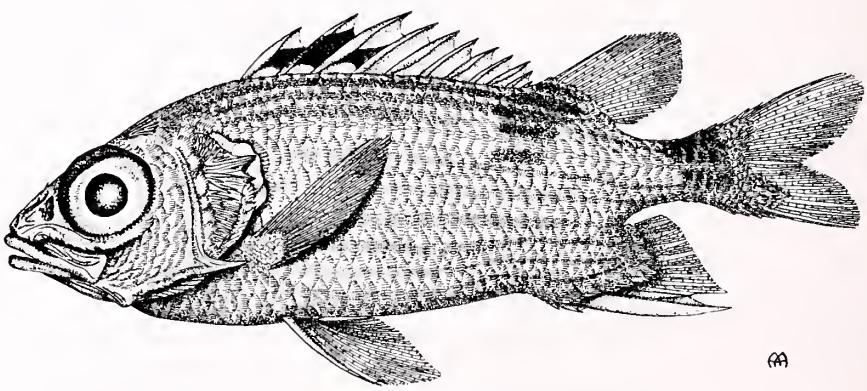
Section 3. Except by special action of the Program Committee the maximum time allowed for the presentation of a paper shall be ten (10) minutes. The presiding offieer will enforce this rule.

Section 4. Papers presented before the Association at the annual meeting shall be read only by members or by persons introduced by members.

ARTICLE IX. Amendments

Section 1. These By-Laws may be amended at any annual meeting of the Association by a two-thirds majority vote of those present.

Section 2. Amendments to these By-Laws shall take effect at the close of the meeting at which they were adopted.



News of Biology in the Southeast

About People

Roy Hunter, Jr., Department of Biology, Atlanta University, has received a grant of $1630 from the Atlanta University Center Faculty Research Fund to study enzyme systems in isolated notochords of frog larvae.

Lafayette Frederick, Department of Biology, Atlanta University, is the project supervisor of a cooperative research grant from the Bureau of Plant Industry, United States Department of Agriculture to conduct taxonomic and cultural studies of fungi isolated from Pakistan soil samples.

Ernest P. Edwards, formerly at the College of the Pacific, is now Professor of Biology at Sweet Briar College. His time will be divided between teaching and research on the ecology of the 3000 acres of woodland and pasture in which the 600 acre campus is situated.

New members of the staff of the Department of Biology, **West Virginia University**, for the 1965-66 term include:

Gideon Nel Louw, formerly of the University of Pretoria, South Africa, animal physiology.

David Fairchild Blaydes, a graduate of the Ohio State University, plant physiology.

Amir Agfa Badiei, graduate of the University of Tehran, Iran, botany.

Eddie Ray Crouse, of Fairmont State College, biology.

John Edward Fairey, III, graduate of the University of South Carolina, botany.

Jack Corbin Martin, East Tennessee State University, biology.

Ermo Attilio Sicher, Fairmont State College, biology.

Dale H. Arner, Department of Zoology, Mississippi State University, has been awarded a grant of $14,000 by the Water Resources Institute of the University for a 13 month ecological study of beaver impounded water areas. Dr. Arner, together with two of his graduate students, Msrs. J. L. Baker and B. B. Billingsley, have been awarded $1000 for wildlife research as a Theodore Roosevelt Memorial Grant by the American Museum of Natural History.

James D. Lancaster, Agronomy Department, Mississippi State University, was recognized by the *Progressive Farmer* as Mississippi's "Man of the Year in 1964 in Service to Mid-South Agriculture." This award was made in recognition of his contributions through recent researches on boron deficiencies in cotton.

John T. McGinnis has been appointed Assistant Professor in the Institute of Radiation Ecology at the University of Georgia on March 1, 1965, from the Department of Experimental Statistics at the University of Georgia campus.

The National Science Foundation announced it has awarded a $7,100 grant to Parsons College for the purchase of undergraduate instructional scientific equipment. In announcing the grant, the Foundation also stated that the project will be under the direction of Dr. Jack S. Brown, Professor of Biology and Dean of the College. In receiving the federal grant, the College agrees to provide an equal amount from non-Federal sources, bringing the project cost to $14,200. Dr. Brown has been a Professor of Biology on the Parsons faculty since 1963 after serving several years on the faculty of Emory and Henry College in Emory, Virginia.

Institutions and Organizations

The **Florida Oceanographic Society** of Stuart, Florida, a nonprofit organization dedicated to the encouragement and development of Marine Sciences and the general knowledge of kindred subjects through scientific research, is offering a limited number of openings for the use of our facilities to interested qualified Marine Research Scientists.

The society was recently organized, and at this time offers the following facilities:

A. A headquarters building adequate to house approximately fifteen visiting scientists.
B. A technical reference library of approximately 200 volumes and selected periodicals.
C. A boat house with several small boats adequate for the study of the area waters.
D. A spacious laboratory equipped for basic marine research including:
   1. Microtome
   2. Phase microscope and photo-microscope
   3. Analytical balances
   4. Stereo microscopes
   5. Bacteriological equipment
   6. Drying oven
   7. + − .02 C. refrigeration
   8. Water distillation unit
   9. Autoclave
   10. Ultrasonic cleaner
   11. Sheet metal and wood shop available

Provisions for visiting scientists include research and living space with no fees charged. Meals, transportation, and special equipment will be the responsibility of the visiting participant.

Interested parties should submit a short resume of their research project and their specific needs to: *Florida Oceanographic Society, 1212 Riverside Dr., Stuart, Florida — Att: Marine Science Directors.*

The **U. S. National Herbarium**, Department of Botany, Smithsonian Institution, has recently completed a move into new quarters in the west wing of the Museum of Natural History building on the Mall in Washington, D. C. The move has provided the herbarium with 50,000 square feet of storage space on two floors and over 60 rooms comprising offices, laboratories, workrooms, and a library. Present professional staff consists of 20 botanists, 5 of whom are research associates, and a supporting staff of 12 persons.

The American College of Gastroenterology has awarded Third prize in the 1965 Rorer Award Contest to Dr. **John E. Skandalakis** (Director of Surgical Training, Piedmont Hospital, Atlanta and Professor of Anatomy Emory University, Atlanta), Dr. **Stephen W. Gray** (Professor of Anatomy Emory University, Atlanta) and Dr. **Duncan Shepard** (Attending Surgeon, Piedmont Hospital & St. Joseph's Infirmary) for their paper "Smooth Muscle Tumors of the Small Intestine" which appeared in the August 1964 issue of "The American Journal of Gastroenterology."

The Department of Biology at **Atlanta University** has received a grant of $40,000 from the Sloan Foundation for the purchase of an electron microscope. Dr. Roy Hunter, Jr., Associate Professor of Biology, will be in charge of the new electron microscope laboratory.

Sweet Briar College will dedicate the new $1,000,000 Connie M. Guion Science Building the week of April 24th. The Building houses Physics, Chemistry, and Biology, with an enlarged Ames greenhouse adjacent to it for teaching use. Interested persons are invited to examine the building and attend lectures marking the dedication.

A NSF **Summer Institute in Protozoology** for college teachers of biology will be held at the University of California, Berkeley, July 6 - August 16, 1966. The program is intended especially for instructors concerned with special subject areas such as Invertebrate Zoology, Microbiology, Cellular Biology, etc. Consideration will also be given to college teachers currently engaged in "traditional" courses in Protozoology, or who are planning to introduce courses in the subject.

For further information write to:

Dr. William Balamuth, Director
c/o Letters & Science Extension
University of California
Berkeley, California 94720

Completed forms must be returned by February 15, and initial stipend offers will be made by March 5, 1966.

The **Smithsonian Institution** has just issued a new, illustrated public information leaflet (No. 447) called "Insectivorous Plants," by Stanwyn G. Shetler and Florence Montgomery, which is suitable for high school students and wildflower amateurs. Free copies may be obtained by writing to: Dr. William L. Stern, Chairman, Department of Botany, Smithsonian Institution, Washington, D. C. 20560.

A $10,000 greenhouse, financed in part by NSF, is under construction at **Millsaps College**. This new facility will be used in instruction and in faculty and student research projects. There will be facilities for growing both foliage and non-foliage plants.

A well-equipped weather station has been established at **Millsaps College** by the biological sciences departments. The station will be used in instruction and in faculty and student research programs. Initially the data accumulated at the station will be used in studies of small mammal reproductive cycles and food preference and in tree ring analyses.

Mississippi State University has under construction a new $2-million Forestry-Plant Science Building. The building will be completed in mid-1966, and will house facilities for teaching and basic and applied research for the Departments of Agronomy, Horticulture, Plant Pathology and Weed Science, and Agricultural Chemistry, and the School of Forestry.

Mississippi State University has been awarded a grant of $212,500 through the Federal Facilities Act to be matched by $425,000 in state funds to be used in the construction of a new wing on the biology building. Upon completion of the new structure, the existing facility will be renovated to provide full modern facilities for the Departments of Botany, Microbiology, and Zoology. This project will at least triple the present space available for instruction and research in these departments.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
(Act of October 23, 1962; Section 4369, Title 39, United States Code)

Publisher: File two copies of this form with your postmaster.

1. DATE OF FILING: 1 October 1965
2. TITLE OF PUBLICATION: The ASB Bulletin
3. FREQUENCY OF ISSUE: Quarterly (January, April, July, and October)
4. LOCATION OF KNOWN OFFICE OF PUBLICATION (*Street, city, county, state, zip code*): Academy of Natural Sciences, 19th & The Parkway, Philadelphia, Pennsylvania 19103
5. LOCATION OF THE HEADQUARTERS OR GENERAL BUSINESS OFFICES OF THE PUBLISHERS (*Not printers*): Dept. of Zoology, Univ. of Kentucky, Lexington, Ky. 40506 (Dr. John Carpenter)
6. NAMES AND ADDRESSES OF PUBLISHER, EDITOR, AND MANAGING EDITOR

PUBLISHER (*Name and address*): Association of Southeastern Biologists, Inc., Chapel Hill, North Carolina

EDITOR (*Name and address*): C. W. Hart, Jr., Academy of Natural Sciences, 19th & The Parkway, Philadelphia, Pa.

MANAGING EDITOR (*Name and address*): none

7. OWNER (*If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.*)

NAME	ADDRESS
Association of Southeastern Biologists, Inc.	Chapel Hill, North Carolina, (Dr. William J. Koch, Associate Professor, Dept. of Botany, University of North Carolina -- Agent.)

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NAME	ADDRESS
none	

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POD Form 3526 Aug. 1963

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Number 2

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1966

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The Association of Southeastern Biologists

ASB BULLETIN

Volume 13, Number 2 - April 1966

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Pa. 19103. Change of address should be sent promptly to the Secretary of the ASB, Dr. Margaret Y. Menzel, Dept. of Biological Sciences, Florida State Univ., Tallahassee, Fla. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. John Carpenter, Dept. of Zoology, Univ. of Kentucky, Lexington, Kentucky. Subscription rate for nonmembers of the ASB: $4.00 per year. Printing and typography by the Fulton Press, Inc., Lancaster, Pa.

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C. WILLARD HART, JR.
EDITOR

MARGARET Y. MENZEL
Associate Editor

BETTY PEDDICORD, Assistant Editor

JOHN CARPENTER, Business Manager

CONTENTS

ASSOCIATION AFFAIRS

Nominees for 1966 Elections

The following slate of nominees is submitted by the Nominating Committee for consideration at the 1966 meeting at North Carolina State University:

PRESIDENT

B. Theodore Cole, University of South Carolina
Harold J. Humm, Queens College

VICE PRESIDENT

Wilbur H. Duncan, University of Georgia
Herbert A. McCullough, Samford University

EXECUTIVE COMMITTEE

Stuart S. Bamforth, Tulane University
Richard E. Garth, Northwestern State College
Mason E. Hale, Jr., Smithsonian Institution
Grover C. Miller, North Carolina State University

— William Burbanck, Chairman

Program of the 27th Annual Meeting of the Association of Southeastern Biologists

A Joint Meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, and the Southeastern Region of Beta Beta Beta National Honorary Biological Society.

THURSDAY, APRIL 14

1:30 p.m. **Field Trip:** Lower Piedmont Communities in vicinity of Raleigh. Led by Dr. A. W. Cooper. Information available from Dr. Cooper, Department of Botany, North Carolina State University.

1:30 p.m. **Executive Committee Meeting, A.S.B.:** McKimmon Room, Williams Hall.

4:00-7:30 p.m. **Registration:** Front Lobby, Erdahl-Cloyd Union.

7:30 p.m. **General Session:** Nelson Auditorium, Textile Building. Dr. Harry J. Bennett, Presiding.

Address of Welcome: Dr. John T. Caldwell, Chancellor, North Carolina State University.

Response: Dr. Harry J. Bennett, President, The Association of Southeastern Biologists.

Invitational Symposium: "Restoring the Quality of Our Environment: What Needs to be Done and How We Are Doing It." Dr. John L. Buckley, Office of Science Advisor to the Secretary of the Interior.

Moderator: Dr. Arthur W. Cooper, Department of Botany and Forestry, North Carolina State University.

Discussants: Dr. Theodore R. Rice, Director, Radioecology Laboratory, U. S. Fish and Wildlife Service, Beaufort, North Carolina.

Dr. Don W. Hayne, Professor of Experimental Statistics, North Carolina State University.

Smoker and Exhibits: The Symposium will be followed by a smoker to be held in the Lobby and Ballroom of the Erdahl-Cloyd Union. Refreshments will be served. The exhibits will be on display in the ballroom of the Union.

Facilities in Gardner Hall: Departments of Botany, Entomology, Genetics, Microbiology, Plant Pathology, Zoology will be open to visitors Thursday afternoon and all of Friday. You are welcomed in classrooms, laboratories, greenhouses, growth chambers, offices, Entomology Museum (Rm. 325, Dr. D. A. Young, Curator), Herbarium (Rm. 248, Dr. J. W. Hardin, Curator), Mammal and Bird Range (Rm. 244, Dr. F. S. Barkalow, Curator), Electron Microscope Facility (Rm. 251, Dr. R. T. Moore, In Charge).

FRIDAY, APRIL 15

MORNING

7:15 a.m. **Breakfast, Southern Appalachian Botanical Club:** 1st floor of the Erdahl-Cloyd Union (go through Cafeteria line and meet in the State Room).

8:00-12:00 **Registration:** Front Lobby, Erdahl-Cloyd Union.

8:30-12:00 **Exhibits:** Ballroom, Erdahl-Cloyd Union.

8:30-11:30 **Paper Sessions:**

Plant Cytology and Evolution — Theater, 2nd floor of Union.

Plant Ecology — Room 256-258, Union.

Cryptogamic Botany — Room 248-250, Union.

Animal Physiology and Genetics — Behind Reservation Desk, Union.

Invertebrate Ecology and Radiobiology — Room 230, Union.

9:00 a.m. **Beta Beta Beta** Registration and General Meeting: Room 107 Harrelson Hall.

10:00-1:00 **Beta Beta Beta** Paper Sessions:

Eastern Division — Room 107 Harrelson Hall.

Western Division — Room 206 Laboratory Building.

11:15 a.m. **Informal Discussion:** The Flora of the Southeastern U. S. Dr. A. E. Radford, Moderator. Room 252, Union.

11:45 a.m. **Business Meeting: Association of Southeastern Biologists,** Nelson Auditorium, Textile Building.

AFTERNOON

1:00-5:30 **Exhibits:** Ballroom, Erdahl-Cloyd Union.

2:00-5:30 **Paper Sessions:**

Systematic Botany and Floristics — Theater, 2nd floor of Union.

Plant Autecology and Physiology — Room 256-258, Union.

Morphogenesis — Room 248-250, Union.

Animal Ecology — Room 230, Union.

Parasitology — Behind Reservation Desk, Union.

EVENING

7:00 p.m. **Banquet:** N. C. State University Faculty Club (Hillsboro Street, 1½ miles west of the Campus).

ASB Evening Program: N. C. State University Faculty Club.

Presentation of Awards and Prizes:

Ivey F. Lewis Fellowship at the Mountain Lake Biological Station. Sponsored by Phipps and Bird, Inc.

Association Research Prize. Sponsored by Carolina Biological Supply Company.

Meritorious Teaching Award. Sponsored by Will Scientific, Inc., Georgia.

Past President's Address: Dr. William D. Burbanck, Emory University — "The Biology of *Cyathura*: The Development of a Problem."

SATURDAY, APRIL 16

7:30, 8:00 a.m. **Field Trips:** Details at Registration Desk. Please sign up at time of Registration.

1. *Phycology* — Led by Dr. L. A. Whitford. Vicinity of Raleigh.
2. *Carolina Biological Supply Company* — Led by Dr. T. L. Quay and Mr. Alva Harris.
3. *Ecology* — Taxonomy (Communities of the southeastern N. C. Coastal Plain) — Led by Dr. Arthur W. Cooper, Mr. W. E. Standaert and Mr. E. D. Waits.

8:30 a.m. **Executive Committee Meeting,** Association of Southeastern Biologists: Redwood Room, College Inn Motel Restaurant (Western Blvd. opposite campus).

SCHEDULE OF PAPER SESSIONS

FRIDAY MORNING — APRIL 15, 8:30 A.M.

PLANT CYTOLOGY AND EVOLUTION

Theater, 2nd floor of Union

Presiding: Dr. David L. Mulcahy, University of Georgia

8:30 1. BEATTY, ALVIN V. AND JEANNE W. (Emory University). The Involvement of Nucleic Acid in Repair of Radiation Damage.

8:43 2. HOWE, H. BRANCH, JR. AND PHILIP HAYSMAN (University of Georgia). Establishment of the Linkage Groups in *Neurospora tetrasperma.*

8:56 3. GERSTEL, D. U. AND J. A. BURNS (N. C. State University). Association of Species-foreign Heterochromatin with Developmental Disorders in *Nicotiana.*

9:09 4. RILEY, H. P., S. K. MAJUMDAR AND R. E. HAMMACK (University of Kentucky). A Chromosome Translocation in Three *Haworthia* Plants.

9:22 5. WALKER, SALLY A. (Vanderbilt University). Karyotype Analysis of *Petalostemon* Species.

9:35 6. SMITH, BEN W. (N. C. State University). Dioecism, Karyotype and Geography in *Rumex hastatulus.*

9:48 7. STEWART, SHELTON E. (Lander College, University of Georgia). An Investigation of Heterostylism in the *Houstonia purpurea* Complex.

10:01 8. BRADLEY, TED R. (University of North Carolina). Variation in *Specularia* Populations.

10:14 9. MURDY, W. H. (Emory University). Speciation in *Phacelia* in Response to Habitats Afforded by Granite Outcrop Communities of the Southeastern Piedmont Region.

10:27 10. SOHMER, SEYMOUR H. (University of Tennessee). Possible Evolutionary History of *Manihot esculenta* Crantz.

10:40 11. BEAL, E. O. AND RUSSELL M. SOUTHALL (N. C. State University). Selection Mechanisms in *Nuphar* Sm. (Nymphaeaceae).

10:53 12. DEPOE, C. E. AND E. O. BEAL (Northeast La. State College and N. C. State University). Origin and Maintenance of Polymorphism in *Nuphar* Sm. (Nymphaeaceae).

11:06 13. BROWNE, EDWARD T., JR. (University of Kentucky). An Instance of Possible Interfamilial Hybridization in the Ferns.

PLANT ECOLOGY

Room 256-258, Union

Presiding: Dr. Dorothy L. Crandall, Randolph Macon Woman's College

8:30 14. MONK, CARL D. (University of Georgia). Tree Species Diversity in Six Forest Types in North Central Florida.

8:43 15. DAYTON, BRUCE R. (University of North Carolina). The Relationship of Vegetation to Iredell and Other Piedmont Soils.

8:56 16. GIBBON, EDWARD L. (N. C. State University). Vegetation of Three Monadnocks in the Eastern Piedmont of North Carolina.

9:09 17. ROGERS, HOLLIS J. AND JOHN D. BARNETT (University of N. C. at Greensboro and N. C. Dept. Conservation & Development). Relict Vegetation in the Vicinity of Hanging Rock State Park, Danbury, North Carolina.

9:22 18. BARCLAY, FRANK H. (East Tennessee State University). Alison's Woods.

9:35 19. MILLER, GARY L. (University of North Carolina). Serpentine Barren Vegetation.

9:48 20. WILLIAMS, RICHARD B. AND MARIANNE B. MURDOCH (U. S. Bur. Commercial Fisheries). Annual Production of *Spartina alterniflora* and *Juncus roemerianus* in Salt Marshes Near Beaufort, N. C.

10:01 21. WAITS, E. DOUGLAS AND ARTHUR W. COOPER (N. C. State University). Net Primary Productivity in an Irregularly Flooded N. C. Salt Marsh.

10:14 22. KERWIN, JAMES A. (Va. Inst. Marine Sci. and College of William & Mary). Classification and Structure of the Tidal Marshes of the Poropotank River, Virginia.

10:27 23. STROUD, LINDA M. AND ARTHUR W. COOPER (N. C. State University). Use of Color and Color Infra-red Aerial Photographs for Mapping Salt Marsh Community Types.

10:40 24. COOPER, ARTHUR W. (N. C. State University). The Need for Coordinated Statewide Vegetational Surveys in the Southeast.

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Room 248-250, Union

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8:43 26. Lembi, Carole A. and Walter R. Herndon (University of Tennessee). Ultrastructure of the Pseudocilia of *Tetraspora.*

8:56 27. Taylor, Sylvia Earle (Duke University and Cape Haze Marine Lab.). The Ecology and Distribution of Phaeophyta (Brown Algae) in the Eastern Gulf of Mexico.

9:09 28. Humm, Harold J. (Queens College). On the Distribution of Marine Algae in the Western North Atlantic.

9:22 29. Whitford, L. A. (N. C. State University). Is This an Alga?

9:35 30. Wolf, Frederick A. (Duke University). Old Non-fossilized Fungus Spores.

9:48 31. Eudy, William W. and James C. McDonald (Wake Forest College). Characteristics of Agents Producing Aggregation in *Dictyostelium discoideum.*

10:01 32. Miller, Charles E. (Ohio University). Isolation of Aquatic Fungi Using a Millipore Filter.

10:14 33. Clausz, John C. (University of North Carolina). Experimentally Induced Changes in Oogonial Structure and Oospore Germination in the Water Mold, *Achlya hypogyna.*

10:27 34. Peterson, Ronald H. (University of Tennessee). Convergent Evolution in the *Clavariaceae.*

10:40 35. Walker, Alma Toevs (University of Georgia). Crystallizing Chlorophyllous Compounds in Lichens.

ANIMAL PHYSIOLOGY AND GENETICS

Behind Reservation Desk, Union

Presiding: Dr. John Roberts, N. C. State University

8:30 36. Mohler, Carolyn G. and Carolyn Wells (Longwood College). Chromatographic Analysis of 260 mμ Absorbing Material from Well-fed and Starved *Tetrahymena pyriformis.*

8:43 37. Stenroos, Orrie O. (The Woman's College of Georgia). Electrophoretic Identification of Two Species of *Peromyscus.*

8:56 38. Thornborough, J. R. and William L. Mengebier (Denison University and Madison College). Stimulation of Respiratory Enzyme Activity of the Oyster, *Crassostrea virginica* by Crustacean Eyestalk Extract.

9:09 39. Kemp, Donald T. and Beryl C. Franklin (Northeast La. State College). The Effects of Phenothiazine Drugs upon Biological Pregnancy Tests in Male Batrachia.

9:22 40. Kaiser, Hans E. and John C. Bartone (George Washington University Medical School). Different Reactions of Chemical and Physical Carcinogens in Specific Areas of Mouse Skin.

9:35 41. Welch, A. S. and B. L. Welch (College of William & Mary). Differential Effect of Chronic Grouping and Isolation on the Metabolism of Brain Biogenic Amines.

9:48 42. Canonico, Peter G. (University of South Carolina). Effect of Prolonged Hypergravity Stress on the Myogenic Properties of the Gastrocnemius Muscle.

10:01 43. Kent, G. C., Jr., G. W. Tate, Jr. and D. R. Dickerson (Louisiana State University). Effect of Total Uterine Denervation on the Luteolytic Action of the Pseudopregnant Hamster Uterus.

10:14 44. Bartone, John C. and Hans E. Kaiser (George Washington University Medical School). Theoretical and Factual Problems of Animal and Human Space Flight.

10:27 45. Miller, James A., Jr., Faith S. Miller and Mickey Via (Tulane University). Effects of Temperature, Tris and Glucose upon Asphyxia in Newborn Puppies.

10:40 46. Menzel, R. W. (Florida State University). Studies of the F_1 and F_2 Hybrids of the Northern and Southern Quahog Clams.

10:53 47. Whiting, P. W. and Doris J. Bush (Oak Ridge National Lab. and University of Pennsylvania). Mass Production of Diapause Larvae in *Mormoniella.*

INVERTEBRATE ECOLOGY AND RADIOBIOLOGY

Room 230, Union

Presiding: Dr. John Hobbie, N. C. State University

8:30 48. Bamforth, Stuart S. (Newcomb College of Tulane University). Parallels Between Rotifer and Ciliate Ecology.

8:43 49. Williams, Richard B. and John P. Baptist (U. S. Bur. Commercial Fisheries). Physiology of *Mnemiopsis* in Relation to its Role as a Predator.

8:56 50. Shaw, William N. (U. S. Bur. Commercial Fisheries). Oyster Setting in Two Adjacent Tributaries of Chesapeake Bay.

9:09 51. Burbanck, W. D. (Emory University). A Device for Collecting Water for pH, Salinity, Temperature and Dissolved Oxygen Determinations.

9:22 52. Jones, Duvall A. (University of Florida). Use of DFP^{32} in Frog Erythrocyte Survival Studies.

9:35 53. Angelovic, J. W., J. C. White, Jr., and D. W. Engel (U. S. Bur. Commercial Fisheries). Influence of Salinity on the Response of Estuarine Animals to Ionizing Radiation.

9:48 54. Hoss, Donald E. (U. S. Bur. Commercial Fisheries). The Use of Activation Analysis Methods of Tagging Post-larval Fish.

10:01 55. Crossley, D. A., Jr. (Oak Ridge National Lab.). Arthropod Predatorprey Transfer of Radioactive Cesium.

10:14 56. Reichle, David E. (Oak Ridge National Lab.). The Behavior of Radiocesium During Insect Metamorphosis.

SYSTEMATIC BOTANY AND FLORISTICS

Theater, 2nd floor of Union

Presiding: Dr. A. Murray Evans, University of Tennessee

2:00 57. O'DELL, HERMAN (East Tennessee State University). A Blooming Sweet Potato.

2:13 58. HARRISON, DALE E., E. O. BEAL AND HENRY L. LUCAS (Wilmington College and N. C. State University). The Taxonomic Significance of the Effect of Nutrient Media, Photoperiod and Light Intensity on the Morphological Features of the Genus *Spirodela*.

2:26 59. JONES, SAMUEL B., JR. (University of Southern Mississippi). *Vernonia georgiana* Bartlett — hybrid or species?

2:39 60. MATTHEWS, JAMES F. AND W. H. MURDY (University of N. C. at Charlotte and Emory University). Systematics of *Isoetes* found in Granite Outcrop Communities.

2:52 61. VARNER, JOHNNIE B. (University of Kentucky). The Flora of Harrison County, Kentucky.

3:05 62. SHARP, AARON J. (University of Tennessee). Another Coastal Plain Plant on the Tennessee Cumberland Plateau.

3:18 63. MUELLER, SABINA (University of North Carolina). Cuticular Patterns as a Taxonomic Tool within the Genus *Vaccinium*.

3:31 64. KEENER, CARL S. (N. C. State University). Evolutionary Relationships in the Short stemmed Leatherflowers of the Eastern United States.

3:44 65. YATES, HARRIS O. (David Lipscomb College). Taxonomic Status of *Uniola* (Gramineae).

3:57 66. MERCER, EVELINE P. AND ARTHUR W. COOPER (N. C. State University). A Preliminary Report on a Study of Variation in *Fagus grandifolia* Ehrh. in North Carolina.

4:10 67. DJATIE, SRI HAJATIE (University of Kentucky). Preliminary Results for a Monograph of Asiatic Species of *Aletris*.

4:23 68. BOSTIC, P. E. (University of North Carolina). A Preliminary Evaluation of *Rhexia alifanus* Walter.

4:36 69. CLARKSON, QUENTIN D. (N. C. State University). Some Statistical Aspects of Systematic Botany.

4:49 70. LELONG, MICHEL G. (University of South Alabama). Studies of Reproduction in *Panicum* Subgenus Dichanthelium.

5:02 71. HINDS, HAROLD R. (Smith College). A Floristic Study of Outer Cape Cod, Massachusetts.

5:15 72. BURK, C. JOHN (Smith College). A Floristic Comparison of Cape Cod, Massachusetts and the North Carolina Outer Banks.

5:28 73. HARDIN, JAMES W. (N. C. State University). New Facilities and Research Opportunities at the Highlands Biological Station.

PLANT AUTECOLOGY AND PHYSIOLOGY

Room 256-258, Union

Presiding: Dr. Edward Clebsch, University of Tennessee

2:00 74. BROWN, GREGORY N. AND FRED G. TAYLOR, JR. (Oak Ridge National Lab.). Factors Affecting Radiosensitivity of Flowering in *Xanthium*.

2:13 75. JONES, JOAN M. (Emory University). The Effects of Ionizing Radiation on the Growth of the Lichen *Parmelia conspersa*.

2:26 76. SKEEN, JAMES N. AND G. L. PLUMMER (University of Georgia). Homogeneity in *Andropogon* Growing on Areas of High and Low Natural Background Radioactivity.

2:39 77. PITTILLO, J. DAN, G. L. PLUMMER AND H. F. PERKINS (University of Georgia). Accumulation of Radioisotopes within *Pinus taeda, Juniperus virginiana* and *Quercus georgiana* in Two Ecosystems.

2:52 78. PEDIGO, ROBERT A. (College of William & Mary). Effects of Moisture Stresses on the Recovery and Growth Rates of Irradiated *Pinus taeda* Seedlings.

3:05 79. RITCHIE, JERRY C. AND G. L. PLUMMER (University of Georgia). Thorium, Uranium and Potassium in Certain Georgia Soils and their Biological Implications.

3:18 80. MCCORMICK, J. FRANK (University of North Carolina). An Ecological Study of the Radiation Sensitivity of *Euterpe globosa*.

3:31 81. BANNISTER, BARBARA (University of North Carolina). Ecological Studies of the Sierra Palm, *Euterpe globosa* Gaertn.

3:44 82. LUGO, ARIEL E. (University of North Carolina). Photosynthesis and Respiration of Rain Forest Seedlings Under Natural Conditions.

3:57 83. BANGMA, GAIL SYDNEY AND ELSIE QUARTERMAN (Vanderbilt University). Ecological Factors Affecting Germination of *Leavenworthia stylosa*.

4:10 84. EDMISTEN, JOE A. AND HENRY F. PERKINS (University of Georgia). Changes in Tropical Rain Forest Soils After Irradiation.

4:23 85. WOLF, FREDERICK T. AND PAUL G. BARTELS (Vanderbilt University and University of Arizona). Biochemical Differences Between Light-grown and Dark-grown Wheat Seedlings.

4:36 86. WHATLEY, BOOKER T., STANLEY O. THOMPSON AND JACK H. JEFFERSON (Southern University). The Effects of Media and Levels of Root Inducing Chemicals on Rooting of *Pittosporum tobira*.

4:49 87. VAN FLEET, D. S. (University of Georgia). Polyacetylenes in Plant Tissues.

5:02 88. O'CONNER, JAMES L. (University of Georgia). Analysis of Terminal Oxidation Enzymes in Tissue Culture of *Nicotiana* by Microelectrophoresis and Histochemical Methods.

MORPHOGENESIS

Room 248-250, Union

Presiding: Dr. Elinor Behre, Black Mountain, N. C.

2:00 89. Decker, R. Dean and Heinz Seltmann (N. C. State University). Growth and Development of Tobacco Suckers Following Topping.

2:13 90. Herr, J. M., Jr. (University of South Carolina). The Stomata of *Kalanchoe daigremontiana* Hamet & Perrier, *K. verticillata* Elliott and the Hybrid, *K. daigremontiana* X *verticillata.*

2:26 91. Flemister, Mary R. and Lafayette Frederick (Atlanta University). Observations on the Ontogeny of Sclereids in Leaves of *Nymphaea odorata.*

2:39 92. Ball, Ernest and P. C. Joshi (N. C. State University). Effect of Gibberellic Acid upon Isolated Tobacco Callus Cells.

2:52 93. Joshi, P. C. and Ernest Ball (N. C. State University). An Approach to the Culture of Mesophyll Cells under Autophytic Conditions.

3:05 94. Ball, Ernest and P. C. Joshi (N. C. State University). Adventive Embryos in a Callus Culture of *Didiscus.*

3:18 95. Whittier, Dean P. (Vanderbilt University). The Effect of Auxin, Kinetin and Gibberellin on Induced Apogamy in Fern Gametophytes.

3:31 96. Cole, Madison B., Jr. and J. Gordon Carlson (University of Tennessee). Nuclear Pores in Grasshopper Neuroblasts.

3:44 97. Gregg, Kenneth W. and Charles B. Metz (Emory University and University of Miami). A Comparison of Fertilizin and Cytofertilizin from Eggs of *Arbacia punctulata.*

3:57 98. Pickel, Virginia M. and Robert A. Rinaldi (Duke University Marine Lab. and University of Tennessee). A New and Unusual Structure Observed in Ova of *Arbacia.*

4:10 99. Humphries, A. A., Jr. (Emory University). Observations on the Deposition, Structure and Cytochemistry of the Jelly Envelopes of the Egg of the Newt, *Triturus viridescens.*

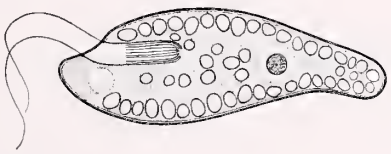
4:23 100. McLaughlin, Ellen W. (Emory University). Artificial Fertilization and Sperm Penetration in Eggs of *Triturus viridescens.*

4:36 101. Eiland, Lonnie and Roy Hunter, Jr. (Atlanta University). Histochemical Studies on the Notochord of *Rana catesbeiana* Larvae.

4:49 102. Leiter, E. H. and Ernest L. Hunt (Emory University). *In Vitro* Studies of the Embryonic Chick Pancreas.

5:02 103. Pav, E. I., D. Rollins and T. R. Marcus (East Tennessee State University and Children's Hospital Medical Center, Boston). Skin Transplantation Study in the Mongolian Gerbil (*Meriones unguiculatus*).

5:15 104. Loxley, Sidney S. and John C. Bartone (George Washington Medical School). Indole Derivatives in the Histological Differentiation of Early Pig Embryos.



ANIMAL ECOLOGY

Room 230, Union

Presiding: Dr. Herbert E. Shadowen, Western Kentucky State College

2:00 105. Woodmansee, Robert A. (University of South Alabama). Daily Vertical Migration of *Lucifer.* Planktonic Numbers in Relation to Solar and Tidal Cycles.

2:13 106. Darlington, Julian T. and James G. Place (Southwestern at Memphis). A New Terrestrial Triclad from the Highlands, N. C. Region.

2:26 107. Outten, L. M. (Mars Hill College). Some Fishes from the Chesapeake Bay Drainage in Eastern Maryland.

2:39 108. Foster, Neal R. and John Cairns, Jr. (Academy of Natural Sciences of Philadelphia). Effects of Alkyl Benzene Sulfonate on Breeding Behavior of Flagfishes, *Jordanella floridae.*

2:52 109. Hogarth, William T. and William S. Woolcott (University of Richmond). The Mountain Stripeback Darter, *Percina notogramma montuosa,* a New Subspecies of Percid Fish from the Upper James River, Va.

3:05 110. Jackson, Crawford G., Jr. (University of South Alabama). A Morphometric Analysis of the Shell of *Pseudemys concinna suwanniensis* Carr (Order: Testudinata).

3:18 111. Tanner, James T. (University of Tennessee). The Temperature Stimulus for the Start of Nesting by Birds.

3:31 112. Boykins, Ernest A. (Alcorn A & M College). The Effects of DDT Contaminated Earthworms in the Diet of Some Birds.

3:44 113. Harvey, Michael J. (University of Kentucky). Seventy-two Hour Constant Surveillance Studies of the Prairie Mole (*Scalopus aquaticus*).

3:57 114. Smith, Michael H. (University of Florida). Reproduction in the Old-Field Mouse, *Peromyscus polionotus.*

4:10 115. Welch, B. L., J. P. Henry, A. S. Welch and P. Stephens (College of William & Mary and University of Southern California). Cardiovascular Response to Different Levels of Social Stimulation.

PARASITOLOGY

Behind Reservation Desk, Union

Presiding: Dr. Reinard Harkema, N. C. State University

2:00 116. Stiven, Alan E. (University of North Carolina). The Effect of Host Population Density on Experimental Epidemics of *Hydramoeba hydroxena.*

2:13 117. Price, Charles E. (The Woman's College of Georgia). Host-Specificity in the Suborder Monopisthocotylea (Trematoda: Monogenea).

2:26 118. Harris, Alva H. (N. C. State University). Development of the Sporocyst Generations of *Didelphodiplostomum variabile* (Trematoda: Diplostomatidae).

2:39 119. Ehrhardt, Warren R. (N. C. State University). Some Helminths of Two Species of North Carolina Gulls.

2:52 120. Huber, Richard T. and Grover C. Miller (N. C. State University). The Parasites of Certain Members of the Catfish Family Ictaluridae from Two North Carolina Watersheds.

3:05 121. Aldridge, Frank P. and Burton J. Bogitsh (Vanderbilt University). The Ultrastructure and Histochemistry of the Integument and Subcuticle of *Posthodiplostomum minimum.*

3:18 122. Bogitsh, Burton J. (Vanderbilt University). Esterase Activity in the Strigeid Trematode, *Posthodiplostomum minimum.*

3:31 123. Goodchild, C. G. and V. L. Martin (Emory University). The Effect of Temperature Upon Infection and Maturation Time of Blood Flukes in Turtles.

3:44 124. Goodchild, C. G. and Ardis L. Cramer (Emory University). Effects of Dietary Lipid Depletion in Rat Host and *Hymenolepis diminuta.*

3:57 125. Robinson, E. S. (University of Tennessee and University of New South Wales). Effects of X-Irradiation on the Development of *Moniliformis dubius* (Acanthocephala).

4:10 126. Proffitt, Max Rowland (University of Tennessee). Chromosomes of an Acanthocephalan and a Cestode Using Mammalian Spread Technique.

4:23 127. Tan, B. D. (University of Tennessee). Effects of Primary Infection Upon Secondary Infection of Female Mice with the Bile Duct Tapeworm, *Hymenolepis microstoma.*

W. Ralph Singleton Appointed Director of National Colonial Farm

The appointment of Professor W. Ralph Singleton as Director of the National Colonial Farm, the museum project of the Accokeek Foundation under development on the banks of the Potomac River opposite Mt. Vernon, has been announced by Frances P. Bolton, president of the Accokeek Foundation.

Dr. Singleton is the Miller Professor of Biology at the University of Virginia, and will continue in that position during the winter months. He has recently retired as Director of the Blandy Experimental Farm, near Winchester.

Dr. Singleton served as the senior geneticist of the Brookhaven National Laboratories for Atomic Energy Research from 1948 to 1955. For many years, he was geneticist at the Connecticut Experiment Station in New Haven, where he developed sweet corn hybrids widely used throughout the United States. After graduate work at Harvard, he was assistant superintendent of the Harvard Botanic Garden in Soledad, Cienfuegos, Cuba. Dr. Singleton was Chairman of the Northeast Corn Improvement Conference. He served as a member of the Food and Agricultural Study Group of the National Academy of the Sciences, and as technical advisor to the U. S. delegation at the first Geneva Conference on the peace time uses of atomic energy in 1955.

Dr. Singleton was born in Jacksonville, Missouri, on April 24, 1900, was married to Dorothy Amrine, October 10, 1931, and has four children.

The National Colonial Farm project has been under development by the Accokeek Foundation since 1957. In 1961, the Congress of the United States passed, and President Kennedy signed into law, PL 87-362 to preserve the area "for the benefit of present and future generations the historic scenic values, the unusual cultural, scientific and recreational values . . . of such lands as existed at the time of construction active use of Mt. Vernon Mansion and Fort Washington." The Foundation then entered into agreement with the United States Department of the Interior to continue the development of the National Colonial Farm as the working model farm of the period of 1750, coupled with a scientific program in genetic research.

President Bolton stated in connection with the appointment of Dr. Singleton, "The Colonial Farm can make a great contribution to our understanding both of Colonial life and the economic botany of the Colonial period. It will be a typical working farm of the period. Its scientific objective in stabilizing the aboriginal genetic strains of crops and animals, of course, will be carried on simultaneously."

Abstracts of Papers Presented at the 27th Annual Meeting of the Association of Southeastern Biologists

The Ultrastructure and Histochemistry of the Integument and Subcuticle of *Posthodiplostomum minimum*

FRANK P. ALDRIDGE AND BURTON J. BOGITSH, *Vanderbilt University*

Electron microscope and histochemical studies of the integument and subcuticle of the strigeid trematode, *Posthodiplostomum minimum,* are reported. The spiny forebody integument is of a cytoplasmic nature containing mitochondria, a membrane system, and secretory vesicles. It is PAS-positive and is covered with a layer of acid mucopolysaccharide. A number of cell types comprise the subcuticle, among which are acid mucopolysaccharide secreting cells and esterase secreting cells. A possible mechanism by which secretions pass through the integument is discussed. (Supported, in part, by a research grant from the National Institutes of Health (No. AI-06413-02) and, in part, by a grant from the Natural Science Committee, Vanderbilt University.)

Influence of Salinity on the Response of Estuarine Animals to Ionizing Radiation

J. W. ANGELOVIC, J. C. WHITE, JR., AND D. W. ENGEL, *Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina*

During investigations of the effects of ionizing radiation on estuarine animals we found that animals in water with different salinities respond differently to radiation. LD-50's and survival were determined for three euryhaline species after irradiation with cobalt-60 in water at different salinities within their tolerance ranges. Mummichog, *Fundulus heteroclitus,* were tested at salinities between 5-25%; grass shrimp, *Palaemonetes pugio,* between 15-30%; and brine shrimp, *Artemia salina,* between 5-100%. Comparison of LD-50's at the salinities tested showed that mummichog and grass shrimp, typical estuarine species, were more resistant to radiation at lower salinities. The magnitude of variation between LD-50's of organisms at different salinities varies with temperature. The resistance of brine shrimp to radiation is not increased at lower salinities; rather, irradiated brine shrimp survive longer than unirradiated at 5%. These data indicate that salinity has a significant role in determining the response of estuarine species to radiation.

Adventive Embryos in a Callus Culture of *Didiscus*

ERNEST BALL AND P. C. JOSHI, *N. C. State University*

Callus produced *in vitro* from surface-sterilized stem segments upon complex medium containing coconut water and 2,4-D plus sucrose developed numerous adventive embryos which occasionally broke loose and fell to the bottom of the culture tube. Embryos retained within the callus often germinated to produce elongate seedlings bearing leaves of the mature type and basal roots. Those cast loose from the callus frequently underwent callusing to such a degree that the form of the embryo was obscured by the overgrowth. Conversely, certain callus cultures produced embryos in such great numbers that little or no growth of callus remained. The auxin used appeared to control embryo formation; they were numerous upon medium containing 2,4-D, but none at all on that with 2,3,5-T. The callus culture upon 2.4-D has been transferred four times at monthly intervals without apparent diminution in production of embryos.

Effect of Gibberellic Acid Upon Isolated Tobacco Callus Cells

ERNEST BALL AND P. C. JOSHI, *N. C. State University*

Tobacco callus during the first 3 monthly transfers upon complex agar medium produced, when shaken in liquid medium, living isolated cells with abundant streaming cytoplasm that are capable of division and growth. In subsequent transfers, such shaken-off cells were cytologically aged, had progressively decreased amounts of cytoplasm with practically no streaming. Many were either dying or dead. Ageing of the callus thus appears concomitant with a lessening of growth by single cells, and a tendency to growth as a multicellular organism. When the liquid medium contained an appropriate concentration of gibberellic acid A_3, the released cells of aged lines had abundant streaming of cytoplasm and were capable of division. Several old lines which had not produced viable single cells for more than 2 years were thus rejuvenated. A probably important effect of gibberellin here was the stimulation of production of cytoplasmic protein.

Parallels Between Rotifer and Ciliate Ecology

STUART S. BAMFORTH, *Newcomb College of Tulane University*

Rotifers are multicellular parallels of those larger ciliates possessing developed ingestive and locomotor abilities, and occupy the same ecological niches. Planktonic rotifers are limnetic counterparts of marine tintinnid and oligotrich ciliates. Many littoral forms, especially bdelloids, are only transiently sessile, combining behaviour patterns of specialized heterotrichs, hypotrichs, and peritrichs. Their adaptations parallel ciliate evolution to Aufwuchs niches, and they appear with these specialized ciliates toward the end of ciliate successions in organically enriched waters.

Ecological Factors Affecting Germination of *Leavenworthia stylosa*

GAIL SYDNEY BANGMA AND ELSIE QUARTERMAN, *Vanderbilt University*

Leavenworthia stylosa (Cruciferae) is a winter annual that is endemic to the cedar glades of Middle Tennessee. The seeds normally germinate in September after a dormancy period of three to four months. Under experimental conditions, temperature appears to be the overriding factor in effecting germination; however, age of seeds, alternate periods of wetting and drying, and scarification also influence the time and percentage of germination. This paper deals with interactions of these factors and their relation to the field situation.

Ecological Studies of the Sierra Palm, *Euterpe globosa* Gaertn.

BARBARA BANNISTER, *University of North Carolina*

The life cycle of *Euterpe globosa* Gaertn. was studied in the lower montane rain forest of Puerto Rico. Field investigations were made of seed distribution and germination, seedling growth and turnover rate, and distribution of size classes. Biomass was measured in relation to size class. An estimate was made of the growth rate of adult trees on the basis of leaf turnover rate. Laboratory investigations were made of seed germination and seedling growth. Data derived from these investigations were used to evaluate the part played by the palm in the structure of the rain forest community.

Alison's Woods

FRANK H. BARCLAY, *East Tennessee State University*

In Sullivan County, Tennessee, a few miles from Tricities Airport, there is a tract of land comprising some two hundred and fifty acres. On this area there stands one of the finest remnants of the Eastern Deciduous Forest now in existence.

Dominants of this woodland, known as Alison's Woods, are Tulip Poplar and several species of Oak. An extremely small amount of cutting of trees has been done, and the subordinate layers have also remained virtually undisturbed. There are many trees both standing and fallen which are of enormous size, and Oak and Chestnut logs are numerous.

The unique character of Alison's Woods makes its study highly desirable. Unfortunately, the imminent threat of its destruction makes it a matter of urgency that this be done at once.

Theoretical and Factual Problems of Animal and Human Space Flight

JOHN C. BARTONE AND HANS E. KAISER,
George Washington University Medical School

White and Berry (1964) indicate catastrophic emergency in human programmed flight is unlikely, but suggest changes may exist as slowly shifting values. These momentarily are unknown and significances, when apparent, remain to be determined. Such aspects, new theoretical perspectives and factual problems of space have been considered upon our participation of launched vehicles at NASA's Wallops Station, Virginia. Payloads with similar physical parameters varied upon retrieval from normal to lifeless recovery.

Our life in space demands normal activity; body responses may be dissimilar to work or in space injuries. Failure of organ repair, ateleosis, suggests dysplasia and histomegaly. Normal tissue replacement may suffer in prolonged space, affect the *organ law of performance* and relative telotism with possibilities of hypofunction, atrophy and hyperfunction leading to hyperplasia. Real and simulated space experiments reveal swollen mitochondria, reduced bladder wall, depressed hematopoiesis and cell enzyme changes. Clinical implications and histophysiological explanations are presented.

Selection Mechanisms in *Nuphar* Sm. (Nymphaeaceae)

E. O. BEAL AND RUSSELL M. SOUTHALL,
North Carolina State University

The *Nuphar macrophyllum-sagittifolium* complex exhibits a morphological cline extending from inland areas toward the coast. Individual populations composing this cline are under rigid selection pressures. Since the intensity of winter temperatures in inland areas is greater than that toward the coast, it is conceivable that the degree of vernalization may provide a mechanism effective in selection. To test this hypothesis, seeds from areas representative of the cline were allowed to germinate with no vernalization. Remaining seeds were vernalized for 15 days at 4° C., then germinated. Those remaining were subjected to an additional 15 days at 4° C., then germinated. Variation in leaf length-width ratios of seedlings, germinated following the three vernalization treatments, were compared. Results provide conclusive evidence that higher ratios result from non-vernalized seeds, medium ratios from 15 days vernalization, and lower ratios from 15 + 15 days of vernalization. Thus, the temperature gradient does present a selection pressure upon populations of *Nuphar*.

The Involvement of Nucleic Acid in Repair of Radiation Damage

ALVIN V. BEATTY AND JEANNE W. BEATTY,
Emory University

All experiments involve the study of chromosomal aberrations in the first microspore division of *Tradescantia paludosa* with X-irradiation being given at 50r per minute for eight minutes in a helium atmosphere. Chemical treatments, both pre- and post-irradiative, were given for one and one-half hours. Inhibitors of protein synthesis such as dihydrostreptomycin, puromycin, and chloramphenicol facilitated recovery rather than inhibited it, indicating that, under these conditions, protein synthesis is not necessary for recovery from radiation damage. FUDR, although radiomimetic at 10^{-4}M, neither hindered nor facilitated rejoining. Adenine, adenosine, adenosine monophosphates 2′, 3′, and 5′, adenosine 5′ diphosphate, deoxyadenosine 5′ mono- and 5′ triphosphates had no effect on radiation recovery, while ATP, 3′, 5′-diphosphoadenosine and deoxyadenosine effected in each case a 50% recovery. When the microspores were denied a supply of ATP, deoxyadenosine had no effect. The effect of other pyrimidines, purines, nucleosides, nucleotides, and deoxyribose compounds on recovery from radiation damage will be given. All of these results indicate an involvement of nucleic acid in the recovery process.

Esterase Activity in the Strigeid Trematode, *Posthodiplostomum minimum*

BURTON J. BOGITSH, *Vanderbilt University*

The histology and histochemistry of the subcuticular cells and the holdfast organ cells have been studied in both the metacercariae and adults of *Posthodiplostomum minimum*. The primary secretory product of both cell types is a nonspecific esterase that is eserine-resistant but is inhibited by sodium fluoride. The contents of the subcuticular cells are granular and contain, in addition to nonspecific esterase, protein and RNA. The products of the subcuticular cells are apparently emptied to the exterior through the cuticle of the forebody of the worm. The contents of the holdfast organ cells react histochemically the same as do the contents of the subcuticular cells. These cells, however, possess definitive ducts that communicate with the cuticle of the holdfast organ. Cholinesterase is found in the nervous system of the organism. (Supported, in part, by a research grant from the National Institutes of Health (AI 06413-02).)

A Preliminary Evaluation of *Rhexia Alifanus* Walter

P. E. BOSTICK, *University of North Carolina at Chapel Hill*

In C. W. James's 1956 revision of the genus *Rhexia* of the Melastomataceae, two series were erected: Series A.

with short, straight, large-pored anthers and Series B with long, curved, small-pored anthers. *Rhexia Alifanus* Walter was tentatively included in Series B, with the reservation that its seeds, which are much larger than and of a different shape than any other species, might indicate that this species has affinities with the oblong-seeded tribe Merianieae. Although the relationships of *Rhexia Alifanus* to other genera in the Melastomataceae are still unclear; evidence has been obtained from anatomical and chromatographic studies that indicates that this species' relationships with others of the genus *Rhexia* are tenuous. Leaf cross-sections of this species show that there are two palisade layers, in contrast to the single layer of other *Rhexia* species. The chromatographic pattern is much more complex; and the chromosomes are approximately twice as large as other species.

The Effects of DDT Contaminated Earthworms in the Diet of Some Birds

Ernest A. Boykins, *Alcorn A. & M. College*

The study involved determining if earthworms containing various levels of DDT could cause death, the survival time if death occurred, and the quantities of the toxicant in the tissues of the birds. Other birds were given DDT contaminated water to see if such solutions might prove toxic. Experiments in feeding House Sparrows earthworms (*Helodrilus foetidus*) containing 298 μg of DDT/g showed a survival time for the birds of 1 to 5 days. The brain averaged 31.4 μg of DDT/g while the liver averaged 48.4 μg of DDT/g. Japanese Quail on the same diet had a survival time of 3 to 10 days. The brain of the quail averaged 43.6 μg of DDT/g and 44.4 μg of DDT/g in the liver. However, Japanese Quail showed a preference for chick starter grain when given a choice of grain or earthworms and did not eat lethal quantities of the earthworms. House Sparrows fed on earthworms containing 86 to 90 μg of DDT/g, had a survival time of 2 to 6 days. The brain and liver averaged 33.6 to 59.0 μg of DDT/g respectively. House Sparrows given a 12 per cent DDT solution had a survival time of 5 to 13 days while those maintained on a 12 per cent DDT solution and tap water had a survival time of 6 to 17 days. DDT levels in the brain and liver increased with survival time in the above groups.

Variation in *Specularia* Populations

Ted Bradley, *University of North Carolina*

Hybrids were easily made between *Specularia perfoliata* (L.) A.DC. and *Specularia biflora* (R.&P.) Fisch. & Mey. The morphology of this F_1 as regards those characters separating the two species was that usually attributed to *S. perfoliata*. In the F_1 plants and plants from natural populations, the key characters separating the two species were compared and were found to be similar indicating that hybridization was occurring and was responsible for variation in natural populations. Only one qualitative character was found to be separating the two taxa and this trait may be the result of a one gene difference. The data indicate the two taxa should be considered one species, *Specularia perfoliata* (L.) A. DC.

Factors Affecting Radiosensitivity of Flowering in *Xanthium*

G. N. Brown and F. G. Taylor, Jr., *Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee*

Radiosensitivity of flowering in *Xanthium* varies with time of irradiation with respect to photoinduction. This study is intended to determine varying radiosensitivity of flowering during the light and dark periods of photoinduction.

Five-week-old *Xanthium pensylvanicum* plants received a dose of 2010 rads ^{60}Co gamma radiation over a five-day period simultaneous with photoinduction (12 hours of light per day). One group of plants was irradiated only during the five dark periods, another only during the light periods, while a third group served as non-irradiated controls.

An inhibition of flowering was observed in all irradiated plants. The development of staminate and pistillate flowers differed in radiosensitivity. Radiation during the light periods produced different flowering responses than did the corresponding dark period irradiations. There appeared to be a relationship between critical parts of the photoinductive cycle and radiosensitivity of the flowering mechanism. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

An Instance of Possible Interfamilial Hybridization in the Ferns

Edward T. Browne, Jr., *University of Kentucky*

In June 1965 an unusual fern was collected in Carter Co., Kentucky, which was rather unlike any previously observed by the writer. The most unique feature of these plants was the great size of the leaves — some of them reaching a height of 1¼-1½ meters. In other characteristics some plants appeared to be similar in a few ways to *Lorinseria areolata* (L.) Presl, the small chainfern, and in other plants the resemblance was nearer *Onoclea sensibilis* L., the sensitive fern. An analysis of individual leaves of different plants and all leaves of the same plants by the hybrid index method is indicative that these unusual plants are probably the result of hybridization between the two species followed by segregation and back-crossing among individuals of the population. *O. sensibilis* occurs elsewhere in the county, but *L. areolata* is not known from the county. Comparison is made between the putative hybrid population and specimens more typical of the supposed parental species with remarks concerning the probable time of hybridization and possible explanation of the absence today of the second parental species.

A Device for Collecting Interstitial Water for pH, Salinity, Temperature, and Dissolved Oxygen Determinations

W. D. Burbanck, *Emory University*

The device is essentially two parts, viz., a 1.5 meter aluminum tube with a welded flange and a second flange with a perforated (2 mm) stainless steel cone welded to it. Within the cone and supported by another tightly fitting duplicate cone is placed a filter suitable to the bottom being studied. The two parts are tightly locked together with a rubber gasket in between. A solid aluminum cone attached to a rod is inserted so that the solid cone is tightly apposed to the inner perforated one. Above the solid cone the rod passes through a solid 4 cm rubber disk 8.4 cm in diameter which serves as a plunger.

With all parts locked, the device is forced into the substratum. The plunger is removed and water is drawn in. Oxygen and temperature are determined *in situ* galvanically and salinity and pH tests are run on samples pumped out of the tube with a small bilge pump. (Work supported by National Science Foundation Grant GB-3122.)

A Floristic Comparison of Cape Cod, Massachusetts, and the North Carolina Outer Banks

C. John Burk, *Smith College*

Cape Cod, Massachusetts, and the North Carolina Outer Banks are seaward extensions of the coastal plain land mass which possess structurally similar vegetations. Cape Cod has a native flora of slightly more than 600 species of vascular plants; the Outer Banks flora contains 462 native species. The two floras have at least 179 species in common, representing 130 genera. Floristic similarities and dissimilarities will be discussed in terms of community structure, major phyletic groups, patterns of plant distribution, and the geological histories of the areas.

Effect of Prolonged Hypergravity Stress on the Myogenic Properties of the Gastrocnemius Muscle

Peter G. Canonico, *University of South Carolina*

Adult male hamsters were exposed to a force of 4 x g in a small animal centrifuge for up to 4 weeks. The gastrocnemius, an anti-gravity muscle, responded to the increased gravitational stress by an increased myogenic efficiency during the first 2 weeks of exposure, returning to near normal by the 4th week. Although food consumption after the first 5 days was 28.7% greater in the experimental animals they showed a weight loss of 15.3% at the end of the first week, regaining 4.8% of the lost weight by the 4th week. The gastrocnemius, however, showed no parallel loss in mass. Actually there was an hypertrophy manifesting a mass increase of 8.13% at the end of the 3rd week. Tetany in the muscle, induced by sciatic nerve stimulation, produced a contraction force (gms/gm of muscle) which was 18.7% and 26.8% greater than the control for the 1st and 2nd week respectively, returning to normal by the 3rd week. The time required for the muscle to fatigue, in response to continued stimulation, was 2-3 fold greater during the first 3 weeks, returning to near normal by the 4th week.

Some Statistical Aspects of Systematic Biology

Quentin D. Clarkson, *North Carolina State University*

Some statistical aspects of systematic biology are discussed with emphasis on the sampling problem. The importance of a careful definition of the sampling unit and the use of the museum and of pilot surveys are stressed.

Experimentally Induced Changes in Oogonial Structure and Oospore Germination in the Water Mold, *Achlya hypogyna*

John Clausz, *University of North Carolina at Chapel Hill*

At high temperatures (25°C.) *Achlya hypogyna* Coker and Pemberton has only a few, small papillae and usually 1-2 oospores per oogonium; whereas, at low temperatures (15°C.) the oogonium has many large papillae and usually 3-5 oospores.

Oospores of *Achlya hypogyna* have a natural dormancy period of about 7 days which can be slightly reduced by a washing technique. Enhanced germination occurs only when oospores are placed on corn meal agar plates. This enhancement results in germinations occurring in only 2% of the total number of oogonia that are treated. Light is not necessary for germination. Twenty degrees Centigrade is the optimum temperature for germination. Freezing and cold-shock treatments are not effective in shortening the dormancy period or enhancing germination. Desiccation kills oospores.

Nuclear Pores in Grasshopper Neuroblasts

M. B. Cole, Jr. and J. G. Carlson, *The University of Tennessee*

Embryos of the grasshopper *Chortophaga viridifasciata* (De Geer) were used at a stage of development equivalent to 14-15 days development at 26°C. The embryos were prepared for electron microscope examination by fixation with buffered (pH 6.7) 1 percent glutaraldehyde followed by buffered (pH 6.8) 1 percent osmium tetroxide. Thin Epon sections were double-stained with uranyl acetate and lead citrate. Within the neuroblast is a large, roughly hemispherical nucleus with a central cytoplasmic core, in which the astral centers and cytoplasmic spindle originate. Electron microscopic examination of the core region reveals that the core material is continuous with the cytoplasm surrounding the nucleus. Structures similar to nuclear pores are observed almost exclusively in that portion of the nuclear envelope which surrounds the cytoplasmic core. (This study was supported in part by the Atomic Energy Commission under contract number AT-(40-1)-2575.)

The Need for Coordinated Statewide Vegetational Surveys in the Southeast

Arthur W. Cooper, *North Carolina State University*

There are relatively few statewide vegetational surveys in the United States. None exist for the Southeastern States. Many modern areas of land management require thorough knowledge of natural vegetation. Several bills now before Congress (Ecological Research Bill, United States Botanical Survey Bill) take cognizance of the lack of data concerning our natural vegetation and provide for ways in which such data may be collected. In view of the need for a better knowledge of the vegetation of the Southeast, and in view of the possible passage of a bill providing for support of vegetational research, it seems desirable that steps be taken early to plan for the development and coordination of vegetation studies in the Southeast. A suggestion as to how we may start toward this goal will be made and a call for discussion of the problem will be made.

Arthropod Predator-prey Transfer of Radioactive Cesium

D. A. Crossley, Jr., *Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee*

Radioactive isotopes of cesium have been employed in field areas to estimate rates of dry matter and energy movement along plant-to-insect food chains. Efficiencies of radiocesium transfer from herbivore to predator were analyzed so that the methods could be extended to include higher trophic levels. Laboratory studies of three arthropod predators (*Tenodera sinensis, Otocryptops sexspinosus,* and lycosid spiders) feeding upon crickets (*Acheta domestica*) showed that cesium-134 transfer and dry matter transfer both exceeded 90 percent. Cesium transfer from crickets to spiders was as efficient as to predators with chewing mouthparts. Other radioisotopes, particularly those of elements with affinities for the integument, may not be transferred so efficiently to suctorial predators. Implications of these results for studies of food chain kinetics in field plots tagged with radioisotopes are discussed. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

A New Terrestrial Triclad from the Highlands, North Carolina Region

JULIAN T. DARLINGTON AND JAMES G. PLACE,
Southwestern at Memphis

During the summer of 1965 four specimens of a new species of land triclad were collected in the vicinity of Cliffside Lake near Highlands, North Carolina. Two of the three sexually mature specimens were sectioned successfully and studied. The morphology of the reproductive system indicates that it belongs to the genus *Diporodemus* Hyman, 1938. The external appearance is unusual in that the caudal tip of the worm and the 'neck' region are white in contrast to the overall black pigmentation.

The Relationship of Vegetation to Iredell and Other Piedmont Soils

BRUCE R. DAYTON, *University of North Carolina*

The vegetation of an upland area of Iredell clay loam, in Granville County, North Carolina, was compared with the upland vegetation of three nearby soil types. Ninety-one of the 252 species collected on Iredell clay loam were not collected on other soils, suggesting the presence of many characteristic species on the soil type. Among these species, four distinct floral elements were present: "calcareous species", "xeric species", "alluvial species", and "prairie species". A line-intercept transect, sampling broomsedge community vegetation across a transition from Iredell clay loam to another soil type, demonstrated a vegetation gradient which paralleled gradients in soil parameters. Samples of oak-hickory-pine communities indicated that importance and frequency of certain species on Iredell soils differed from that of the same species on unrelated soils. Results suggested that distribution and abundance of certain species on Iredell soils are influenced by exchangeable calcium-magnesium content and extremes in moisture availability.

Growth and Development of Tobacco Suckers Following Topping

R. DEAN DECKER AND HEINZ SELTMANN,
North Carolina State University

When *Nicotiana tabacum* cv. flue-cured is in flower the axillary buds are in various stages of development. In the axils of those leaves below the point of topping, there may be as many as three buds; primary, secondary, and/or tertiary. In leaf axils lower on the stalk, the number and stage of development of the buds are usually reduced. Topping, which destroys the apical dominance exerted by the growing point, stimulates growth of the axillary buds. The uppermost primary buds develop noticeably and establish a semblance of dominance. Removal of these buds (suckers) again will destroy apical dominance, and again the uppermost primary buds below those removed will develop noticeably. The appearance of secondary buds may occur following the removal of the primary buds in any given leaf axil. The pattern of development of suckers is probably due to the stage of development found in the various leaf axils at the time of topping.

Origin and Maintenance of Polymorphism in *Nuphar* Sm. (Nymphaeaceae)

C. E. DEPOE AND E. O. BEAL, *Northeast Louisiana State College* and *North Carolina State University*, respectively

Variability within the *Nuphar macrophyllum-sagittifolium* complex in North Carolina is clinal. Statistical methods of analysis, reciprocal hybridizations and reciprocal transplantations show the morphological leaf shape features of the cline to be rigidly controlled on a genetic basis. Analysis of seedling leaves and leaves of mature populations permits a direct correlation of the seedling potential for any habitat and its actually existing adult population. This correlation shows that extensive selection occurs prior to seedling establishment. Additional analysis of adult plants in Yates Pond shows that selection also occurs under the competitive conditions of adult populations. Thus, the polymorphism evident in *Nuphar*, whether at the subspecies, population, or individual clone level, is shown to be genetically based but under the control of natural selection.

Preliminary Results of a Monograph of Asiatic Species of *Aletris*

SRI HAJATI DJATIE (Sponsored by E. T. BROWNE, JR.),
University of Kentucky

The taxonomic picture is very confused concerning the number and validity of the species of *Aletris* in Asia. Not since Franchet (1896) has the genus been monographed in this geographic area although several species have been named more recently.

The genus *Aletris* was named by Linneaus in 1753 and 3 species were known, 2 among them from North America and the third from Japan which was discovered by Thunberg and originally named *Hypoxis spicata*. So far as the literature is concerned up to now, there are about 30 species, but synonymy may exist for several of the names. According to herbarium studies and literature references, the species are widely distributed in Asia. Most of them are found in Western China, the Himalayas and Japan, but some are distributed also in the Philippines, British North Borneo and Sumatra.

Changes in Tropical Rain Forest Soils After Irradiation

JOE A. EDMISTEN AND HENRY F. PERKINS,
University of Georgia

Soils of a tropical rain forest were studied before, immediately after, and 6 months after the following treatments; (1) 3 months of continuous gamma radiation from a 10,000 curie Cesium source, (2) mechanical denudation, and (3) no damage. Bulk density in heavily studied irradiated areas was around 1.18 while only .66 in the mechanically denuded area. Infiltration rates were inversely proportional to the radiation dose and amount of traffic in an area and ranged from 60 cm per hour to .1 cm per hour. Chemical analysis of the soils included pH in H_2O and .1 N KCl, acid extractable P, C.E.C., exchangeable Ca. Mg, K, Na, Zn, Cu, Mn, and Fe. In the area denuded by radiation and by mechanical means, apparent flushes of soil minerals were observed immediately after deposition of detritus with subsequent loss of minerals 6 months later. Profiles of the above chemical characteristics obtained from the analysis of 6 soil pits will be presented.

Histochemical Studies on the Notochord of *Rana catesbeiana* Larvae

LONNIE EILAND AND ROY HUNTER, JR.,
Atlanta University

Investigations have been initiated to ascertain the synthetic capabilities of the notochordal cells of amphibian embryos and larvae. To this end, fresh frozen sections of the tail of *Rana catesbeiana* larvae were subjected to histochemical procedures for the demonstration of succinic dehydrogenase, glucose-6-phosphatase, and glycogen. Succinic dehydrogenase and glucose-6-phosphatase

were observed in the peripheral notochordal cells. The latter enzyme was also present in the inner fibrous lamella of the sheath. Glycogen was demonstrated in the fibrous reticulum, outer elastic lamella of the sheath, and the peripheral notochordal cells. If the notochordal cells are involved in the synthesis of the collagen and mucopolysaccharides present in the inner fibrous lamella of the notochordal sheath, they would require a source of energy. The localizations cited above indicate that glycolysis and the Krebs cycle are operative in these cells as sources of energy derived from the high energy bonds of adenosine triphosphate (ATP).

Characteristics of Agents Producing Aggregation in *Dictyostelium discoideum*

WILLIAM W. EUDY, *Wake Forest College*
JAMES C. MCDONALD, *Wake Forest College*

Acrasin active extracts from aggregating centers of *Dictyostelium discoideum* were prepared with cold methanol, hydrochloric acid, and boiling water. These extracts were fractionated by methods of paper and column chromatography. It has been previously reported that acrasin activity was restricted to compounds which fluoresce in ultraviolet light. Three such compounds are present in methanol extracts, two in hydrochloric acid extracts, and three in water extracts. These compounds are presently being investigated by chemical and physical methods. It is hoped that this investigation will reveal something of the chemical nature of the active agents in the three extracts.

Observations on the Ontogeny of Sclereids in Leaves of *Nymphaea odorata*

MARY R. FLEMISTER AND LAFAYETTE FREDERICK,
Atlanta University

Sclereids are conspicuous and abundant in leaves of *Nymphaea odorata*. The ontogeny of these sclereids has been studied in petioles and lamina of leaves at different stages of maturation. Nuclear enlargement of certain cells in the ground tissue of leaf primordia provide the first clear indication of incipient sclereid differentiation. Further development involves increased vacuolation, outgrowth of protuberances, deposition of secondary wall layers, and eventually complete loss of the protoplast. In young petioles, sclereids were observed to originate from cells bordering air canals that became enlarged. In the lamina of leaf primordia, the time of sclereid initiation appears to be correlated with air space formation in the mesophyll. Some variation in sclereid morphology was found when those occurring in the mesophyll regions and petioles were compared. Stellate sclereids were the predominant type in the spongy region, mostly I-shaped sclereids in the palisade, and H-shaped sclereids in the petiole.

Effects of Alkyl Benzene Sulfonate on Breeding Behavior of Flagfishes, *Jordanella floridae*

NEAL R. FOSTER AND JOHN CAIRNS, JR.,
Academy of Natural Sciences of Philadelphia

The Florida flagfish, *Jordanella floridae* Goode and Bean, is well suited for bioassays involving effects of toxicants on breeding behavior. Under optimum conditions, these killifishes spawn virtually daily in laboratory aquaria. Male flagfishes occupy specific bottom territories and defend these. A female can enter a male's territory and solicit spawning by undergoing a color change and "backing" towards him in a distinctive fashion. After spawning, the male fans the substrate where the eggs were laid. Under test conditions, flagfish exhibit normal breeding behavior for at least four days' exposure to an introduced concentration of 6 p.p.m. alkyl benzene sulfonate mixture (54.8% active ingredient). Significantly less breeding behavior was observed, and no viable eggs were recovered, in concentrations of 11.5 p.p.m. and 24 p.p.m. ABS mixture. (Supported by N.I.H. Grant EF-00266.)

Association of Species-foreign Heterochromatin with Developmental Disorders in *Nicotiana*

D. U. GERSTEL AND J. A. BURNS,
North Carolina State University

The *Co*^{v} gene for carmine flower color from *N. otophora* is unstable in expression in hybrids of the latter with coral (*co*) *N. tabacum* and in backcrosses to *co*; plants are variegated carmine-coral. This is a report on a 5th backcross generation consisting of coral and variegated plants. The chromosomes of the coral sibs resembled those of normal *N. tabacum*; they had no conspicuous heterochromatin. All variegated sibs contained a large heterochromatic segment derived from *N. otophora*; thus variegation was associated with the presence of such a segment. Megachromosomes, i.e. single oversized chromosomes found in scattered cells of derivatives from *N. tabacum* X *N. otophora* (Gerstel and Burns, Heredity, in press), occurred in the same family and also only in variegated plants. Megachromosomes were formed from the particular chromosomes which contained the heterochromatic segment as indicated by morphological similarities; e.g., a satellite marked the chromosome in its normal as well as in the enlarged state. (Aided by Grant GB-2517 from the National Science Foundation.)

Vegetation of Three Monadnocks in the Eastern Piedmont of North Carolina

EDWARD L. GIBBON, *North Carolina State University*

The vegetation on two monadnocks located in Orange County and one located in Randolph County, North Carolina, was sampled at various altitudes and exposures using one quarter acre circular plots. *Quercus prinus* L. was found to be the dominant tree species. Total nutrient content of the L and F layers of the forest floor in the plots was determined from samples of the floor. Available nutrients were determined from soil samples. The relationship of vegetation and soil data will be discussed, as will the possible relationship of existing vegetation to that which has occurred in the past.

A Comparison of Fertilizin and Cytofertilizin from Eggs of *Arbacia punctulata*

KENNETH W. GREGG, *Emory University*
CHARLES B. METZ, *University of Miami*

A sperm agglutinating substance ('cytofertilizin') was detected in the sea water in which completely dejellied eggs of *Arbacia punctulata* were fertilized. Careful controls, using demembranated and/or dejellied eggs showed that the presence of the material was not due to jelly contamination, but was probably released from the cortical granules. As with fertilizin, sperm agglutination induced by this substance reversed readily. Such 'reversed' sperm could not be reagglutinated either by egg water or by the sperm agglutinin from the egg. This suggests identity in mode of action between fertilizin and cytofertilizin. Concentrated, dialyzed fertilization products, upon hydrolysis, yielded fucose, galactose, glucose, and nitrogenous material. Controls showed that a glucose-containing component 'leaks' out of the eggs before fertilization and is not, properly, part of the fertilization product. Cellulose acetate electrophoresis, immunoelectrophoresis, and immunodiffusion studies suggest that

there are two common antigens in jelly and cytofertilizin which differ in their electrophoretic mobility. (This research was supported in part by training grant 5T1 HD 26-04 from the National Institutes of Health and by a predoctoral research fellowship 1-F1-GM-28, 960-01 from the National Institute of General Medical Sciences.)

Effects of Dietary Lipid Depletion in Rat Host and *Hymenolepis diminuta*

CHAUNCEY G. GOODCHILD AND ARDIS L. CRAMER, *Emory University*

In the seventh week of receiving one of five diets which had a lipid content of either 9%, 4.5%, 2.2%, 1.1%, or none, with starch isocaloric compensation, five young male Wistar rats of each group were infected with five *Hymenolepis diminuta* cysticercoids apiece. Three other rats from each group were uninfected controls. Twenty-five more rats, previously on laboratory chow, were infected and then separated into diet groups. After fourteen more days of respective diets all were sacrificed. Worms and samples of blood, liver, small intestine, caecal contents and skin were recovered. Microsoxhlet extraction of lyophilized material indicated an inverse correlation of liver and worm lipid percentages on the 9%, 4.5%, and 1.1% diet groups, and direct correlation in the 2.2% and total depletion.

The Effect of Temperature Upon Infection Rate and Maturation Time of Blood Flukes in Turtles

C. G. GOODCHILD AND V. L. MARTIN, *Emory University*

In an attempt to discover whether temperature differences affect rate of maturation of Spirorchiid parasites, *Chrysemys picta* hatchlings were exposed to cercaria from mono-miricidial infections in *Menetus dilatatus*. Hatchlings were divided into 4 groups, each maintained at a different temperature. In Group 1, composed of 12 turtles maintained at 21 C, 58% infection was observed. Infected turtles shed eggs in feces by the tenth week of infection; at eight weeks, although eggs were found in tissues of one turtle, none were shed. Only one infection was found in Group 2, composed of 12 turtles maintained at 17 C, giving 8% infection. No eggs were shed by this turtle. Six turtles in Group 3 were maintained at 27 C. Eggs were shed by the eighth week and an infection of 67% noted. Results of infection studies on Group 4, composed of 4 turtles maintained at 32 C, will be available soon.

New Facilities and Research Opportunities at the Highlands Biological Station

JAMES W. HARDIN, *North Carolina State University*

A facilities grant from the National Science Foundation has provided for remodeling and an addition to the existing laboratory plus a separate garage and storage building. These new facilities and the research grants-in-aid available to pre- and post-doctoral investigators provide an excellent opportunity for biological research on the southeastern escarpment of the Blue Ridge or the southern Appalachians in general.

Development of the Sporocyst Generations of *Didelphodiplostomum variabile* (Trematoda: Diplostomatidae)

ALVA H. HARRIS, *N. C. State University*

Miracidia penetrate host snails on the external margin of the mantle where it curls up and over the anterior edge of the shell. Cilia and epidermal plates of the miracidia are shed as penetration becomes complete, transforming it into a young mother sporocyst. Young mother sporocysts migrate through the mantle to the pericardium where they remain for 2 days. At 4 days the mother sporocyst is in the periesophageal blood sinus, where it remains during its development and production of daughter sporocysts. Six day old mother sporocysts contain differentiating daughter sporocysts that developed from the germ cells of the miracidia. Daughter sporocysts are born individually beginning when the mother sporocyst is 10 days old, and continue to be born periodically as long as the infection lasts. Daughter sporocysts migrate posteriorly into the digestive gland of the snail and give birth to cercaria 18-20 days following initial infection by miracidia.

The Taxonomic Significance of the Effect of Nutrient Media, Photoperiod and Light Intensity on the Morphological Features of the Genus *Spirodela*

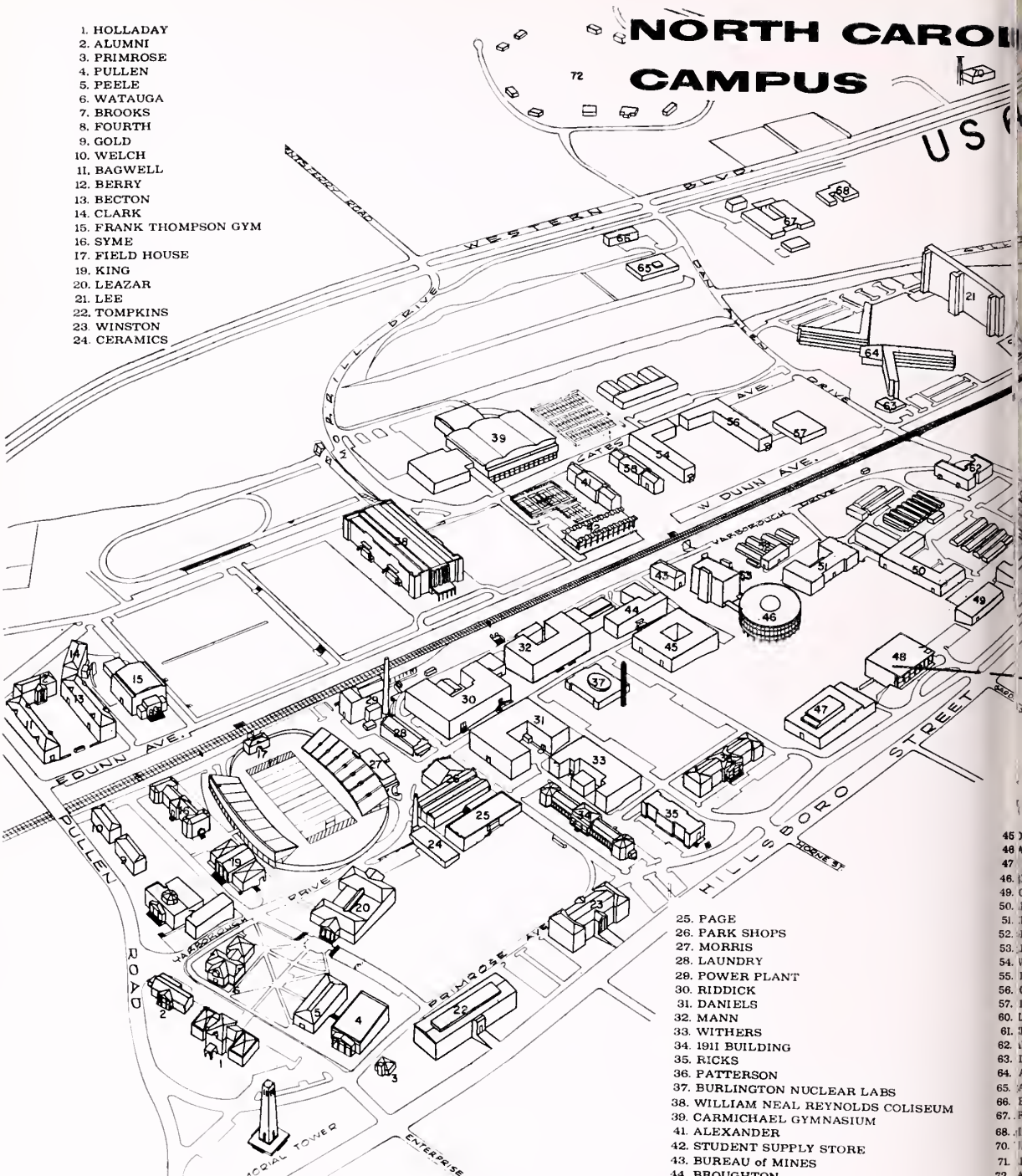
DALE E. HARRISON, E. O. BEAL, AND HENRY L. LUCAS, *Wilmington College* and *North Carolina State University*

Fifteen collections of *Spirodela* and one of *Lemna* were obtained, representing all the recognized species of *Spirodela*. These were brought into clonal conditions and cultured aseptically. Clonal strains were then subjected to 36 different combinations of nutrient media, light intensity, and photoperiod. The strains were scored for several taxonomic features and the results analyzed statistically. The results show that the morphological features are environmentally modified and cannot be validly used as taxonomic characters. The results also show that *S. oligorrhiza* is consistently different from all other taxa of *Spirodela* except *S. punctata* and that physiological strains exist in this species. The study is concluded in a revision of the genus. *Spirodela* is interpreted as consisting of two species, *S. punctata* (Meyer) Thompson and *S. polyrhiza* (L.) Schleid. The latter species is considered to consist of three subspecies, *S. polyrhiza* subsp. *polyrhiza, S. polyrhiza* subsp. *biperforata* (Koch) Harrison and *S. polyrhiza* subsp. *intermedia* (Koch) Harrison.

Seventy-two Hour Constant Surveillance Studies of the Prairie Mole (*Scalopus aquaticus*)

MICHAEL J. HARVEY, *University of Kentucky*

Activity and movements of a male and a female prairie mole were studied using radioisotopic tagging and tracing techniques. An attempt was made to trace each mole for a 72-hour period in September, 1965, and again in November, 1965. Data on the male are incomplete due to loss of the animal on 5 occasions. For both moles, 31 periods of activity ranged from 45 minutes to 15 hours 55 minutes, averaging 4 hours 33 minutes. Thirty-five periods of inactivity ranged from 1 hour to 5 hours 55 minutes, averaging 3 hours 1 minute. In September, the male spent 7 inactive periods at 3 locations and in November spent 11 inactive periods at one location. In September, the female spent 12 inactive periods at 10 locations, and in November spent 7 inactive periods at 2 locations, 6 of these at one location. No correlation was found between periods of activity and the daily cycle of light and dark. Range length of the male during the 72-hour period in September was 165 ft., and in November 820 ft. Range length of the female was 187 ft. in September and 171 ft. in November.


NORTH CAROL
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US
1. HOLLADAY
2. ALUMNI
3. PRIMROSE
4. PULLEN
5. PEELE
6. WATAUGA
7. BROOKS
8. FOURTH
9. GOLD
10. WELCH
11. BAGWELL
12. BERRY
13. BECTON
14. CLARK
15. FRANK THOMPSON GYM
16. SYME
17. FIELD HOUSE
19. KING
20. LEAZAR
21. LEE
22. TOMPKINS
23. WINSTON
24. CERAMICS
WESTERN BLVD.
DAN ALLEN DRIVE
AVE.
DRIVE
CATES
W. DUNN AVE.
E. DUNN AVE.
PULLEN ROAD
HILLSBOROUGH STREET
PRIMROSE AVE.
ENTERPRISE ST.
MEMORIAL TOWER
25. PAGE
26. PARK SHOPS
27. MORRIS
28. LAUNDRY
29. POWER PLANT
30. RIDDICK
31. DANIELS
32. MANN
33. WITHERS
34. 1911 BUILDING
35. RICKS
36. PATTERSON
37. BURLINGTON NUCLEAR LABS
38. WILLIAM NEAL REYNOLDS COLISEUM
39. CARMICHAEL GYMNASIUM
41. ALEXANDER
42. STUDENT SUPPLY STORE
43. BUREAU of MINES
44. BROUGHTON

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The Stomata of *Kalanchoë daigremontiana* Hamet & Perrier, *K. verticillata* Elliot and the Hybrid, *K. daigremontiana* X *K. verticillata*

J. M. Herr, Jr., *University of South Carolina*

The syndetochelic stoma of *Kalanchoë daigremontiana* Hamet & Perrier and *K. verticillata* Elliot originates from a stomatal mother cell which by two divisions establishes a guard cell initial surrounded by three subsidiary cells. Final division of the guard cell initial to form the guard cells may be immediate or delayed. Ontogeny of the stomata in the hybrid, *K. daigremontiana* X *K. verticillata,* follows the same pattern. Mature stomata of the hybrid are in size clearly intermediate between the size extremes exhibited by the parent species. The hybrid also shows intermediate characteristics in the structure, size and shape of other epidermal cells and in more obvious features such as leaf form and the location of plantlets on the leaf margins.

A Floristic Study of Outer Cape Cod, Massachusetts

Harold R. Hinds, *Smith College*

A recent study of the flora of the outer or lower Cape Cod area has revealed data relating to patterns of plant migrations, plant relicts, and plant succession in this area. Northern, southern and continental elements were found incorporated in complex ecological situations.

An understanding of this flora hinges on a complete understanding of the glacial geology of the area and patterns of land uplift and sea-level fluctuations.

The Mountain Stripeback Darter, *Percina notogramma montuosa,* A New Subspecies of Percid Fish from the Upper James River, Virginia

William T. Hogarth and William S. Woolcott, *University of Richmond*

Percina notogramma montuosa is described from 50 specimens taken in the tributaries of the upper James River. It is best separated from *Percina notogramma notogramma* (which inhabits the lower James, Rappahannock, York, Potomac and Patuxent rivers) on the basis of more lateral-line scales (average difference 89%) and more scales around the caudal peduncle (average difference 79%). A comparison of the meristic indices resulted in an average difference of 96%. Eighteen of 31 meristic and proportional characters were found to give statistically significant differences.

The Use of Activation Analysis Methods for Tagging Post-Larval Fish

Donald E. Hoss, *Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina*

We increased the cobalt content of post-larval flounder (genus, *Paralichthys*) to determine if the element could be detected after activation by nuclear bombardment and thus be used as a tag for these fish. When bombarded with neutrons stable cobalt is transformed to radioactive cobalt 60, which can be detected with a gamma spectrometer. A group of post-larval flounder were tagged by placing them in sea water containing stable cobalt ranging in concentration from 0.031 to 125 micrograms per milliliter. Immediately after tagging, one half of the group of tagged fish, along with control fish, were irradiated in the 10 KW reactor at North Carolina State University and then analyzed for cobalt 60 content. The remaining fish were maintained in flowing sea water for 36 days, then were irradiated and analyzed. Tagged fish in both irradiated groups had more cobalt 60 than non-

tagged fish, but the difference was small, therefore a final conclusion on the usefulness of activation methods for tagging post-larval fish was not reached.

Establishment of the Linkage Groups in *Neurospora tetrasperma*

H. Branch Howe, Jr. and Philip Haysman, *University of Georgia*

The establishment of one or more genetic markers on each of the seven chromosomes of *Neurospora tetrasperma* is reported for the first time. Linkage relationships among the twenty available mutants were initially sought through intraspecific crosses. Actual linkage group assignments, however, were made by hybridization studies with *Neurospora crassa*.

Only four of the twenty *N. tetrasperma* mutants proved fertile when hybridized with *N. crassa* wild types. When these four hybrids were backcrossed several generations with the *N. crassa* wild type parents, so as to improve fertility, and then analyzed with *N. crassa* linkage testers, three of the seven linkage groups were found. An additional nine *N. tetrasperma* mutants which failed to hybridize were subsequently placed in these three linkage groups by intraspecific crosses. *N. crassa* mutants which represented the other four linkage groups were hybridized with *N. tetrasperma* wild types and then backcrossed several generations with the *N. tetrasperma* wild type parents. These backcross stocks were used to analyze the other seven *N. tetrasperma* mutants refractory to to hybridization; the remaining four linkage groups were thereby established.

The Parasites of Certain Members of the Catfish Family Ictaluridae from Two North Carolina Watersheds

Richard T. Huber and Grover C. Miller, *N. C. State University*

A study was conducted to determine the parasitic fauna of catfishes, family Ictaluridae, collected in eastern North Carolina. Two hundred ictalurids, representing two genera and six species, were collected and examined between March 10, 1964, and March 14, 1965. These were the white catfish, *Ictalurus catus* (Linnaeus); the yellow bullhead, *Ictalurus natalis* (LeSueur); the brown bullhead, *Ictalurus nebulosus* (LeSueur); the flat bullhead, *Ictalurus platycephalus* (Girard); the channel catfish, *Ictalurus punctatus* (Rafinesque); and the margined madtom, *Noturus insignis* (Richardson).

All hosts were collected from the Neuse River and the Northeast Cape Fear River watersheds. These collections were made from 18 separate localities in Duplin, Pender, and Wake Counties by using setpoles, trotlines, traps, angling, dipnets, and seines. Twenty-six species of parasites, representing five phyla, were recovered. New information is presented in regard to the morphology, taxonomy, and distribution of these parasites.

On the Distribution of Marine Algae in the Western North Atlantic

Harold J. Humm, *Queens College*

In terms of north-south distribution, seven groups of marine algae can be recognized along the Atlantic coast of North America as a result of the current pattern and associated coastal configuration. 1. Those distributed from the arctic to the tropics. 2. From the arctic to Cape Kennedy (Canaveral). 3. From the arctic to Beaufort, N. C. 4. From the arctic to Cape Cod. 5. From the tropics to Cape Kennedy (Canaveral). 6. From the tropics to Beaufort, N. C. 7. From the tropics to Cape Cod.

Only two major floras are involved. An arctic one (4) and a tropical one (5). Cape Cod to Cape Kennedy is a great zone of overlap of the more eurythermal elements of the two floras, with Beaufort, N. C., the principal southern limit of the arctic flora in winter and the principal northern limit of the tropical flora in summer. A few species (1) may be regarded as members of both floras.

Observations on the Deposition, Structure, and Cytochemistry of the Jelly Envelopes of the Egg of the Newt, *Triturus viridescens*

A. A. Humphries, Jr., *Emory University*

The jelly envelopes surrounding the amphibian egg have been implicated previously in such processes as maturation, fertilization, and cleavage, but there is a scarcity of information as to their formation, structure, and chemical nature. The jelly capsule of the newt egg is composed of five layers, which are morphologically and cytochemically distinct. The layers have been designated J1 through J5, from innermost to outermost. All layers, with the possible exception of J5, contain mucopolysaccharide. Layers J1, J2, and J4 contain acid mucopolysaccharide, and possibly neutral mucopolysaccharide, as well. Layer J3 contains neutral mucopolysaccharide. Only layers J2 and J5 definitely contain protein, but protein may also be present in the other layers. Layers J2 and J5 appear to contain sialic acid. The apparent presence of sialic acid in these layers, considered in the light of information on the fertilization process, suggests a possible role of sialic acid in sperm penetration. (Supported by grant GM 09878 from the United States Public Health Service.)

A Morphometric Analysis of the Shell of *Pseudemys concinna suwanniensis* Carr (Order: Testudinata)

Crawford G. Jackson, Jr., *University of South Alabama*

A quantitative study of the form of the shell of *Pseudemys concinna suwanniensis* Carr was made of individuals from a natural population in a north-central Florida spring. A total of 172 individuals was examined which included 32 males, 36 females, and 104 unsexed juveniles. Since graphing of the original data revealed no obvious curvilinearity, the form of the animal was expressed by 30 linear regression equations of the type $Y = bX + a$ and the transposed form $X = b'Y + a'$. Each of 6 linear shell measurements: carapace length, carapace width, plastron length, anterior plastron width, posterior plastron width, and width of bridge was compared against each other shell measurement yielding 15 possible X versus Y combinations. The corresponding correlation coefficients (r) and standard errors of estimate ($S_{y.x}$ and $S_{y.x}$) were computed for each of the 15 combinations of variables. Correlations between the paired dimensions are all very high, with the lowest being .9882. Coefficients of variability (V) were calculated for each series of shell measurements as an indicator of morphological variability. Males, females, and unsexed (juvenile) individuals were treated separately in all of the parameters used. (Supported in part by a Sigma Xi - ReSA Grant-in-Aid.)

Use of DFP^{32} in Frog Erythrocyte Survival Studies

Duvall A. Jones, *University of Florida*

Phosphorus-32 labeled di-isopropylfluorophosphate (DFP^{32}) is used to determine human erythrocyte survival time since it combines irreversibly with cholinesterases of

human red cells and plasma. In an attempt to elucidate the poorly known life spans of amphibian red cells, DFP^{32} was injected into the dorsal lymph sacs of several species of frogs. Over a two month period, small samples of whole blood from individual frogs showed declines in radioactivity, which were similar for individuals within a species. To ascertain that the decreasing radioactivity was due to elimination of labeled cells, recently injected frogs were desanguinated, the blood centrifuged and plasma removed by micropipette; the cells were washed and resuspended in isotonic saline solution, then sampled for measurement of radiation. Washed cell samples averaged 4.3 counts per minute, only 8.7% of the radioactivity of the plasma samples. Thus DFP^{32} appears to be associated mainly with the plasma cholinesterase of these frogs and is not advantageous in their erythrocyte survival studies.

The Effects of Ionizing Radiation on the Growth of the Lichen *Parmelia conspersa*

JOAN M. JONES, *Emory University*

Colonies of *Parmelia conspersa* received gamma radiation treatments of 17kr, 35kr, and 64kr. Variations in climate and semi-monthly applications of nutrients were made in combination with the radiation levels in a 4x2x2x7 factorial design (radiation, environment, nutrients, and month). Radial growth was measured by sequentially superimposing photographs taken at monthly intervals. Analysis of variance with means based on average radial monthly growth shows that all main effects on growth plus interaction of environment x radiation were significant. Normal radial growth for six months averaged 1.86 mm, while colonies irradiated with 64kr averaged 0.92 mm. Additional studies included relative chlorophyll content, thallus coloration, and isidial growth. Results indicate that only environment was significant for chlorophyll content, while all four factors were significant for thallus color and isidial formation.

Vernonia georgiana Bartlett — Hybrid or Species?

SAMUEL B. JONES, JR., *University of Southern Mississippi*

The identification of *Vernonia* species has long been a persistent source of difficulty, resulting in a large part from the blurring of species lines by hybridization. Through field and experimental studies, it has been established that interspecific hybridization between members of the genus is common. In the present paper three taxa, *Vernonia angustifolia* Michx., *V. acaulis* (Walt.) Gleason, and *V. georgiana* Bartlett are considered. Although *V. angustifolia* and *V. acaulis* have been observed to hybridize with other taxa they have been accepted as species. *V. georgiana* has been listed in various floras as both a species and as a hybrid. Crosses were made between *V. angustifolia* and *V. acaulis* and the F_1 hybrids produced were morphologically intermediate between the two parents and were practically identical with the type specimen. On the basis of the study of morphology, geographical distribution, and the hybrids, it is suggested that *V. georgiana* is of hybrid origin.

An Approach to the Culture of Mesophyll Cells Under Autophytic Conditions

P. C. JOSHI AND ERNEST BALL, *N. C. State University*

Our original cultures of mesophyll cells of *Arachis hypogaea* were upon Heller's medium containing sucrose, several vitamins, inositol, sorbitol, 2,4-D, kinetin, and casein hydrolysate. In shake cultures under light, mesophyll cells produced spheres of bright green tissue. As isolated cells they underwent repeated divisions to produce small masses of callus. In order to ascertain whether the isolated mesophyll cells were capable of sufficient photosynthesis to support themselves and to permit divisions and growth of derivatives, the main carbon source, sucrose, was deleted. While the number and size of spheres of green tissue produced was decreased, an encouraging number of them grew to diameters up to 5 mm. Deletion of casein hydrolysate from the medium resulted in further decrease in number and size of the spheres. It appeared that the amino acids of CH were being used as carbon sources. When the last 2 potential carbon sources, inositol and sorbitol, were deleted, there was still further decrease in growth. That, however, some of the mesophyll cells in an inoculum were capable of growth without any carbon source in the medium, is attested by the fact that a number of cultures on medium containing only minerals, vitamin B_1, 2,4-D, and kinetin, produced a number of large green spheres of tissue.

Different Reactions of Chemical and Physical Carcinogens in Specific Areas of Mouse Skin

HANS E. KAISER AND JOHN C. BARTONE,
George Washington University Medical School

Species of several phyla show reactive differences to chemical and physical carcinogens. Animal species not previously used in cancer experiments, which exhibit negative reactions to one mammalian carcinogen, cannot be said to be unresponsive to cancer in general. This is not always true because published negative results concerning newly treated species with one carcinogen cannot be generalized for other carcinogens. Furthermore, closely related species indicate positive and negative reactions when a single organ as skin is treated with 3,4-benzopyrene in different areas. Animal models prove that the reaction of two main groups of cancer producing agents yield different results. Mice and rat models revealed earliest tumors on naked ears with two hundred and fifty day whole body ultraviolet ray exposure. Chemicals as 3,4-benzopyrene quickly produce tumors on dorsal mouse skin but none at all in rats similarly treated over the same period. The mouse ear showed no response to 3,4-benzopyrene treatment.

Evolutionary Relationships in the Short-Stemmed Leatherflowers of the Eastern United States

CARL S. KEENER, *North Carolina State University*

Four taxa of *Clematis*, Subsection *Integrifoliae* will be discussed with regard to their probable evolutionary relationships. Evidence for the suggested evolutionary pattern derived from studies based on comparative morphology, karyology, chemotaxonomy, and population analyses will be briefly reviewed.

The Effects of Phenothiazine Drugs Upon Biological Pregnancy Tests in Male Batrachia

DONALD T. KEMP AND BERYL C. FRANKLIN,
Northeast Louisiana State College

To determine the practicality of substituting *Bufo woodhouseii fowleri* for *Rana pipiens* as a test animal in biological pregnancy tests, particularly in those cases where phenothiazine interference is encountered, or expected, 122 urine samples were tested, including 61 pregnancy, 31 phenothiazine, and 30 control specimens. Diagnostic accuracy in the true pregnancy group was 86.9% for the frog, and 78.6% for the toad. Only three frogs, and two toads, gave false-positive reactions to the urine samples from the phenothiazine group. This lack of tranquilizer interference, as compared to

previous results by others, is possibly due to the smaller average drug doses received by the mental outpatients in this test group, or to a lesser degree of mental illness; as compared to those test subjects used in the earlier researches.

Effect of Total Uterine Denervation on Luteolytic Activity of the Pseudopregnant Hamster Uterus

G. C. Kent, Jr., G. W. Tate, Jr. and D. R. Dickerson,
Louisiana State University

In totally hysterectomized pseudopregnant hamsters (*Mesocricetus auratus*) psychic estrus was delayed until 16 days after sterile mating (Gatipon and Kent, Bull. Asso. S.E. Biol. 12:45, 1965). To test whether this effect may depend on uterine innervation a denervation procedure was employed consisting of total isolation of the uterus by hyfrecation followed by rejunction of the organ in situ with the exception of the mesometrium. There was rapid reestablishment of uterine circulation but not of innervation. Operated animals exhibited psychic estrus 12 days after sterile mating compared with 16.3 days in totally hysterectomized controls. Isolation and rejunction operations performed on days 5 or 6 of pseudopregnancy resulted in termination of pseudopregnancy 6 days after operation. Neither hysterectomy nor isolation and rejunction on days 8 or 9 of pseudopregnancy prevented estrus on day 9. We conclude that any luteolytic effect of the pseudopregnant uterus is independent of uterine innervation and that any humoral effect has become operative at extra-uterine sites by early day 8 of pseudopregnancy.

Classification and Structure of the Tidal Marshes of the Poropotank River, Virginia

James A. Kerwin, *Virginia Institute of Marine Science*

A random quadrat sampling plan was employed to analyze the community structure of the tidal marshes of the Poropotank River near Williamsburg, Virginia. A classification of four marsh types was made: fresh, slightly brackish, brackish, and salt water marshes. The mean range in salinities recorded from river sites adjacent each marsh type were respectively 0.33-0.79%, 0.79-4.11%, 4.11-9.38%, and 9.38-14.72%. Although several marsh types existed within the 1000 acre system, it may be stated that the tidal marshes of the Poropotank River function as a salt water marsh or an *S. alterniflora* association. Dominant species for the entire system were respectively *S. alterniflora, S. patens, D. spicata, S. robustus,* and *J. roemerianus.* The saltmarsh cordgrass, *S. alterniflora,* occurred as a dominant in at least one community of each of the four marsh types. It appears that the distribution of the species is not governed by salinity; rather its distribution expresses an ability of the plant to become established and compete successfully with other phanerogams growing in fresh water. The Poropotank River marshes exhibit greater affinity with marshes to the north of Chesapeake Bay than to those marshes southward; conspicuous differences appearing in associations of the dominant plants at the community level of organization.

In Vitro Studies of the Embryonic Chick Pancreas

E. H. Leiter and Ernest L. Hunt, *Emory University*

In attempts to effect the isolation and propagation of a clonal line of epithelioid cells of pancreatic origin, pancreases from 14-17 day chick embryos were maintained in organ, tissue, and cell culture. Such a clonal line was not established due to failure of the epithelioid cells to adhere to glass or plastic surfaces and undergo histogenesis.

Since limited maintenance and growth of pancreatic acinar and endocrine-like islets occurred in organ and tissue cultures, it was possible to examine the question of hormonal parameters limiting the culture of functional beta (insulin-producing) cells. Explants were incubated in medium containing adrenaline chloride, adrenal gland extract, embryonic adrenal gland tissue in parabiotic culture, and crude chick pituitary extract. Such treatments did not result in detectable elaboration of islet-tissue insulin, although some morphological alterations of cells were noted. (This research was supported in part by a NASA predoctoral traineeship grant.)

Studies of Reproduction in *Panicum* Subgenus *Dichanthelium*

Michel G. Lelong, *University of South Alabama*

Certain assemblages of species in the large subgenus *Dichanthelium* of the genus *Panicum* present intricate patterns of morphological variation and offer considerable taxonomic difficulties. In an effort to elucidate the interrelationships among these grasses and to delimitate the species more sharply, a prolonged investigation of certain aspects of the growth, morphology, ecology, breeding behavior and population structure of these plants was undertaken. This report deals primarily with the methods of reproduction in the subgenus. The dichanthelia investigated are primarily autogamous or cleistogamous. However, certain florets borne on large terminal or axillary inflorescences possess relatively long and well exserted anthers from which clouds of pollen are readily shed, and it is likely that cross pollination results from this latter type of flowering. It appears that a combination of preponderant selfing and of occasional cross fertilization between races and "species" of dichanthelia might have given rise to the unusual population structure characteristically formed by these plants.

Ultrastructure of the Pseudocilia of *Tetraspora*

Carole A. Lembi and Walter R. Herndon,
University of Tennessee

The green algal genus *Tetraspora* is characterized by the presence of two pseudocilia per cell, the cells being enclosed in a gelatinous matrix. Light microscopic observations indicate that the immobile pseudocilia consist of a hollow tube surrounded by a broad sheath. An electron microscopic investigation was carried out to determine differences in ultrastructure between pseudocilia and flagella. The pseudocilia have basal bodies similar in structure to those of flagella. However, the portion of the pseudocilium extending from the cell does not have a 9 plus 2 fibrillar composition but shows a progressive decrease in the number of fibrils until only three or four single fibrils remain. Possible function and relationship to flagella of the pseudocilia will be discussed.

Indole Derivatives in the Histological Differentiation of Early Pig Embryos

Sidney S. Loxley and John C. Bartone,
George Washington University Medical School

The condensation reaction of Adams (1957), which utilizes Ehrlich's reagent, p-dimethylaminobenzaldehyde (DMAB), was applied to sectioned tissue and organs of ten millimeter pig embryos. The histochemical distribution of tryptophan containing proteins was specific in reactivity throughout most primordial tissues although the chemochromatic quality of visualized products was generally low. However, the reaction and results are valuable because the DMAB mechanism has a known, chemi-

cal explanation which contributes information to differentiation and morphogenetic processes. All germ layers contained tryptophan in variable amounts without apparent predominance established with other reactions (Anatomical Record 148:360). Positive, moderate reactions were observed in hearts, livers, red blood cells and Wolffian bodies. Minimum tryptophan intensities were deposited in bronchi, muscles and spleens. The brain, pharynx and gall-bladder, as other organs, were negative. The DMAB reaction appears positive in rapidly forming organs and negative in later appearing organs.

Photosynthesis and Respiration of Rain Forest Seedlings Under Natural Conditions

ARIEL E. LUGO, *University of North Carolina*

Previous studies of shade seedlings (*Sloanea berteriana* and *Dacryodes excelsa*) suggested that respiration exceeded photosynthesis. The experiment was conducted using an infra-red gas analyzer with an open system. Results were variable and conclusions were subject to question. More recent data were obtained using a closed system which proved to be more sensitive and provided less variable results. Magnitudes of photosynthesis and respiration were found to be greater than with the open system. Maximum photosynthesis of *Dacryodes excelsa* was found to be 0.07 gm C/m^2 of leaf area/hour ($gC/m^2/h$) in contrast to 0.03 $gC/m^2/h$ obtained from the open system. With a closed system ratios of photosynthesis and respiration (P/R) increased but did not exceed one. It is concluded from the P/R ratios that these seedlings do not grow under natural shade conditions. P/R ratios and corresponding growth increase with an increase in sunlight which reaches the seedlings as sunflecks. (These studies were supported by the Puerto Rico Nuclear Center Terrestrial Ecology Program.)

An Ecological Study of the Radiation Sensitivity of *Euterpe globosa* Gaertn.

J. FRANK MCCORMICK, *University of North Carolina*

The sierra palm, *Euterpe globosa* Gaertn., is the most abundant species in a lower montane rain forest being studied by the Ecology Division of the Puerto Rico Nuclear Center. Since the palm comprises one-fourth of an otherwise highly diverse forest flora, studies of this species provide a useful evaluation of changes in the forest following a three month exposure to 10,000 curies of Cs^{137}. Field studies include estimations of population density, age class distribution, and plant growth before and after irradiation. Field investigations were followed by better controlled laboratory studies of palm sensitivity to acute and chronic radiation exposures. Results of laboratory studies were used to evaluate field data. Results of this study and several related investigations indicate that the tropical forest is less radiation sensitive than temperate forests.

Artificial Fertilization and Sperm Penetration in Eggs of *Triturus viridescens*

ELLEN W. MCLAUGHLIN, *Emory University*

Experiments were designed to determine the most favorable conditions for obtaining artificially fertilized eggs and to study sperm penetration through the jelly capsule. Results showed the following method to be a reliable fertilization technique. Eggs were removed from the lower portion of the oviduct (D and E regions) and placed in a moist chamber. During this procedure, care was taken to keep the eggs free from contact with fluids. Sperm from the vas deferens were smeared directly on the jelly surface and three to five minutes later the eggs were flooded with standing tap water. In twenty-two experiments, 68% (205/304) of the eggs cleaved, with 100% cleavage in several cases. Insemination with dilute sperm suspensions or with sperm from the testes proved unsatisfactory. In eggs fixed two to three minutes after insemination, sperm were found in all jelly layers and at the egg surface. Four to five minutes later, sperm were observed in the peripheral cytoplasm. (Supported by grant GM 09878 from the U.S.P.H.S.)

Systematics of *Isoetes* Found in Granite Outcrop Communities

JAMES F. MATTHEWS, *Univ. of N. C. at Charlotte;*
W. H. MURDY, *Emory University*

Populations of *Isoetes* have been collected from several granite outcrop communities in Alabama, Georgia, and South Carolina. The thin soils bordering rock exposures, which have a firm, rock substratum and receive drainage water during winter months, afford a favorable habitat for these plants. Populations have been tentatively classified into 3 species, on the basis of megaspore characters: *I. melanopoda, I. engelmanni,* and *I. melanospora.* Only the latter is considered to be endemic to granite outcrop communities, having been reported from only 7 stations in 2 Georgia counties. Classification is made difficult in *Isoetes* by the general lack of diagnostic characters, and by environmental modifications. It is difficult to adequately classify a plant if it is immature, and comparisons between plants at different stages of development is often impossible. Chromosome counts have been made on plants from these populations, and from well documented *I. engelmanni* not associated with the outcrop habitat. All have $2n = 22$. Plants are presently being grown under uniform conditions to determine genetic differences and to make comparisons at different stages in the life cycle. Two-dimensional chromatographic studies are also in progress in order to determine if phenolic patterns can be used in the classification of the genus.

Studies of the F_1 and F_2 Hybrids of the Northern and Southern Quahog Clams

R. W. MENZEL, *Florida State University*

During the first half of five years' observations of northern and southern parents and reciprocal hybrids, the southern species grew fastest, the northern slowest, and the hybrids were intermediate, but close to the southern parent. During the latter half the hybrids surpassed both parents. The F_1 hybrid of the cross, female *M. campechiensis* X male *M. mercenaria,* grew larger than those of the reciprocal cross, and their F_2's were the most successful. The F_2 of the reciprocal cross all died within one month. A limited number of F_2's from reciprocal crosses between F_1's and the first mentioned F_2 are still growing. Although still too small for final characterization, they so far resemble the southern parent in shell morphology.

A Preliminary Report on a Study of Variation in *Fagus grandifolia* Ehrh. in North Carolina

EVELINE P. MERCER AND ARTHUR W. COOPER,
North Carolina State University

Preliminary studies on the morphological variability of *Fagus grandifolia* Ehrh. in North Carolina confirm, in part, the opinions of the late Wendell Camp that this variability shows some correlation with geographical regions in the State. Since Camp's supporting data were never published, the basis for his original three "races"

and later subspecies of American Beech are in part conjectural. Analyses of leaves and fruit in the present study demonstrate the complexity of the beech problem in North Carolina and show that certain features are correlated with geographic regions of the State.

Isolation of Aquatic Fungi Using a Millipore Filter

CHARLES E. MILLER, *Ohio University*

Presently employed methods for isolation of Chytridiomycetes and certain other aquatic fungi in pure culture are tedious, difficult and somewhat restricted in application. A simple technique using a Millipore filter to concentrate the spores was tried. The moist concentrate was resuspended in 0.5 ml. of water and streaked on sterile agar containing antibiotics and low nutrients (water, 1000 ml.; agar, 30 gm.; glucose, peptone, yeast extract, 0.05 gm. each; streptomycin sulfate and penicillin G sodium, 0.5 or 1.0 gm. each). Two liters of lake water yielded 362 isolates categorized as follows: Chytridiomycetes 170; Oomycetes 31; other fungi 161. Some isolates were probably the same species; no identification was made in this preliminary experiment. *Chytriomyces hyalinus* Karling was isolated 39 times from 200 ml. of lake water. Species of *Achlya* and *Saprolegnia* were collected frequently. *Thraustochytrium* and *Schizochytrium* species from marine habitats on the Maine coast have also been isolated. This technique might have application in studying large chytrid populations to better delimit species or in ecological studies.

Serpentine Barren Vegetation

GARY L. MILLER, *University of North Carolina*

A vegetation analysis of the serpentine barrens and adjacent areas in Southern Lancaster County, Pennsylvania was conducted during the summers of 1963 and 1964. Correlations between serpentine and schist plant formations and the factors of the substrates were observed. The general lack of necessary nutrients, water availability, slope and competition appear to be the primary causes for the serpentine's variable vegetation patterns. A total of 273 species was identified from the study area. The data obtained from the analyses of these communities indicates that the flora, succession patterns, and climax on serpentine are quite distinct from that on adjacent schist soils. Using Jaccard's community coefficient, the climax communities on serpentine and schist were only 7.1% similar.

Chromatographic Analysis of 260 mμ Absorbing Material from Well-Fed and Starved *Tetrahymena pyriformis*

CAROLYN G. MOHLER AND CAROLYN WELLS, *Longwood College*

The initial observable event in protozoan conjugation is the union, by pairs, of cells belonging to opposite mating types. The union does not occur immediately after mixing appropriate mating types; a starvation period of approximately 4 hours is prerequisite for mating between the strains of variety 1 employed in this study. It has been assumed that mating type substances are synthesized during this refractory period. Our studies indicate that UV absorbing substances (260 and 280 mμ) elaborated by the ciliate accumulate in the water medium during starvation. Addition of water from 4-6 hour starved cells to freshly washed cells shortens the refractory period. In order to detect possible changes in the intracellular UV absorbing substances, the acid-soluble (0.4 *M* PCA) nucleotide material of well-fed and starved cells were analyzed chromatographically. The results show that qualitative changes in acid soluble nucleotide material accompanies starvation of *Tetrahymena* in distilled water. The possibility is being considered that the changes in the acid soluble nucleotides and the concurrent accumulation of exogenous substances accompanying starvation may have a role in the initiation of mating.

Tree Species Diversity in Six Forest Types In North Central Florida

CARL D. MONK, *University of Georgia*

Frequent mention is made in the literature of an increase in diversity from (1) successional communities to climax communities, (2) extreme environmental conditions to optimum environmental conditions, and (3) temperate communities to tropical communities. Data presented in this study conform to these generalities. The differences in diversity of the forest community types in north central Florida partially reflect variations in the respective environments. The types characterized by extremes in moisture are less diverse than those of middle moisture conditions. Cypress heads, flatwoods, mixed swamps, and bayheads all occupy poorly drained sites which may be flooded periodically while the sand hills are situated on excessively drained areas. Diversity may vary within a community type from one portion of the environmental gradient to another. Such variations may reflect not only moisture differences but soil fertility differences. Within the climax southern mixed hardwoods noncalcareous stands on dry, mesic, and wet sites are less diverse than corresponding calcareous stands.

Cuticular Patterns as a Taxonomic Tool Within the Genus *Vaccinium*

SABINA MUELLER, *University of North Carolina*

The species of the genus *Vaccinium* are well known for their variability, due to polyploidy and subsequent hybridization. Many of the diagnostic characters of the species involve leaf morphology; a survey of the cuticular patterns of leaves of several species showed that the cuticle of some species was highly ornamented and that the patterns were different for different species. Investigations of variability of patterns within an individual, within and among populations, year-to-year variation, ontogenetic variation, and species differences were undertaken to determine constancy of patterns. A hybrid, determined by other methods, was found to have a pattern differing from both parental species. From surveys of herbarium material it seems that cuticular patterns may be of greatest value within populations or within localized geographic areas where the amount of genetic contamination from other species is known, or at a minimum.

Speciation of *Phacelia* in Response to Habitats Afforded by Granite Outcrop Communities of the Southeastern Piedmont Region

W. H. MURDY, *Emory University*

Phacelia maculata and *P. dubia* var. *georgiana* are endemic to granite outcrop communities in the Piedmont region of Ala., Ga. and S. C. These taxa, together with the wide-ranging, Appalachian species, *P. dubia*, comprise a 5-chromosome complex within the genus and a close relationship among them is supported by data from morphology, geographic distribution and biochemistry. *P. dubia* is considered to be closest to the basic stock from which the other taxa have evolved in response to the marginal, granite outcrop habitat located at the geo-

graphic margin of its range. *P. maculata* originated as an ecotype adapted to deciduous woodland glades bordering rock exposures. Subsequent development of a postfertilization, incompatability factor, which reproductively isolates it from *P. dubia*, has rendered *P. maculata* a good species. *P. dubia* var. *georgiana* has had a recent origin in response to open, disturbed outcrop habitats. It is presently at the ecotype stage and expanding its range. Within the extensive range of *P. dubia*, marginal habitats have not illicited an ecotypic response because their geographic location precludes the type of isolation necessary for ecotype formation.

Analysis of Terminal Oxidation Enzymes in Tissue Culture of *Nicotiana* by Microelectrophoresis and Histochemical Methods

JAMES O'CONNER, *University of Georgia*

Peroxidase isozymes characteristic of normal intact plant tissue and the cultured plant tissue were investigated by disc microelectrophoresis and by histochemical localization. Molecular size differences in peroxidase isozymes were found between normal pith tissue and the subsequently cultured pith tissue. In the normal uncultured pith tissue, peroxidase isozymes seem to be of small molecular size. In the cultured pith tissue, the peroxidase molecules seem to be much larger as evidenced by their much slower movement in the gel columns. Isozymes from the callus were also slower in reaction with the benzidine H_2O_2 substrate than were the isozymes of the intact plant. There is an extracellular peroxidase as evidenced by an electrophoretic and a histochemical reaction from the culture medium beneath the callus. By electrophoresis two types of phenolases were found and one type apparently does not occur in tobacco tissue.

A Blooming Sweet Potato

HERMAN O'DELL, *East Tennessee State University*

During the summer of 1958 a number of sweet potato plants were observed blooming in the field. Plants of this same variety (Porto Rico) were also observed blooming for the next two seasons. Flower buds were collected at various intervals and sections of these were made by standard methods of histological technique. The early stages of development of the ovule appear to be quite normal. The megasporocyte differentiates within the nucellus and four megaspores are formed. One of these functions in the development of the embryo sac. The later stages of this development were not observed, but in a few cases seeds matured.

Some Fishes from the Chesapeake Bay Drainage in Eastern Maryland

L. M. OUTTEN, *Mars Hill College*

During the latter part of August, 1964, and in early September, 1962, collections of fishes were made in Carey's Creek, a tributary of the Pocomoke River, Chesapeake Bay drainage, near Goodwill about 4 miles east to east-southeast from Pocomoke City, Worcester County, Maryland. Among the specimens collected were *Umbra pygmaea* (DeKay), eastern mudminnow; *Esox a. americanus* Gmelin, redfin pickerel; *Notemigonus c. crysoleucas* (Mitchill), eastern golden shiner; *Erimyzon o. oblongus* (Mitchill), eastern creek chubsucker; *Anguilla rostrata* (LeSueur), American eel; *Aphredoderus s. sayanus* (Gilliams), pirate perch; *Roccus americanus* (Gmelin), white perch; *Lepomis auritus* (Linnaeus), redbreast sunfish; *Lepomis gibbosus* (Linnaeus), pumpkinseed; *Etheostoma fusiforme* (Girard), swamp darter; and *Etheostoma nigrum* Rafinesque, Johnny darter.

Skin Transplantation Study in the Mongolian Gerbil (*Meriones unguiculatus*)

D. I. PAV, D. ROLLINS AND T. R. MARCUS, *Children's Cancer Research Foundation at the Children's Hospital Medical Center, Boston, Massachusetts, and Department of Biology, East Tennessee State University*

Skin transplantation has been undertaken in seventy-eight Mongolian gerbils in order to study the fates of inter- and intra-sex, and inter- and intra-breeding stock transplants, and to estimate the rates and intensity of xenografts (mouse, hamster to gerbil) reactions. Full thickness, fitted skin grafts were transplanted according to the technique of Cannon and Longmuir; observations and evaluations followed the scheme outlined by Medawar. Autografts were successful in ninety-two per cent as compared to eighty-eight per cent of the allografts. "Second set" reaction was studied in the allograft group. Gerbils reacted rapidly and violently to transplants from hamsters, but rejected mouse skin implants more slowly and less vigorously.

The Mongolian gerbil is an animal which seems to display unusual transplantation tolerance; the discussion will stress its suitability for cancer research. (Supported, in part, by Contract #1690-3.)

Effects of Moisture Stresses on the Recovery and Growth Rates of Irradiated *Pinus taeda* Seedlings

ROBERT A. PEDIGO, *College of William and Mary*

One hundred ninety-two *Pinus taeda* seedlings in June of 1964 were arranged in experimental groups involving three levels of radiation, three levels of drought stress and controls. Plants were irradiated under conditions of sufficient moisture and then subjected to drought stress. Effects were analyzed by measuring terminal and radial growth. At the end of fourteen months results indicated that non-irradiated plants grow better both terminally and radially than non-irradiated controls. At higher levels of radiation terminal growth is reduced in all experimental situations, but as reported in earlier work, radial growth at higher radiation levels is equal to or greater than radial growth at lower levels of radiation or non-irradiated controls.

Convergent Evolution in the Clavariaceae

RONALD H. PETERSEN, *The University of Tennessee*

Emphasis on the hyphal structures of the fruiting body of higher Basidiomycetes as a useful taxonomic tool was introduced by Corner, first for the Polyporaceae, then the Clavariaceae. Donk arranged the families of the Aphyllophorales so that the genera of clavarioid fungi are found in the Clavariaceae, Gomphaceae and Cantharellaceae. Evidence has been gathered repeatedly which adds a number of hitherto undisclosed origins for the clavarioid fungi. Among these are the Corticiaceae, postulated as an origin for *Ramariopsis* through *Cristella* and the Asterostromataceae for *Lachnocladium* through *Asterostroma*. Conversely, several genera listed in Donk's three families probably evolved from a small group of common ancestors in the genera *Cantharellus* and *Gomphus*, with a fundamental dichotomy between *Ramaria* and *Clavariadelphus*. Phylogenetic lines are proposed to include *Gomphus*, *Ramaria*, *Ramaricium* and *Kavinia*; and *Gomphus*, *Clavariadelphus*, *Clavulinopsis* and *Clavaria*.

A New and Unusual Structure Observed In Ova of *Arbacia*

VIRGINIA M. PICKEL AND ROBERT A. RINALDI,
Duke University Marine Laboratory and The University of Tennessee

A structure was observed with the light microscope in centrifuged, parthenogenetically stimulated ova of *Arbacia*. These structures appeared when the ova were at prophase. They resemble electron micrographs of Golgi bodies in their morphology but differ from Golgi bodies in their size and in their stainability. These structures exhibit folded, accordion-like canals ranging in size from four to fifteen microns in length. The structures were most easily observed in sectioned ova which had been fixed in Bouin's and stained with haematoxylin. Osmium tetroxide did not stain these structures. There were from one to four such structures found in the cytoplasm and generally near the nucleus. The origin(s) and function(s) of these cytoplasmic structures are unknown. Perhaps they are associated with the formation of the spindle apparatus, or they may be artifacts.

Accumulation of Radioisotopes within *Pinus taeda, Juniperus virginiana,* and *Quercus georgiana* in Two Ecosystems

J. DAN PITTILLO, GAYTHER L. PLUMMER AND H. F. PERKINS, *University of Georgia*

Red cedar, loblolly pine and Georgia on granitic outcrops and in woodlands of the Piedmont region were analyzed in 1964 for radioisotopes in order to evaluate variability in concentrations relative to ecological factors. Cesium-137, Mn-54, Ce-144 and Ru-106 were more concentrated in oak and pine parts on lowland outcrop sites than on highland outcrop or in woodland sites. However, radioisotopes were most concentrated in red cedar on highland sites. Cerium-144 was primarily associated with external parts where it was deposited, whereas Mn-54 was readily incorporated within growing tissues, especially pine phloem. Distributions of radioisotopes within other plant parts will be shown. Radioisotope analysis of soils supporting these trees indicated greatest concentration in topsoils, particularly those topsoils in lowland habitats. Analysis for exchangeable soil nutrients showed more Mg than K, Cs, and Mn, whereas in plant tissues K>Ca>Mn>Mg for all trees of all sites. These trees, therefore, apparently accumulated radioisotopes proportional to concentrations of radioisotopes in the habitat.

Host-Specificity in the Sub-Order Monopisthocotylea (Trematoda: Monogenea)

CHARLES E. PRICE, *The Woman's College of Georgia*

Host-specificity is a major problem confronting parasitologists. This field is meaningful from the standpoints of evolution, ecology, physiology, and biochemistry, as well as to general parasitology.

A total of 152 species of monopisthocotylean Monogenea contained within 12 genera have been described for North America to date. Of these forms, 13 parasitize three or more different host species, 31 live on two different host species, while 108 have been described from a single host. Apparently most monogenetic flukes tend to utilize a single host species. In an unpublished study by the present author branchial material was removed from 300 host specimens of *Gambusia a. affinis* (Baird and Girard), with resultant recovery of over 1000 gill parasites. All of these proved to be *Urocleidus seculus* Mizelle and Arcadi, 1945. Other studies are cited.

Intraspecific morphological variation of parasites is apparently associated with parasite-host specificity. Examples are furnished.

Chromosomes of an Acanthocephalan and a Cestode Using Mammalian Spread Technique

MAX ROWLAND PROFFITT, *University of Tennessee*

In recent years, great advances have been made in the field of mammalian cytogenetics. Among these has been the development of the chromosome spread technique, which combines the effects of hypotonic treatment, surface tension, and air drying to produce well spread and flattened chromosomes. These methods have now been modified in our laboratory to use with two helminth parasites, the mouse bile duct tapeworm *Hymenolepis microstoma* and the rodent acanthocephalan *Moniliformis dubius*.

In the case of *M. dubius*, cells from the ovarian masses of 50 day old, non-fertile females were treated hypotonically then fixed in Carnoy's fixative. Preparations were made by allowing a drop of the cell-fixative mixture to fall onto a completely wet slide which was then quickly dried on a slide-warming table. The finished slides were stained with Giemsa, dried, then coverslipped using a resinous mounting medium.

The Behavior of Radiocesium During Insect Metamorphosis[1]

DAVID E. REICHLE,[2] *Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee*

The evergreen bagworm, *Thyridopteryx ephemeraeformis*, was employed as a model for the uptake and fate of cesium-134 during transformation in inseet populations feeding upon contaminated vegetation. Pupating female larvae were placed in artificial cases simulating natural bagworm cases in which normal development occurs (38 days), and reared to adults at mean field temperatures of 72°F (40 days). Essentially the entire radiocesium body burden was transferred from the larval to pupal stage, with only 0.3% lost with the cast skin at ecdysis. The activity density in the pupa increased by about 16% over the larval stage. Expressed as a percentage of pupal radioactivity the distribution was: 10% to puparium and miscellaneous residues, 40% to egg clutch, and 50% remaining with the female after oviposition. Slightly less than half the female body burden of radiocesium (44.5%) was transferred in egg production, which in itself accounted for 82.4% of the total female biomass.

[1] Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.

[2] U. S. Atomic Energy Commission Postdoctoral Fellow under appointment from the Oak Ridge Institute of Nuclear Studies.

Factors Influencing Zoospore Production and Motility in *Tetraspora gelatinosa*

RUSSELL G. RHODES AND WALTER R. HERNDON, *University of Tennessee*

A technique whereby zoospore production of *Tetraspora gelatinosa* (Vauch.) Desv. could be measured quantitatively under controlled conditions was devised; the method employed compound colonies grown from zoospore suspensions. Variations in temperature, and light were tested for their effect on zoospore production. No zoospore production occurred at 3 C while at 11 C and 23 C zoospore production had reached a maximum

after 24 hours of darkness. The rate of zoospore production at 11 C was higher than at 23 C. Zoospore production was low at light intensities from 120 ft-c to 13 ft-c; in darkness and at a light intensity of 6 ft-c, zoospore production reached a maximum after 24 hours. Quantitative data confirms that the duration of motility of zoospores of *T. gelatinosa* is prolonged in darkness. Thirty per cent of an inoculum of zoospores remained motile for a period of five days without light. However, there was no increase in cell number in the inorganic medium used, during the period.

A Chromosome Translocation in Three *Haworthia* Plants

H. P. Riley, S. K. Majumdar and R. E. Hammack, *University of Kentucky*

A translocation between two large acrocentric chromosomes was observed in two diploid plants of *Haworthia attenuata* and one triploid of *H. limifolia* var. *schuldteana* and is apparently the same in all three plants. The result of the translocation was two abnormal chromosomes, (a) a large metacentric chromosome consisting of the long arm of one chromosomes, most of the long arm of the other and the centromere of the first, and (b) a small chromosome consisting of most of the short arm of the first and the short arm, probably a little of the long arm and the centromere of the second. In each plant one of the large chromosomes involved was an "A" chromosome characterized by a slightly longer short arm than is found in the other large chromosomes. Such a translocation can reduce the chromosome number by the loss of the new small chromosome as it probably lacks euchromatin.

Thorium, Uranium, and Potassium in Certain Georgia Soils and Their Biological Implications

Jerry C. Ritchie and Gayther L. Plummer, *University of Georgia*

Gamma-ray spectrometric analyses were made on surface soil material collected in the central Piedmont region of Georgia and the lower Piedmont near Augusta, Georgia to determine the concentrations of naturally occurring thorium, uranium, and potassium. Thorium ranged from 5 to 70 ppm with an average of 17.1 ppm for 76 samples. Uranium ranged from 1 to 10 ppm with an average of 3.7 ppms for 76 samples. The mean Th/U ratio was 4.7. Potassium varied from non-detectable levels to 4.45% with an average of 1.46%. Relative gamma activity ranged from 1.0 CPM/gram to 8.9 CPM/gram. Thorium, uranium, and potassium contributed 90 to 98% of the relative activity, the remaining 2 to 10% was due chiefly to fallout nuclides, mostly Cesium-137. Differences in relative activity from one area to another were closely correlated with variations in thorium concentrations, the r^2 value being 0.90.

Effects of X-irradiation on the Development of *Moniliformis dubius* (Acanthocephala)

E. S. Robinson, *University of Tennessee and University of New South Wales*

Shelled acanthors and cystacanths of *M. dubius* were X-irradiated *in vitro* with doses of 2, 4, 8, 16, 32, 56, and 80 Kr and then fed to cockroaches (*P. americana*) and rats, respectively. Irradiated acanthors were infective even after 80 Kr but development to cystacanths was inhibited in proportion to dose. In late acanthellae from irradiated acanthors, abnormalities were observed in the muscle nuclei and gonads (after 8 Kr), the genital apparatus (after 16 Kr) and the proboscis (after 24 Kr). Higher doses increased the degree and frequency of these abnormalities. Adults from irradiated acanthors showed a reduction in length and fertility with increased dose.

Irradiation of cystacanths led to lowered infectivity at doses above 8 Kr. After 4 Kr ovarian masses were usually absent in adult females and sperm were absent in the reduced testes of males. Some of these results may be explained in terms of known cellular effects of radiation and the pattern of development found in acanthocephalans.

Relict Vegetation in the Vicinity of Hanging Rock State Park, Danbury, North Carolina

Hollis J. Rogers, *University of North Carolina at Greensboro*
John D. Barnett, *Superintendent, Hanging Rock State Park*

Hanging Rock and Moore's Knob in this area are erosion peaks of the Sauratown Mountains which have been carved from the piedmont plateau by the Dan River. Mica schist, an extremely resistant metamorphic rock, forms a protective cover which has prevented the eradication of their peaks and produced a striking contrast between their summits and the valley between them. Moore's Knob reaches 2572 feet above sea level, while the average elevation of this area is approximately 800 feet. The Sauratown Mountains are separated from the Blue Ridge by some fifty miles of piedmont plateau, yet several species characteristic of higher elevation are found at relatively low altitudes within this area. *Tsuga caroliniana* Engelm., *Xerophyllum asphodeloides* (L.) Nuttall and *Saxifraga michauxii* Britton are examples. The presence of these and other mountain species within this piedmont area indicates that this relict mountain flora has persisted since the recession of the ice age some 10,000 years ago.

Oyster Setting in Two Adjacent Tributaries of Chesapeake Bay

William N. Shaw, *U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Biological Laboratory, Oxford, Md.*

The setting of the eastern oyster, *Crassostrea virginica*, was monitored weekly and seasonally for 5 years, 1961 to 1965, in Broad Creek and Tred Avon River on the eastern shore of Chesapeake Bay, Talbot County, Maryland. Data on time of spawning, length and peak of setting season, first season growth and survival of spat, preference of metamorphosing larvae to surface angle, and associated fouling organisms are presented and discussed.

Each year setting was considerably greater in Broad Creek than in the Tred Avon River. The reasons for the higher setting intensity in the creek are not known, though several aspects such as larvae abundance and water quality were investigated.

Homogeneity in Andropogon Growing on Areas of High and Low Natural Background Radioactivity

James N. Skeen and Gayther L. Plummer, *University of Georgia*

Various investigators have conducted studies in which morphological variations in plants have been associated with natural background radiation. Field measurements on 1964 and 1965 mixed populations of broomsedge (*Andropogon virginicus* and *A. ternarius*) growing on areas of "high" and "low" natural background radiation

within the Georgia Piedmont were made to determine whether or not gross morphological differences occurred with a three-fold difference in the radiation levels. Although the number of culms/unit basal diameter differed between the two areas, no significant difference in gross morphology could be attributed to background radiation. Because *Andropogon* occurred in the normal successional pattern of the areas for perhaps 8 years without obvious differences, it is reasonable to assume that morphological differences may not be obvious in other species of equal or lesser duration.

Possible Evolutionary Development of *Manihot esculenta* Crantz

SEYMOUR H. SOHMER, *University of Tennessee*

Manihot esculenta, endemic to the American Tropics is cultivated throughout the world's tropics as its tuberous roots are an important source of starch. The species is known only from cultivars . . . there perhaps never having been a natural, uncultivated, species but a complex of species from which the "ancestral" cultivars were selected. Vegetative propagation and a man-made environment produced changes that the related species and/or the ancestral species have not experienced. The changes, occurring by spontaneous mutation would have eliminated those plants carrying them in the wild. These changes, added to the original genetic complexity of the man-selected plants, have yielded a very morphologically variable species.

Eighty-five cultivars of *Manihot esculenta* were studied under the auspices of the Organization for Tropical Studies in Costa Rica, and an artificial key was constructed as a means of isolating cultivars for genetical and cytological work.

Electrophoretic Identification of Two Species of *Peromyscus*

ORRIE O. STENROOS, *The Women's College of Georgia*

Work was undertaken to determine whether two closely related species of field mice, *Peromyscus leucopus* (Rafinesque) and *P. maniculatus* (Wagner), could be identified by electrophoretic densitometric tracing of their serum proteins as well as by external morphology. The species were identified morphologically by external measurements. The most consistent was the total length: tail length ratio (<2.49 for *P. leucopus* and >2.50 for *P. maniculatus*). Densitometric tracings of electrophoretic strips demonstrated a difference in most cases in migration distance of the beta globulin fraction in relation to albumin mobility. Using the A_d/B_d ratio, the species could be identified in 85.2% of the cases, with the ratio for *P. leucopus* >3.17 and *P. maniculatus* <3.16 (arbitrary values). The remaining 14.8% overlapped into the A_d/B_d range of the other species. The present work apparently supports investigators who believe interbreeding occurs between these species.

An Investigation of Heterostylism in the *Houstonia purpurea* Complex

SHELTON E. STEWART, *Lander College and The University of Georgia*

Members of the *Houstonia purpurea* complex are distylous. Distylism is genetically controlled by a single pair of S alleles. Morphological differences between the two floral forms concerns the size and color of the pollen grains, diameter of the pollen tube conducting tissues, position of stamens, size of anthers, length of styles and stigmatic papillae, presence of papillae on the styles and the number of seeds produced per capsule.

The Effect of Host Population Density on Experimental Epidemics of *Hydramoeba hydroxena*

ALAN E. STIVEN, *University of North Carolina at Chapel Hill*

The pathogenic amoeba *Hydramoeba hydroxena* and the host *Chlorohydra viridissima* provide a versatile host-parasite system in which epidemic processes can be studied experimentally. In the presence of an infected host a population of susceptibles rapidly becomes infected with the resulting epidemic curve assuming a sigmoid form. This curve is described by the logistic function, and the instantaneous infection rate responds to certain experimental treatments. To determine the quantitative and functional relationships between host population density and the rate of spread of an epidemic *Hydramoeba* infections were initiated in host populations possessing densities of 1.5, 3.0, 6.0 and 12.0 hosts per square cm. of substrate. The results indicate that no difference in the rate at which the proportion of susceptible host material becomes infected exists among the various densities. This implies that if the initial number of susceptible hosts is doubled, the initial inoculant has the potential to double the amount of infected host material, indicating that the potential spread of the epidemic is directly proportional to and limited by the density of the host population. This was further borne out by the highly significant linear regression of the mean numbers of hosts infected on the 13th day against host density which showed that when the density was doubled the number of hosts that became infected increased by 2.1 times.

Use of Color and Color Infra-red Aerial Photographs for Mapping Salt Marsh Community Types

LINDA M. STROUD AND ARTHUR W. COOPER, *North Carolina State University*

Community mapping constituted the first phase of a study of productivity of vascular plants in salt marshes in Brunswick County, N. C. Aerial photographs (scale 1 inch = 500 feet) taken both with Ektachrome and Ektachrome Infra-red film have proven to be the most efficient method to accomplish this mapping. Five community types are in the marshes studied: Tall, Medium, and Short *Spartina alterniflora, Juncus roemerianus,* and *Spartina patens.* Although each community may be distinguished on the Ektachrome photographs, the distinctions are clearer on the Infra-red positives. Acreages of communities within an area of marsh may be determined by analyzing on the photographs a series of randomized transects. Each transect may be mapped and acreages determined by planimetry or acreages may be determined directly from the transect using a dot grid. The technique has proven satisfactory for analysis of areas of marsh over 1000 acres in size.

Effects of Primary Infection Upon Secondary Infection of Female Mice with the Bile Duct Tapeworm, *Hymenolepis microstoma*

B. D. TAN, *University of Tennessee*

Groups of two month old female mice were infected with 1, 5, and 10 cysticercoids per mouse, respectively. These groups plus uninfected controls were challenged with secondary infections of 5 cysticercoids per mouse at one, two, three or eight weeks after the primary infection. At autopsy seven days after the secondary infection the numbers of worms from the secondary infection were recorded. Fewer worms of the secondary

infection appeared in those mice which had been infected later. This result may have been due to both crowding and immunity caused by the primary infection.

The Temperature Stimulus for the Start of Nesting by Birds

JAMES T. TANNER, *University of Tennessee*

The start of the nesting season of temperate zone birds, as measured by the laying of the first egg of the season, is determined in part by temperatures of late winter and early spring. Several different hypotheses were formed about the manner in which environmental temperatures determine the start of laying. These hypotheses were tested with data on egg laying by four species of birds, which provided a total of several hundred first egg dates, and with temperature records from the nesting localities. The hypothesis best supported by the data is that warmer temperatures result in an energy surplus, colder temperatures in a drain on energy reserves, and that there must be a certain accumulation of energy reserves before egg production proceeds to the laying stage.

The Ecology and Distribution of Phaeophyta (Brown Algae) in the Eastern Gulf of Mexico

SYLVIA EARLE TAYLOR, *Duke University*

A study of environmental conditions in the eastern Gulf of Mexico and the ecology and distribution of the Phaeophyta in this region resulted in the delineation of six subregions between the Mississippi Delta and the Dry Tortugas, Florida. Inshore waters of the eastern Gulf are characterized by tropical temperatures during summer months (averaging 28.1-29.9°C), but conditions in the winter season in the Gulf north of Cedar Keys, Florida, become temperate (averaging 13-15°C). During the cold months, most tropical Phaeophyta disappear in the northern Gulf, and many species with New England affinities become established, including 13 Phaeophyta which are not continuous around the tip of Florida. Several explanations for these patterns of disjunct distribution are presented.

Stimulation of Respiratory Enzyme Activity of the Oyster *Crassostrea virginica* by Crustacean Eyestalk Extract

JOHN R. THORNBOROUGH, *Denison University*
WILLIAM L. MENGEBIER, *Madison College*

Eyestalk extract from the prawn, *Palaemonetes pugio* stimulated the activity of cytochrome oxidase, succinoxidase and malic dehydrogenase of oyster mantle homogenate system. The activity of succinic dehydrogenase was also stimulated. Since the extract *per se* showed no reaction with any of the substrates of the systems involved, it must be concluded that the site of stimulation is on the enzymes themselves.

Polyacetylenes in Plant Tissues

D. S. VAN FLEET, *University of Georgia*

Ultraviolet absorption characteristics of conjugated polyacetylenes are of great value in their identification and distribution. The vibrational fine structure of the absorption is both beautiful and useful. Thin layer chromatography, the solubility of poly-ynes in hexane and the character of absorption peaks made it possible to localize these molecules in tissues and plants not listed in the literature. Polyacetylenes were found in *Psilotum*, one of the first of the land plants, through plants recently evolved. The pathogen blocking action of polyacetylenes affords a telelogical reason for function and distribution but one should like to obtain evidence for other reasons as to their origin and function. Specialized cells were found that produce conjugated poly-ynes as a result of adventive and functional systems associated with protein degradation.

The Flora of Harrison County, Kentucky

JOHNNIE B. VARNER (SPONSORED BY E. T. BROWNE, JR.), *University of Kentucky*

With the building of a dam on the Licking River at Falmouth, Kentucky, many side ravines and coves in Harrison County will be flooded and their plant life lost. The author felt that a study of the Flora of Harrison County should be undertaken now or much valuable information would be lost. The county flora has been under study for more than three years and during that time 398 species have been identified. This number does not include the families Compositae, Gramineae, Cyperaceae, and Polypodiaceae. Only 14 species had been collected from Harrison County before this project was started. The county lies wholly within the Bluegrass province, but across two regions within that province. Records were kept as to flora changes found in the two regions. Two additional stations for disjunct species have been added to the Bluegrass flora. *Dentaria heterophylla* Nutt. has been collected from the Bluegrass of Kentucky for the first time.

Net Primary Productivity in an Irregularly Flooded North Carolina Salt Marsh

E. DOUGLAS WAITS AND ARTHUR W. COOPER, *North Carolina State University*

Net primary productivity has been studied for a period of two growing seasons in an irregularly flooded salt marsh on the North Carolina Outer Banks. Standing crop estimates have been derived for the major species in the four community types occurring in the marsh. The annual pattern and rate of production of *Spartina patens* (Ait.) Muhl., *Distichlis spicata* (L.) Greene, *Juncus roemerianus* Scheele, and *Scirpus robustus* Pursh will be discussed.

Crystallizing Chlorophyllous Compounds in Lichens

ALMA TOEVS WALKER, *University of Georgia*

Following acetone extraction of lichen fragments, methanol removes first the yellow fluorescing substances in a yellow solution and then green chlorophyllous red-fluorescing compounds from *Cornicularia normoerica* (Gunn.) Du Rietz and from *Cetraria crispa* (Ach.) Nyl. Fractionation of this methanol extract removed the green portion into petroleum ether and the yellow into ethyl ether. Details of differences in crystal formation and chromatography of the black, orange, and colorless compounds isolated in methanol from these two lichens will be presented. (This work has been supported by a grant-in-aid from Sigma Xi and by National Science Foundation (NSF G-22079) at Highlands Biological Station in North Carolina.)

Karyotype Analysis of *Petalostemon* Species

SALLY A. WALKER, *Vanderbilt University*

Three species of *Petalostemon* occur in the central basin of Tennessee, *P. gattingeri*, *P. purpureum*, and *P. foliosum*. Putative hybrids of *P. gattingeri* and *P. purpureum* have been reported, but hybridization of *P. foliosum* with other species is not known. The chromosome number of *P. foliosum* has been found to be 2n =

14, which agrees with previous counts for the genus. On the basis of differences which exist in the pachytene chromosomes with regard to length, arm ratio, chromomere pattern, and attachment of the nucleolus, the karyotype of *P. foliosum* has been established. The chromosomes were numbered 1 through 7, with 1 being the longest and 7 the shortest. Chromosome length ranged from an average of 25 μ to 66 μ, and arm ratio varied from about 1.3 to 2.8. Only chromosomes 2 and 3 were similar enough to present problems in identification but could be separated when several cells were examined. Karyotype analysis is expected to be helpful in the study of species relationships in *Petalostemon*.

Differential Effect of Chronic Grouping and Isolation on the Metabolism of Brain Biogenic Amines

A. S. Welch and B. L. Welch,
College of William and Mary

Male DUB/ICR mice which had lived in groups of 10 for 15 weeks metabolized brain norepinephrine (NE), dopamine (DA), and serotonin (S) differently from similar mice which had been put into social isolation 2, 5, or 15 weeks prior to sacrifice. At termination the animals were injected with 40 mg/kg MO-911 or with saline and kept in isolation during the drug-induced elevation of brain amines. 27 brains pooled in 3's were analyzed for each treatment and time period. After 2 and 5 weeks of social isolation brain NE and DA were increased, but they dropped significantly by 15 weeks; their rate of increase after MAO inhibition was greater in the grouped than in the isolated mice. Brain NE and DA content after 0, 2, 5, and 15 weeks of isolation were: NE — .37, .40, .42, .32 ugm/gm; DA — .49, .52, .57, .43 ugm/gm. Drug-induced increases were: NE — .44, .22, .21, .23 ugm/gm/hr; DA — .48, .26, .21, .29 ugm/gm/hr. Brain S content was not sig. different (1.18, 1.12, 1.23, 1.09 ugm/gm), although drug-induced elevation tended to be greater in the longest term isolates (.34, .23, .29, .46 ugm/gm/hr). These data suggest that social stimulation can influence the pattern of brain amine metabolism.

Cardiovascular Response to Different Levels of Social Stimulation

B. L. Welch, J. P. Henry, A. S. Welch and P. Stephens, *College of William and Mary and University Southern California*

Systolic blood pressures were higher and heart ventricle weights larger in male white mice housed in relatively uncrowded groups of 10 for 4-6 months than in those maintained in pairs, and they were smallest of all in mice that had lived in isolation. Kidney weights were inversely related to groups size. Adrenal weight and adrenal catecholamines increased with increasing group size. Aggressiveness declined with increasing group size; therefore, the other changes noted are not attributable to fighting but more nearly to nonspecific increases in the level of social stimulation. This is an example of density-dependent social genesis of vascular hypertension.

The Effects of Media and Levels of Root Inducing Chemicals on Rooting of Pittosporum Tobira

Booker T. Whatley, Stanley O. Thompson and Jack H. Jefferson, *Southern University*

A 3 x 4 x 5 factorial experiment with three replications was employed to study the effects of media and levels of root inducing chemicals on rooting of *Pittosporum tobira*. The media used were vermiculite, perlite, perlite and peat moss (v/v), sand and peat moss (v/v), and Southern University Potting Mix. The root inducing chemicals were 3-indoleacetic acid, 3-indolebutyric acid, and 1-naphthaleneacetic acid at levels of 0; 5,000; 10,000 and 20,000 ppm in talc. The data were obtained by counting the number of roots that penetrated the peat pot and statistically analyzed.

Is This an Alga?

L. A. Whitford, *North Carolina State University*

A number of plants and plant parts resemble algae closely enough that students and even phycologists confuse them with algae. Some of these are illustrated and compared with algae which they resemble.

Mass Production of Diapause Larvae in *Mormoniella*

P. W. Whiting and Doris J. Bush, *Biology Division, Oak Ridge National Laboratory and University of Pennsylvania*

The junior author devised a method of alternating short "days" at room temperature with long "nights" at 12°C so that mothers produced a very high proportion of diapause larvae among their offspring. Following the suggestion of Howard A. Schneiderman, that larval diapause is induced by maternal effect upon unlaid eggs, the senior author has transferred mothers through successive vials containing fresh host pupae, all kept in a refrigerator so equipped that a 6-hour day at 18°C alternates with an 18-hour night at 10°C. In vials *a* (about 5 days) most of the offspring pupate to form adults but vials *b-e* contain all, or almost all, diapause larvae. A few days are required for conditioning the mothers in order to affect the eggs. Because diapause larvae live for one, two, or even three years, their value for stock keeping is obvious.

The Effect of Auxin, Kinetin and Gibberellin on Induced Apogamy in Fern Gametophytes

Dean P. Whittier, *Vanderbilt University*

In sterile culture apogamy can be induced in gametophytes of the bracken fern, *Pteridium aquilinum* (L.) Kuhn. Experiments employing three media demonstate the effect of naphthaleneacetic acid (NAA), kinetin and gibberellic acid (GA) on induced apogamy. The most effective sequence is 4% sucrose from 1-14 days, 4% sucrose plus growth substances from 15-28 days and 0.1% sucrose from 29-56 days. In this sequence NAA and GA promote apogamous sporophyte formation. A higher concentration of NAA than optimal for sporophyte production stimulates apogamous root formation. Kinetin, kinetin/GA and NAA/GA concentrations do not promote apogamy. There is a synergistic combination of kinetin/NAA concentrations for apogamous sporophyte production. The addition of GA to this synergistic combination of kinetin/NAA decreases the apogamous response.

Physiology of *Mnemiopsis* in Relation to Its Role as a Predator

Richard B. Williams and John P. Baptist, *Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina*

Physiological research was done on the common estuarine ctenophore, *Mnemiopsis leidyi*, to evaluate its importance as a predator on zooplankton. Respiratory rates, measured by changes in dissolved oxygen, were directly proportional to the volumes of the live animals

over a size range of 1 to 23 ml. At 10 C, daily respiration ranged from 0.06 to 0.11 mg 0_2/ml volume, and averaged 0.08. The Q_{10} for respiration was 2.3. Comparison of these measurements with data on the chemical composition and abundance of zooplankton suggested that at times grazing by *Mnemiopsis* may be important. In the estuaries near Beaufort, N. C., the organic carbon required each day by a *Mnemiopsis* 20 ml in volume is equivalent to the zooplankton contained in 4 to 100 liters of water.

Annual Production of *Spartina Alterniflora* and *Juncus Roemerianus* in Salt Marshes Near Beaufort, North Carolina

RICHARD B. WILLIAMS AND MARIANNE B. MURDOCH, *Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina*

The production of organic matter by salt marsh phanerogams, *Spartina alterniflora* and *Juncus roemerianus,* was studied in areas near Beaufort, N. C. Living and dead plants were removed from 1 m^2 quadrats at 5-week intervals, sorted, dried and weighed. Production was calculated by adding an estimate of the quantity of material produced and lost prior to harvest to the measured standing crop of living plants. In September, the end of the main growing season, standing crops of live *Spartina* ranged from 0.25 kg (dry weight)/m^2 in the high marsh to 2.1 kg/m^2 in the streamside marsh. Average annual production for *Spartina* was ca. 1 kg/m^2. Both the maximum standing crop and the annual production of *Juncus* were also ca. 1 kg/m^2. From this rate of production and the quantities of dead plant material in the marsh, the daily loss of dead *Spartina* was estimated to average 1% of its total weight, and of dead *Juncus,* a fraction of 1%.

Old Non-Fossilized Fungus Spores

FREDERICK A. WOLF, *Duke University*

This study involves the occurrence in African lake sediments of non-fossilized fungus spores. It has been found that the oldest of these sediments date from the Pleistocene Era or Ice Age. Beginning about 50 years ago, palynologists have been concerned with identification of the kinds of pollen found in bogs, swamps, lakes, and streams but they have quite generally ignored the fungus spores interspersed among the pollen. It is apparent that the conditions which favor preservation of pollen in sediments also favor preservation of fungus spores. These spores resemble present day genera. Pollen analyses have been used to interpret the previous plant cover and vegetational changes of a given region. It is believed that spore analyses can be employed to supplement pollen analyses, and that paleomycological investigations should be encouraged.

Biochemical Differences Between Light-Grown and Dark-Grown Wheat Seedlings

FREDERICK T. WOLF, *Vanderbilt University,* AND PAUL G. BARTELS, *University of Arizona*

Comparison of the amounts of certain gross chemical constituents of the shoots of 1 week old dark-grown and light-grown (16 hour day) wheat seedlings has revealed large differences other than the obvious ones concerned with pigments, and carbohydrates resulting from photosyntheic activity in light. Significant differences are also found in total protein, total fatty acids, total RNA, and total DNA, which are usually at least twice as high in light-grown as in dark-grown plants. Large differences in fatty acid composition have been found. Light-grown plants are characterized by a higher CO_2 production in respiration (as measured in darkness). The levels of certain enzymes also differ appreciably with the illumination condition prevailing during growth. Thus, the metabolic differences between light-grown and dark-grown seedlings are greater than might at first have been anticipated.

Daily Vertical Migration of *Lucifer,* and Planktonic Numbers in Relation to Solar and Tidal Cycles

ROBERT A. WOODMANSEE, *University of South Alabama*

The daily variation in the planktonic numbers of mature and juvenile *Lucifer faxoni* Borradaile has been determined for two neritic locations in the northern Gulf of Mexico. The planktonic numbers are apparently related to both solar and tidal cycles. There are more *Lucifer* in the sampled water column during the night than during the day and more during the flooding tide than the ebbing tide. The flood to ebb ratios are higher than the nocturnal to diurnal ratios at both locations. It is suggested that the daily vertical migration of *Lucifer* at these locations is being modified to achieve landward transport by the tendency of *Lucifer* to swim up into, or remain up in, the water column during a flooding tide and to drop out of the water column during an ebbing tide.

Taxonomic Status of *Uniola* (Gramineae)

HARRIS O. YATES, *David Lipscomb College*

The nine species of the Linnaean genus *Uniola* are compared employing the new characters utilized in grass systematics. Data from the analyses indicate that three discordant elements are present. These elements are recognized as distinct genera having different tribal affinities.

GEORGE H. BOYD
1891-1965

Dr. George H. Boyd, Dean and Professor Emeritus of Zoology, University of Georgia, Athens, Georgia, died on December 30, 1965. Dr. Boyd had been associated with Emory University and Georgia Tech., but had been at the University of Georgia since 1926. Dr. Boyd was the first president of the Association of Southeastern Biologists (1937-1938).

HERMAN KURZ
1886-1965

Dr. Herman Kurz, Professor Emeritus of Botany, Florida State University, Tallahassee, Florida, died December 16, 1965, in Chamblee, Georgia. Dr. Kurz was for a number of years head of the Department of Botany at F.S.U., and was known for his work on the trees of Northern Florida and for ecological studies of the dunes and tidal salt marshes of the state.

News of Biology in the Southeast

The Duke University Marine Laboratory, Beaufort, N. C., announces an NSF grant making possible study and research awards for predoctoral and postdoctoral students. Each predoctoral award will cover travel and all expenses for one summer term of five weeks. First Term: June 13-July 18, 1966 — **Marine Mycology** — T. W. Johnson; **Marine Ecology** — I. E. Gray; **General Physical and Chemical Oceanography** — Unnsteinn Stefansson; **Physiological Ecology** — F. J. Vernberg. Second Term: July 20-August 24, 1966 — **Marine Phycology** — R. B. Searles; **Marine Geology** — O. H. Pilkey; **Marine Invertebrate Zoology** — Robert Barnes. Postdoctoral awards of $2,000 each are available for twelve weeks of research, which may be carried on at any time of the year but must require marine laboratory facilities. For further information write: Dr. C. G. Bookhout, Director; Duke University Marine Laboratory, Beaufort, N. C. 28516.

Carla J. Huddleston, Dept. of Biology, Florida Southern College, will return to Northwestern University next year to work toward her Ph.D. under Laurence Gilbert in developmental animal physiology. A replacement is being sought.

Margaret L. Gilbert is President-Elect of the Florida Academy of Sciences.

J. B. McFarlin, through Florida Southern College, has donated his extensive collection of North American mosses to the herbarium of the University of Florida.

The Department of Biology, **Virginia Military Institute,** has received $8,000 from the National Science Foundation on a matching fund basis for undergraduate instructional scientific equipment.

The Department of Biology, **Virginia Military Institute,** in conjunction with the Department of Mathematics will offer on an academic year basis a National Science Foundation financed Secondary Science Training Program in mathematics and ecology.

The 1966 officers for the Southern Appalachian Botanical Club are: **Dorothy Crandall,** Randolph Macon Woman's College, President; **Edward T. Browne, Jr.,** University of Kentucky, Vice-President.

The **16th Annual Wildflower Pilgrimage,** sponsored in part by the Department of Botany, The University of Tennessee, will be held at Gatlinburg, Tennessee, in the Great Smoky Mountains National Park April 28-30, 1966. For further details write to: Department of Botany, University of Tennessee, Knoxville, Tennessee 37916.

Bruce L. Welch, Assistant Professor of Biology, and **Annemarie S. Welch,** Research Associate in Biology, College of William and Mary, received a two-year grant of $59,265 on February 1, 1966, from the National Institute of Mental Health for continuation of their work on "Population and Brain Biogenic Amines." Mr. Welch has been recently named as a fellow of the American Association for the Advancement of Science.

Jesse C. Thompson, Jr., Hampden-Sydney College, Hampden-Sydney, Virginia, has received a National Science Foundation grant of $17,500 for three years for "A Comparative Systematic Investigation of Marine Ciliates in the Holotrichous Protozoan Order Hymenostomatida."

Tully H. Turney has joined the Biology Department of Hampden-Sydney College.

C. W. Hart, Jr., Academy of Natural Sciences of Philadelphia, has received a $20,000 grant from the National Science Foundation to continue his work on entocytherid ostracods.

A. J. Sharp, Professor of Botany at the University of Tennessee has been nominated by the Alumni Association as the University's eleventh Distinguished Service Professor. He is the retiring President of the Botanical Society of America, and returned in the fall from a year abroad in which he studied at the Hattori Botanical Laboratories and traveled in India and the Philippines in connection with his National Science Foundation supported project, "Phytogeographical Relationships Between Japan and North America with Particular Reference to the Bryophytes." His second year on this project is being spent at the University except for a month long trip to Mexico in December.

Jack H. Moore has been promoted to Research Biologist in the Chemotherapy Section of the Southern Research Institute, Birmingham, Alabama. Dr. Moore is also serving as Chairman of the Biological Sciences Section of the Alabama Academy of Science for the year 1965-66.

Recent promotions at the University of Tennessee Botany Department are Drs. **Raymond W. Holton** and **Gordon E. Hunt** to Professor and Drs. **H. R. DeSelm** and **Ronald H. Petersen** to Associate Professor.

New staff members in the Department of Botany at the University of Tennessee this academic year have included the following: **Larry W. Jones** who was appointed an Assistant Professor, completed his doctoral work in botany and photobiology at the University of Texas and spent the past year and a half at the Research Institute of Advanced Studies in Baltimore, Maryland working with Dr. Bessel Kok. **George Van Dyne** of the Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory, joined the staff as a part-time Associate Professor under a program supported by the Ford Foundation. Dr. Van Dyne did his doctoral work at the University of California, Davis. He joins **Jerry S. Olson** and **Bernard S. Patten,** also of the Health Physics Division, and **Alan H. Haber,** of the Biology Division, ORNL, who were appointed Ford Foundation Professors in the department during the past academic year.

Walter R. Herndon, Professor of Botany at the University of Tennessee, is President of the Phycological

Society of America this year. After serving as Head of the Department since 1961, Dr. Herndon was made Associate Dean of the College of Liberal Arts while retaining a part-time position in the Botany Department. **Dr. Raymond W. Holton,** who served as Acting Head of the Department after Dr. Herndon's promotion to Associate Dean, was made Head effective this academic year.

Thomas M. Pullen, University of Mississippi, **J. Ray Watson,** Mississippi State University, and **Samuel B. Jones,** University of Southern Mississippi are working cooperatively under a two year NSF grant of $20,100 on a floristic project entitled "Flora of the Central Gulf Region of the United States."

Sylvia E. Taylor, who completed requirements for the Ph.D. degree at Duke University in October, was recently appointed Research Associate at the Cape Haze Marine Laboratory, Sarasota, Florida. Dr. Taylor served as scientist on cruise 9 of the **Anton Bruun,** the American biological vessel of the International Indian Ocean Expedition, and obtained an extensive collection of marine algae from the Indian Ocean. She works in an aqualung at depths in excess of 100 feet. She was also on cruise 10 of the **Anton Bruun** in the Gulf of Mexico, Caribbean Sea, and the West Indies in September, and on cruise 12 of this vessel during November and December, 1965, from Callão, Peru, southward along the coast of South America to Valparaiso, Chile, via Islas Juan Fernandez. Again she obtained an extensive collection of algae but on this cruise was obliged to wear a heat-conserving "wet suit." She dived to the bottom around Cathedral Rocks near Juan Fernandez where it is virtually impossible to work near the surface because of the pounding surf.

Formal dedication of the Connie M. Guion Science Building at **Sweet Briar College** will take place April 22-23. Bentley Glass will give the opening address on Friday night, entitled "Science and Liberal Education." The following morning Helen Dodson Prince will speak on "The Sun-Star of International Prigrams," and Henry Guerlic will give an address on "Science and Uncommon Sense." There will be limited seating available for public visitors, and tours of the building will be conducted on Friday and Saturday afternoons.

East Carolina College has received an N.S.F. grant to offer next summer a six-week program for students and teachers of high school biology in Eastern North Carolina. The $15,000 grant will enable the college to select 12 teachers and 24 students to take classes together in two areas of biology – genetic continuity and field ecology. **Patricia A. Daugherty** is director of the program, scheduled for June 6 to July 17. She directed a similar program at East Carolina College last summer.

The Biology Department of Northeast Louisiana State College in Monroe, Louisiana, has added two additional staff members. They are: **William W. Norris,** a graduate of Louisiana State University who came from Western Kentucky State as Associate Professor in September. He is doing N.S.F. sponsored research on "Specificity of Enzyme Activity." **B. L. Ricks** joined Northeast's Biology Department as an Assistant Professor from Mississippi public schools. Mr. Ricks has attended N.S.F. Institutes in Radiation Biology, Chemistry, and Teaching of BSCS Biology. He also was a Shell Oil Company Merit Fellow in Chemistry at Cornell.

Northeast Louisiana State College in Monroe, Louisiana, has received a N.S.F. Undergraduate Research Program Grant, with **Charles E. DePoe** as Director.

Two men have recently joined the staff of the Biology Department at the University of South Alabama, Mobile, Alabama: **Robert A. Woodmansee,** Associate Professor, whose research interest is in marine plankton, and who has recently received a two-year NSF grant to study the daily vertical migrations of crustacea. **Michael G. Lelong,** who recently received his Ph.D. degree from Iowa State University, and whose interests are in botanical taxonomy.

Billy Williams and **Macon Weaver** have recently been appointed Instructors in the Biology Department of Mississippi College, Clinton, Mississippi.

Mountain Lake Biological Station

The University of Virginia has announced the program of graduate biology courses to be offered this summer at the **Mountain Lake Biological Station** in southwestern Virginia. They are as follows:

First Term – June 17 through July 21

Ecological Genetics, Dr. David A. West, Virginia Polytechnic Institute.

Pteridology, Dr. A. Murray Evans, University of Tennessee.

Algology, Dr. F. R. Trainor, University of Connecticut.

Herpetology, Dr. Harry G. M. Jopson, Bridgewater College.

Second Term – July 22 through August 25

Taxonomy of Seed Plants, Mr. Carl S. Keener, North Carolina State University.

Mammalogy, Dr. Charles O. Handley, Jr., Smithsonian Institution.

Animal Behavior, Dr. Harold F. Heatwole, University of Puerto Rico.

Introduction to the Immature Insects, Dr. Tom Daggy, Davidson College.

A limited number of National Science Foundation scholarships are available for research and study: (1) Post-doctorate for research, stipend $1300; (2) Pre-doctorate for supervised research, stipend $500; and (3) Post-graduate for training in field biology, stipend $400. Preference is given for studies concerned with the biota of the region. Application blanks for these awards may be secured from Dr. J. J. Murray, Jr., Director, Mountain Lake Biological Station, Department of Biology, University of Virginia, and must be submitted before May 1, 1966.

Tulane University

Effective July 1, 1965, the departments of Zoology and Botany of the Arts and Sciences College were merged with the departments of Zoology and Botany of Newcomb College into a single university-wide Department of Biology under the chairmanship of **E. Peter Volpe.** Simultaneously the unified departments established a new core curriculum for undergraduate students.

The new core program is designed so that a student completing the two semester sequence in general biology will be able to enter any of the upper division core courses. Rescheduling of lecture and laboratory sessions enables the student to take any of the core courses offered in a particular semester without conflict; he can thus enroll in as many as four core programs simultaneously. Careful coding of each student permits the Department to preschedule him for the entire biology major program, thereby guaranteeing that class enrollment will be limited to 20 students maximum per section, and allows planning for the needs of future years. The favorable faculty-student ratio has permitted redesign of course content so that conceptual biology is emphasized and creative experimentation in open-end laboratories is possible.

The core curriculum consists of one semester courses in: vertebrate morphology, plant morphology, cellular biology, developmental biology, comparative physiology, environmental biology, genetics and evolution, and microbiology. Advanced students, of course, can select electives and problems courses. Honors sections are available in the general biology course.

Three new appointments were made to the Biology Department effective September, 1965: **William McDonald,** Associate Professor of Biology, specializing in microbial genetics, who obtained his doctorate at the University of Texas, came to Tulane from Washington State University; **John Seed,** Assistant Professor of Biology, a microbial physiologist, previously with the 6th Army Medical Laboratory and a Ph.D. product of Yale University; and **Richard Lumsden,** cellular biologist, who received the Ph.D. at Rice University. Promotions within the Department include: **Norman C. Negus** and **Franklin Sogandares** to Professor and **Robert G. McKinnell** and **Andrew Arata** to Associate Professor. On leave of absence are: **Norman Negus** who is in Thailand studying tree shrews, **Arthur Welden** who spent some time at Harvard studying fungi, and **Eugene Copeland** who is spending the year at Woods Hole continuing his work on osmoregulatory physiology. **Andrew Arata** will be in Colombia during 1966-7 studying tropical bats and rodents, a project that he began during the summer of 1965. **Alfred Smalley** continued his work on freshwater crabs, extending his field studies to Colombia during the summer of 1965. **Royal Suttkus,** ichthyologist, made two voyages on the Anton Brunn during 1965 — one to the Indian Ocean, the other to the Yucatan Channel. **Stuart Bamforth** presented a paper at the 2nd International Conference of Protozoology in London. **Joseph Ewan** attended the XI International Congress of the History of Science in Warsaw and Cracow.

Continuing grants from NIH support two training programs . . . Cell biology and environmental biology. The latter program conducts an extended summer session at various field stations. An undergraduate research program sponsored by NSF is directed by **Stuart Bamforth.**

The Department hosted several meetings during 1965: Southwestern Naturalists, Southeastern Division of American Society of Ichthyologists and Herpetologists, SE Regional Section Endocrinology of ASZ.

Recent grant awards include: $19,400 from NSF for 14 months to **William C. McDonald** for "Genetic studies on bacterial growth at high temperatures"; $20,400 from NSF for 2 years to **Gerald Gunning** for "Ecological life history of the blacktail redhorse"; $60,240 from NIH for three years for "Biology of heterophyid metacercarial encystment" and $2000 from the American Cancer Society for a year study on "Studies on the fine structure of macromolecular glycogen in parasitic helminths" to **Richard Lumsden;** $400 for one year from Sigma Xi to **Louis Dove** for studies in plant physiology; $20,333 for a year and a half to **Robert McKinnell** for "The cytopathology and epidemiology of the frog renal adenocarcinoma"; **John Seed,** $30,000 for one year from the U. S. Army Research and Development Command for "A study of the biological properties of *Trypanosoma rhodesiense* and *Trypanosoma gambiense*"; $85,487 for four years from NIH to **E. P. Volpe** for "Genetics and development of pigmentary patterns"; **Andrew Arata** continues on a two year grant of $8000 from NSF for studies on the vertebrate paleontology of the Gulf Coastal Plain and in an NIH Contract to the Delta Regional Primate Research Center, along with **Clyde Jones,** for studies on tree shrews as laboratory animals.

The new director of the Meade Natural History Library, which is the repository for the 750 biological journals received in exchange for *Tulane Studies in Zoology,* is **Harold A. Dundee.**

Zip . . .

Response to requests for Zip Code numbers has been gratifying, and a large percentage of them are now in our files waiting to be placed on the address stencils. To those of you who have sent in your numbers: We thank you.

Recently, several people have pointed out that the Post Office Department publishes a book listing all Zip Code numbers. We are all too familiar with this exciting publication, but not being a paid staff devoted entirely to the care and feeding of the *ASB Bulletin,* we felt that ASB members would be glad to chip in and help with Operation Zip Code. (In light of the response, we do not feel that we were wrong.) Moreover, we had rather have you tell us your number than risk a wrong interpretation of the Epistle According to Mr. O'Brien, for even on the clearest of days the Zip Code book presents many a foggy vista. . . . C.W.H.

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CONTENTS

CHARLES M. GOETHE

1875 - 1966

Early in July, Mr. Charles M. Goethe died at the age of 91. Mr. Goethe, founder of the Mary Glide Goethe Travel Awards for graduate students, has been a friend and benefactor of the ASB since 1948. As a tribute on the occasion of his 90th birthday, in March, 1965, a short biographical sketch of this remarkable man appeared in the July, 1965, *ASB Bulletin*.

Mr. Goethe, and his "We-2" remembrances of his wife, will be missed.

The following symposium — Restoring the Quality of Our Environment: What Needs To Be Done and How We Are Doing It — took place at the North Carolina State University, Raleigh, N. C., during the 27th Annual Meeting of the Association of Southeastern Biologists, 14 April, 1966. The principal speaker was Dr. John L. Buckley, Office of the Science Advisor to the Secretary of the Interior. Discussants were: Dr. Theodore R. Rice, Director, Radioecology Laboratory, U. S. Fish and Wildlife Service, and Dr. Don W. Hayne, Professor of Experimental Statistics, North Carolina State University. The Moderator of the symposium was Dr. Arthur W. Cooper, Department of Botany and Forestry, North Carolina State University.

RESTORING THE QUALITY OF OUR ENVIRONMENT:

What Needs To Be Done and How We Are Doing It

John L. Buckley: Mr. Chancellor, Dr. Bennett, Dr. Cooper, ladies, and gentlemen — I should like to express my thanks to you all for the opportunity of being here this evening. I am not quite sure, from the diversity of the audience, what things I am expected to say. At the risk of boring some of you, it seems to me we need to talk a bit about organization and advisory mechanisms within the Federal Government. I recognize that organization can be a dull subject. Yet, if we don't understand the relationship of one group to another, I think the multiplicity of recent reports on environmental pollution is a little bewildering. Maybe it is bewildering anyway.

I don't have an appropriate joke about organization. The only one I can think of is this — and maybe it is appropriate because we are in a tobacco growing area. One of the cigarette advertisements of a few years gone by stressed "a thinking man's filter," and that reminded me of two friends, one of whom was a neural surgeon interested in the functions of the brain, the other was a sanitary engineer. These two men had spent a great deal of time fishing together over the years, and while they didn't have anything professional in common, they were very good friends through these fishing expeditions. Finally, the sanitary engineer, who ran the local sewage disposal plant, retired, and shortly after he retired he passed away. In his will he bequeathed his brain to his good friend, the neural surgeon. Upon hearing of this, the surgeon was delighted because he had always wanted to see "a filtering man's thinker." This kind of story is not very different from the semantic confusion which is present in many of our discussions relating to pollution. When we use the term *pollution,* it means many things to many people. When we use the word *environment,* it means many things to many people. As Dr. Cooper pointed out, I am now in the Department of the Interior, and when one says 'environment' in the Department of the Interior, it depends on who he speaks to as to what concept he elicits. To those people who are in the Geological Survey, for example, the word 'resources' brings to mind the non-living resources; the word 'environment' means to them really the atmosphere and the hydrosphere and the lithosphere. The Fish and Wildlife Service people, on the other hand, think first of living resources and their habitats. I think it's this latter view that most of us here are concerned with, the thin layer — the interface between water and air and land — which provides the basis for life as we know it. Such is the confusion of words.

One of the things that I intend to do, then, is to talk about what has led to the present interest in environment, and, more precisely, the pollution of the environment. It is not easy to point to any single event. To go back to 1961 and 1962, the National Academy of

Sciences — National Research Council put together a series of documents on natural resources. In these, they pointed out that one of the major problems facing the users of resources in the future would be pollution. Nobody paid too much attention to the comment at that time. There were some funds left over from that study, and the Academy put together another study group. It was concerned with environmental pollution, and recently, within the last month, in fact, it issued a document, "Waste Management and Control." This is a document well worth looking at. Something over a hundred people have participated in one way or another in its preparation, and it has a series of recommendations, some of which are novel and many of which are highly useful. In that same general period of time, within the Federal Government — to be specific, in the summer of 1964 — President Johnson was seeking to identify some of the most serious problems this Nation faces. In the process of doing this, some fourteen task forces were created to work for the President in different fields. One of these was the field environmental pollution, and a task force was established under the chairmanship of Dr. John Tukey, statistician and mathematician at Princeton. Most of the task forces of the Great Society ceased to exist after they finished their reports in early November of 1964. This particular one, however, continued on as a panel of the President's Science Advisory Committee, and produced the report "Restoring the Quality of our Environment," which was issued in November of last year. It is that report in particular, that I wish to talk about tonight.

What is the President's Science Advisory Committee, and where does it fit into the scheme of things? The President's Science Advisory Committee is made up of distinguished scientists appointed by the President, each of them for a four-year term. The elected Chairman of this group at the present time is Dr. Donald Hornig, a chemist. Dr. Hornig also is the President's Science Advisor by appointment from the President. He is Director of the Office of Science and Technology, which is a small group within the Executive Office of the President. He is also Chairman Ex-Officio of the Federal Council for Science and Technology, made up of the senior scientists from each of the larger departments of the government. Its membership is totally Federal employees. They offer advice to the President through Dr. Hornig. The other group, the President's Science Advisory Committee, is totally non-Federal. The members are all university or industry or non-Federal people. So the President has access to independent sources of advice on science matters.

There is no direct relationship between these organizations and the National Academy of Sciences. While I don't wish to belabor this point, it seemed to me important because a non-government group, the National Academy of Sciences, had identified deterioration of the environment as a major National problem, requiring some considerable understanding. The President intuitively identified this as an area he felt required considerable effort and understanding. The President's Science Advisory Committee had separately selected this as a topic worthy of study. Both of these groups, produced a report. The first of these, that by the Presidential task force, was presented directly to the President, with no copies made public. Parts of it did influence the legislative program, the budget of the United States, and were incorporated in the President's message on natural beauty which was transmitted to the Congress on February 8 of 1965. The second report, from the President's Science Advisory Committee, "Restoring the Quality of our Environment," was published with a strong letter from the President which ends by saying, "I am asking the appropriate departments and agencies to consider the recommendations and report to me on the ways in which we can move to cope with the problems cited in the report. Because of its general interest, I am releasing the report for publication." Within the Federal Government, when the President asks that an ageney do something or another, it is pretty likely that the agency will do it. Consequently, there has been a considerable stir within the Federal Government as a result of this particular directive. It was backed up by a more specific directive from the Bureau of the Budget, which asked each agency to report specifically how it planned to reaet to the recommendations that had been made. It was not a directive to earry out all the recommendations, but it was a directive to think about the recommendations, and to consider how the problems can be solved. Several points stand out clearly in both these reports:

1. Pollution is a serious and growing problem, or more precisely a whole complex tangle of problems.
2. We can never eliminate pollution. We can and must find better ways to manage pollution at levels we can aecept.
3. We can do a much better job of managing pollution with present knowledge than we are doing.
4. There is a great deal more that we need to learn before we can do an *adequate* job of managing pollution.

As biologists we recognize that pollution problems are not simple. You know more about many of the details of these pollution problems than I do, but I am impressed that not only biologists, but engineers recognize that biological understanding is one of the most pressing needs in pollution control. With this broader awareness will come increased funds.

The opportunities for biologists to contribute to maintaining environmental quality is most welcome. The greatest need that we can fill I think, is in providing the basis for environmental quality standards. Much of our work in the past has been concerned with demonstrating how bad a particular substance was. What we need to do, I think, is to learn what quantities of a substance or combination of substances can be permitted in the environment without causing damages that society is unwilling to accept.

The second point that I should like to make, is that we ought to employ biological foresight at the time that we make decisions affecting the environment. Sometimes we have done this and done it well. An outstanding case has been our management of radiation. Potentially radioactive wastes and by-products are among the most damaging substances to living materials. Perhaps because we were scared by the potential destruction of these materials, we approached their use with caution. The safeguards we have devised have made it possible to use nuclear energy with reasonable safety. We didn't have all the knowledge we would like to have had at the time we began to develop peaceful uses of nuclear energy. We don't have all the knowledge yet. But we did apply what we knew with the result that we will be able to reap the benefits of nuclear energy with a minimum of deteriment to our living environment.

At the other extreme has been our release of some toxic chemicals in the environment, with resulting effects which were apparently a surprise. It seems to me we can no longer afford the luxury of proceeding blindly. As more and more of us live in the same space, and as each of us generates greater quantities of waste, we shall have to provide a more formal mechanism to maintain the kind of environment we wish to live in. As a basis for providing this kind of environment we need a much greater understanding of the world in which we live.

Each of us here recognizes that we depend directly on many kinds of living things. Each of us here recognizes that these living things in turn depend upon other living things. Beyond our direct dependence for food we use some of these living things for recreating or esthetic proposes. But beyond these relatively obvious uses of other living organisms, there are some biological values and some services that are performed which are essential to the well-being of man. You all recognize the essential role of phyotosynthese in removal of carbon dioxide, release of oxygen, and conversion of incident energy. We exploit this process directly for the production of food. But we also benefit by the removal of carbon dioxide and the release of oxygen. How much must we affect the vegetation (including the marine phyto-plankton) of the earth to alter carbon dioxide or oxygen balance? Or we can consider the cycling of nutrients (or pollutants) that takes place in the waters and the land and the atmosphere around us. Here again, biological processes are important in breaking down, segregating and putting aside, eliminating some of these materials, rendering them into simpler forms. There are a whole series of services of this sort performed, and, again, we can't, I think, quantify the level of dependence that we have. For the most part it's more nearly an intuitive feeling that some of these services are indispensable to us than it is a definable quantified fact.

In terms of "what can we do about it," there are at least two general categories of waste products that we need to be concerned about. The first of these includes waste products that occur in concentrated form. Among these, I would include the municipal wastes, industrial wastes, the solid trash, and things of this sort that accumulate in cities. Clearly, we can't leave them in the places where they are; we must find some way of getting rid of them, and, in fact, we do, — through our sewer systems, dumps, incinerators, etc. There is another category of waste, which is in some ways more difficult to handle. These are the wastes that are by-products of some activity or another and that are widely dispersed. I would cite asbestos fibers that we find in sufficient concentration to occur in the lungs of people, or lead as we find in the atmosphere or plants, or soil, or water, which may have arisen from lead we have added to gasoline. There are a number of others.

The approach to control of these two types of wastes needs to be quite different. Considering the problem of deliberate waste disposal, we have followed a somewhat fragmented approach. We have people who specialize in this. We have other people in cities who worry about trash; we have others who worry about air pollution; and yet these things are not unrelated. They are very closely related. Somehow or other, we've got to find some way of incorporating a common concern in building the disposal of these into some unified system. I don't mean they have to be a single system. I simply mean we have to worry about optimizing over the whole range of disposal problems rather than within any one of these, as we so often have done in the past.

As to what we are doing about it, I touched briefly on this before, and I won't elaborate too much now, but there has been legislation passed in the last session of Congress in regard to water pollution, air pollution, and solid waste disposal. In water pollution, the Water Pollution Control Act was amended to require the states to submit standards of water quality for interstate waters, which after being accepted by the Secretary of Health, Education, and Welfare, would become established standards within that state. The deadline for submission of these is July 1 of 1967. Do we have enough information at hand to put together a reasonable set of standards? I am not at all sure that we do, but I wouldn't for a moment suggest that we delay establishing standards until we know all the things we'd like to know. I would rather move ahead and do the best we can at this time and consider whatever standards are established now as somewhat tentative in nature, subject to change as information is accumulated. I would also use the obligation to set standards as a strong weapon to increase the research that we now are carrying out.

Another action affecting water pollution is the Reorganization Plan that proposes to move the Federal Water Pollution Control Administration from the Health, Education, and Welfare Department to the Department of the Interior; the reorganization becomes effective sixty days from the time it is submitted to Congress unless the Congress disapproves. The waiting period on this is up on the 10th day of May of this year. To me, it seems quite likely that the Congress will not refuse the President on this and that the Federal Water Pollution Control Administration will be shifted to the Department of the Interior. There is concern about this reorganization

among people who feel quite strongly that water problems are primarily associated with human health. They feel that if water pollution control responsibility is placed in the Department of the Interior, which is not really oriented to people's health, that Interior may let the rivers and streams get into a much worse condition than they are now. There is another group of people that feels that if you can protect the fish — they are much more sensitive than people — you automatically protect the people. This is the nature of the debate. It's not a very vigorous debate. Other actions that have been taken relate to solid waste. This is perhaps the least attractive field, and yet one of the more pressing problems that almost every community faces. There are only three or four cities in the United States, I think, that have a full time professional engineer who is responsible for the disposal of trash that originates within the city. More often than not, he is the guy who runs the highway department or something of this sort, who has a sideline to make sure that his trucks pick up the junk, and somehow or other get it out of the people's sight. This was all right so long as we had scattered communities. But now that we live closer together, I think this booklet on "Waste Management" here phrases it well. It says "one man's trash basket is another man's living space." In all seriousness, we are getting pretty close to this situation in some communities, so there are some difficulties here. The last session of the Congress did authorize a substantial program in the Department of Health, Education, and Welfare, within the Public Health Service, to stimulate work in finding new means of disposing of solid waste.

There are a number of other actions which are going on. Most of these relate to more and better than we have done before — more money, more research, more training of people. To this, I think we generally all agree, but not much of this relates to change in direction.

I think the main thing which causes the situation today in regard to pollution to be different from what it was three or four years ago is that there are groups such as this one you represent which are concerned, which look upon this as a problem, who can provide pieces of information that *do* fit in here, who feel that this *is not* beneath their dignity. These are definitely applied problems, things that we must find answers to. But in spite of being useful to mankind, they also have some fascinating, intellectually stimulating possibilities. Many of these have not yet been looked into, and most of them have not been pursued as far as they should be. I think there is considerable evidence that there is an increase in interest in this field, and there is certainly strong public support. Everybody knows about pollution now. In fact, it wouldn't be too difficult to see this awareness push actions further than it should — where people are scared when it's not necessary to be scared, where they demand expenditures that may be greater than we need. The question is 'how clean is clean?' How clean *can we afford* to have rivers? How clean *must we have* rivers? In many states, for example, the Conservation Department may have certain responsibilities in regard to water pollution. It may, for example, be almost the sole arbiter as to the cause of the fish deaths; yet have no enforcement responsibility. And what this amounts to is power of influencing the public — power without responsibility. It seems to me that we could overplay this business of how bad pollution is. We could overplay on how much we should spend and how clean we must have our surroundings. I don't think that we will, but I think the only way to assure that we don't and to assure that we *do* make expenditures that we must make and that we *do* have things as clean as we need to have them will be on the basis of information, much of which has not yet been gathered. I rambled on much longer than I should have and I'd like now to turn this over to Dr. Cooper; and if the opportunity permits later, I will be glad to evade or answer questions, as the case may be.

Thank you.

T. R. Rice: Mr. Chancellor, President Bennett, and ladies and gentlemen. — As we learned from Dr. Buckley's interesting and informative talk, to improve the quality of our environment will require the cooperation of all and the integration of political, scientific, and social aspects of the problem. Also, it must be obvious that a much greater expenditure of money than now goes to this problem will be needed to correct the rapidly deteriorating condition of our environment and to maintain it in an improved state. Twenty or 30 years ago most people would have been amazed if told that highways would eventually cost a million dollars per mile. Yet today we have thousands of miles of highways costing this much, or even more. We should not, however, approach the problem of improving the quality of our environment as we did in the building of our roads, advancing from dirt and winding roads to modern four-lane interstate highways. In our improvements we should look ahead and build and work with sufficient foresight that we will not have outgrown our improvements by the time we obtain them.

If we are to build intelligently for the future we must first answer the question, "What type of environment do we want"? Those with the pristine view would not permit any pollution of our environment, while those with the sterile view would permit an unlimited amount of pollution. It is obvious that we cannot follow either of these courses. Rather, if man is to consider himself ecologically a part of the environment and take an ideal approach, he must consider all effects of pollution of the environment. Even with this logical approach, we will, no doubt, be faced with many difficult decisions.

In our search for the best and most expeditious ways of improving our environment we will make many mistakes, but let us hope that we shall be as fortunate as we were in establishing our government. We often have heard it said that, although our democratic form of government is not perfect, it is the best government in exist-

ence today. Similarly, we can say that thus far we have had no perfect plan for disposal of any waste, but we believe the disposal of radioactive materials is an example of a well-planned system. Injury and loss of life from disposal of radioactive materials or from accidents involving these materials have been minimal. Now let us consider why.

1. The public, legislators, and scientists must be aware of the dangers associated with a problem before it can receive sufficient financial support. The atomic bomb very effectively acquainted the public with the dangers of radioactive substances. Although the improvement of the quality of our environment will require the cooperation of the present generation, we must also obtain the support of future generations, since the improvements must be maintained and possibly broadened. Thus, to prevent people from becoming litter bugs, polluters, and destroyers of our environment, I advocate more emphasis, starting with the first year of school, on nature study and establishing an understanding of the importance of the environment to man. This indoctrination is important if the vital role of the environment in man's welfare is to be placed in proper perspective.

2. *Research* to develop the atomic bomb was supported on a national basis. The bomb was born in secrecy, yet the potential danger of radiation to man has grown since 1896 when the existence of radioactive elements was discovered by Becquerel. Research to protect man against radiation effects and levels of radioactive materials that could be released progressed with research on the bomb. Similarly, there should be no significant disposal of any waste material until its effect on man is known.

3. From this research came *standards* for the handling, shipping, and disposal of radioactive substances. Standards for radioactivity are contained in publications such as: Standards for Protection against Radiation, Title 10, Part 20, U. S. Atomic Energy Commission; Reports of the National Committee on Radiation Protection; and the International Committee on Radiation Protection. Standards for any waste disposal should be for the entire United States, as they are for radioactivity. No one should be penalized because of his geographical location. In contrast, however, the numbers of *E. coli* that can exist in a body of water before it is considered polluted now varies among the states.

4. After standards and guidelines were established, an extensive *monitoring system* was inaugurated and has been functioning for years. The atmospheric, aquatic, and terrestrial environments were sampled frequently and on a broad geographical basis.

Man can modify his environment both in beneficial and in deleterious ways. I have referred mostly to how man injures his environment by releasing wastes into it and have emphasized the need for examining the total effect of these substances upon different forms of life. The effect of a given substance upon an organism can vary with the amount of substance present. Pesticides began to be used in relatively large amounts just after World War II, but it was not until 1962 when Rachel Carson's *Silent Spring* was published that more nearly adequate amounts of money became available for research into the effects of these materials.

In addition to more research into the deleterious effects of waste materials upon the environment, more consideration should be given to the use of waste materials for beneficial purposes. Great emphasis has been given to finding "Peaceful Uses for Radioisotopes" as indicated by a number of international meetings on this subject. As we all know, the use of radioisotopes has had a tremendous impact on research, medical practice, and certain areas of industry.

There are other instances of practical uses of waste materials. The common aspirin originated years ago from a waste material, acetylsalicylic acid, through the ingenuity of a researcher of the I. G. Farben Chemical Company in Germany. Also, stickwater or wash water in a menhaden plant which a few years ago created a waste-disposal problem is now mixed with fish meal, passed through the dryer, and effectively incorporated into the meal.

I would not want anyone to conclude that we have all the answers concerning radioactive waste disposal and the levels of radiation to which man can be exposed. Based on research findings, the maximum permissible concentrations to which man can be exposed are continually being examined and changed. For instance, two areas requiring more research are the effects of low levels of radioactivity over long periods of time and the effects of various mixtures of radioisotopes. In general, toxicity studies on any substance usually involve concentrations which result in the death of 50 percent of the test animals in a relatively short period of time. Yet, man is exposed in the natural environment to lower levels of many toxic materials over a lifetime. Also, one needs to consider whether tests relating to exposure to a single substance have any real significance. Threshold-limit values now have been accepted and are being applied to industry for some 300 waste materials. Of these values, probably not more than 10 have been studied sufficiently to ensure levels which would result in a safe and healthful environment over a full working lifetime. If the substances were mixed together, what would we know about their effect?

Advances are being made in other areas which will contribute also to restoring the quality of our environment. Control of the population explosion will contribute, since waste disposal is directly related to the total number of people and to their standard of living. Modification of the weather has been attempted without much success in the past, but it is expected that in the next few decades it will be possible to increase precipitation in certain areas. Water used for cooling in industrial processes is presently suitable for re-use and by the year 2000, the volume required for cooling may exceed all other uses of water combined. We therefore must make plans for handling this large demand for water before the need arises. Research into this problem is now progressing satisfactorily.

The level of contaminants in water must be controlled because we will be faced with an ever-growing demand

for water. The ways in which water is used and re-used and is renovated and conserved, no doubt, will be changed through research by the government, industry, and universities. Although technology will dictate to a certain extent many future uses and re-uses of water, public regulation and economics also will influence our use of water resources.

Dr. Don. W. Hayne: Chancellor Caldwell, Dr. Buckley, Dr. Bennett, ladies and gentlemen. It is a real and personal pleasure for me to be here for I have been associated with Dr. Buckley in different capacities for years. Curiously enough, it happens that I have not before heard him give a formal lecture. Many times I have heard him talk to his staff as a really superlative administrator of a research center, and later I saw him in action as an effective staff man of a panel. Now this, the first formal lecture, comes up to the other standards.

I am going to comment briefly as what we might call a technician in this area, speaking mostly to other professional biologists who may be ready to consider for the moment the view of a technician. I wish to mention a few problems of ecologists who accept the facts that, as Dr. Buckley has pointed out, there is here both a broad interest and a need for the work. As Dr. Rice has pointed out, we need money, but when we have this degree of interest at the national level the money is there. In fact, it is my impression that we have more money than good work to be supported by it.

As biologists, we have talked about this pollution problem for so many years that it is now almost automatic. But at last we are faced with the fact that we must now produce something more than talk. What are we going to do? This is a very tough problem which I cannot solve tonight, but I want to talk about a few of its phases. First, our interests are really greatest regarding the effects at the lower levels of exposure. Dr. Rice touched on this problem. True, we are horrified by those disasters which occur from unwise and unwarranted use of pesticides, or from the occasional accidents with isotopes or reactors, but these are not the things which the biologists in his professional capacity is going to be called upon to worry about. These high level effects are apparent to everyone and they are being taken care of, as we have been told. Our problem is how we are to deal with this problem of detecting the effects on the biota, the environment and the whole ecosystem, of exposure at low levels.

If we must talk in terms of life-time effects, then how are we going to work with these problems, for they are literally those of a life-time? I do not have the answer, but I think that this general problem is going to challenge us, as biologists, and as experimentalists to devise methods of working with it. This problem is not new, of course, it is exactly the same question faced by medical science in working with carcinogens, or with any suspected toxin. Here you must define a substance as not to be tolerated at some level far below that where it will produce any appreciable and measurable effect under experimental conditions. For our part we are now concerned with the effect on our environment of pollutants, and, as I said, we must truly be concerned professionally with the low level effects, not with the intermediate and obvious effects, but the subtle effects, the long-term effects. We hear emotion talk of banning use of every chemical which is toxic at any modest level, but I believe that rather than accept this costly concept, we must learn to appraise the low-level effects.

As a second point, the effect of environmental contamination on natural populations is a promising tool as well as an interesting and challenging problem. I wish to comment on one possible parameter for study, and the implications of considering this. For some time now ecologists have been concerned with the structure of a community, that is, number of species present, number of individuals per species, the kinds of species, whether there is a pattern in the occurrence together of a series of species, why the pattern occurs as it does, and what will change it. It is apparent that pollutants change this pattern or structure of the communty. Certain species are benefited, or at least they increase in numbers and by the rules of the game we say they are benefited. Other species decrease or are eliminated. Up to now, we have worked on this problem largely in a non-quantitative sense, and it is clear that we must now move into a much deeper understanding and a much more use of this concept for studying environmental changes. And, yet, the people who wish to study environmental changes usually are not the same people competent to handle the genuine and vexing taxonomie problems involved here. So, in such studies we have been handicapped by the fact that if you wish to work with a community, a natural population of species, you must somehow combine a taxonomic ability with the aptitudes of the population ecologists, and some competence in mathematics. Since the first characteristic is so rarely associated with the others, it seems to me to follow that one of needs growing out of our concern with pollution these days is a very much increased support for the taxonomic sciences, and some means of making services of this group more readily available. Working taxonomists are overworked now in their attempts to help others. We need a better way for providing their services to the practicing ecologists in some organized manner which will allow the studies of both to flourish.

With the lateness of the hour and the thorough coverage presented here by others I will conclude my remarks here. Thank you.

Audience Participation

Jesse C. Thompson, Jr., (Hampden Sydney College): Dr. Buckley, your remarks are very much different from

those of Dr. Egler, our speaker at the symposium last year. You seem to be more subdued in your discussion of this important problem and, if I understand correctly, you are saying that all is going well and that the Great Society is taking care of everything. You even stated that possibly we may even be getting too concerned about the pollution of our environment. Do you believe there is more danger in being too concerned or too little concerned?

Buckley: Let me try to show you what I meant — I am sorry I didn't jump up and down on the platform. It isn't that I am less concerned than was Dr. Egler. It seems to me that what I was trying to say in this particular context, and I am glad you raised the question here, is that *the burden is on us to make sure that the dollars spent buy the things that we want bought.* I can foresee large expenditures for sewer systems and the hardware for sewage treatment plants, and similar sorts of thing. All I am suggesting is that we make sure that when we spend that money it buys the kind of control that we want bought. If we are not prepared to use wisely the funds provided by the public, I am worried more about an embarrassment of riches rather than the other way around. There was $120,000,000 of money this year (the 1967 budget) that wasn't in the 1966 budget. And this year almost every other kind of program, except the war in Viet Nam, was cut. So I am trying to point out that money is available. There is public concern. We don't know all the answers we want to know. I would prefer to go slow on those kinds of things where we are not quite sure. I would like to be as vigorous as possible in cleaning up where we know how. Shouting that this river has got to be clean as it can possibly be, or that we can't afford a speck of dust or sulfur dioxide in the air — I don't think this is what's going to get us places. We have to look at it the other way around. There will be sulfur dioxide; there will be dust particles; but there need not be the quantities that there now are. I was recently in Germany, I can't vouch for the validity of these statistics, but they were given us. They are that on the average in industrial cities in Germany there are 85,000 particles of dust in a liter of air. In forested parts of Germany, there are something like a hundred particles to the liter of air. The point I am trying to make is that there is room for improvement in every industrialized country. Another point connected with this, it seems to me, is the matter of who pays the bill. And it seems to me that one of the pronouncements made in this "Restoring the Quality of our Environment," and since made by President Johnson, has been that there ought not to be, that there is no right, to pollute; that, rather, industrialists must begin to consider, as a cost of doing business, the proper disposal of the waste products that result from their manufacturing processes. Now, you couldn't have said this five years ago, but this is a statement which is generally believed by the American public today. I think that Federal expenditures will be related to cleaning up what's already happened; to restoring those things that have already been deteriorated; but the cost of prevention of further pollution ought clearly to be borne by those people, those industries, those municipalities that would otherwise cause this pollution.

Winston Menzel (Florida State University): I think this pollution problem is ironical. The biologists of my acquaintance have been aware of the evils of pollution problem for a long time, but, it took Miss Carson to explode the atomic bomb. I am glad she did. Dr. Rice said that radioactivity has the best control. That is true. We know the dangers of it. There has been more money spent on radioactive control — and more research. So my plea is to spend more money, even though we do make mistakes. We certainly spend enough on radioactivity control, and there have been more people killed, or harmed from pollution, than from any radioactivity.

Buckley: Maybe I need to draw the line in a different place. Most of us in the room are interested in this problem from the point of view of science; and yet, the cost of research associated with this sort of thing, I look upon as being fairly small. We are talking about a relatively few millions of dollars, 50 or 150 — something of this sort. What costs money is the "hardware" for control and treatment. Let me give an example. One of the ways that one can possibly solve the problem of combined sanitary waste and storm drainage is to build two separate systems, two sets of pipes; but if we were to do this in the older cities of the United States, the estimates run at something like $20,000,000,000. Now, are there other ways that we can solve that problem? Secondly, it's not at all clear to me, on the basis of what evidence I have seen, that with two sets of pipes we still won't have a problem bigger than we wish to have. The evidence I have seen strongly suggests that the surface drainage that comes from the city itself causes a sufficient oxygen sag and carries a sufficient quantity of materials picked up from the roadways, and so on, to be in its own right detrimental to the waters. And, yet, we have serious proposals to get on with this business of tearing up all the streets of all the major cities, laying two sets of pipes instead of one, and solving the problem this way. This is the kind of thing I am talking about as perhaps an ill-advised expenditure. Maybe this is the only solution — and if it is, then these are costs we ought to be prepared to bear. On the other hand, if we are talking about more money for research, then I agree with you. We have spent too little — we need to multiply our expenditure over the next several years. I are not suggesting to the contrary. I hope this makes people a little more comfortable. I don't intend to sound complacent.

Leon Hicks (Loyola University, New Orleans): I have a question of Dr. Rice. I believe you said, concerning the advances in the disposal of Radioactive waste, that we could probably apply these advances to other waste disposals. I saw pictures of the incident of the hydrogen bomb over the Spanish coast where there were barrels of radioactive dirt that were going to be disposed by just dropping them into the deepest parts of the sea, in radioactive dumps, and I have heard that waste materials from

reactors are disposed of in that manner. I'd like to know, is that the advances in radioactive waste disposal that you were talking about? It seems to be parallel to dumping garbage outside the edge of a town, and since there is a foreseeable increase in reactor applications, are there going to be any advances made in this wholesale junking of radioactive waste?

Rice: My comments that what we had learned in the disposal of radioactivity could be applied to other wastes, of course, had reference to generalities; the same thinking, the same general approaches and research, financing, publicity and other things could be applied to any waste; and I would like to make a comment on your disposal. Most of you probably know that radioactivity is different from any other type of waste. Most wastes, with time, are degraded biologically or otherwise. But there is no way of changing the rate of decay of radioactivity. Only time can eliminate it. Therefore, there are two ways of handling waste. One is to contain it, to put it somewhere that it will be of no danger to anyone — and this is often done by putting it into deep wells; the possibility of storing it in salt domes in some of the southern states, or putting it in the depths of the oceans. Theoretically, I should mention, in these cases it is contained in thick containers that sink to the bottom and remain intact, and by the time it has disintegrated the radioactivity will have gone. The length of time required for the water from the depths to be circulated back to the surface is of such a magnitude that there would be no danger from long-life radioactivity placed in the depths. The thinking has changed somewhat in recent times, and there is no longer this wholesale disposal in the ocean. We do not like to think that the ocean is a garbage pail, but man has looked to some parts of his environment as a means of disposing unwanted material, and the ocean, being so deep, he naturally has taken advantage of this, and still does today. Well, I should mention that there is another way of disposing of radioactivity also, and that is to dilute it in such a concentration that the total volume of our breath, the total amount of water that you drink, or the food that you eat, would never contain sufficient radioactivity of accumulating sufficient activity that you would suffer any harmful effects. Now, we are sort of fixed — if we can have "X" amount of radioactivity in a liter of air and there are so many liters, once we have reached this threshold we must contain the radioactivity. So while we may use an intelligent approach to disposal of radioactivity, we still are faced with the problem. Shall we keep it all hidden, or shall we release some of it? And we feel that some of it must be released, but not in an uncontrollable amount.

Frank McCormick (University of North Carolina): I'd like to address my question to Dr. Buckley. It seems that we have mostly discussed how we might modify the results of a problem rather than how we might fight the problem itself. I think the President and most of the agencies of his Great Society Program recognize the problem; the problem being that pollution increases primarily because there are more people — the more people, the more pollution. Wouldn't it be more feasible to attack the problem of population control?

Buckley: I guess I will label that a political question rather than a scientific one and refuse to answer it. Seriously, I think your statement is essentially half true and half untrue. It seems to me there are two things that are happening at the same time. There is an increase in population; no doubt about this. But even without this increase in population, there is an increasing use of resources and an increasing volume of waste generated by each individual. What I am saying is that pollution increases at a faster rate than the population. Certainly population reduction would be one of the ways of reducing it, but on the other hand, it is not likely to be a very rapid procedure. If we were able to reduce the *rate of increase* of population in the United States or the world in the very near future, we still would end up with a population very much larger than it is now and still be faced with a need to do something to better the condition of the environment we now live in.

I would also point out that there are other things one can do about some kinds of pollution. You can use other sorts of materials, which create less of a pollution problem. Perhaps we can find other means of powering automobiles, for example, which would not have all the noxious by-products. Who is going to push this kind of thing? How do you move it from the idea that it would be nice if we did this, to something that you can go into the marketplace and buy? I don't think we have found any way of doing this yet.

One other point I intended to make before, and I will volunteer now. We were talking about ecology a good deal. One of the points in relation to ecology, it seems to me, is that there isn't a central place in the Government where one can put his finger on what we do know.

Many of you people know locally what a community looks like, what it's made up of, and what's happening to it, but at the same time there isn't any centralized place where you can begin to piece together a picture for the country as a whole.

Ecology is a field where almost every agency in Government has some concern — and each agency considers it is doing most of the things that need to be done in its area of responsibility. Yet it seems that there is a need for some additional work, particularly work done in the universities — basic research in ecology, better understanding of ecosystems, better understanding of population ecology. Much of this doesn't have an immediate practical application; yet, some of the things that Dr. Hayne said reminded me of this. He talked about changes in community structure — and I would ask you, changes compared to what? There are very few communities that we know enough about to measure whether, in fact, a change is taking place or not. If you ask a man who is working in pollution how he knows that a particular piece of water is polluted, pin him down hard, at last you find out that a piece of water is polluted *because somebody says* it is polluted. It may be a governor, a group of local citizens, but somebody has de-

cided it is polluted. There doesn't seem to be any uniform basis on which you judge pollution. And, here again, research aimed at understanding what takes place without pollution, or with a minimum of pollution, seems to me one of the things we most need. There is a certain amount of concern in the Congress in relation to this. There are some bills, one of them introduced by Senator Nelson, which propose some increased activity in the field of ecology. Hearings are scheduled for the latter part of this month. Legislation of this sort ought to be of interest to you people in the universities. You ought to be looking for monies to begin to fill some of these needs.

William D. Burbanck (Emory University): I wonder, in this age when we get all our daily vitamins in one cereal at breakfast, and when we will not buy an apple having a wormhole, or an oyster with an imperfect shell — whether there is any way that we might begin to educate ourselves to the point where we don't need quite so much perfection in everything? It seems to me we have become almost ridiculous in our demands. If we cut down on our demand for perfection a little, perhaps our suppliers could cut down, and we could then get some sort of equilibrium.

Rice: Regardless of how concentrated man produces his vitamins or any other essential food ingredients, he still requires a certain amount of bulk. Years ago I heard some discussion that in Germany they were beginning to add essential ingredients to sawdust, and that this would make a very appetizing and nutritious food. But we are going to have to continue to eat a certain amount of raw material. So we are going to have to produce it. The question is, can we sacrifice, as Dr. Burbanck mentioned, the appearance of an apple, and have just as many apples per tree, or do we want more apples per tree, and, as a consequence, more pesticides in the environment? Of course, we come back to the population problem again. We have so many acres of land, and it has been estimated by the year 2,000 if we continue to increase at the present rate there will be one square yard of land per person. We must have so much food for the present and for future populations. Thus, we must grow more food per acre. We not only will have to use more pesticides, but also more fertilizers, and we can — when we hear there are certain pesticides in certain foods — boycott them. But, I do not know a simple answer to your question.

Buckley: May I add just one more comment here? I think this question and this response sort of pointed up the nature of the pollution question. There are separate actions we can take. But the problems cut across almost everything that we do, and we aren't going to sit in a room and solve all the problems. We will solve them back in our respective laboratories and not here. If we recognize they exist, if we tell the public they exist, if we help educate people, then we have begun to get some handles on control of pollution. Right now we have stirred the public up to the point they want to do something. It seems to me that we need to tell them what it is that they need to do. Before we can tell them some of the things they need to do, we need to find out ourselves. I hope you all go home and apply for grants from wherever you think you can get them; that you will all turn your interest to solving some of these fascinating problems that exist in pollution. By the time you treat the subject at next year's meeting, you will all be personally deeply involved.

Margaret Menzel (Florida State University): I'd like to address a question to Dr. Buckley. It seemed to me he indicated several times that really the crux of the problem is social and not strictly biological or scientific and he has indicated areas, such as city planning, control of human reproduction, and some other problems in human psychology, which would be basic to a solution. I'd like to ask him what amount of money is devoted to in research in these areas compared to that devoted to remedying the effects of the problem?

Buckley: I can't give you any fixed answer. Social aspects are very important — the attitudes of people, pressures in city planning, the overlapping of jurisdictions. I am thinking of the Lower Delaware Valley area, for example, where there are three states, eleven counties, 377 communities, 4,000 civic organizations, all wound up in one area that uses the same water supply and disposes of its waste in the same place, and yet each may have a somewhat different interest in how this water is used. How do you operate in a system such as this? I singled that out because we happened to have some numbers. But you can look at other cities. You can go to California — take Los Angeles County — and within the county you find other communities. These are very real problems, and they are ones we must find a way to handle. At the same time, there is another kind of problem that I don't feel we know enough about. Somebody has referred to the earth as a spaceship, a self-contained environment. We aren't going to add anything or get rid of anything that's on it. Our choices in disposal of waste become those of segregating it in some fashion and storing it away or returning it to the environment in such a fashion that it isn't harmful. Basically, these are our choices. We have got to learn to re-cycle, to re-use. These, too, involve social problems. How do you make people in a large city take water they know has already passed through the city and has come from the sewage treatment plant and to the water treatment plant and is re-cycled? This has been done in a few places where drought has been extremely severe, but it's a pretty difficult problem to make the people of a community believe that this is the best they can get. In fact, it may be purer than water they now use. It may be chemically and biologically suitable, but you can't get away with this without some degree of education in the community. I can think of at least as many social problems as there are biological ones. I am sorry I didn't emphasize this before because certainly it's severe and a real part of the problem which has not received the type support which it should.

Books and Periodicals

The final portions of the "Flora of West Virginia," by P. D. Strausbaugh and Earl L. Core, of West Virginia University, have just appeared. This final part contains a comprehensive index to the entire work of more than 1,000 pages.

The work includes all species of vascular plants known to occur in a wild or naturalized state in West Virginia, and represents the results of field, herbarium, and library studies of the authors extending over a period of more than forty years. In these studies, every county in the State has been explored in detail. Descriptions and illustrations of more than 2,000 species are given, including ecological and geographical data, plus other information, especially that of local interest. There is also a comprehensive bibliographic treatment, with hundreds of references to pertinent literature, particularly that dealing with species that have their type localities within the present boundaries of West Virginia, and species that are rare or for other reasons are of unusual interest in the State.

The work has been published in parts, the first part (Pteridophyta to Orchidaceae, pages 1-274) appearing in 1952, the second part (Saururaceae to Leguminosae, pages 275-570) in 1953, the third part (Linaceae to Plantaginaceae, pages 571-860) in 1958, and the fourth part (Rubiaceae to Compositae, pages 861-1075) in 1964.

The parts were published as bulletins by West Virginia University and may be purchased from the University Bookstore.

Parts I, II, III, IV, and the Introductory Section, if purchased together — $10.00; separately, $2.50 each plus $0.50 for the Introductory Section.

The entire Flora, Parts I, II, III, IV, and the Introductory Section, is available in hardback binding at $15.00.

A HISTORY OF BOTANY IN WEST VIRGINIA. 1965. Weldon Boone. McClain Printing Co., Parsons, W. Va. $6.00.

This book, the product of a labor of love on the part of its author, should serve numerous purposes. It is a contribution to the general history of West Virginia. It is far more than a collection of biographies of West Virginia botanists, although it is that, too: in a sense it is a bibliography of West Virginia botany. That it is a thorough treatment of the subject is attested by the fact that the index lists references to approximately 500 persons associated with the development of botany in this State. In addition, hundreds of titles of books and articles dealing with the botany of the State are listed. It is, itself, a valuable contribution to the botanical literature of West Virginia. — EARL L. CORE, *West Virginia University*.

GROWTH AND DEVELOPMENT (2nd ed.). Maurice Sussman. Foundations of Modern Biology Series. Prentice-Hall, New Jersey. 1964. 116 pp. $3.95.

This book explains basic developmental and growth changes both at the molecular and at the cellular level. It begins with generalities about growth, cell differentiation and morphogenesis. Then there is a phylogenetic approach viewing the growth of single cells to the growth of vertebrate embryos. Interactions among and between cells are emphasized; they are classified and evidence in support of their mechanisms is explained. Valuable examples providing information about differentiation, importance of RNA and protein synthesis and control of reactions involved are discussed with regard to time, place and quantity. The remainder of the book deals with mechanisms of cell differentiation as understood from biochemical and descriptive events of genetics.

The book is brief, but the editing has been poor and has led to inconsistencies, misspellings and errors of omission. Some of the most irritating points are those concerned with comparison of index numbers and page numbers. Some words or phrases indexed incorrectly in one way or another are: amitosis, budding, *Dictyostelium discoideum*, gut, known mechanisms of cell interactions, morphogenetic fields, mutants, normoblasts, RNA, Siamese twinning and zygote. Scientific words such as erythroblast, erythrocyte, *cereviseae* and teratomas are all misspelled as are a few nonscientific words. Indexed definitions of differentiation, genotype and phenotype are somewhat vague and are better explained in other parts of the text. Two important names are deleted from the text material, but both are indexed. These most glaring omissions involve references to both Watson and Crick. Deleted from Fig. 9-6 is messenger B and from Fig. 9-8, the $_1$ of BR_1 and the entire BR_2. The reader is not absolutely positive about the identification of A and B for chromosomes on this latter figure. Numbers are omitted from seven pages; this is not entirely related to the presence of figures as some pages with figures have numbers. Some pages have numbers at the top and some at the bottom. Other inconsistencies exist for italicized words. One wonders why both ganglia and *Plasmodium malariae* are italicized and not neurula, *Rana sylvatica* and *Saccharomyces cereviseae*.

Some readers might quibble about these points. One concerns the caption for Fig. 2-2 regarding DNA synthesis. The text material so carefully emphasizes that synthesis occurs before and not during cell division; however, the caption reads that it occurs during the cell division cycle. Figure 7-3 fails to justify the text description because of use of per cent instead of total cell number. It is difficult to visualize, without computation, and in spite of its accuracy, that the vertical distance from the abscissa to the line representing the S-cells at 20 days is less than 10 per cent and even more difficult to visualize it at one per cent. Another criticism might be leveled at the use of "tissue culture" before the word "tissue" is defined two chapters later. Some chapters have a "resumé" and others, "conclusions." Use of both

mycetozoa and myxomycetes in two different locations for the same organisms seems superfluous. One might question the inexactness of "marine eggs."

The book is useful in that it raises more questions than it answers. Obviously it is for use at the undergraduate level although it is generally less informative than other books in this series. Until the editorial errors are corrected and based on the exacting attitudes of some of my own past professors concerning spelling, etc., I would say both student and teacher will have less than a happy time employing it as a supplementary text. — FRANCIS M. BUSH, *Medical College of Virginia.*

READINGS IN ECOLOGY, by Edward J. Kormondy. Prentice-Hall, Inc. 1965. $3.95 (Paper).

Ecologists will not regret buying this modestly priced little volume. The pleasure and convenience of having so many magnificent ecological papers between two covers is sufficient justification for getting a copy. In addition original works reveal the thought patterns, methodology, and insights of distinguished investigators to a degree that is impossible even in the best texts. Kormondy has a brief commentary before each paper which indicates its relationship to the others as well as the significance of each ecological concept. — JOHN CAIRNS, JR., Univ. of Kansas.

BIOLOGY OF THE SKIN AND HAIR GROWTH, by A. G. Lyne and B. F. Short. American Elsevier Publishing Co., Inc. 1965. $23.50.

This volume is a compilation of the proceedings of a symposium held at Canberra, Australia, during August, 1964. The symposium was proposed by Dr. P. G. Schinckel of the Ian Clunies Ross Animal Research Laboratory. He was also responsible for its early organization until his untimely death on March 7, 1963.

The impetus for a symposium of this kind grew out of the interest in wool research which has been an integral part of the wool industry of Australia for many years.

The volume consists of forty-six articles which were contributed by leading researchers in specialized fields related to wool growth and development, and is an excellent reference volume for workers in this field as well as being a fascinating source of information for persons who are casually interested in a specialized aspect of these several areas. The degree of depth and style of presentation exhibited in each section vary somewhat but in general are quite thorough and clear. The articles are individually well documented. — J. E. DAVIS, JR., Wake Forest College.

Books recently received

The following books have been recently received by the ASB. Should any member of the ASB wish to review one of these books in return for the review copy, please write to: Mrs. Betty Peddicord, Assistant Editor, Academy of Natural Sciences, 19th and The Parkway, Philadelphia, Penna., 19103.

NORTH AMERICAN BIRDS EGGS. 1965. Chester A. Reed. A Dover Reprint. 372 pp. $3.00.

BIRD DISPLAY AND BEHAVIOR. 1965. Edward A. Armstrong. A Dover Reprint. 431 pp. $2.50.

THE BIRD, ITS FORM AND FUNCTION. 1965. C. W. Beebe. A Dover Reprint. 496 pp. $2.75.

BIRD STUDIES AT OLD CAPE MAY. 1965. Witmer Stone. A Dover Reprint. 2 vols., 941 pp. $5.50.

TREE FLOWERS OF FOREST, PARK AND STREET. 1965. W. E. Rogers. A Dover Reprint. 495 pp. $3.00.

OSMOTIC REGULATION IN AQUATIC ANIMALS. 1965. August Krogh. A Dover Reprint. 242 pp. $1.75.

READINGS IN ECOLOGY. 1965. E. J. Kormondy. Prentice-Hall. 219 pp. $3.95.

THE COCCIDIAN PARASITES (PROTOZOA, SPOROZOA) OF RODENTS. 1965. Illinois Biological Monographs, 33. 365 pp. $7.50.

SEX AND BEHAVIOR. 1965. Frank A. Beach. John Wiley and Sons. 592 pp. $9.75.

FERTILIZATION. 1965. C. R. Austin. Prentice-Hall. 145 pp. $2.95 (paper), $4.95 (cloth).

The National Referral Center

The National Referral Center for Science and Technology may be most simply described as the "information desk" of the scientific and technical community. Operating in the Library of Congress with the support of the National Science Foundation, the Center is designed to provide a single place to which scientists and engineers may

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By Charles M. Schulz

turn for advice on where and how to obtain scientific or technical knowledge of any kind.

The Center does not answer technical inquiries directly, nor does it furnish bibliographic assistance. Rather, it functions as an intermediary, directing those who need information to those who can provide it.

The Center is concerned with all fields of science and technology: The physical, biological, social, and engineering sciences, and the many technical areas relating to them. Similarly, it is concerned with all kinds of information capabilities, wherever they may exist: In Government, in industry, and in the academic and professional world.

The concept of "information resources" which the Center has adopted is an extremely broad one. It includes, of course, traditional information sources and media — technical libraries, information and document centers, abstracting and indexing services, and the like — which play a basic part in the scientific information network. But the concept extends also to resources which have a significant capability, and the willingness, to answer technical inquiries or provide scientific information in any form.

The National Referral Center for Science and Technology is on the fifth floor of the Library of Congress Annex, Second Street and Independence Avenue S.E., Washington, D. C. 20540. Visits by those interested in its functions or services are welcome between 9 a.m. and 5 p.m., weekdays.

Telephone inquiries should be directed as follows:

(Area code 202)
967-8087 for general inquiries.
967-8265 for referral service.
967-8242 for registration of information resources.

Correspondence should be addressed to:

National Referral Center for
Science and Technology
Library of Congress
Washington, D. C. 20540

Clam-Toting Turtle

Robert R. Grant, Jr., and Robert Robertson
Academy of Natural Sciences of Philadelphia

A cursory literature search has yielded only one record of a fresh water bivalve being transported by a turtle [H. W. Kew (1893, The Dispersal of Shells, London, p. 83) summarizes J. E. Todd's observations on a unionid clinging to the lower jaw of a snapping turtle]. On the other hand, reports of fresh water bivalves clamped on the appendages of mammals, birds, amphibians, insects, and crustaceans are common (*ibid.*, pp. 56-84; A. W. Spencer, 1964, Jour. Colorado Wyoming Acad. Sci., 5(5): 43-44).

The musk turtle, *Sternothaerus odoratus* (Latreille), is typically found in permanent bodies of fresh water, and is less inclined to move overland than are its close relatives the mud and snapping turtles. However, musk turtles do occasionally move from one isolated body of fresh water to another and, based on our observations, might occasionally disperse live clams with them.

At about 2:30 P.M. on December 15, 1965, a common musk turtle inhabiting a rather haphazardly populated aquarium, was observed with a fresh water Fingernail Clam, *Sphaerium* (*Amesoda*) *striatinum* (Lamarck), firmly clamped on the second claw of its right rear foot. At 4:00 P.M. the turtle was removed from the aquarium and placed in a shallow dish for photography, which lasted until after 5:00 P.M. During this time the clam remained attached, although the turtle made intermittent efforts to remove it. The two were left in the dish overnight so that the clam would not be lost in the dense growth of plants in the aquarium, but at 9:00 A.M. the following morning the clam was found in one corner of the dish, the turtle in another.

It is difficult to estimate how long the turtle had been carrying the clam because for some time before the discovery it had been hidden in remote areas of the aquarium. Still, the elapsed time it is known to have been carrying the clam is long enough for a turtle to have moved several hundred feet upstream.

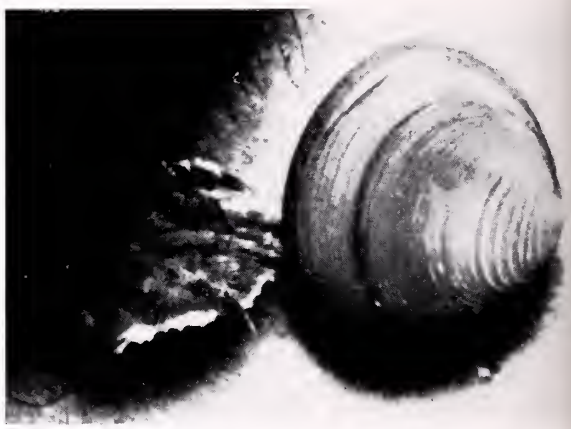


Fig. 1. A fresh-water Fingernail Clam, *Sphaerium striatinum*, clamped on second claw of right rear foot of a Musk Turtle, *Sternothaerus odoratus*. Attachment occurred in an aquarium. The alga growing on the turtle's shell is *Basicladia chelonum* (Collins) Hoffman & Tilden — a turtle-specific green alga.

News of Biology in the Southeast

About People

Hobart F. Landreth has joined the staff of the Department of Zoology, Mississippi State University, as a Research Assistant. During the summer months he will head a team of MSU researchers in Oregon in an NSF-sponsored field study of sun-compass orientation in amphibians. In September he will return to the campus to continue his research.

William H. Adams, Professor of Biology and Acting Chairman of the Department of Biology at Tennessee Technological University, has joined the National Science Foundation. **Ralph W. Dimmick,** Assistant Professor of Biology, has joined the University of Tennessee, and **Daniel H. Stern,** Assistant Professor of Biology, has joined the Louisiana State University in New Orleans.

David J. Cotter has been appointed Professor and Chairman of the Biology Department of The Woman's College of Georgia, Milledgeville, Ga.

Frank H. Barclay, Professor of Biology, East Tennessee State University, served as President of the Tennessee Academy of Science during the past year.

G. K. Parris, Professor of Plant Pathology, Mississippi State University, has been awarded a grant of $2400 by the Southern Forest Disease and Insect Research Council for a project entitled "The relationship of saprophytic and weakly parasitic fungi to infection of loblolly pine needles by brown-spot (*Scirrhia acicola*)." The entire amount of the grant will be used for financial support of a graduate student. Other incidental expenses will be borne by the Department of Plant Pathology and Weed Science and the Agricultural Experiment Station of the University.

Claire L. Schelske, head of the Estuarine Ecology Program at the Radiobiological Laboratory, Beaufort, N. C., has moved to Washington, D. C., for six months as Technical Assistant on the Panel on Marine Biology.

Samuel L. Meyer, President of the Association of Southeastern Biologists, 1948-49, and now President of Ohio Northern University, Ada, Ohio, was honored on February 20, 1966, when the honorary degree of Doctor of Laws was conferred upon him by Ohio Wesleyan University. In conferring the degree, President Elden T. Smith, of Ohio Wesleyan University, said: "Samuel Lewis Meyer, distinguished educator, scholar, and administrator; your experience in centers of higher learning across the nation have prepared you well for your new role as President of our sister university in Ada. Ohio Wesleyan is proud to honor you and be honored by you as you receive its degree of Doctor of Laws."

J. F. Fitzpatrick, Jr., Assistant Professor of Zoology, Mississippi State University, has recently been awarded a grant of $24,000 by the National Science Foundation for a study entitled "Systematics of crawfishes of the southeastern United States." Two graduate research assistants will be associated with Dr. Fitzpatrick in this research which will be centered in the triangle formed by the Mississippi and Tennessee and Tombigbee Rivers.

Willie M. Reams, Jr., Associate Professor of Biology at the University of Richmond, was an invited speaker at an international symposium on "the Biology of Skin — the Pigmentary System" held at the Oregon Regional Primate Research Center, Portland, Oregon, April 22-24. His paper was entitled "Pigment cell population pressure within the skin and its role in the pigment cell invasion of extraepidermal tissues."

William J. Riemer, formerly with the Systematic Biology Program, has become Planning Officer for the Biological and Medical Sciences Division, National Science Foundation.

Edward J. Kuenzler has been appointed Associate Professor of Environmental Biology in the Department of Environmental Sciences and Engineering of the School of Public Health, and the Institute of Fisheries Research at the University of North Carolina. Dr. Kuenzler joins the faculty with a background of wide experience in studies concerned with the cycling of phosphorus and other elements in the natural environment. He has conducted these studies both in the estuarine environment at the Sapelo Island Laboratory of the University of Georgia and the marine environment at the Woods Hole Oceanographic Institution.

Dr. Kuenzler's thesis for the Ph.D. degree from the University of Georgia was a study of the population structure and phosphorus budget of a mussel population in a salt marsh. His initial activities in his new assignment will be directing a field investigation of the impact of phosphate rock mining on the Pamlico River of North Carolina.

A National Science Foundation matching grant of $20,400 has been awarded to Greensboro College under the Foundation's Undergraduate Instructional Equipment Program. The funds, to be used for the purchase of equipment in the biological sciences, will be under the direction of **Dr. Arnold Van Pelt,** Professor of Biology and Chairman of the Department of Science and Mathematics.

Robert J. Hurley of the Institute of Marine Science, University of Miami, has been nominated as Deputy Director of the UNESCO Office of Oceanography in Paris, it was announced by Dr. F. G. Walton Smith, Director of the Institute. Dr. Hurley was nominated by a panel from the U. S. National Academy of Sciences and the Interagency Committee of Oceanography. The 36-year-old scientist will assume his new post in August. His appointment will be for two years, during which time he will be on a leave of absence from the University of Miami.

Dr. Hurley was born in Boston, Massachusetts, and received his B.S. degree in geology at Tufts University,

and his M.S. and Ph.D. degrees in oceanography at Scripps Institution of Oceanography, University of California. In 1961 he came to Miami and joined the staff of the Institute of Marine Science as assistant professor. Dr. Hurley is an expert on the sea floor and has made extensive studies in the Bahamas, West Indies, and in European waters.

David E. Wesley, Graduate Student, Department of Zoology, Mississippi State University, has been awarded a Grant-in-Aid of Research by the Society of the Sigma Xi to further his studies in the productivity of Beaver-impounded areas.

John G. Turnbull has accepted appointment as Assistant Professor of Biology at the University of South Alabama. Dr. Turnbull received his Ph.D. from Louisiana State University.

Marion Lawrence, Instructor in Biology at the University of South Alabama has been awarded a fellowship by the National Institute of Health for study toward the doctorate at Boston University.

Thomas L. Linton, Research Associate at the University of Georgia Marine Institute, Sapelo Island, Ceorgia, has received a grant of $120,900 from the Georgia State Game and Fish Commission for a three year study of methods for improving oyster production in Georgia.

Denzel E. Ferguson, Professor of Zoology, Mississippi State University, delivered an invitational paper and participated in the annual Oregon State University Colloquium. The topic of the colloquium was animal orientation and Dr. Ferguson reported on his researches in sun-compass orientation in amphibians.

C. Ritchie Bell, Department of Botany, University of North Carolina, Chapel Hill, N. C., has been appointed Chairman of the Facilities Panel recently established by the Commission on Undergraduate Education in the Biological Sciences. The function of the Panel is to draw up guidelines and checklists for the construction of biological facilities, and to offer a plan review and consultant service to those schools planning buildings for biology teaching and research.

Bruce L. Welch and Annemarie S. Welch, Laboratory of Population Ecology, College of William & Mary, have received a grant of $59,902 from the National Institute of Mental Health for a continuation of their work on "Population and brain biogenic amines." The grant is for a two year period.

Thomas M. Pullen, Associate Professor of Biology, University of Mississippi; **Samuel B. Jones, Jr.,** Assistant Professor of Biology, University of Southern Mississippi; and **J. Ray Watson, Jr.,** Assistant Professor of Botany, Mississippi State University, have been jointly awarded a grant of $20,100 by NSF for a two-year study entitled "Flora of the central Gulf Region of the United States."

T. S. Osborne, Agricultural Research Laboratory, University of Tennessee, Oak Ridge, Tennessee, spent three weeks in Europe during January under the auspices of the U. S. Atomic Energy Commission and the International Atomic Energy Agency. Dr. Osborne visited laboratories in Paris and Cologne, attended a panel discussion in Vienna, and consulted with the FAO/IAEA Division of Atomic Energy in Agriculture in Vienna.

Walter N. Hess, Visiting Professor of Biology at Converse College, received a $5000 grant from the Public Health Service for a period of two years.

Guy Marlow has been appointed Assistant Professor at St. Mary's Dominican College in New Orleans.

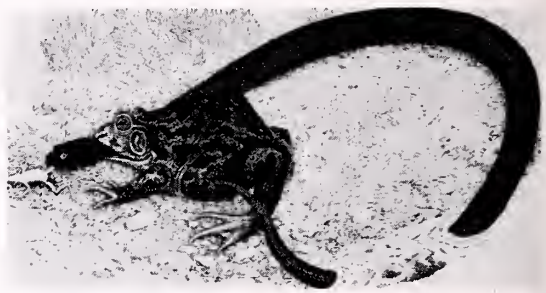
Asa C. Sims, Jr., Professor of Biology at Southern University, Baton Rouge, is spending a year at the University of Minnesota on a Post Doctoral NSF grant studying fungus physiology and biochemistry.

John W. Bishop, who received his doctorate at Cornell University in Limnology, and **R. D. Decker,** a botanist from North Carolina State University, have been appointed to Assistant Professorships in the Department of Biology at the University of Richmond. **Anne Caperton Beirne,** who will receive her Master's degree in Biology from the University of Richmond in August, will join the staff as an instructor at the Junior College Division of the University of Richmond.

Warwick R. West, Jr., Associate Professor and Chairman of the Department of Biology at the University of Richmond, was promoted to Professor effective September, 1966.

John C. Strickland, Professor of Biology at the University of Richmond, will be on sabbatical leave for the school year 1966-67 and plans to do botanical research in Costa Rica.

Willie M. Reams, Jr., Associate Professor at the University of Richmond, has received a research grant from the Virginia Academy of Science and two grants from the University of Richmond Faculty Research Committee for his work with pigment cells.



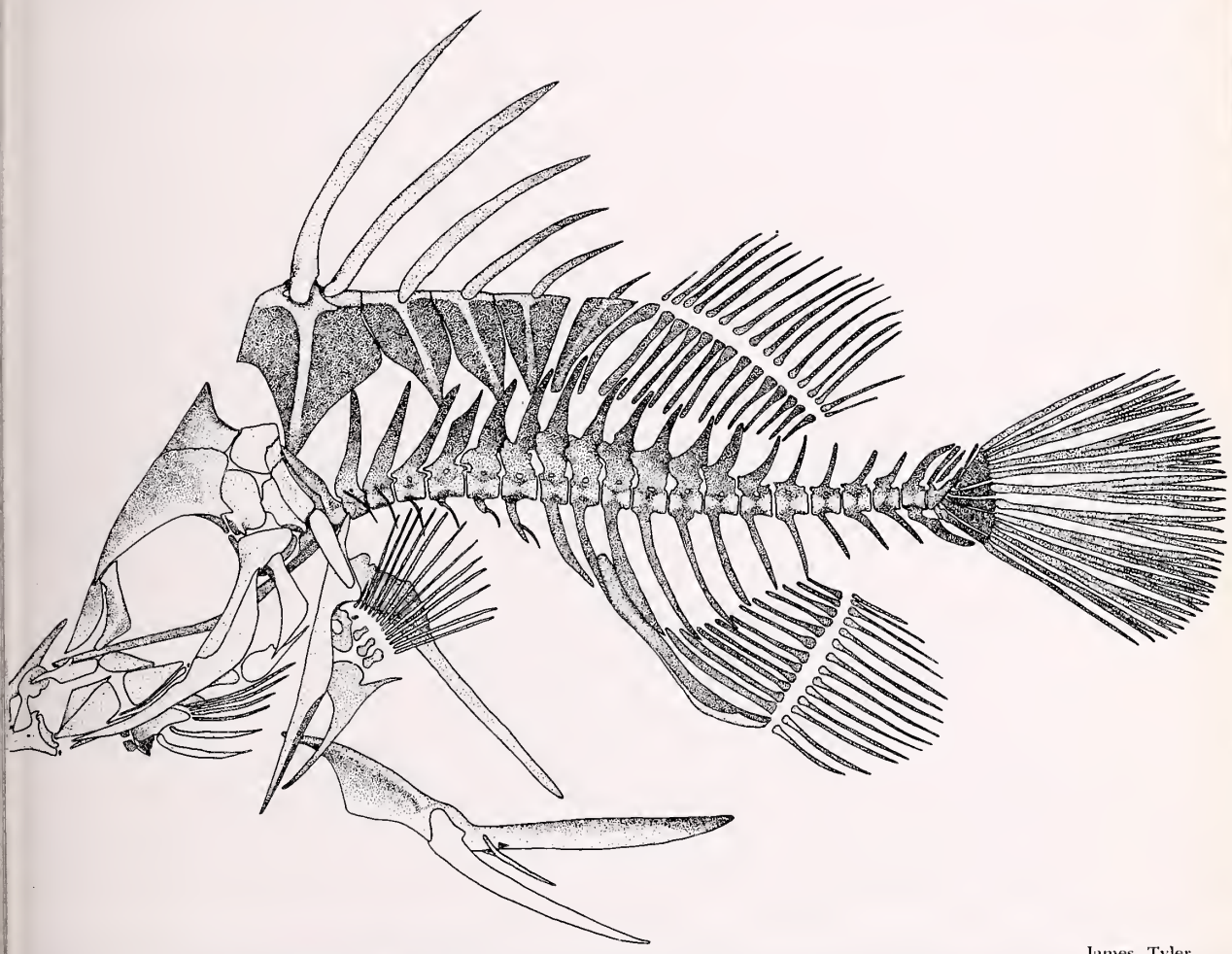
About Institutions

The first chapter of the Society of the Sigma Xi in the state of Mississippi was installed at Mississippi State University on May 4 by Dr. Farrington Daniels, President of the Society.

Approximately 96 additional acres of farm and forest land have been added to the North Carolina Botanical Garden at Chapel Hill. The new area provides for a small lake and other water habitats, as well as cleared, open land for more experimental work and plant propagation. The total area of the Garden, adjacent to the campus, is 329 acres, of which most is in mature woodland. Dr. C. Ritchie Bell was appointed as Director of the Garden in January.

The ASB BULLETIN

Volume 13, Number 4 October, 1966



Skeleton of *Parahollardia lineata* (Longley) — the Jambeau

James Tyler

The Official Quarterly Publication of The Association of Southeastern Biologists

ASB BULLETIN

Volume 13, Number 4 - October 1966

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Pa. 19103. Change of address should be sent promptly to the Secretary of the ASB, Dr. Margaret Y. Menzel, Dept. of Biological Sciences, Florida State Univ., Tallahassee, Fla. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. John Carpenter, Dept. of Zoology, Univ. of Kentucky, Lexington, Kentucky. Subscription rate for nonmembers of the ASB: $4.00 per year. Printing and typography by the Fulton Press, Inc., Lancaster, Pa.

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C. WILLARD HART, JR.
EDITOR

MARGARET Y. MENZEL
Associate Editor

BETTY PEDDICORD, Assistant Editor

JOHN CARPENTER, Business Manager

CONTENTS

ASSOCIATION AFFAIRS

SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

PRESIDENT-ELECT .....

VICE-PRESIDENT .....

SECRETARY .....

EXECUTIVE COMMITTEE MEMBERS (2 for 3-year terms) .....

.....

Deadline: January 1

Mail to: DR. HARRY J. BENNETT
Box 8985, Dept. of Zoology
Louisiana State University
Baton Rouge, La. 70803

CURRENT RESEARCH ON VEGETATION IN THE SOUTHEASTERN STATES

A Symposium Co-Sponsored by the ASB, the Ecological Society of America, and the Society for the Study of Evolution — December 29, 1966 Washington, D. C., AAAS Meeting

Arranged by Elsie Quarterman, Vanderbilt University

Although an excellent beginning has been made in understanding the vegetation of certain areas of the southeastern United States, some areas are poorly represented in ecological literature, and much remains to be done in all areas to bring our knowledge of the vegetation to the level made possible by research means at hand today. The importance of the region in phytogeographical and evolutionary contexts makes such knowledge of more than local significance. This symposium was organized, therefore, to present a sampling of the kinds of research on various aspects of vegetation presently in progress and to encourage further activities along these and other profitable lines.

Topics presented will include: "Introductory Remarks" (Elsie Quarterman, Vanderbilt Univ.); "Distribution of Marine Algae Along the Coast of North America in Relation to Inshore Oceanographic Conditions" (Harold J. Humm, Queens College); "Salt Marsh Vegetation of the South Atlantic Coast" (Arthur W. Cooper, North Carolina State University, Raleigh); "Successional and Environmental Relationships of North Central Florida Vegetation" (Carl Monk, University of Georgia Institute of Radiation Ecology); "Edaphic and Vegetational Changes in Florida Pine Flatwoods with Fire Exclusion" (Joe A. Edmisten, University of Georgia); "Multiresources Management of Coastal Plain Lands" (J. B. Hilmon, U. S. Forest Service, Ft. Myers, Florida); "Vegetation of the Western Gulf Region" (George Ware, Northwestern Louisiana University); "Comparative Study of Four Community Types (Old Fields, Hardwood, Pine, and Rain Forest) *re* Radiation Stress" (Frank McCormick, University of North Carolina, Chapel Hill); "Granite Rock Outcrop Endemics from the Standpoint of Speciation" (William P. Murdy, Emory University); "Vegetation of the Highlands, North Carolina Gorges" (Arthur W. Cooper, North Carolina State, Raleigh); and "Forest Productivity in the Great Smoky Mountains" (E. E. B. Clebsch, University of Tennessee).

AAAS WASHINGTON MEETING

DECEMBER 26-31, 1966

The 133rd Meeting of the American Association for the Advancement of Science will include sessions of 20 AAAS Sections and of some 90 participating organizations. Programs of particular interest to biologists are:

SPECIAL AND GENERAL SESSIONS

I. Moving Frontiers of Science lectures by Lynn T. White, "The Historical Roots of Our Ecologic Crisis" and by Th. Dobzhansky, "The Changing Man" (Dec. 26 eve.); by Thomas F. Malone, "Weather Modification" and by Dan Greenberg, "Problems of Securing Constructive Legislation" (Dec. 28 aft.).

II. AAAS Council Study Committee on Population Explosion and Birth Control, Section F, and Ecological Society of America. Symposium: Population Control: I-Mechanisms; II-Impact of Modern Medicine; III-Political Implications (Dec. 27, 28 morn.), arranged by G. W. Wharton. Speakers: David Pimentel, Charles Krebs, Ulia Olin, David M. Heer, Bernard Berelson, Amos Hawley, and Joseph M. Stycos, C. H. Buckner, Samuel M. Wishik, Martin D. Keller.

III. Other concurrent AAAS Interdisciplinary Symposia (Dec. 28 morn.):

A. Science in International Perspective;

B. Exchange and Use of Scientific Information;

C. Pollution Control.

IV. Sarton Memorial Lecture by George Wald, "Color Vision: Model and Reality" (Dec. 28 aft.).

V. AAAS Retiring Presidential Address of Henry Eyring, "Untangling Biological Reactions" (Dec. 28 eve.).

VI. AAAS Committee on Arid Lands. Symposium: "Migration to Arid Lands" (Dec. 29), arranged by Marion Clawson. Other speakers: Homer Aschmann, Neil Goldberg, Benjamin Higgins, Stephen C. Smith, Dean E. Mann, Wynne Thorne, and R. W. Richardson.

VII. Joint address of the Society of the Sigma Xi and United Chapters of Phi Beta Kappa by Walter Orr Roberts, "Science, a Wellspring of Our Discontent." (Dec. 29 eve.)

VIII. AAAS Committee on Science in the Promotion of Human Welfare, co-sponsored by AAAS Sections on Zoological Sciences-F, Anthropology-H, and Psychology-I, and by the Animal Behavior Society. Three-part symposium, "The Utility of the Construct of Race" (Dec. 30), arranged by Margaret Mead, Th. Dobzhansky, R. E. Light, and Ethel Tobach: I-Behavior-Genetic Analyses and Their Relevance to the Construct of Race; II-Biological Aspects of Race in Man; and III-Social Psychological Aspects. Speakers: The arrangers and Herbert G. Birch, Benson E. Ginsburg, Jerry Hirsch, Peter H. Klopfer, J. P. Scott, Loren C. Eiseley, Bentley Glass, Paul T. Baker, Hudson Hoagland, Dwight J. Ingle, Morton Fried, Gloria Marshall, and Irwin Katz.

SECTIONAL PROGRAMS

AAAS Section on Chemistry. Three two-part symposia: "Chemistry, Form and Function" (Dec. 26), arranged by Bernard B. Brodie; "U. S. Policy on Food and the World's Future," joint with AAAS Section on Agriculture-O (Dec. 27), arranged by Fred R. Senti; and "Scientific Aspects of Pest Control," joint with AAAS Section on Zoological Sciences (Dec. 29), arranged by George W. Irving.

AAAS Section on Zoological Sciences. Program includes cosponsorship of all appropriate symposia, a business meeting, the Zoologists' Dinner, followed by the vice presidential address, "Critical Points of Evolution," by Richard B. Roberts (Dec. 29), and a symposium, "Wildlife Resources in a Changing World," joint with the Wildlife Society; arranged by John L. Buckley. Speakers: Fred G. Evenden, Raymond F. Dasmann, Richard D. Taber, John E. Bardach, John L. McHugh, Lee M. Talbot, Stanley A. Cain.

AAAS Section on Botanical Sciences. Two-session symposium, cosponsored by the Botanical Society of America, "Plant Biology Today: Advances and Challenges" – a continuation of the review papers on basic topics found so helpful by teachers. Also sessions for contributed papers and a Botanists' Luncheon at which C. E. Olmsted will give the vice presidential address (Dec. 30).

AAAS Section on Medical Sciences. Two-session symposium, "Regulation of Metabolic Pathways," arranged by J. R. Williamson (Pennsylvania). Other speakers: George Weber (Indiana), A. Sols (Instituto Maranón, Madrid), P. G. Garland (University of Bristol), Gordon Tompkins (NIH), R. W. Butcher (Vanderbilt), Eugene Knox (Harvard), Jack Gorski (Illinois), D. E. Atkinson (UCLA), John M. Lowenstein (Brandeis), Martin Klingenburg (Universitat Marburg), and Britton Chance University of Pennsylvania), whose vice presidential address is a part of the symposium (Dec. 29).

A second two-part symposium, "Biological Functions of Lipids," (Dec. 30) arranged by Robert E. Olson. Speakers: J. David Robertson, F. A. Vandenheuvel, Sidney Fleischer, Thomas Thompson, George Wolf, Hector DeLuca, John G. Bieri, and Robert E. Olson.

AAAS Section on Dentistry. Four-part symposium, "The Biology of the Mouth," arranged by Philip Person (Dec. 29, 30). A keynote speaker will be J. Z. Young, University College, London.

AAAS Section on Pharmaceutical Sciences. Sessions for contributed papers; a distinguished lecture, "Hypertension-Pathogenesis and Treatment" by Arthur Grollman and a symposium, "Therapeutic Incompatibilities Involved in Drug Dosage" (Dec. 30 aft.). Speakers: William J. Kinnard, Jr., Frank J. Ayd, Jr., Joseph D. McEvilla, James R. Gillette, Karl H. Beyer, Jr., and Leighton E. Cluff.

AAAS Section on Agriculture. In addition to the joint sponsorship of the interdisciplinary session on "Pollution Control" (Dec. 28), six other sessions on "Agriculture and the Quality of Our Environment," arranged by Nyle C. Brady: L. H. Weinstein, J. R. Hansbrough, R. G. Menzel, M. D. Bell, G. M. Merriman (tentative), R. F. Kahrs, K. C. Walker, Emanuel Landau; R. K. Arnold and O. G. Bentley, presiding.

III and IV-Water Quality (Dec. 27). Speakers: J. M. Quigley, R. S. Green, L. G. Iverson, J. Verduin, G. E. Smith, S. R. Hoover, Lenore Jasewicz, L. M. Glymph, H. C. Storey, D. W. Thorne, L. T. Kardos, E. N. Castle; R. R. Renne and C. H. Wadleigh, presiding.

V and VI-Soil Pollution and Animal Wastes (Dec. 29). Speakers: R. F. Reitemeier, L. T. Alexander, H. L. Hollister, P. R. Stout, T. J. Sheets, Martin Alexander, J. V. Lagerwerff, C. D. Gates, E. P. Taiganides, R. H. Deibel, D. C. Ludington, T. L. Willrich; W. P. Martin, presiding.

AAAS Section on Statistics. Invited papers on "Experimental Design in Epidemiology," joint with AAAS Section on Medical Sciences (Dec. 27).

SOCIETAL PROGRAMS

Alpha Epsilon Delta. Symposium, "Preparation for the Practice of Medicine in the Next Decade," luncheon, and address by Norman F. Witt (Dec. 29).

American Association of Clinical Chemists. Symposium, "Inborn Errors of Metabolism," arranged by Robert S. Melville; and contributed papers (Dec. 27).

American Fisheries Society. Special program arranged by Edwin L. Cooper.

American Physiological Society. Two-part symposium, "Circadian Rhythms," arranged by Robert E. Smith and Franz Halberg (Dec. 28). Speakers: Alain Reinberg (Sorbonne), D. Eccleston (Edinburgh), and 18 others.

American Psychiatric Association. Three-part symposium, "Recent Research in Alcoholism" (Dec. 26, 27).

American Society of Naturalists. Two-part symposium, "Polarity of Organization in Genetic Material," arranged by Rollin D. Hotchkiss (Dec. 27). Other speakers: Paul Margolin, K. G. Lark, Norobu Sucka, E. P. Geidushek, Gordon Tomkins.

American Society of Zoologists. Among the many sessions, Dec. 27-30, are symposia on "Lactogenic Hormone," arranged by Irving I. Geschwind; "Chemical Activation of Developmental Processes," by M. S. Steinberg and W. M. Laetsch; "Comparative Aspects of Parathyroid Function," by John R. Cortelyou; "Comparative Aspects of Muscle," by Graham Hoyle; "Animal Parasites of Invertebrates," by Frank F. Katz; and "Vertebrate Olfaction," by Richard J. Baldauf. There are 25 sessions for contributed papers in behavior, embryology, endocrinology, invertebrate zoology, morphology, and physiology.

Animal Behavior Society. Several symposia, including "Recent Advances in the Behavior of Marine Organisms" (two sessions) arranged by Howard E. Winn and "Social Environment and Brain Chemistry," cosponsored by AAAS Sections on Medical Sciences and Pharmaceutical Sciences, arranged by Bruce L. Welch (Dec. 27). Other speakers: Silvio Garattini and L. Vanzelli (Instituto di Recherche Farmacologiche, Milan), Eugene L. Bliss, Edward Geller, Arthur Yuwiler, Delbert D. Thiessen and Kenneth E. Moore. An Animal Behaviorists' luncheon (Dec. 29). Seven sessions for contributed papers on animal behavior, and a business meeting are scheduled for Dec. 26-30.

Association of Southeastern Biologists. Two-part symposium, "Current Research on Vegetation of the Southeastern United States," arranged by Elsie Quarterman, cosponsored by the Ecological Society of America, the Society for the Study of Evolution, and AAAS Section G – Botanical Sciences (Dec. 29). Speakers: Harold J. Humm, Arthur W. Cooper, Carl Monk, Joe A. Edmisten, J. B. Hilmon, George Ware, William P. Murdy and E. E. B. Clebsch. (See p. 00).

Beta Beta Beta Biological Society. Biennial business meeting and luncheon (Dec. 28), followed by address "Molecular Biology of Bacteriophage-Host Cell Relationships" by Austin L. Taylor.

Biometric Society, ENAR. Two-session symposium, "Over-exploited Animal Populations," joint with AAAS Sections on Zoological Sciences and Statistics and cosponsored by the American Fisheries Society, arranged by Douglas S. Robson (Dec. 29). Speakers: Douglas G. Chapman, Aelred D. Geiss, Ian A. McLaren, Richard S. Peterson, M. D. Grosslein, Peter A. Larkin, Garth I. Murphy, Brian J. Rothschild, Milner B. Schaeffer and Stanford H. Smith; Walter F. Crissey, presiding.

Another two-part symposium, "Statistical Ecology," arranged by Evelyn C. Pielou (Dec. 30). Speakers: K. E. F. Watt, G. P. Patil, S. K. Katti, A. V. Rao, L. B. Slobodkin, G. M. van Dyne, W. E. Waters, D. B. Mertz, R. B. Davies, C. F. Cooper, and Gordon Mott.

SHERATON-PARK HOTEL

Ecological Society of America. Sessions for contributed papers in animal, plant, and other ecology; several symposia, and possible tours (Dec. 26-30).

Herpetologists' League. Three sessions for contributed papers and business meeting (Dec. 29, 30). There will be an Open House in the Division of Reptiles and Amphibia, USNM, Dec. 31.

Mountain Lake Biological Station. Annual breakfast of former staff, students, and researchers, attending the Washington meeting (Dec. 29).

National Association of Biology Teachers. Annual meeting, Dec. 27-30, will include participation in joint sessions of the science teaching societies (Dec. 27); one or more paper-reading sessions; the NABT luncheon (Dec. 29); and a joint field trip with ANSS (Dec. 30).

National Speleological Society. Invited papers on Cave Biology, cosponsored by the Society of Systematic Zoology, (Dec. 30).

Society for the Study of Evolution. The annual meeting will include a Council meeting; a two-part symposium, "Patterns of Vertebrate Evolution" (Dec. 27); and five sessions for contributed papers (Dec. 28-30).

Society of Systematic Zoology. Annual meeting with several sessions for papers, a business meeting session, maintenance of the SSZ Book Lounge, the annual coffee hour, and the following symposia: "As-

pects of Systematics of Recent and Fossil Organisms," joint with the Paleontologieal Society, arranged by Ellis L. Yochelson and J. T. Dutro; "Empirical Character Weighting in Animal Taxonomy," arranged by Ernst Mayr; and "The Effect of Body Size on Species Interactions," arranged by John L. Brooks (Dec. 29). Speakers: N. Philip Ashmole, John L. Brooks, Peter R. Grant, Richard T. Holmes, and Alan J. Kohn.

The **Biologists' Smoker**, sponsored by AAAS Sections F and G and all the biological soeieties, will be 9:30-11:00 Dec. 27 eve., in the Park Room of the Sheraton-Park.

The AAAS Exposition of Science and Industry and the AAAS Science Theatre, with recent foreign and domestic films, will be prominent features of the meeting. Coupons for sleeping accommodations and advance registration will be found in SCIENCE, beginning July 22.

News of Biology in the Southeast

Jesse C. Thompson, Jr., Professor of Biology at Hampden-Sydney College, spent five weeks this past summer at the Eniwetok Marine Biological Laboratory, Eniwetok Atoll, Marshall Islands. His research involved the morphology and taxonomy of marine ciliated protozoa. Further collecting and study was done in Honolulu at the University of Hawaii.

James M. Boyles has been appointed Assistant Professor of Biology at the University of South Alabama. He received his Ph.D. from the University of Alabama.

Sammie H. Phelps has been appointed Interim Instructor of Biology at the University of South Alabama. Mrs. Phelps is completing her thesis research on tidal pool ecology of the Alabama coast.

The Department of Biological Science at The Florida State University announces that **Robert K. Godfrey** will be on leave during the coming year as Program Director of the Section of Environmental Biology and Systematics at the National Science Foundation. During his absence **Martin Roeder** will serve as Associate Chairman of the Department.

Harry A. Kent, Assoeiate Professor of Zoology at the University of Georgia, has received an NIH Special Fellowship which will permit him to spend the next year doing research at the Medical School of the University of Washington.

Robert C. Taylor has joined the Department of Zoology of the University of Georgia as Assistant Professor of Zoology. Dr. Taylor is a comparative physiologist working in crustacean sensory physiology.

Hope T. Ritter has joined the Department of Zoology of the University of Georgia as Professor of Zoology. Dr. Ritter will be responsible for developing the new introductory biology eourse which will replace several departmental introductory courses.

Two interdepartmental training programs have been started at the University of Georgia, with the financial support of the NIH. One program, in ecology, is under the direction of **Dr. Eugene P. Odum,** Alumni Foundation Professor of Zoology, and includes the Departments of Botany, Entomology, Zoology, and Wildlife Conservation. The second program, in malariology, is directed by **Dr. R. Barclay McGhee,** Alumni Foundation Professor of Zoology; it includes the Departments of Entomology and Zoology.

Francis M. Bush, Assistant Professor of Anatomy, Medical College of Virginia, has been awarded $27,122 from the U. S. Public Health Serviee for a two year study of "Molecular Aspects of Proteins and Blood Types of Birds." The grant will provide trainee funds for two graduate students, Charlene Seibert and William Farrar, both former students of Samford University.

William H. Ellis was named director of the graduate division at Austin Peay State College, effective September 1. Dr. Ellis, associate professor of biology, will continue to do some teaching in addition to the duties of his new position. A native of Robertson County, Ellis holds the B.S. and M.A. in Education degrees from APSC, and the Ph.D. from the University of Tennessee.

Nancy P. Groseclose, under the U.S.-India Women's College Exchange Program, is on leave from Agnes Scott and is teaehing in Miranda House, a eollege for women in Delhi. Under the same program **Mercy Samuel** of the Women's Christian College of Madras is an aeting instructor in the Biology Department of Agnes Scott. Miss Samuel holds M.A. and M.S. degrees from Anamali University in south India.

John Cairns, Jr. formerly Curator, Dept. of Limnology, Academy of Natural Sciences of Philadelphia is now Professor, Dept. of Zoology, University of Kansas, Lawrence, Kansas.

HINTON BAXTER OVERCASH

1894-1966

Dr. Hinton Baxter Overcash, 72, Professor Emeritus of Biology at Hampden-Sydney College, died July 21, 1966, after a long illness. Born in Statesville, N. C., Dr. Overcash received a B.S. degree from Davidson College and an M.A. degree from Columbia University. After extensive study at the University of Virginia and Cornell University he was awarded an honorary Doctor of Science degree by Davidson College in 1964. Upon his retirement, after 43 years of service at Hampden-Sydney, he received the college's Algernon Sydney Sullivan medallion. He was a member of Phi Beta Kappa, Chi Beta Chi, and the Association of Southeastern Biologists.

Charles Ray, Jr., Receives Meritorious Teaching Award for 1966

Professor Charles Ray, Jr., of Emory University was the recipient of the Meritorious Teaching Award for 1966.

Dr. Ray was born in Baltimore, Maryland. He received, in 1937, the Bachelor of Arts degree from Lafayette College. In 1941, the University of Virginia conferred upon him the degree of Doctor of Philosophy in Biology. From 1941 until 1952, he worked in industry, studying the genetics of *Linum,* from which linen is made. Emory University called him to the halls of Academia in 1952 and he has remained there ever since, teaching and studying the genetics and cytology of *Tetrahymena pyriformis,* a ciliate protozoan.

Professor Ray, as expected of a scholar, has attended and participated in the meetings of many scientific societies and congresses, including those of the Genetics Society of America, the American Association for the Advancement of Science, the American Institute of Biological Sciences, the International Congress of Protozoology (Prague), and the Association of Southeastern Biologists.

But, it is as a teacher that Professor Ray was honored. He has co-authored a widely used general biology text. He has participated in institutes for superior high school students and in the Danforth Foundation Institute for College Teachers of Biology. He has directed the graduate training of a number of biologists who now occupy positions of importance in college and university teaching, biological research, and public health. His seminars, his informal discussions with any student who wishes to talk with him, his classroom performance, always lucid, scholarly, enthusiastic, have stimulated and contributed to the maturation of scores of graduate students and hundreds of undergraduates.

The respect and love for Professor Ray, so movingly expressed by his former students, can only inspire his colleagues to greater efforts; the Association of Southeastern Biologists is honored by inscribing his name on its roll of great teachers.

Books and Periodicals

THE PLANKTON OF THE SEA. R. S. Wimpenny. American Elsevier Publishing Co., New York. 1966. 426 pp. $16.00.

The stated objective is to give the student a simple and elementary account of the titled subject but with a bias towards the physiological aspect. The book admirably meets this objective. The ultimate dependence of all the rest of marine life, including commercial fish and the largest whales, upon the mainly microscopic plankton which form such a dense population in the apparently empty sea is vividly told. The play constantly going forward in the depths and distances of the immense theatre of the sea has for its characters the many small floating animals and plants. The setting, the interrelations, the distribution and the behavior of the fascinating planktonic actors are all skillfully outlined.

There are twelve main chapters in the book, some with such descriptive yet fascinating titles as "The Fields of the Sea", "Hangers-on", "Producers and Consumers", and "The Life Within and Things Outside." The author gives an excellent account of the tremendous diversity in form and habits of the small organisms, and illustrates them by many line drawings which add greatly to the interest. Examples of all the animal and plant groups concerned are illustrated, and for the most important group of plants — the diatoms — almost all the known species are shown.

The book is not merely a descriptive list of sea plankton, however. It gives a great deal of practical and precise information for persons who may be able to use it in aspects of a career having to do with the sea, or with certain features of the sea. For instance, in the later chapters of the book, details are given on plankton and the productivity of the sea; on its potential use in providing food for man; and its role in the production of fuel oil; on explanations of form and distribution, and on the techniques employed. The effect of climate and water movements on the way organisms adapt themselves is examined and treated.

It should be added that the book has a short but adequate glossary; a bibliography of over 300 titles; an index which is well arranged and which casual sampling indicates is complete and accurate; and illustrations which add much to the clarity, interest and excitement of the book. The latter include a double page Frontispiece in color; 20 plates arranged on 15 full pages; 76 figures, many of them with multiple line drawings, scattered throughout the text material; and, in addition, a separate section titled "Illustrations of Species" at the end of the text which contains 22 numbered figures on 44 pages. Each of these 22 figures contain quite a num-

ber of individual line drawings, separately numbered, and each of which is a good figure in itself. There are over 500 separate line drawings among these "Illustrations." All are done simply, but in excellent detail, and comprise a really exquisite and beautiful collection.

The book would be of interest to almost any biologist for its general information. It should certainly be useful to every marine biologist, and would seem virtually indispensible to students of marine plankton. — WALTER S. FLORY, Wake Forest College.

HUMAN GENETICS AND ITS FOUNDATIONS. Maurice Whittinghill. Reinhold Publishing Corp. New York. 1965. 431 pp. $8.95.

Human genetics is a rapidly expanding subject. This new text book was developed during many years of teaching a course in human genetics. It utilizes the "classical" approach to teach the basic principles of genetics with illustrations drawn from man. Designed for a one-semester course, it is considerably more concise than such books as Stern's "The Principles of Human Genetics."

The twenty-eight chapters of the text are divided into four logical parts. The first nine chapters, making up Part I, deal with "Monohybrid Genic Segregation." In small size human families considerably more explanation is needed, and is given, to present the population geneticist's point of view and especially the point of view of the human population geneticist. The second part covers dihybrid and multihybrid inheritance, the developments in mapping the human X-chromosome, and the nature of currently unsolved linkage problems. Part III, "Biological Interactions," in six well written chapters, begins with cellular biochemistry, continues into the genetics of intermediary metabolism and gives a good appraisal of recent developments and conclusions. These lead naturally to the eight final chapters on "Mutation and Evolution," which comprise Part IV. These chapters deal especially with factors which can and which have caused evolution to occur — resulting in the human population of today — factors which range from spontaneous gene mutations to genetic changes in virulence.

At the end of each chapter is a well worded summary, a representative cross section of the pertinent literature for that chapter — dealing particularly with the more recent papers, and several problems of graded complexity. The book is well illustrated with a number of selected photographs and figures, together with many original drawings and a profusion of diagrams and tables. One gets the impression that there are, perhaps, too many diagrams at places. The necessary statistical concepts are carefully explained and illustrated with examples and problems.

The field of human genetics is developing rapidly enough to need new texts. This one is up to date and timely and with many student aids. It merits careful consideration for adoption for a one-semester course in its subject. — WALTER S. FLORY, Wake Forest College.

COMPREHENSIVE BIOCHEMISTRY, Vol. 16: Hydrolytic Reactions. Ed. by M. Florkin and E. H. Stoltz. American Elsevier Publishing Company, Inc. N. Y. 267 p. 1966. $14.00.

It is rather difficult to assess the value and quality of a multivolume treatise from just the examination of one or two volumes. Even so, what more could one say about an encyclopedic work of this magnitude than that it is informative, occasionally interesting, sometimes stimulating, but rarely exciting. Granted encyclopedias are essential educational aids and research tools, there is probably a utilitarian limit to the number of such works justifiable in any one field. In addition, one wonders for whom ownership is intended considering the price of extensive treatises. The present series enjoys these concerns. Is not most of this material published and available in similar works, and is not a 28 volume set (at $14-17 per volume) too expensive for the individual educator or researcher? On the other hand, who wouldn't be pleased to own a set of such superbly printed and handsomely bound books as this.

The same general comments apply to this volume that were made in my review of volume 6 (ASB Bulletin 12: 94, 1965). As the title implies, the book is a thorough and detailed account of the topics covered, and the treatments seem authoritative and accurate. The discussions are not just presentations of empirical data, but are refreshingly interpretive and theoretical. Personally, I found the discussions on enzymatic mechanisms particularly enlightening. Although the publishers are to be commended for the attractive format, the editors must assume responsibility for the redundancy of material — albeit difficult to avoid.

Lastly, permit me a digression to a personal prejudice. There appear to be two kinds of biochemists — BIOchemists, and bio-CHEMISTS: the former being essentially concerned with *in vivo* reactions but generally ignorant of reaction kinetics; the latter primarily preoccupied with *in vitro* studies but too often uninformed on basic biological processes. Too much of the material presented here seems to have been produced by people in the latter category. However, those of the former group will presumably find Chapter II on Phosphatases of particular interest and value; whereas those inclined more to the latter type might find the remaining chapters palatable (particularly if they are zoologically oriented). This reviewer, at best a BIO-chemist, is keenly aware that *in vitro* studies shed much light on natural biologic processes, but is also cognizant of the fact that what goes on in the test-tube may be only remotely analogous to what goes on in living stuff. We may, from such studies, make approximate inferences of life's chemistry but should avoid being deluded into thinking that we know the real workings of biologic entities whose parameters are far more complex than those for similar reactions in the test-tube. The present treatise is, at best, a status report. Perhaps other volumes of the series deal more explicitly with this concern. — RALPH D. AMEN, Wake Forest College.

The ASB BULLETIN

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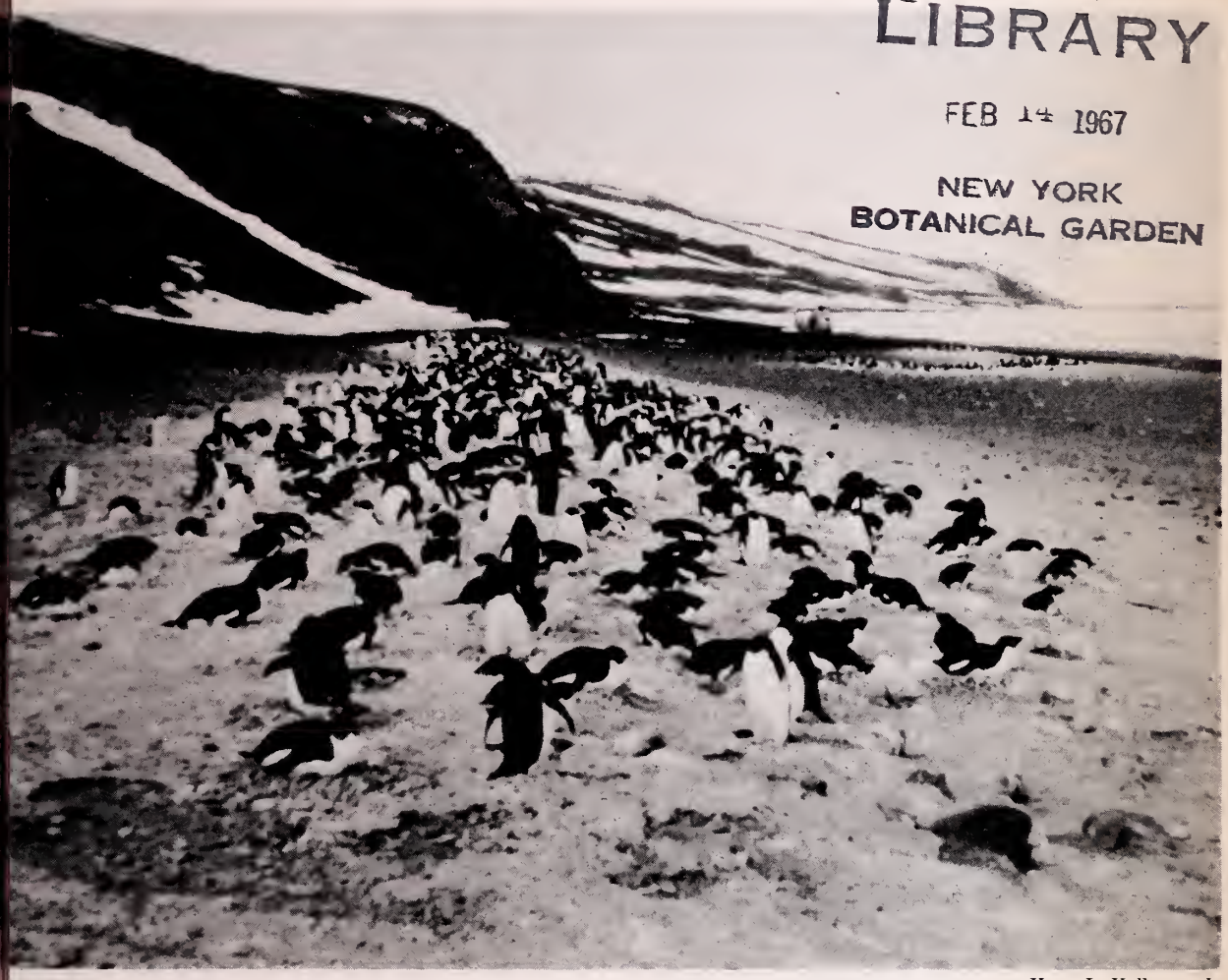

Harry L. Holloway, Jr.

Adelie penguins (*Pygoscelis adelie*) at Cape Bird, Ross Island, Antarctica

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About the Columbia Meeting

The Association of Southeastern Biologists will hold its 28th Annual Meeting April 20-22, 1967, at the University of South Carolina, Columbia, S. C. Registration and most activities will be in the Russell House on Green Street. The Thursday evening program will be held in Drayton Hall on Sumter Street beginning at 7:30 P.M. Following the program, exhibits will be on display and the smoker will be held at the Russell House. Friday will be occupied by paper sessions and the annual business meeting. A paper session sponsored by the Southeastern Section of the American Society of Ichthyologists and Herpetologists will also be held. The site of the Friday evening banquet, retiring President's address, and presentation of awards will be the banquet hall of Columbia Hall (the former Columbia Hotel) on Sumter and Gervais Streets.

Dates of meeting — April 20-22

Executive Committee Meeting — 1 P.M., Thursday, April 20, Russell House Conference Room.

Registration

Time — 4:00 P.M. to 7:15 P.M., Thursday
8:00 A.M. to 11:00 A.M., Friday
Place — Main lobby, Russell House
Fee — $1.00

Location of Exhibits and Paper Sessions

Exhibits — Assembly room of Russell House 4-11 P.M., Thursday; 8 A.M.-11 P.M., Friday; 8 A.M.-noon Saturday.
Paper Sessions — Russell House and Life Science Building.

GENERAL INFORMATION

Columbia is the capital of South Carolina and the heart of a 250,000 size metropolitan area. The recent influx of many new industries in addition to those already long established here, along with the proximity of Fort Jackson, the Army's very active recruit-training center, gives the whole area an excellent base for economic progress and rapid growth.

Geographically, Columbia is in the center of the state and on the fall line between the Piedmont and Coastal Plain. Elevation ranges from about 200-250 feet. The very mild climate and rather adequate rainfall has allowed the development of a striking display of ornamentals, especially camellias and azaleas in the spring.

The Sand Hills, a 5-20 mile wide strip extending Northeast and southwest across the state, closely parallels the fall line and forms the most conspicuous physiographic feature of the central region. The strip represents what is generally believed to be a former beach line. Here the very porous sandy soil is poorly developed and supports a xeric type of vegetation with long-leaf pine and turkey oak being the most conspicuous species.

Local alcohol mores

Beer and wine are sold in grocery stores and in some restaurants. Hard liquors are available at retail liquor stores only.

Travel to Columbia

Highway routes serving Columbia are East-West I-26, U. S. 76, 378; North-South U. S. 1, 21, 321. The Seaboard and the Southern Railroads, the Greyhound and Carolina Trailways Bus Lines provide ground transportation to Columbia. Airlines serving Columbia Metropolitan Airport are: Delta, Eastern, Piedmont and Southern. Limousine fare one-way is $1.25. If advised of your arrival time, a representative of USC can meet you at the airport. Correspondence concerning time of arrival by plane should be addressed to W. H. Queen, Biology Department.

The USC campus is located on the near south side of downtown Columbia, extending north and south from Green Street and eastward from Sumter Street.

Dining facilities

Dining facilities on the campus include the Faculty Dining Room at Russell House Union Building, serving during 11:30-1:30 lunch hour, and cafeterias located in Russell House, South Women's Residence Hall and M-N Men's Residence Hall which serve during regular meal time hours. These facilities are quite crowded from 11:30-12:30. A snack bar in Russell House remains open during the day and evening.

Other eating establishments within walking distance of the campus are: the Sportsman Restaurant on Assembly St. near Pendleton; the Market Restaurant on Assembly at Gervais; S and S Cafeteria on Gervais near Bull; Morrison's Cafeteria on Sumter at Washington; and Cornell Arms Cafeteria on Sumter at Pendleton. Several short order establishments are also located in the vicinity of the campus, and some downtown motels have restaurant facilities.

Placement Service

An attempt to formalize and improve the efficiency of the placement service will be made. The present plans are to have a registry of employers and potential employees. For those who wish, interview schedules will be arranged. The usual employment opportunity bulletin board service will also be available.

Field Trips

At present, pending expression of interest, the following field trips are planned:

1. For early arrivals on Thursday a field trip has been arranged by Dr. W. T. Batson to South Carolina sand hill communities in the vicinity of Columbia. Emphasis will be on floristic and ecological aspects of these communities.
2. On Saturday a tour planned by Dr. E. F. Thompson will include a visit to some Carolina Bays in Berkeley County, S. C. and the Grice Marine Laboratory in Charleston. The Bays to be visited have been studied floristically by Mr. Richard Porcher, a Ph.D. candidate at the University of South Carolina. Mr. Porcher will guide this portion of the trip. The Grice Marine Laboratory is operated by the College of Charleston and laboratory personnel will be present to guide a tour through the laboratory facilities.
3. A Saturday trip through swamp and flood plain communities in the vicinity of Columbia has been planned by Dr. W. T. Batson. Ecological and floristic aspects of the communities will be emphasized.

4. A tour of points of interest in Columbia will be conducted on Friday. Since this trip will be during the day, it is designed primarily for wives and children of the members who may find some idle time on their hands during paper sessions.

Local Arrangements Committee

Co-Chairmen	D. L. Claybrook
	G. T. Cowley
Housing and Family Activity	W. H. Queen
Banquet, Food Services	W. D. Dawson
Smoker, Exhibits, Publicity	J. M. Herr
	W. T. Wimer
Field Trips	W. T. Batson
	E. F. Thompson
Meeting Rooms, Audio-Visual	B. T. Cole
Transportation	W. H. Queen
Registration	Roberta Lovelace
	Cecile Huggins
	G. DeCoursey
	R. Lumb
Placement Service	R. Lumb
Finance	F. H. Lauter
Program	G. T. Cowley
	D. L. Claybrook

Accommodations

It is advisable to make reservations at least by the end of March. Write directly to the hotel or motel.

ROOM RATES OF METROPOLITAN COLUMBIA MOTELS-HOTELS

	No. of Units	Type Room	Price
Facilities Within Walking Distance of USC Campus			
DOWNTOWNER MOTOR INN			
1301 Main Street	101	Single	$ 8.50-$12.00
		Double	$ 8.50-$12.00
		Twin	$10.50-$14.00
HEART OF COLUMBIA			
1011 Assembly Street	100	Single	$ 8.00-$10.00
		Double	$12.00-$16.00
		Twin	—
ORVIN COURT			
821 Assembly Street	101	Single	$ 6.50-$12.00
		Double	$ 6.50-$ 7.00
		Twin	$ 7.00-$10.00
TOWN HOUSE MOTOR INN			
1615 Gervais Street	100	Single	$ 8.00-$12.00
		Double	$12.00-$18.00
		Twin	$12.00-$18.00
WADE HAMPTON HOTEL			
	350	Single	$ 6.00-$ 8.00
		Double	$ 9.00-$12.00
		Twin	$12.50-$14.50
Facilities in Downtown Columbia, Bus Service to USC Campus			
CAPITAL CABANA MOTOR INN			
1901 Assembly Street	122	Single	$ 9.00-$18.00
		Double	$ 9.00-$10.00
		Twin	$12.00-$16.00
GOLDEN EAGLE MOTOR INN			
2025 Main Street	119	Single	$ 8.00
		Double	$11.00
		Twin	$12.00
LAUREL HILL HIGHWAY HOTEL			
1829 Assembly Street	50	Single	$ 8.00-$10.00
		Double	$10.00-$12.00
		Twin	$12.00-$14.00
Motels Within 5 Miles of USC Campus			
HOLIDAY INN OF COLUMBIA			
505 Knox Abbot Drive	158	Single	—
		Double	$ 5.50-$ 8.00
		Twin	$ 8.00-$13.00
HOLIDAY INN #2			
Highway #1 and I 26		Single	$ 8.50
		Double	$14.00
		Twin	—
HOST OF AMERICA			
4502 Devine Street	100	Single	$ 9.00-$16.00
		Double	$ 9.00-$10.00
		Twin	$12.00
HOWARD JOHNSON'S MOTOR LODGE			
Knox Abbott Drive, Cayce	70	Single	$ 9.50-$10.50
		Double	$14.00
		Twin	$16.00
HOWARD JOHNSON'S MOTOR LODGE, COLUMBIA NORTH			
Highway I 26	66	Single	$ 9.50
		Double	$16.00
		Twin	—
QUALITY COURT MOTEL FOREST			
3111 Two Notch Road	46	Single	$ 9.00-$13.00
		Double	$13.00-$15.00
		Twin	—
TREMONT MOTOR INN			
Knox Abbott Drive	100	Single	$ 9.00
		Double	$11.00-$13.00
		Twin	$13.00-$15.00

A number of other motels are located in the Columbia area.

CAMPING FACILITIES

The Sesqui-Centennial State Park is approximately 12 miles northeast of Columbia on U. S. 1. There are 36 campsites available, with utilities and hot showers. The fee is $1.75 per day, and no sites are reserved in advance. For further details write to Park Supt., Sesqui-Centennial State Park, Columbia, S. C. 29206. Telephone Columbia (area 803) 787-6285.

Meritorious Award Nominations

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)
1961. Dr. Warren Deacon (Vanderbilt)
1962. Dr. Septima C. Smith (Univ. of Alabama)
1963. Father Patrick H. Yancey (Spring Hill College)
1964. Dr. Ruskin S. Freer (Lynchburg College)
1965. Dr. Harwell P. Sturdivant (Western Maryland College)
1966. Dr. Charles Ray, Jr. (Emory Univ.)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting material to *Dr. Julian Darlington, Chairman, Biology Dept., Southwestern at Memphis, Memphis, Tennessee* by 1 March 1967.

COMMITTEE
DOROTHY L. CRANDALL
H. BRANCH HOWE, JR.
JULIAN T. DARLINGTON, *Chairman*

Association Research Prize

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.
2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.
3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.
4. **Papers submitted in competition are judged by eminent scientists in the various fields of biology. These individuals are selected by the Research Committee and are from schools outside the Southeast. Every effort is made by the Research Committee to keep the authors of submitted papers anonymous. Criteria for the award are left to the discretion of the judges' panel, who may withhold said award if no paper is considered to have sufficient merit.**
5. Papers must be submitted *in triplicate* and in their entirety not later than March 1, 1967, to *Dr. Edward Clebsch, Dept. of Botany, Univ. of Tennessee, Knoxville, Tenn., 37916.* One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.
6. Announcement of the winner of the Research Prize will be made at the annual meeting.

Ivey F. Lewis Fellowship at Mountain Lake Biological Station

A Research Fellowship of $150.00 for summer course study or research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. This fellowship, formerly known as the *Phipps and Bird Research Fellowship,* was re-named at the request of the Phipps and Bird Company. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and especially in the case of younger workers, by references and educational data. Applications should be sent to *Dr. J. J. Murray, Dept. of Biology, Univ. of Virginia, Charlottesville, Virginia 22903* not later than 29 March 1967. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE
J. J. MURRAY, *ex officio*
JAMES RIOPEL, *ex officio*
DONALD CAPLENOR
R. W. HULL
EDWARD E. C. CLEBSCH, *Chairman*

Mary Glide Goethe Travel Awards

For the tenth year there will be funds available through the generosity of the late Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year at the University of South Carolina, Columbia, S. C. Approximately $300 will be available from the contributions of Mr. Goethe, and it is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from Columbia.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe Committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1967 meeting of the Association of Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Indicate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.
2. Give information as to whether or not a paper is being presented by the applicant.
3. In a paragraph, give a brief history of your education to date, of how many years you have been — and plan to be — in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.
4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.
5. Have your major professor or departmental head write a letter supporting your application.
6. Applications and supporting letters, both in triplicate, should be in the hands of *Dr. Thomas Daggy, Box 626, Davidson, N. C., 28036, by 1 March 1967.* Applicants will be notified of the decision of the Committee during March.

C. J. Umphlett, Paul Bailey,
Thomas Daggy, *Chairman*

A vote will be taken at the Business Meeting in April to determine whether or not the travel awards should be continued after the funds on hand are exhausted. So that members may be better informed on the history of the travel awards, we refer you to an article on the late Mr. Goethe that appeared in the ASB Bulletin, Volume 12, Number 3, July, 1965, pp. 66-67.

INTERNATIONAL SYMPOSIUM ON EUTROPHICATION SCHEDULED FOR JUNE 11-16 IN MADISON, WIS.

The complex processes, both natural and man-induced, which contribute to and, in the case of man's activities, frequently hasten the aging of lakes and streams will be the subject of an International Symposium on Eutrophication, to be held June 11-16, 1967 at the University of Wisconsin, in Madison.

The public symposium has been organized by the Division of Biology and Agriculture of the National Research Council in cooperation with the Atomic Energy Commission, Department of Interior, National Science Foundation, and Office of Naval Research.

The program is intended to provide a review of the present status of world knowledge of the problem, as well as an open forum for the exchange of informed views on what may be done to slow or reverse the processes of eutrophication.

Taking part in the program will be 36 eminent scientists, from the United States and abroad, representing the fields of botany, chemistry, limnology, zoology, hydrology, and sanitary and agricultural engineering.

In addition, public policy considerations and the broad social and economic consequences of eutrophication will be discussed by Senator Gaylord Nelson, of Wisconsin, and Secretary of the Interior Stewart L. Udall. Senator Nelson will speak at noon on Tuesday, June 13, and Secretary Udall will address the banquet audience, Wednesday evening, June 14.

The symposium will be held in the Wisconsin Center Building of the University of Wisconsin and will be open to research scientists, public health personnel, conservationists, representatives of industry, officials from state and Federal regulatory agencies, and others interested in water pollution control. Proceedings of the symposium will be published and a copy sent to each registrant.

During the first full day session on Monday, June 12, reports will be presented documenting the eutrophication of lakes in Europe, Scandinavia, Asia, and North America. Special reports will be presented as well on the American Great Lakes, Canadian streams, and estuaries in Norway and the U. S.

The detection and measurement of eutrophication will be considered on Tuesday, June 13, in a series of papers dealing with the indices of eutrophication, primary productivity, zooplankton, fish, bottom organisms, phytoplankton, and bacteria.

On Wednesday, June 14, the symposium will take up the engineering problems of nutrient removal and the preventive measures needed to control urban, agricultural, and forest drainage. Corrective measures, including the removal of sediment and organic material, the use of chemical toxicants, and zoning restrictions will also be discussed.

Contributions to basic research from the study of eutrophication will be considered on Thursday, June 15. Papers will deal with the physiological stresses induced by eutrophication, nutrition of rooted aquatic plants and zooplankton, factors in plant growth, chemical exchange at the interface of sediment and water, past eutrophication from microfossils, geochemistry of eutrophication, and the use of mathematical models in eutrophication studies.

An executive session will be convened on Friday, June 16, to prepare recommendations for appropriate remedial action by government and private interests.

A registration fee of $10 has been set to cover the cost of the published proceedings of the symposium. Registration will begin at 2:00 p.m. Sunday, June 11, in the Wisconsin Center Building.

Gerard A. Rohlich, Professor of Civil Engineering, University of Wisconsin, is chairman of the planning committee for the symposium. Other members of the committee are: Alfred M. Beeton, Professor of Zoology, University of Wisconsin; David C. Chandler, Professor of Zoology, University of Michigan; W. T. Edmondson, Professor of Zoology, University of Washington; and Arthur D. Hasler, Professor of Limnology, University of Wisconsin.

Those desiring further information about the program may write to Dr. Michael R. DeCarlo, Division of Biology and Agriculture, National Research Council, 2101 Constitution Avenue, N.W., Washington, D. C. 20418.

The National Research Council is the operating agency of the National Academy of Sciences and the National Academy of Engineering, private organizations devoted to the furtherance of science and engineering and their use for human welfare. They also serve as official advisers to the Federal Government in science and technology.

Tentative Program

INTERNATIONAL SYMPOSIUM
ON EUTROPHICATION

University of Wisconsin
June 11, 12, 13, 14, 15, 16, 1967
Wisconsin Center Building
Madison, Wisconsin

Sunday — June 11, 1967

14:00-17:00 Registration and Reception
20:00 Natural and Cultural Eutrophication
G. E. Hutchinson (USA)

Monday — June 12, 1967

CONCEPTS OF EUTROPHICATION & DOCUMENTATION — GEOGRAPHICAL

09:00 Opening Session — Welcome
F. H. Harrington, President
University of Wisconsin

09:15 The European Lakes (Southern)
Eugen A. Thomas (Switzerland)
10:00 Northern Europe & Scandinavia
Wilhelm Rodhe (Sweden)
10:45 Eastern Europe
M. Straskraba (Czechoslovakia)
11:30 Asian Lakes
S. Horie (Japan)
12:15 LUNCH
13:30 North America
W. T. Edmondson (USA)
14:15 Great Lakes
A. M. Beeton (USA)
15:00 Streams
H. L. Hynes (Canada)
15:45 (2 papers) Estuaries
K. Baalsrud (Norway)
B. Ketchum (USA)

Tuesday — June 13, 1967

DETECTION AND MEASUREMENT OF EUTROPHICATION

09:00 Indices of Eutrophication
Frank Hooper (USA)
Biological
09:45 Primary Productivity
10:30 Zooplankton
J. Brooks (USA)
11:15 Fish
P. A. Larkin (Canada)
12:00 LUNCH
Speaker: The Honorable Gaylord Nelson
United States Senate
13:45 Bottom Organism
P. Jonasson (Denmark)
14:30 Phytoplankton
J. W. G. Lund (United Kingdom)
15:15 Bacteria
Chemical
16:00 Chemical
W. Ohle (Germany)
Physical
16:45 Physical
C. L. Mortimer (USA)
19:00 BOAT RIDE & PICNIC SUPPER

Wednesday — June 14, 1967

PREVENTIVE AND CORRECTIVE MEASURES

Preventive
09:00 Engineering Aspects of Nutrient Removal
G. A. Rohlich (USA)
09:45 Urban Drainage
10:30 Agricultural Drainage
R. Corey (USA)
11:15 Forest Drainage
Charles Cooper (USA)
12:00 LUNCH
Corrective
13:45 Chemical Toxicants
14:30 Sediment Removal
R. Ogelsby (USA)
15:15 Organic Production — Removal
D. Livermore (USA)
16:00 Legal Controls — Zoning
J. Beuscher (USA)
20:00 BANQUET
Speaker: The Honorable Stewart L. Udall
Secretary of the Interior

Thursday — June 15, 1967

CONTRIBUTIONS TO SCIENCE FROM THE STUDY OF EUTROPHICATION

09:00 Physiological Stresses Induced by Eutrophication
09:45 Nutrition of Rooted Aquatic Plants
G. Gerloff (USA)
10:30 Zooplankton Nutrition
G. Saunders (USA)
11:15 Plant Growth Factors
L. Pravosoli (USA)
12:00 LUNCH
13:30 Chemical Exchange at Sediment Water Interface
14:15 Past Eutrophication from microfossils
D. Frey (USA)
15:00 Geochemistry of Eutrophication
15:45 Interaction of Eutrophication Indices in Models
Fred Smith (USA)
16:30 Analytical Methods — Dissolved Substances
G. F. Lee (USA)

Friday — June 16, 1967

09:00 EXECUTIVE COMMITTEE MEETING AND ADVISORY COMMITTEE TO PRESENT RECOMMENDATIONS
11:30 ADJOURNMENT

Books and Periodicals

The 4th edition of A MANUAL OF TROPICAL MEDICINE by George W. Hunter, III, William W. Frye and J. Clyde Swartzwelder was released by W. B. Saunders Company on October 18. This is a book of some 931 pages and covers the diseases of the tropics, subtropics and many common to the temperate zone. Since it includes material from the viruses to the medically important arthropods, the authors secured the collaboration of some 37 contributors to cover segments of the field they did not feel competent to write themselves.

The book is used extensively by the Armed Forces, Peace Corps personnel, medical students, public health workers and practicing physicians. Previous editions have been translated into Spanish and Polish with photo-offset copies being sold by the Japanese.

COMPREHENSIVE BIOCHEMISTRY, Vol. 14: Biological Oxidations. Ed. by M. Florkin and E. H. Stoltz. American Elsevier Publishing Company, Inc., N. Y. 514 pp. 1966. $25.00.

This volume on Biological Oxidations is in Section III of the treatise on Comprehensive Biochemistry. Section III is devoted to topics of biochemical reaction mechanisms dealing mainly with the chemistry of enzyme systems and coenzymes. The present volume is concerned with oxidation reactions and mechanisms with emphasis on the enzyme complexes of the respiratory chain. The chapter topics covered include: Dehydrogenation; Chemistry and Function of Lipoic Acid; Flavoprotein Dehydrogenases of the Respiratory Chain; The Functional Complexes of the Mitochondrial Electron-Transfer System; Cytochromes and Cytochrome Oxidase; The Mitochondrial Electron-Transfer System; Oxidative Phosphorylation; Photosynthetic Phosphorylation; Enzymatic Activation of Oxygen; and Peroxidases and Catalase.

The chapters on Dehydrogenation, The Functional Complexes of the Mitochondrial Electron-Transfer System, and The Mitochondrial Electron-Transfer System are particularly informative, as they lucidly develop the concepts and clearly summarize the salient ideas of terminal oxidations. Although this is a relatively large volume and exceptionally well detailed, the information is adequately summarized. The chapter on The Mitochondrial Electron-Transfer System offers an exeellent review and summary of the latest models for this system.

Another refreshing attribute of the papers in this volume is the historical development of the topics covered. Considerable attention is paid to early investigations and this has been systematically integrated into the formulation of current models of oxidative mechanisms.

Aside from the general but thorough treatment of dehydrogenases, the specific enzyme complex receiving the most detailed treatment is that of succinic dehydrogenase. This is not unexpected since this is historically the best known oxidative complex.

Unlike other volumes examined in this series, the botanical aspects of biochemistry are given greater and their due consideration in this volume. The chapter on Photosynthetic Phosphorylation is particularly welcome, and constitutes an often neglected contrast to oxidative phosphorylation. The significant similarities and differences between these two types of phosphorylation are presented and illuminating.

My hopes expressed in an earlier review of another volume in this series (ASB Bulletin 13:76, 1966) appear to be realized in this volume — that of a truly biochemical exposé timely for physiologists. A casual reading of this volume prompts me to alter, to a more positive evaluation, my opinion of this series. This volume, and the others of Section III, will probably be of more immediate value to the physiologist than the more strictly chemically oriented volumes.

This volume appears to be relatively free of technical errors. It is superbly bound and printed on a heavy, textured paper — making a handsome book. However, the stated price is a deterrent to ownership for most interested investigators. RALPH D. AMEN, WAKE FOREST COLLEGE.

Regulations for Collecting in Mexico

The Department of State has asked the National Science Foundation to assist in informing the U. S. scientific community about regulations imposed by the Government of Mexico on all persons, including scientists, who wish to collect flora and fauna in Mexico for export.

The Government of Mexico is concerned about shipments of live wild animals and plants from Mexico. The tightening of regulations is part of a worldwide effort to protect scarce and endangered species. Strict enforcement of present regulations on plants, and new regulations on wildlife, have therefore been instituted by the Government of Mexico.

The following restrictions are now in effect:

1. No wild orchids or cactus may be sold or exported and no one except authorized scientific collectors may collect any. Scientists who apply will be screened carefully and only those with a valid reason will be granted permits.

2. No wild birds, mammals, or terrestrial mammals may be sold or purchased, nor exported commercially.

3. Hunting for many species formerly on the open list is now prohibited or allowed only under special permit.

4. Scientific collectors of wild terrestrial animals must make formal application and pay a fee. Only those with legitimate research projects and sponsored by appropriate institutions will be issued permits.

5. Although there are no specific regulations

for collectors of marine life, both plant and animal, the same general procedure applies.

Scientists who are connected with appropriate institutions may apply for permits to take wild terrestrial plants from:

Ing. Alfonso Loera Borja,
Dirección General de Aprovechamicntos Forestales,
Subsecretaria de Recursos Forestales y de la Fauna,
Aquiles Serdán 28 — Segundo Piso,
Mexico, D. F.

To obtain a permit for the non-commercial export of the plant specimens that he collects, the botanist applies to:

Ing. Alfonso Tamez Mireles,
Dirección General de Economía Agrícola,
Subsecretaria de Agricultura,
Aquiles Serdán 28 — Primer piso,
Mexico, D. F.

The accredited scientist who wishes to collect wild birds or terrestrial mammals and reptiles as part of his scientific studies, should send applications and fees to:

Dr. Rodolfo Hernández Corzo,
Director General de Caza,
Dirección General de la Fauna Silvestre,
Aquiles Serdán No. 28 — 7mo. piso
Mexico, D. F.

The scientist who wishes to take fishes, amphibia, or aquatic mammals, reptiles and plants, should apply to:

Lic. Jorge Echaniz R.,
Director General,
Secretaria de Industria y Comercio,
Avenida Cuauhtémoc No. 80,
Mexico, D. F.

The American Embassy in Mexico City is able to help obtain permits, if given adequate advance notice, for scientists who are connected with U. S. Government agencies or institutions or who are conducting Federally sponsored research. The Embassy can help other qualified applicants on a "time available" basis.

PERMIT REQUIREMENTS

1. — Submit your application at your earliest convenience. It must be signed by the Director or Dean of the Scientific Institution where you work.
2. — State in detail the research program of your interest, and the intended use of specimens that you wish to collect.
3. — State the area in which you wish to work, and the number of specimens needed for your investigation.
4. — A $20.00 U. S. currency fee is charged for the permit, and two small identification photographs are needed for your credential.
5. — Permits are issued only to senior research workers, not to students or assistants.
6. — Present yourself to the Delegado Forestal y de la Fauna in the State where your collection will take place, for the control of your permit and activities.
7. — Restrict yourself to the activities and number of specimens allowed in the permit, with due regard for the bio-ecological status of the area.

News of Biology in the Southeast

The University of South Alabama has acquired a tract of land on Big Creek Lake which will be developed into a permanent limnologieal research and teaching faeility available to visiting seientists. **Dr. Crawford G. Jackson, Jr.** has been appointed Direetor of the Big Creek Lake Biological Station and will be responsible for development of the physieal facilities and coordination of the teaching and research program.

Michael J. Pelczar, Jr., has suceeeded Ronald Bamford as ehief administrative officer of the Graduate School of the University of Maryland.

Norvel M. McClung, formerly of the University of Georgia, has been appointed Professor of Botany and Bacteriology at the University of South Florida, Tampa.

Marvin R. Alvarez, formerly of the University of Florida, has been appointed Assistant Professor of Botany and Bacteriology at the University of South Florida, Tampa.

Alan Richter has been appointed Assistant Professor of Mierobiology at Georgia State College. He received his Ph.D. from the University of Wiseonsin. He comes to G.S.C. from the Army Biological Laboratories, Frederick, Md.

Donald G. Ahearn will join the Microbiology staff at Georgia State College as Assistant Professor of Microbiology at the beginning of the winter quarter. He rereceived his Ph.D. from the University of Miama.

Lamar Morrison (M.S., University of Georgia) started in September as Instruetor of Microbiology at Georgia State College.

Other recent additions to the Biology Department of Georgia State College are **Dr. Peter Gaffney,** (Microbiology), from the Georgia Institute of Technology and **Dr. Fred K. Parrish** (Invertebrate Zoology) from Agnes Scott College. The department recently reeeived a matching N.S.F. grant of $17,400 for the purehase of instructional scientifie equipment.

Applications for Environmental Health Fellowships are now being accepted for graduate study during the 1967-68 academic year at the Consolidated University of North Carolina (Chapel Hill and Raleigh campuses). This is a broad interdepartmental program designed to give students training for careers in research, teaching, and practice in environmental health. It is sponsored by the Departments of Biostatisties, Environmental Sciences and Engineering, and Epidemiology of the School of Publie Health; the Departments of Botany, Chemistry, City and Regional Planning, Geology, and Zoology of the College of Arts and Seiences; the School of Medicine; and the Department of Food Science at North Carolina State University at Raleigh. Students will generally enroll in the department of their basic specialty and then select eourses in other departments in order to obtain a broad understanding of the problems of the environment and the applieation of their specialty to the solution of these problems. The fellowships are provided through the Institute for Environmental Health Studies and include tuition, fees, and a stipend. The amount of the stipend under these fellowships will be in aeeordanee with eurrent Publie Health Serviee and University policy.

Further information may be obtained by writing the head of any of the sponsoring departments. All are located at Chapel Hill, North Carolina except the Department of Food Seience which is located at Raleigh, North Carolina.

The University of Tennessee

News from the Botany Department of The University of Tennessee includes a number of items. **Mr. Wayne Chester,** a graduate student, reeeived support from the Society of the Sigma Xi for travel in connection with studies of the genus *Halesia* during the spring quarter. **Dr. H. R. DeSelm** also reeeived support from Sigma Xi for travel to a workshop in Arizona at the Laboratory of Tree-Ring Analysis.

Dr. A. J. Sharp has traveled extensively during the past several months. He spent several weeks in Mexico in connection with his studies of bryophyte distribution in North America and Asia, in company with a Japanese botanist and graduate student. He also attended the Pacific Science Congress in Tokyo, Japan, in August, after delivering his address as immediate past president of the Botanical Society of America at the AIBS meetings. **Dr. Larry Jones,** who has just completed his first year in the department, worked as a research partieipant in the Biology Division of Oak Ridge National Laboratory during the summer. **Dean Walter Herndon** and **Dr. Ray Holton** received a contract with the U.S. Army for the study of certain aspects of the effeet of environmental and physiological factors on algae reproduction. **Dr. J. S. Olson,** part-time professor in the department who is with ORNL and who is supported by funds from the Ford Foundation, is Project Director for a grant from the National Science Foundation in an Advanced Science Seminar Project for the training of systems ecologists. **Dr. Bernard G. Patten** from ORNL is teaching the fall and winter quarters of this sequence.

Dr. Edward E. C. Clebsch was promoted to Associate Professor. He will administer a contract with the National Park Service in the amount of $11,600 for the next two years to investigate factors related to the formation and maintenance of the grass and heath balds of the Great Smoky Mountains. He also administers a contract in the amount of $12,500 with Union Carbide Corporation to continue serviees in eonnection with the cataloging, identification, collection, and processing of soil and vegetation samples from the Oak Ridge area. **Dr. Clebsch** also administers a eontract with the Tennessee Game & Fish Commission for the study of grasses as potential wildlife plants in Tennessee. The graduate student on the last project, **Mr. Ken E. Rogers,** spent the summer at the U. S. National Herbarium in Washington under the support of The Association for Tropieal Biology.

Dr. Sandra Bell is on leave for this year for the purpose of doing research in the Department of Genetics at the National Agrieulture Institute in Paris, France. **Dr. A. Murray Evans** taught a eourse in pteridology at the Mountain Lake Biological Station in the first term this past summer. He continues to administer a 3-year NSF grant for $26,000 for evolutionary studies in tropical ferns.

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION (Act of October 23, 1962; Section 4369, Title 39, United States Code) — Publisher: File two copies of this form with your postmaster

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NAME	ADDRESS
Association of Southeastern Biologists, Inc.	Chapel Hill, North Carolina (Dr. William J. Koch, Associate Professor, Dept. of Botany, University of North Carolina -- Agent.)

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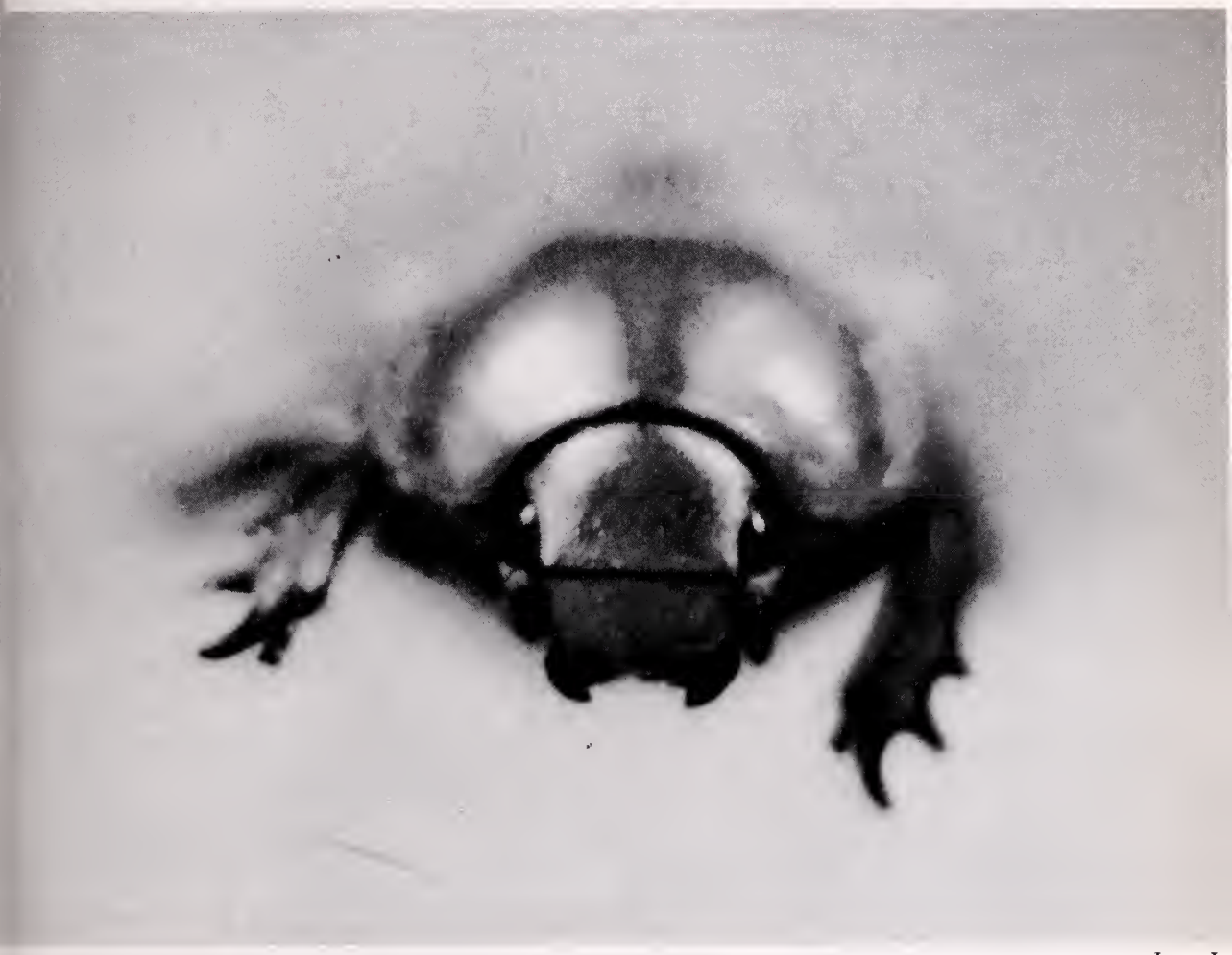
Volume 14, Number 2 April 1967



Beetle

James Joe

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The Association of Southeastern Biologists

ASB BULLETIN

Volume 14, Number 2 - April 1967

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Associate Editor

JOSEPH F. FITZPATRICK, JR.,
News Editor

BETTY PEDDICORD, Assistant Editor

JOHN CARPENTER, Business Manager

CONTENTS

Note: Shortly before this issue went to press, we learned that Dr. Cain, who is scheduled to give the Invitational Address on April 20, will not be able to attend because of governmental commitments. Another speaker, recommended by Dr. Cain, will speak in his place — but at press time we do not know who this will be.

ASSOCIATION AFFAIRS

The Nominating Committee has selected the following slate of nominees for the various ASB offices that will be vacated this year. So that you may be able to consider your choices carefully, we are including a short biographical sketch of each nominee.

President Elect

John Mervin Herr, Jr. — Robert B. Short

Vice-President

C. Ritchie Bell — Margaret Y. Menzel

Secretary

Dorothy L. Crandall — Faith S. Miller

Executive Committee

Burton J. Bogitsh — Anna Josephine Bridgman

James C. McDonald — Frances E. Silliman

(*Continued on page 46*)

Program of the 28th Annual Meeting of the Association of Southeastern Biologists

A joint meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Southeastern Region of Beta Beta Beta National Honorary Biological Society, and the Southeastern Section of the American Society of Ichthyologists and Herpetologists.

THURSDAY, APRIL 20

12:00-2:00 P.M. **Beta Beta Beta Registration:** Room 200, Life Sciences.

1:30 P.M. **Executive Committee Meeting, Association of Southeastern Biologists:** Conference Room, Russell House.

2:00 P.M. **Field Trip:** Sandhills communities in the vicinity of Columbia. Led by Dr. W. T. Batson. Information available from Dr. Batson, Dept. of Biology, University of South Carolina.

4:00-7:15 P.M. and Conclusion of General Session until 10:00 P.M. **ASB Registration:** Front Lobby, Russell House.

Placement Service Registration: Front Lobby, Russell House.

6:00 P.M. **Beta Beta Beta Smorgasbord:** Room 119, Life Sciences.

7:30 P.M. **ASB General Session:** Drayton Hall Auditorium. Dr. Elsie Quarterman, presiding.

Address of Welcome: Dr. James A. Morris, Vice-President for Advanced Studies and Research, University of South Carolina.

Response: Dr. Elsie Quarterman, President, the Association of Southeastern Biologists.

Invitational Address: "Natural-area Preservation." Dr. Stanley A. Cain, Assistant Secretary for Fish and Wildlife and Parks, Department of the Interior, and a plant ecologist.

Smoker and Exhibits: A smoker with refreshments, will follow the general session and will be held in the Confederate Room of the Russell House. Exhibits will be on display in the Assembly Room, Russell House.

Facilities in the Life Science Building and the Biology portion of the Science Annex: The Department of Biology will be open to visitors throughout the meetings. You are welcome in classrooms, teaching and research laboratories, the herbarium, and the greenhouse.

FRIDAY, APRIL 21

MORNING

7:15 A.M. **Breakfast, Southern Appalachian Botanical Club:** Palmetto Room, Russell House.

7:15 A.M. **Breakfast, Mountain Lake Biological Station Alumni and friends:** Jasmine Room, Russell House.
Both breakfasts. Go through cafeteria line in the Confederate Room for food and beverage. Silverware, etc. will be at your table.

8:00-12:00 noon **Registration:** Front lobby, Russell House.

8:00-10:00 A.M. **Placement Service Registration:** Front lobby, Russell House.

8:30-12:00 noon **Exhibits:** Assembly Room, Russell House.

8:30-11:30 A.M. **Paper Sessions:**
Systematic Botany and Floristics — Room 107, Life Science.
Animal Ecology, Genetics, and Vertebrate Zoology — Room 205, Russell House.
Plant Autecology and Physiology — Room 207, Russell House.
Cytology and Cytogenetics — Room 208, Russell House.
Vertebrate Physiology — Room 302, Russell House.

8:30-12:00 noon **Southeastern Division of the American Society of Ichthyologists and Herpetologists** — Paper session: Room 207, Life Science.

8:30 A.M. **Beta Beta Beta Registration:** Ballroom, Columbia Hall.

8:30-12:00 noon **Beta Beta Beta Paper Sessions:**
Eastern Division — Ballroom, Columbia Hall.
Western Division — Campus Room, Columbia Hall.

11:45 A.M. **Business Meeting, Association of Southeastern Biologists:** Drayton Hall Auditorium.

AFTERNOON

1:00-5:30 P.M. **Exhibits:** Assembly Room, Russell House.

1:00 P.M. **Luncheon, University of North Carolina Botany Alumni and friends:** Jasmine Room, Russell House.

1:00-2:00 P.M. **Beta Beta Beta General Meeting:** Ballroom, Columbia Hall.

2:00-5:30 P.M. **Paper Sessions:**
Plant Ecology — Room 107, Life Science.
Morphology and Morphogenesis — Room 207, Life Science.

Parasitology and Histology—Room 205, Russell House.
Invertebrate Physiology and Ecology—Room 207, Russell House.
Cryptogamic Botany — Room 302, Russell House.

2:00 P.M. **Southeastern Division of the American Society of Ichthyologists and Herpetologists Business Meeting** — Room 204, Russell House.

2:30 P.M. **Tour:** Scenic and Historic tour of Columbia, especially for families of ASB members. Please sign up during registration.

EVENING

7:00 P.M. **Banquet:** Ballroom, Columbia Hall.

ASB Evening Program: Ballroom, Columbia Hall.

Presentation of awards and prizes:
Ivey F. Lewis Fellowship at Mountain Lake Biological Station. Sponsored by Phipps and Bird, Inc.
Association Research Prize. Sponsored by Carolina Biological Supply Company.
Meritorious Teaching Award. Sponsored by Will Scientific, Inc., Georgia.

Past Presidents Address: Dr. Harry J. Bennett, Louisiana State University — "Estuarine Biology." (Including a 30 minute movie.)

SATURDAY, APRIL 22

8:00 A.M. **Field Trips:** Details at registration desk. Please sign up during registration.

1. Swamp and floodplain communities — Led by Dr. W. T. Batson. Vicinity of Columbia.
2. Carolina Bays and Grice Marine Laboratory — Led by Mr. Richard Porcher and Dr. E. F. Thompson.

8:30 A.M. **Executive Committee Meeting, Association of Southeastern Biologists:** Conference Room, Russell House.

SCHEDULE OF PAPER SESSIONS

FRIDAY MORNING — APRIL 21

SYSTEMATIC BOTANY AND FLORISTICS

Room 107, Life Sciences

Presiding: Dr. George S. Ramseur, The University of the South

8:30 1. Eggers, Donna Marie (Vanderbilt University). Genetic Fruit Polymorphism in *Valerianella* (Tourn.) Mill. (Valerianaceae).

8:43 2. Freeman, John D. (Vanderbilt University). *Trillium maculatum* Raf. and Related Taxa of Sessile-flowered *Trillium*.

8:56 3. Shetler, Stanwyn G. and James F. Matthews (Smithsonian Institution and Charlotte College). Generic Position of *Campanula americana* L.

9:09 4. Ramsey, Gwynn W. (Lynchburg College). A Biosystematic Study of the Genus *Cimicifuga* (Ranunculaceae), with Emphasis on *Cimicifuga rubifolia* Kearney.

9:22 5. Ware, Stewart A. and Elsie Quarterman (Vanderbilt University). A New *Talinum* (Portulacaceae) from the Cedar Glades.

9:35 6. Burk, C. John (Smith College). A Correlation of Oak Hybridization and Glacial Geology on Cape Cod, Massachusetts.

9:48 7. Jones, Samuel B., Jr. (University of Southern Mississippi). Habitat Hybridization in *Vernonia* (Compositae).

10:01 8. Dietz, Robert A. (Troy State College). The Epiphytic Orchids of Honduras, II.

10:14 9. Browne, Edward T., Jr. (University of Kentucky). Remarks Concerning the Endemics of Tygarts Creek Gorge, Carter Co., Kentucky.

10:27 10. Greear, Philip F-C. (Shorter College). Sag Pond Vegetation in Northwest Georgia.

10:40 11. Pullen, Thomas M. (University of Mississippi). Progress Toward Production of a Flora of Mississippi.

10:53 12. Blair, Aaron and James W. Hardin (North Carolina State University). Vascular Plant Flora of Beaufort County, North Carolina.

11:06 13. Thacker, Wayne, William F. Ruska, and Gwynn W. Ramsey (Lynchburg College). A Preliminary Survey of the Flora of Several Southwestern Virginia Piedmont Counties.

ANIMAL ECOLOGY, GENETICS, AND VERTEBRATE ZOOLOGY

Room 205, Russell House

Presiding: Dr. Frank B. Golley, University of Georgia

8:30 14. SMITH, MICHAEL H. (University of Georgia). Reliability of the Mark-release Technique of Estimating Numbers of Mice.

8:43 15. HEBERT, JOHN R., BOBBY F. DOWDEN, AND HARRY J. BENNETT (Louisiana State University and Mississippi State College for Women). Toxicity of Endrin to *Gambusia affinis:* A Comparison of Static and Flow-through Bioassay Systems.

8:56 16. HOSS, DONALD E. (Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, N. C.). Metabolic Rates of Estuarine Fish.

9:09 17. DUKE, THOMAS W., JAMES N. WILLIS, AND DOUGLAS A. WOLFE (Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, N. C.). Studies on the Exchange of Trace Elements Between Estuarine Sediments and Water.

9:22 18. SATTERFIELD, JAMES D. (Georgia State College). Reproduction in the Southern Studfish, *Fundulus stellifer* (Jordan).

9:35 19. CARVER, J. E., JR. (University of Kentucky). Ecological-Genetic Aspects of South Amherst *Drosophila* Populations.

9:48 20. WHITING, P. W. (Biology Division, Oak Ridge National Laboratory). A Diapause-resistant Stock of *Mormoniella.*

10:01 21. SINGLETON, W. R. AND ENRIQUETA CARTER BOND (University of Virginia). *A.* Allele Necessary for Dilute Coat Color in Horses.

10:14 22. WOOLCOTT, WILLIAM S. AND CAPERTON BEIRNE (University of Richmond). A Comparison of the Skulls of Young Flounders in Three Species of *Paralichthys* Girard.

10:27 23. JONES, DUVALL A. (West Liberty State College). Green Tissues Among Neotropical Frogs.

PLANT AUTECOLOGY AND PHYSIOLOGY

Room 207, Russell House

Presiding: Dr. Victor A. Greulach, University of North Carolina

8:30 24. BASKIN, JERRY AND ELSIE QUARTERMAN (Vanderbilt University). Ecological Studies of *Psoralea subacaulis* (Leguminosae).

8:43 25. WARE, STEWART A. AND ELSIE QUARTERMAN (Vanderbilt University). Seed Germination in Two Species of *Tallinum* (Portulacaceae).

8:56 26. BASKIN, JERRY, CAROL CAUDLE, AND ELSIE QUARTERMAN (Vanderbilt University). Germination and Dormancy in Two Cedar Glade Grasses.

9:09 27. WITHERSPOON, J. P. (Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory). Interactions of Fast Neutron Radiation and Growth-Dormancy Cycles in Yellow Poplar Trees.

9:22 28. TE-HSIU MA (Radiation Biology Laboratory, Smithsonian Institution). Red, Far-red Light Effect on Pollen Tube Elongation and Pollen Germination in *Tradescantia.*

9:35 29. FLINT, FRANKLIN F. (Randolph-Macon Woman's College). Histochemical Effects of Indole-3-Acetic Acid and Kinetin During Megagametogenesis in *Lilium.*

9:48 30. CAPLENOR, DONALD AND DAO CONG NHU (Tennessee Technological University and George Peabody College). Reaction of *Helenium amarum* to Gibberellic Acid.

10:01 31. WHATLEY, BOOKER T., STANLEY O. THOMPSON, AND MCKINLEY MAYES (Southern University). The Effects of Soaking Treatments and Foliar Sprays on Rooting of *Sanchezia nobilis glaucophylla.*

10:14 32. VAN FLEET, D. S. (University of Georgia). Genetics and Differentiation of Polyacetylenes and Polyenes in Vascular Plants.

10:27 33. LUDLOW, C. JOSEPH AND FREDERICK T. WOLF (Vanderbilt University). Photosynthesis in Relation to Chlorophyll Content, Stomatal Distribution and Hill Reaction Activity in Shade and Sun Ferns.

10:40 34. VEECH, JOSEPH A. (University of Georgia). Peroxidase Localization and Isozymic Alteration Resulting from Infection of Tobacco by *Phytophthora parasitica* var. *nicotianae.*

10:53 35. VAN FLEET, D. S. (University of Georgia). Localization and Rhythmic Enzymatic Development of Essential Oils in Flowers.

11:06 36. WARREN, CHARLES O. (Southwestern at Memphis). Respiratory Metabolism in the Heterothallic Water Mold, *Achlya ambisexualis* Raper.

CYTOLOGY AND CYTOGENETICS

Room 208, Russell House

Presiding: Dr. H. Branch Howe, Jr., University of Georgia

8:30 37. STRICKLAND, P. L. AND J. W. DRANE (Emory University). Probability Values for Chromatid Aberrations.

8:43 38. BEATTY, ALVIN V. AND JEANNE W. BEATTY (Emory University). The Influence of Deoxy Compounds on Recovery from Radiation-induced Chromosomal Breaks.

8:56 39. PEDIGO, ROBERT A. (The College of William and Mary). Effects of Dimethyl Sulfoxide and Naphthaleneacetic acid on Radiosensitivity of Cultured *Cucurbita* Calluses.

9:09 40. TAYLOR, F. G., JR. (Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory). Nuclear Characteristics of *Populus deltoides* Clones.

9:22 41. TOTTEN, R. E. AND H. BRANCH HOWE, JR. (University of Georgia). Nonrandom Nuclear Orientation in the Ascospores of *Neurospora tetrasperma*.

9:35 42. BATH, DANIEL W. (University of Mississippi). Radiation-induced Semisterility in the Mouse.

9:48 43. ST. AMAND, W. (University of Mississippi). Cell Population Dynamics in Irradiated Ehrlich Ascites Carcinoma.

10:01 44. COLE, MADISON B., JR., RALPH E. STEPHENS, AND J. GORDON CARLSON (University of Tennessee). Effects of Actinomycin-D on Nucleic Acid Synthesis in Grasshopper Neuroblasts.

10:14 45. PATTERSON, ROSALYN M. AND ERNEST L. HUNT (Emory University). Differential Reactivity of Urodele Developmental Chromosomes.

VERTEBRATE PHYSIOLOGY

Room 302, Russell House

Presiding: Dr. S. P. Maroney, Jr., University of Virginia

8:30 46. KENT, GEORGE C. (Louisiana State University). The Luteolytic Effect of Resectioned and Rejoined Pseudopregnant Hamster Uteri.

8:43 47. WIEAND, KATHERINE AND D. A. OLEWINE (Geisinger Medical Center and Bucknell University). Interference with Pregnancy in the Rat by an Intracervical Suture.

8:56 48. BENNETT, SARA N. AND D. A. OLEWINE (Georgia Southern College). Effect of Intrauterine and Intracervical Sutures on Deciduomata Formation in the Rat.

9:09 49. WELCH, ANNEMARIE S. AND BRUCE L. WELCH (University of Tennessee). Neurochemical Response to Environmental Stimulation.

9:22 50. MILLER, JAMES A., JR., MICKEY VIA AND FAITH S. MILLER (Tulane University). Effects of THAM, Glucose, and Hypothermia Upon Tolerance to Asphyxia in Newborn Puppies.

9:35 51. THOMSON, J. RICHARD AND DAVID A. RINGLE (Midwest Research Institute, Kansas City, Mo.). Effect of L1210 Leukemia on C11/1431a Carbon Clearance in DBA/2 Mice.

9:48 52. IMHOFF, DIANE SUE AND RICHARD E. GARTH (Mississippi State College for Women). Possibility of Beryllium-Manganese Antagonism in Amputated Forelimbs of *Triturus viridescens*.

10:01 53. FRANKLIN, BERYL C. (Northeast Louisiana State College). Phenothiazine Derivatives and Biological Pregnancy Tests Using *Rana pipiens* and *R. clamitans* as Test Animals.

10:14 54. GARTH, R. E., J. R. FORTMAN, AND K. J. SMITH (Mississippi State College for Women and Northwestern State College of Louisiana). Separation of Mature and Immature Quail Hypothalami Extracts by Gel Filtration.

10:27 55. SINE, JANE AND C. N. BOEHMS (Austin Peay State College and Vanderbilt University Medical School). A Method for Investigation of Aldosterone and Corticosterone in *Rana catesbeiana* Plasma.

10:40 56. FOREMAN, CHARLES W. (The University of the South). Comparative Aspects of *Peromyscus* Hemoglobin Ionographic Properties.

10:53 57. FATTIG, W. DONALD AND DAIL W. MULLINS (Southwestern at Memphis and Memphis State University). Molecular Hybridization of Human and Pigeon Hemoglobin.

11:06 58. BUSH, FRANCIS M. AND CHARLENE A. SEIBERT (Medical College of Virginia). Immunoelectrophoretic Analysis of Plasma Proteins of Posthatchling and Adult *Passer domesticus*.

SOUTHEASTERN DIVISION OF THE AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS

Room 207, Life Sciences

Presiding: Dr. Denzel E. Ferguson, Mississippi State University

8:30 59. BOSCHUNG, HERBERT (University of Alabama). The Status of the Genus *Branchiostoma* (order Amphioxi) in the Western North Atlantic.

8:45 60. RELYEA, KENNETH (Tulane University). Taxonomic Studies of Brackish Water *Fundulus* in the Southeast.

9:05 61. GOODYEAR, C. PHILLIP (Mississippi State University). Sun-compass Orientation in Mosquitofish, *Gambusia affinis*.

9:20 62. GILBERT, CARTER R. (Florida State Museum and University of Florida). Systematic Relationships of the American Cyprinid Fishes *Notropis ariommus* and *Notropis telescopus*.

9:35 63. LUDKE, J. LARRY AND W. DAVID BURKE (Mississippi State University). Endrin Uptake and Tolerances in Resistant and Susceptible Golden Shiners.

9:50 64. WOOLCOTT, WILLIAM S. AND CAPERTON BEIRNE (University of Richmond). A Comparison of the Skulls of Young Flounders in Three Species of *Paralichthys* Girard.

10:00 65. HOWELL, WILLIAM MIKE (Samford University). *Etheostoma davisoni* Hay, a Percid Fish Endemic to the Pensacola and Choctawhatchee Bay Drainages of Alabama and Florida.

10:15 10 minute recess.

10:25 66. CULLY, DUDLEY D., GEORGE G. MURPHY, AND MACK T. FINLEY (Mississippi State University). Some Characteristics of Pesticide-resistant Fishes.

10:40 67. Williams, James D. (University of Alabama). A New Species of Sculpin (Pisces, Cottidae) from a Spring in the Alabama River Basin in Alabama.

10:55 68. Williams, James D. and William M. Howell (University of Alabama). A New Cyprinid Fish of the Genus *Notropis* from the Tallapoosa River System in Alabama and Georgia.

11:10 69. Brooks, G. R. (College of William and Mary). Influence of Environmental Factors on Color Change in *Anolis carolinensis.*

11:25 70. Harrison, Julian R. (College of Charleston). Taxonomic Status of *Desmognathus aenus chermocki* Bishop and Valentine.

11:40 71. Bruce, Richard C. (Western Carolina College). Climatic Factors in the Distribution of the Spring Salamander, *Gyrinophilus porphyriticus,* with Comments on its Zoogeographic History.

11:55 72. Cooley, James L. (University of Tennessee). A Study of an Isolated Population of the Salamander *Leurognathus.*

FRIDAY AFTERNOON — APRIL 21

PLANT ECOLOGY

Room 107, Life Sciences

Presiding: Dr. Joe A. Edmiston, University of Georgia

2:00 73. Edmisten, Joe A., and Henry F. Perkins (University of Georgia). The Role and Status of Kudzu in the Southeast.

2:13 74. Hooks, W. S. (Lynchburg College). The Ecological Status of *Pinus strobus* L. in Ogle County, Illinois.

2:26 75. McCormick, J. Frank, Leola Crosthwaite, Carol Damon, Wesley Egan, John Findley, Violet A. Hicks, Richard Leonard, and Wilbur H. Rittenhouse (University of North Carolina, Chapel Hill). Niche Differentiation Between Two Closely Related Species.

2:39 76. Miller, Gary L. (University of North Carolina, Chapel Hill). The Effects of Ionizing Radiation on the Growth of Old-Field Species.

2:52 77. Garrett, Arthur (Emory University). Quantitative Considerations of Ecosystem Disturbance by Gamma Irradiation.

3:05 78. Ballal, S. K. (Tennessee Technological University). A Preliminary Study on the Effect of Fire on Three Plant Communities.

3:18 79. Seneca, Ernest D. (North Carolina State University). Seedling Response of Four Dune Grasses to Varying Levels of NaCl.

3:31 80. Cooper, Arthur W. and James W. Hardin (North Carolina State University). Habitat Factors Associated with Mountain Disjuncts in the Eastern Piedmont of North Carolina.

3:44 81. Dahlman, Roger C. and Clair L. Kucera (University of Missouri). Preparation of ^{14}C Labeled Grass for Use in Evaluating Organic Turnover in a Prairie Ecosystem.

3:57 82. Rogers, Hollis J. and John D. Barnett (University of North Carolina, Greensboro, and Hanging Rock State Park). Distribution of *Tsuga canadensis* (L.) Carr. and *T. caroliniana* Engelm. Along Cascades Creek in the Vicinity of Hanging Rock State Park, Danbury, North Carolina.

4:10 83. Hartshorn, Gary S. (North Carolina State University). Forest Vegetation Patterns in Southern Beaufort County, North Carolina.

4:23 84. Barclay, Frank H. and Joe A. Chapman (East Tennessee State University and Carson-Newman College). Alison's Woods.

4:36 85. Piehl, Martin A. (University of Wisconsin-Milwaukee). Parasitism and Host Range of *Nestronia umbellula* Raf. (Santalaceae).

4:49 86. Piehl, Martin A. (University of Wisconsin-Milwaukee). Root Grafts and Haustorial Self-parasitism in *Aureolaria* (Scrophulariaceae).

5:02 87. Patton, E. Gibbes (Wofford College). Plant Ecology in the Education of Pre-Medical Biology Undergraduates.

5:15 88. Simmons, George M., Jr. (Virginia Polytechnic Institute). Limnetic Carbon Assimilation in Two Virginia Reservoirs.

MORPHOLOGY AND MORPHOGENESIS

Room 207, Life Sciences

Presiding: Dr. John D. Reynolds, University of Southern Mississippi

2:00 89. Rembert, David H., Jr. (University of Kentucky). Comparative Megasporogenesis in Leguminosae, Subfamily Caesalpinoideae.

2:13 90. Coffey, Janice C. and J. M. Herr, Jr. (Clemson University at Sumter and University of South Carolina). The Development of the Ovule and Megagametophyte in *Luzula bulbosa* (Wood) Rydb.

2:26 91. Tandon, S. R. and J. M. Herr, Jr. (University of South Carolina). Some Embryological Features of Taxonomic Significance in the Genus *Nyssa* L.

2:39 92. Herr, J. M., Jr. (University of South Carolina). An Innovation in the Paraffin Embedding Technique for the Preparation of Excised Angiosperm Ovules.

2:52 93. Lucansky, T. W. and J. M. Herr, Jr. (University of South Carolina). A Preliminary Report on Floral Induction in Seedlings of *Chenopodium album* L.

3:05 94. O'Dell, Herman (East Tennessee State University). A Wild Yam.

3:18 95. Salters, Armstead L. and Lafayette Frederick (Atlanta University). Histo-

logical Changes Induced in Nodal Traces and Petioles of *Ulmus americana* by Culture Filtrates of *Ceratocystis ulmi.*

3:31 96. Fleming, Laurence E. (Mississippi State University). Use of the Appendix Masculina as a Taxonomic Character in the Shrimp *Palaemonetes.*

3:44 97. Reams, W. M., Jr., R. B. Scoggins, and A. S. Zelickson (Medical College of Virginia, University of Richmond, and University of Minnesota Medical School). An Experimental and EM Analysis of the Origin of Langerhans Cells.

3:57 98. Hunt, Ernest L. (Emory University). Staining Techniques for the Endocrine Pancreas.

4:10 99. Garrison, Norman E. and J. E. Davis, Jr. (Wake Forest College). Effects of Ethanol on Morphogenesis and Distribution of Glycogen in Developing *Rana pipiens.*

4:23 100. McLaughlin, Ellen W. (Emory University). The Fertilizability of Eggs of *Triturus viridescens* Taken from Different Levels of the Oviduct.

PARASITOLOGY AND HISTOLOGY

Room 205, Russell House

Presiding: Dr. Grover C. Miller, North Carolina State University

2:00 101. Hendricks, Larry (North Carolina State University). A New *Hystrichis* from the Common Crow. (Nematoda: Dioctophymidae).

2:13 102. Powders, Vernon N. (University of Tennessee). A New Host Record for *Cepedietta* (= *Haptophrya*) *michiganensis* (Woodhead), 1928.

2:26 103. Price, Charles E. and Peter S. Maitland (North Texas State University and the University, Glasgow, Scotland). The Proposed Role of Parasites as Indicators of Host Ancestry.

2:39 104. Harris, Alva H., R. Harkema and G. C. Miller (North Carolina State University). Life Cycle of *Procyotrema marsupiformis* Harkema and Miller, 1959. (Trematoda: Alariinae).

2:52 105. Miller, Grover C. and Reinhard Harkema (North Carolina State University). Helminths from Some Wild Mammals in the Southeastern United States.

3:05 106. Powders, Vernon M. (University of Tennessee). Altitudinal Distribution of *Cepedietta* (= *Haptophrya*) *michiganensis* (Woodhead), 1928.

3:18 107. Rogers, Steffen and Burton J. Bogitsh (Vanderbilt University). Nucleoside Polyphosphatase Activity in Helminths.

3:31 108. Shannon, W. Allen (Vanderbilt University). Autoradiographic and Histochemical Studies of Iron Metabolism in *Haemotoloechus medioplexus.*

3:44 109. Davis, Donald A., B. J. Bogitsh, and D. A. Nunnally (Vanderbilt University). Ultrastructure of the Caecum of *Haematoloechus medioplexus.*

3:57 110. Norris, William W. (Northeast Louisiana State College). Specificity of Action of Proteolytic Enzymes (Histological Evaluation).*

4:10 111. Delaney, Josephine and Roy Hunter, Jr. (Atlanta University). Some Effects of Specific and Nonspecific Proteolytic Enzymes on the Notochordal Sheath of Bullfrog Larvae.

* The abstract of this paper is not in alphabetical order. It can be found on page 28.

INVERTEBRATE ECOLOGY AND PHYSIOLOGY

Room 207, Russell House

Presiding: Dr. Richard G. Wiegert, University of Georgia

2:00 112. Styron, Clarence E. (Emory University). Ecology of Two Populations of an Aquatic Isopod, *Lirceus fontinalis* Raf.

2:13 113. Gray, I. E. (Duke University). The Distribution of Seastars of the North Carolina Continental Shelf.

2:26 114. Berry, James W. (Duke University and the Institute of Marine Science, Miami). Distributional Ecology of the Spiders of the North Carolina Piedmont Old-Field Succession.

2:39 115. Mozley, Samuel C. (Emory University). Multiple Regression Comparisons of Six Abiotic Parameters with the Distribution of Two Species of *Chironomus* (Diptera, Chironomidae) in a Five Hectare Piedmont Lake.

2:52 116. Bamforth, Stuart S. (Tulane University). Heterotrophic Protozoa as Ecological Indicators.

3:05 117. Gentry, John B. (University of Georgia). The Effect of Artificial Predation on the Behavior and Population Densities of *Pogonomyrmex badius* Colonies.

3:18 118. Bishop, John W. (University of Richmond). Feeding by Ctenophores and its Effect on Zooplankton.

3:31 119. Jinks, Willard (Indiana Central College). The Reproductive Potential of *D. affinis.*

3:44 120. Lutz, Paul E. (University of North Carolina at Greensboro). Studies on the Life-History of the Damselfly *Lestes eurinus.*

3:57 121. Brown, Pat I. and John M. Carpenter (University of Kentucky). Retention of Zinc-65 in Population of *Drosophila melanogaster.*

4:10 122. Wilson, Billy G. and J. J. Friauf (Vanderbilt University). Facultative Diapause in *Trogoderma sternale maderae* Beal, 1954.

4:23 123. Mobberly, W. C., Jr. (Northeast Louisiana State College). Endocrine Control of Locomotor Activity in the Crawfish *Faxonella clypeata*.

4:36 124. Gittleson, Stephen M. (University of Kentucky). Forces Produced by Beating Flagella of *Polytomella agilis*.

4:49 125. Tietjen, William L. and James N. Liles (Georgia Southwestern College and University of Tennessee). C-14 Isoleucine Studies in *Aedes aegypti*.

5:02 126. Stidham, James D. and James N. Liles (University of Tennessee). The Free Amino Acid Composition and Certain Aspects of the Metabolic Fate of Carbon-14 Labeled Alpha Alanine and Aspartic Acid in the Aging Female Mosquito, *Aedes aegypti* (L.).

5:15 127. McCrone, John D. and Robert J. Hatala (University of Florida and Florida Presbyterian College). Serological Identity of the Mammalian Lethal Components of the Venoms of *Latrodectus mactans* and *L. variolus*.

CRYPTOGAMIC BOTANY

Room 302, Russell House

Presiding: Dr. William J. Koch, University of North Carolina

2:00 128. Olexia, Paul D. (University of Tennessee). The Genus *Clavaria* in the Southeastern U. S.

2:13 129. Petersen, Ronald H. (University of Tennessee). The Genus *Clavulina* (Fungi, Clavariaceae) in the Southeastern United States.

2:26 130. Umphlett, Clyde J. (University of North Carolina, Chapel Hill). An Ecological Study of a Fungus Parasite in Mosquito Larvae.

2:39 131. Benson, George L. and G. T. Cowley (University of South Carolina). Distribution of Soil Microfungi in a South Carolina Sandhill.

2:52 132. Cowley, G. T. (University of South Carolina). Vertical Distribution of Microfungi on Two Trees in the Luquillo Experimental Forest, Puerto Rico.

3:05 133. Mullins, J. T. and D. des S. Thomas (University of Florida). Biochemical Mechanisms in the Hormonal Control of Sexual Morphogenesis in Achlya.

3:18 134. Plummer, G. L. (University of Georgia). Accumulation of Radioisotopes in Certain Lichens.

3:31 135. Walker, Alma Toevs (University of Georgia). Ultrastructure of the Fungus-Alga Association in *Cornicularia normoerica*.

3:44 136. Yoshimura, I. and A. J. Sharp (University of Tennessee). Interesting Record of Southern Appalachian and Mexican Lichens.

3:57 137. Sharpley, J. Miles (Sharpley Laboratories, Inc.). Growth and Survival of Water Microorganisms in Low Nutrient Media.

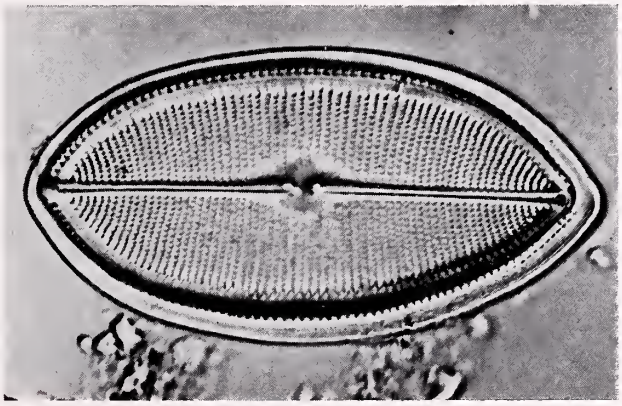
4:10 138. Whitford, L. A. (North Carolina State University). Notes on *Tetrasporopsis funescens*, a Fresh-water Alga of Apparently Wide Distribution.

4:23 139. Earle, Sylvia A. (Cape Haze Marine Laboratory and Farlow Herbarium, Harvard University). Deep Water Algae in the Gulf of Mexico.

4:36 140. Griffin, Dana G., III (University of Tennessee). A Further Look at the Biosystematics of *Chara zeylanica*.

4:49 141. Carroll, Jack W. and T. R. Deason (University of Alabama). Chromosome Numbers in the Genus *Draparnaldia*.

5:02 142. Griffin, Dana G., III (University of Tennessee). A Botanical Case of Mayr's Founder Principle from the Charophyta.



Abstracts of Papers Presented at the 28th Annual Meeting of the Association of Southeastern Biologists

The number in parenthesis at the top of each abstract refers to the number of that paper in the program.

(78)
A Preliminary Study on the Effect of Fire on Three Plant Communities

S. K. Ballal, *Tennessee Technological University*

One grassland and two loblolly pine communities were selected to study the extent of rejuvenation after continual and discontinual fires. The results indicated that in open communities like grassland, accidental spread of any saplings is restricted by fire, and also that the annual fires tipped the vegetation equilibrium toward grasses and herbs. In one of the pine communities, accidental fire destroyed all the ground vegetation with very little damage to the pine stand, in which eight months after the incidence of fire the grass has been replaced by Golden Aster, Field Aster and Greenbrier. In the other pine community, two years after the fire, grass has been replaced by Honeysuckle. The Loblolly pines were found to be fairly resistant to fire damage.

(116)
Heterotrophic Protozoa as Ecological Indicators

Stuart S. Bamforth, *Newcomb College of Tulane University*

Specializations of morphology, nutritional habits, and adaptations to abiotic conditions enable many heterotrophic protozoa to serve as indicators of ecological conditions. Despite Hynes' observation that specialized knowledge is required for detailed species identifications, the principal types and common species may easily be determined. Ciliates of a particular morphology are present in a habitat usually only at a particular stage in the evolution of the habitat, hence their presence indicates the degree of decomposition of organic material. The kinds of ciliates and testacea found in a soil reflect the degree of dessication and comparative decay rate of organic matter.

(84)
Alison's Woods

Frank H. Barclay, *East Tennessee State University*
Joe A. Chapman, *Carson-Newman College*

At the Raleigh meeting of the ASB in 1966, Alison's Woods in Sullivan County, Tennessee, was described in a paper by Frank H. Barclay. The immediate need for study of this nearly natural area was emphasized. A study of Alison's Woods was begun in September, 1966, by Barclay and Chapman, and a progress report was made at the Johnson City meeting of the Tennessee Academy of Science in November, 1967. The present paper summarizes the results of plotless sampling of the vegetation in thirty areas of a 250 acre woodland in Upper East Tennessee. Sampling was completed a short time before cutting operations were begun. The principal dominant tree species were White Oak, Tulip Poplar, Black Oak, and Northern Red Oak. Chestnut Oak was locally dominant on a ridge and steep slopes. All of these species were represented by trees of unusually large size. Cutting is scheduled for completion by March or April, 1967. A number of diameter, height and age determinations have been made. Tree-ring studies are being made by Lanier Brashear, a graduate student at East Tennessee State University.

(26)
Germination and Dormancy in Two Cedar Glade Grasses

Jerry Baskin, Carol Caudle, and Elsie Quarterman, *Vanderbilt University*

Aristida longispica Poir. and *Sporobolus vaginiflorus* (Torr.) Wood are summer dominants of the grassy cedar glades of Middle Tennessee. The seeds of these annual grasses germinate in the spring after they have overwintered in the field. The plants flower in late summer and mature fruits are shed in late fall and early winter. Upon maturity practically 100% of the seeds of both species are dormant. Gibberellic acid, potassium nitrate, and thiourea had no effect on germination of fresh seeds. Intact seeds imbibed water readily and embryos grew normally when the endosperm was removed. Dormancy in seeds of *Aristida* was overcome by stratification for 8-10 weeks and in *Sporobolus* by afterripening for 3-4 months either in warm, dry or cold, moist storage. Nondormant seeds of *Aristida* require a higher temperature for germination than seeds of *Sporobolus*. The length of the dormant period and the temperature requirement for germination in these two grasses are discussed in relation to their germination in nature.

(24)
Ecological Studies of *Psoralea subacaulis* (Leguminosae)

Jerry Baskin and Elsie Quarterman, *Vanderbilt University*

Psoralea subacaulis T. & G. is a low, spreading geophyte restricted to the shallow, rocky soils of the cedar glades of Middle Tennessee, northern Alabama, and northern Georgia. Field and laboratory studies were conducted on the ecological life history of *P. subacaulis* to determine how adaptation to this specialized habitat is exhibited by this species. Identification of the factor(s) restricting it to open glades was a second objective. *P. subacaulis* is well adapted to open cedar glades because: (1) its roots penetrate interstices among rock fragments and utilize the meager soil accumulated there, and (2) it completes the most active part of its life cycle during the cool, moist winter and early spring and is dormant during the hot, dry summer. *P. subacaulis* was found to be obligate upon a high light intensity; therefore, it cannot tolerate competition. This factor alone seems adequate to explain its restriction to open glades where larger plants find establishment difficult.

(42)
Radiation-Induced Semisterility in the Mouse

DANIEL W. BATH, *University of Mississippi*

Male mice that were mutant for markers in six different linkage groups were irradiated (640r or 700r of X-rays) and from their pogeny thirty-eight semisterile lines have been established. Twenty-two were derived from eighty-eight tested females, sixteen from eighty-six tested males. Relative fertilities range from 22.2 to 55.5 percent of normal.

In two lines it has been established cytologically that semisterility is the result of reciprocal translocations. In one of these, two genetically marked chromosomes (Linkage groups I and XIV) are apparently involved. Cytogenetic correlation has not as yet been reported for Linkage group XIV.

(38)
The Influence of Deoxy Compounds on Recovery From Radiation-Induced Chromosomal Breaks

ALVIN V. BEATTY AND JEANNE W. BEATTY, *Emory University*

Inflorescences of *Tradescantia paludosa* were irradiated with a total dose of 400 r of X-rays, and the radiation damage was determined from investigating the metaphase configurations of the first microspore division. The experimental material was treated with various chemicals to determine their effect on the recovery process. Deoxyadenosine, Deoxy Guanosine, Deoxycytidine, Deoxyuridine, and Thymidine were used. All brought about a 50% reduction in chromosomal aberrations over the control, except Thymidine. This chemical had very little effect. When these substances were used in pairs, no greater recovery was found. When all five were used simultaneously, the greatest recovery was found. When these five were used with ATP or Pyrophosphate, or with both, no greater reduction was found.

(48)
Effect of Intrauterine and Intracervical Sutures on Deciduomata Formation in the Rat

SARA N. BENNETT AND D. A. OLEWINE, *Georgia Southern College*

Several investigators have reported an inhibition of deciduomata formation resulting from the presence of an intrauterine suture. In the present study sutures (Ethcon 2-0) were placed along the entire length of either one uteri or one cervix of sexually mature rats. The entire length of the lumen of all uterine horns was scratched with a hypodermic needle (#22) on day 4 of pseudopregnancy. The animals were sacrificed on day 8 of pseudopregnancy and wet and dry weights obtained for each uterine horn. Although the intrauterine sutures markedly inhibited deciduomata formation, the intracervical sutures had very little effect. In another group of animals intrauterine sutures were placed either in the upper ¼ or the lower ¼ of the uterine lumen. In these animals deciduomata formation was greatly modified but not totally suppressed.

(131)
Distribution of Soil Microfungi in a South Carolina Sandhill

GEORGE L. BENSON AND G. T. COWLEY, *University of South Carolina*

Most distributional studies of soil microfungi have compared populations from relatively divers habitats or from several similar stands. In this study, distribution of fungi in the soil of a single stand was investigated in an attempt to determine effects of different ground covers. Four presumably distinct soil habitats, pine litter, oak litter, and lichen covered, and uncovered, were detected in the sandhill in Sesquicentennial State Park near Columbia, S. C.

Soil samples from the four habitats were diluted and plated on Petri dishes of Martin's medium. After incubation for five days, 30 random colonies were isolated from each sample. Populations isolated from samples taken from under oak and pine litter were similar to each other, but differed considerably from populations isolated from uncovered and lichen covered soils.

Penecillium and *Aspergillus* were the most common genera isolated from each habitat. Mucorales were generally limited to soils under pine and oak litter. *Aspergillus fumegatus* was isolated most frequently throughout the study area.

(114)
Distributional Ecology of the Spiders of the North Carolina Piedmont Old-Field Succession

JAMES W. BERRY, *Duke University and the Institute of Marine Science, Miami*

Using the sweeping technique, litter analysis, and pitfall traps, eight types of old-field communities on upland well-drained sites and three types of bottomland communities were sampled 20 times over 12½ months. Generally, different spider faunas were found in forest and non-forest communities. The species assemblages of the field communities showed a great similarity when compared to each other. The spiders of the forest communities showed inter-community variation; however, within the forest communities several spiders were restricted to either upland or bottomland stands, and others to either pine or hardwood communities. Of the 326 species taken in the Piedmont, the lowest number found in any community was 97; the highest, 133. There was a gradual increase in the total spider populations with each advancing phase of the old-field succession. However, the greatest abundance of spiders was found, not in the hardwood climax, but earlier, in the mixed pine-hardwood community. Evidence for the ecological separation of closely related species is given.

(118)
Feeding by Ctenophores and Its Effect on Zooplankton

JOHN W. BISHOP, *University of Richmond*

Rates of feeding by the ctenophore *Mnemiopsis* were measured in order to evaluate the impact of predation by ctenophores on populations of zooplankton. Ctenophores and copepods, mostly *Acartia tonsa,* from the Patuxent River and waters near Solomons, Maryland were used in the experiments. Rates of feeding were

correlated positively with the product of the body size of ctenophores and concentration of copepods. A regression model, based on this relationship, was used to predict the rates of feeding by the ctenophores in their natural habitat. According to the predicted values and estimates of the abundance of ctenophores and copepods, ctenophores eat 21% of the population of *A. tonsa* per day during the summer in the Patuxent River. This value accounts for approximately 40% of the summer mortality of *A. tonsa*.

(12)
Vascular Plant Flora of Beaufort County, North Carolina

Aaron Blair and James W. Hardin,
North Carolina State University

Approximately 1300 collections were made between September 1965 and October 1966 in Beaufort County, in the east-central Coastal Plain of North Carolina. A total of 943 species have been found, 200 of which represent new county records. Most species were typical of Atlantic Coastal Plain vegetation, although species with more western or northern affinities were found.

(121)
Retention of Zinc-65 in Population of *Drosophila melanogaster*

Pat I. Brown and John M. Carpenter,
University of Kentucky

Drosophila melanogaster adults from an inbred wild population were placed in food vials containing Zn^{65} media and yeast suspension for a feeding period of 48 hours. Flies were then removed, weighed and the isotope present counted in a well-type scintillation counter. After counting they were transferred to vials of media containing no isotope. This procedure was continued at twenty-four hour intervals. Average measurements of the Zn^{65} present based on counts per minute per milligram was 4104 at the start of the experiment. It was possible to detect the isotope for a period of 792 hours (33 days) at which time count had decreased to 167 per minute per milligram when all flies were dead.

The biological half-life was 2.67 days. The flies rid themselves of the Zn^{65} rapidly until the biological half-life was reached; after this, evidence for retention was displayed. Exact length of time for retention was not obtained since all flies were dead before the isotope had completely disappeared.

(9)
Remarks Concerning the Endemics of Tygarts Creek Gorge, Carter Co., Kentucky

Edward T. Browne, Jr., *University of Kentucky*

Since the discovery of Taxus canadensis Marsh. in the gorge of Tygarts Creek, other species of very restricted range in Kentucky have been noted from this area. Through the work of Dr. Lucy Braun and others we now know of about twelve species of vascular plants which occur here and nowhere else in the state as well as others of somewhat greater, although restricted, range. The occurrence of these species is thought by some to be the result of their survival during glaciation. While some evidence supports this belief, other evidence may indicate a different explanation. Information in support of the refugium theory and another possible explanation is to be presented.

(6)
A Correlation of Oak Hybridization and Glacial Geology on Cape Cod, Massachusetts

C. John Burk, *Smith College*

A frequent complication attending studies of oak biosystematics is the presence, in any given study area, of several interfertile oak species. Over large portions of the glaciated seetions of Outer Cape Cod, Massachusetts, however, *Quercus velutina* and *Q. illicifolia* are the only species within the subgenus Erythrobalanus. *Quercus velutina* is the only Erythrobalanus growing on those portions of the Outer Cape formed since the last glaciation. Although obvious hybrids of these species are infrequent, populations of *Q. velutina* on the glaciated sites tend to approach *Q. illicifolia* in a number of taxonomic characters and to be more variable than populations of *Q. velutina* growing on post-glacial sites where *Q. illicifolia* is absent. Relationships of the systematics of eastern North American Erythrobalanus to glaeial, postglacial, and recent history will be discussed.

(58)
Immunoelectrophoretic Analysis of Plasma Proteins of Posthatchling and Adult *Passer domesticus*

Francis M. Bush and Charlene A. Seibert,
Medical College of Virginia

White rabbits synthesized antibodies after injections of total plasma proteins of 18 day hatchling and adult House Sparrows. Plasma from sparrows of various ages electrophoresed and reacted with rabbit anti-sparrow plasma sera revealed adults produced more lines of precipitation than younger specimens. Adult patterns exhibited greater precipitation and stained more intensely than those of young. This suggests quantitative differences during development.

Cross reactions showed hatchling and adult plasmas had several similar lines of precipitation. This indicates continual synthesis in adult plasma of some earlier differentiated proteins. Patterns of five day hatchlings had fewer lines of precipitation than those of 18 day hatchlings. This suggests progressive synthesis of proteins after hatching. Reactions of adult sparrow and chicken plasmas with the antisera of each species showed about one-fifth of all proteins to be similar. But sparrow and human plasmas failed to react reciprocally. (Supported by A. D. Williams 3558(555) and N. I. H. Grant GM 13649-01(3792)).

(30)
Reaction of *Helenium amarum* to Gibberellic Acid

Donald Caplenor and Dao Cong Nhu, *Tennessee Technological University and George Peabody College*

Gross responses of the species *Helenium amarum* (Raf.) H. Rock to various dosages of gibberellin, as a substitute for long photoperiods, were studied. Gibberellin $A \pm X$ ($GA_1 + GA_3$) and potassium salt of gibberellic acid (KGA_3, 75% acid) were used. The calculation of the concentration of KGA_3 was based upon the acid part of KGA_3 only. Results are summarized as follows:

1. The elevation of rosette leaves required a minimum of 0.0025 microgram/plant of $GA_1 + GA_3$ or KGA_3.
2. The elongation of rosette leaves required a minimum of 0.0025 microgram/plant of $GA_1 + GA_3$ or KGA_3.
3. Initiation of bolting required a minimum of 0.511 microgram/plant grown on agar ($GA_1 + GA_3$) or 0.522 microgram/plant grown on soil ($GA_1 + GA_3$) or 0.412 microgram/plant (KGA_3).
4. Initiation of flower formation required a minimum of 1.482 microgram/plant of $GA_1 + GA_3$ or 1.450 microgram/plant of KGA_3.

It was concluded that the elevation and elongation of rosette leaves may serve as criteria for the bioassay of gibberellin. At the 5% level of significance, responses were significant with each 10-fold increment of gibberellin concentration. The Log dose/Log response curves are linear in the range from 0.0025 to 0.25 microgram/plant.

(141)
Chromosome Numbers in the Genus Draparnaldia

JACK W. CARROLL AND T. R. DEASON,
University of Alabama

Three species of Draparnaldia Bory, a green, ulotrichalean alga, were grown in Bristol's medium at a temperature of about 22 degrees C. The algae received 300 foot candles illumination from soft-white fluorescent bulbs on a 12 hr.-12 hr. light-darkness cycle. Under these conditions, the algae divided cynchronously, and chromosome counts of 13 were obtained in all three species using an abbreviated aceto-orcein technique.

(19)
Ecological-Genetic Aspects of South Amherst *Drosophila* Populations

J. E. CARVER, JR., *University of Kentucky*

In order to evaluate the influence of various ecological parameters on the genetic structure of *Drosophila* populations, studies were begun to determine whether or not *Drosophila melanogaster* (and other species) are continuous in the South Amherst, Massachusetts locale. If the flies do overwinter, an *a priori* expectation is that the process involves a high degree of genetic adaptation which may be reflected by a difference in frequency, viability, and variance values for drastic heterozygotes in overwintering versus peak summer-fall populations. Results thus far reveal that *Drosophila algonquin, funebris, putrida* and *quinaria,* and *Chymomyza amoena* over winter in a non-adult stage in apple orchard soil at temperatures approaching but not reaching 0° C. The frequency of lethal-bearing second chromosomes in *D. melanogaster* was lower in samples from the smaller spring population. Viability and variance analysis reveals an irregular pattern of statistically significant and nonsignificant differences, the meaning of which will require analysis of additional samples now under study.

(90)
The Development of the Ovule and Megagametophyte in *Luzula bulbosa* (Wood) Rydb.

JANICE C. COFFEY AND J. M. HERR, JR.,
Clemson University at Sumter and University of South Carolina

A single, hypodermal archesporium differentiates after initiation of the inner integument in the slightly curved ovule of *Luzula bulbosa* (Wood) Rydb. and divides unequally to produce a parietal and sporogenous cell. By enlargement the sporogenous cell forms the megasporocyte. Two cells produced by anticlinal division of the parietal cell enlarge markedly through the course of meiosis, formation of the linear tetrad, and early megagametogenesis from the chalazal megaspore. Concomitantly, the crassinucellate nucellus expands laterally by periclinal cell divisions, the outer integument emerges and elongates, and the ovule assumes anatropous form. The chalazal nucleus of the 2-nucleate megagametophyte enlarges to marked hypertrophy as the micropylar nucleus divides twice and ultimately establishes the egg apparatus and a polar nucleus. The absence of vacuoles in the synergids is another unusual feature. With maturation of the megagametophyte, the cells of the inner integument develop secondary walls while those of the outer integument remain parenchymatous and proliferate at the apex to initiate the caruncle, a prominent structure in the mature seed.

(44)
Effects of Actinomycin-D on Nucleic Acid Synthesis in Grasshopper Neuroblasts

MADISON B. COLE, JR., RALPH E. STEPHENS, AND
J. GORDON CARLSON, *The University of Tennessee*

Embryos of the grasshopper, *Chortophaga viridifasciata* (DeGeer), equivalent to 14-15 days development at 26° C., were placed in a culture medium containing known concentrations of the antibiotic, actinomycin-D, and 10 microcuries per milliliter of tritiated uridine. At the end of ½, 1, 2, 4, and 8 hours in culture, the embryos were fixed in 50 percent acetic acid, squashed, and prepared for autoradiography. Analysis of the autoradiographs indicates that uridine uptake (ribonucleic acid synthesis) by neuroblasts is reduced significantly by one hour exposure to one to two micrograms (8 to 16 x 10^{-10} M) of actinomycin-D per milliliter of culture medium at 38° C. Effects of actinomycin-D on thymidine uptake (deoxyribonucleic acid synthesis) are being investigated. The results of these studies and their possible implications will be discussed. (This study was supported in part by the Atomic Energy Commission under contract number AT-(40-1)-2575.)

(80)
Habitat Factors Associated with Mountain Disjuncts in the Eastern Piedmont of North Carolina

ARTHUR W. COOPER AND JAMES W. HARDIN,
North Carolina State University

An interesting floristic pattern observed in North Carolina involves species which show Mountain-eastern Piedmont disjunctions. There are certain unique features of the environment of the eastern Piedmont where these disjuncts occur. Climatic data suggest that this region has lower temperatures, shorter frost-free season, and higher rainfall than adjacent areas in the interior Piedmont and Upper Coastal Plain. The topography of the eastern Piedmont is more rugged than adjacent regions. The soils of the region are not so heavily weathered as those in the interior Piedmont and Upper Coastal Plain, as judged by evidence from clay accumulation and base status. The topographic and soil features are probably

related to stream cutting periods of lower sea level. Considered collectively, these features seem sufficient to account for the local persistence of the Mountain species from a time of continuous distribution during the Wisconsin period of Pleistocene glaciation.

(132)
Vertical Distribution of Microfungi on Two Trees in the Luquillo Experimental Forest, Puerto Rico

G. T. Cowley, *University of South Carolina*

Leaf samples taken from the bottom, middle and top of a *Dacryodes excelsa* tree and a *Manilkara nitida* tree were investigated for microfungi on or within them. By a dilution plate method, population sizes were estimated and 25 random colonies were isolated from each sample. At the time of sampling, five Petri dishes of Martin's medium were exposed to the atmosphere for 15 minutes at each of four elevations; ground level, 30 ft., 48 ft., and 66 ft. The last elevation was above the forest canopy.

Little correlation could be made between plate counts and elevation on *Dacryodes* leaves, but on *Manilkara* leaves, plate counts decreased significantly with height. Fewer species were isolated from the top of either tree than from lower levels. Similarly, the number of colonies and species on plates exposed to the air decreased with elevation.

A degree of specificity of fungal species for tree species was apparent, and the fungal species composition was more uniform of *Manilkara* than on *Dacryodes*.

(81)
Preparation of ^{14}C Labeled Grass for Use in Evaluating Organic Turnover in a Prairie Ecosystem

Roger C. Dahlman, *Oak Ridge National Laboratory, Oak Ridge, Tenn.*
Clair L. Kucera, *University of Missouri*

Carbon-14 is a useful tracer to use in studying organic cycling processes of the ecosystem. Simple technique and inexpensive apparatus are described for obtaining ^{14}C labeled grass plants under both laboratory and field conditions. Radiocarbon was incorporated into root and shoot systems of prairie grasses *in situ*. Regenerated foliage, as the result of clipping 6 weeks prior to exposure, contained 7 times more ^{14}C than maturing vegetation, indicating a greater photosynthetic rate. In mature vegetation, however, a proportionately greater amount of the total photosynthate was translocated to the root system. The roots were adequately labeled with ^{14}C for subsequent study of turnover, transfer, and decay processes.

Organic materials, possessing a somewhat higher specific activity (43 microcuries per gram of carbon), were obtained by growing prairie grasses from seedling to maturity in a closed system using an inexpensive plexiglass growth chamber. More ^{14}C was present in shoots than roots. Both materials were used in decomposition and carbon transfer studies. (This study was supported by National Science Foundation Grant 702 and University of Missouri Research Council Grant 160.)

(109)
Ultrastructure of the Caecum of *Haematoloechus medioplexus*

Donald A. Davis, B. J. Bogitsh and D. A. Nunnally, *Vanderbilt University*

The ultrastructure of the lining of the caecum of *Haematoloechus medioplexus* is investigated with a Phillips 100-C electron microscope. The lining is cellular possessing large sparse nuclei each with a prominent nucleolus. Numerous elongated cytoplasmic processes believed to facilitate endocytosis are found extending from the surface of these cells. Many large, irregularly shaped mitochondria are demonstrated which often contain intramitochondrial granules. Extensive rough endoplasmic reticulum is shown throughout the cells. Vacuoles of various sizes are present. Some vacuoles are bounded by rough endoplasmic reticulum and are presumed to be lysosomes. Other more dense vacuoles are generally smaller and are thought to contain secretory products. There is no indication of secretory and absorptive cycles in the animal. (Supported, in part, by National Science Foundation Grant GB-4742.)

(111)
Some Effects of Specific and Nonspecific Proteolytic Enzymes on the Notochordal Sheath of Bullfrog Larvae

Josephine Delaney and Roy Hunter, Jr., *Atlanta University*

The precise origin of the bilaminar notochordal sheath in larval amphibians has been in dispute for many decades. Much of the confusion has been due to a lack of reliable information on its chemical composition. In an effort to clarify some of the data, the procedure of enzymic hydrolysis was employed. Specific and nonspecific proteolytic enzymes were used on thin sections of tails from bullfrog larvae. Prolonged exposure to trypsin and elastase resulted in general tissue disruptions. The elastic lamella of the sheath was unaffected by elastase and other enzymes. The inner fibrous lamella and the basement membrane under the epidermis were completely hydrolyzed by collagenase. The data have been interpreted to mean that the inner lamella of the sheath is collagenous; that the outer lamella is nonelastin in nature.

(8)
The Epiphytic Orchids of Honduras, II

Robert A. Dietz, *Troy State College*

The initial phase of a study of variation in Honduras epiphytic orchids is complete after three collecting trips to that country between 1965 and 1967. Polyploid complexes have tentatively been identified in *Cattleya* and *Oncidium*. A species list has been prepared, with annotations, containing 63 genera and 388 species, for distribution at the meeting. (Supported in part by grants from Troy State College, and the Alabama Academy of Science.)

(17)
Studies of the Exchange of Trace Elements Between Estuarine Sediments and Water

THOMAS W. DUKE, JAMES N. WILLIS, AND DOUGLAS A. WOLFE, *Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina*

A radioisotopic technique was developed for the study of elemental exchange between cores of estuarine sediments and overlying estuarine water. Sediments are collected in a coring device constructed with a lucite cylinder which is plugged and detached after a core is taken. After equilibration of the cores with estuarine water, the cylinder is slipped into the well of a lead shield constructed so that radiation from only a narrow wedge of the water column is measured. Radioactive tracer is added to the water in the cylinder and the concentration of radioactivity, measured with a 3-inch crystal and single-channel spectrometer, is recorded instantaneously and continuously. Exchange rate on an areal basis is calculated from the initial specific activity and loss of the isotope from the water. The exchangeable amount of the element in the sediment is determined from the specific activity in the water after the tracer in the water has equilibrated with the sediments.

(139)
Deep Water Algae in the Gulf of Mexico

SYLVIA A. EARLE, *Cape Haze Marine Laboratory and Farlow Herbarium, Harvard University*

Most benthic marine algae occur in depths of less than 30 meters, but certain species are known to grow in depths exceeding 100 meters. Species known to range into both shallow and deep habitats in the Gulf of Mexico are listed and compared with species known only from deep water. Special note is made of recent collections taken in 55-60 meters of water in the vicinity of the Dry Tortugas, Florida from the R/V ANTON BRUUN, and previous records of algae taken from deep water in the Gulf are reviewed. The theory of chromatic adaptation is briefly discussed.

(73)
The Role and Status of Kudzu in the Southeast

JOE A. EDMISTEN AND HENRY F. PERKINS, *University of Georgia*

Experiments were done to investigate the role of kudzu (*Pueraria lobata*) in changing the physical and chemical characteristics of soils and to establish the productivity and protein content of this legume. Experiments were done in which the rates of the extension of kudzu into forested and bare areas were established. Other experiments were done to ascertain the protein content of kudzu and to investigate the feasibility of utilizing its leaves as a source of human food. The rate of spread of kudzu appears to have been exaggerated due to its dramatic clinging aspect. Productivity ranged from 5600 lb/acre/yr to 9606 lb/acre/yr. Kudzu's greatest impact on the soil is physical, but small amounts of NH_3 and NO_3 are added to the soil after frost kills it. The nitrogen content of kudzu leaves was $2.8\% \pm 0.18$ or about 18% protein. The leaves of kudzu were cooked in several manners and were found to be palatable.

(1)
Genetic Fruit Polymorphism in *Valerianella* (Tourn.) Mill (Valerianaceae)

DONNA MARIE EGGERS, *Vanderbilt University*

Valerianella ozarkana Dyal and *V. bushii* Dyal, endemics to the Ozarks Region, can be differentiated solely on the basis of the striking difference in the morphologies of their indehiscent fruits. The fruit of the first has three prominent keels, one dorsal and two ventral, with a conspicuous line of hairs along the edge of each keel, in contrast to the fruit of the second which has no keels. Both types of fruit never occur on the same individual. These plants are commonly found growing in mixed colonies, and they flower simultaneously. Tests utilizing samples of fruits of both types show that among the plantings of a particular fruit-type a few of the progeny produce fruits with the other morphology. Thus, this "species-pair" actually represents a sibling relationship within one genetically dimorphic species. The possibility of fruit polymorphism in another species-pair, *V. umbilicata* (Sulliv.) Wood and *V. patellaria* (Sulliv.) Wood is also discussed.

(57)
Molecular Hybridization of Human and Pigeon Hemoglobin

W. DONALD FATTIG AND DAIL W. MULLINS, *Southwestern at Memphis and Memphis State University*

Mixtures of human and pigeon hemoglobin (carbonmonoxy form) were dialyzed against acetate buffer (pH 4.2) for eight hours, then against a tris-citrate-borate buffer (pH 8.5) for six hours, at room temperature. The resulting mixture, together with controls of unmixed pigeon and human hemoglobin which had been treated identically, were subjected to starch-gel electrophoresis. The gels were stained with benzidene dichloride, an iron-specific stain, to reveal the migration positions of the hemoglobins. The results indicate the formation, under the above conditions, of two kinds of "new" molecules in the mixture. The observations suggest that, as with mixtures of human and canine hemoglobins, the parental species of molecules dissociate at low pH into alpha and beta chain dimers which randomly reassociate at higher pH. The recombining ability of these molecular subunits supports the generalization that vertebrate hemoglobins have a similar quaternary structure.

(96)
Use of the Appendix Masculina as a Taxonomic Character in the Shrimp *Palaemonetes*

LAURENCE E. FLEMING, *Mississippi State University*

The American species of *Palaemonetes* are currently identified by characters based on spinosa and tubercular ornamentation of several different body sites. Because of variation and overlap, identification and relationships are difficult to determine. In many Malacostraca, structures used in amplexus, particularly male appendages, have been useful in taxonomic and evolutionary studies. In *Palaemonetes* the first two pleopods exhibit sexual dimorphism. The second pleopods of the males bear an accessory ramus, the appendix masculina. Setal ornamentation of the appendix masculina is apparently unique and stable. Thus, these features are of potential value for systematic study of the Palaemonidae, perhaps

even as significant as are the appendage modifications in such groups as Astacidae, Asellidae, and Entocytheridae. (This research was supported in part by NSF Grant No. *GB*-4719 to Dr. J. F. Fitzpatrick, Jr.)

(29)
Histochemical Effects of Indole-3-Acetic Acid and Kinetin during Megagametogenesis in *Lilium*

FRANKLIN F. FLINT, *Randolph-Macon Woman's College*

Floral buds of *Lilium candidum* treated with Indole Acetic Acid, Kinetin, and a combination of both show effects of this treatment during megagametogenesis. The general effect in each treatment was a retardation of the developmental stages. Indole Acetic Acid-treated plants showed the least retardation (25-30%), and Kinetin-treated the most (40-50% or more). The megagametophyte of Kinetin-treated plants did not mature, many ovaries aborted, and there was one example of twin sporocytes being initiated in one ovule. Cellular protein concentration as measured by the mercuric brom phenol blue method showed no consistent variations between treated and non-treated specimens. Carbohydrate concentration in the ovary wall, as measured with the PAS reagent, during megagametogenesis varied considerably with the kinetin-treated groups having a greater quantity and distribution. IAA-treated material had less than the control groups, although it persisted for a longer period of time.

There is a good correlation between the retardation of megagametogenesis in the treated material with the quantity and persistence of carbohydrate accumulation in the cells of the ovary wall. Kinetin has the greater effect.

(56)
Comparative Aspects of Peromyscus Hemoglobin Ionographic Properties

CHARLES W. FOREMAN, *The University of the South*

Ten species of *Peromyscus* sampled to date from eleven different sites from Arizona to Pennsylvania have shown different proportions and combinations of four electrophoretically separable hemoglobins. One species, *P. gossypinus,* shows genetic hemoglobin polymorphism in each of three separate populations. Another, *P. Leucopus,* has shown only one departure from the usual type among over 100 specimens from five sites between Pennsylvania and Texas. Two species, *P. nuttalli* and *P. eremicus,* have single hemoglobins, and the others have multiple hemoglobins. Much of these data have been published in three separate papers; however, original data will be included for four species and four subspecies from three states upon which I have made no previous public report. (Supported by NSF GB-2391 and GB-4639.)

(53)
Phenothiazine Derivatives and Biological Pregnancy Tests Using *Rana pipiens* and *R. clamitans* as Test Animals

BERYL C. FRANKLIN, *Northeast Louisiana State College*

A total of 109 hospitalized mental patients were divided into three groups by age. Pregnancy tests were performed to determine the interference, if any, by tranquilizing drugs of the phenothiazine group. Nine false-positive tests were elicited when *Rana pipiens* was the test animal, only one when *R. clamitans* was used. *R. clamitans* was compared to *R. pipiens* in only one group. The results indicate that when the subject is using phenothiazine derivatives, a biological pregnancy test is more reliable when using *R. clamitans* rather than *R. pipiens.*

(110)
Specificity of Action of Proteolytic Enzymes (Histological Evaluation)

WILLIAM W. NORRIS, *Northeast Louisiana State College*

The specificity of action of papain and ficin on structural aspects of muscle tissue was investigated histologically. Skeletal muscle from fish, amphibians, reptiles, birds and mammals was quickly quenched at -79° C., sectioned in a cryostat, placed on microscope slides, incubated with enzyme solutions of known concentration, temperature, and hydrogen ion concentration for a prescribed interval of time. Papain and ficin hydrolyzed the sarcolemma, sarcoplasm, myofibrils of skeletal muscle of all forms tested. Both enzymes exhibited limited hydrolytic action on the nuclei of muscle fibers. Papain and ficin attacked the endomysium, perimysium, and epimysium, but apparently had reduced action on the nuclei of fibroblast. The cytological changes elicited by these enzymes are compared to the changes induced by heating alone or by low or high hydrogen ion concentration.

(2)
Trillium maculatum Raf. and Related Taxa of Sessile-flowered *Trillium*

JOHN D. FREEMAN, *Vanderbilt University*

Since 1753, more than fifty specific or varietal names have been proposed for sessile-flowered *Trillium.* Because of this burdensome synonymy, there exists little agreement among taxonomists as to the valid names for various taxa. Much of the taxonomic confusion concerning the sessile trilliums of the southeastern states involves the entity to which the name *T. maculatum* Raf. should apply. The present study, based on field work in 17 eastern states and supplemented by examination of herbarium specimens and types, has shown that *T. maculatum* may be distinguished from other species having sessile flowers, including *T. underwoodii* Small — a valid name often relegated to synonymy. These two species occupy much the same geographic range in the southeastern coastal plain where sympatric populations are not uncommon. Evidence of hybridization between the two is lacking and in view of their consistent morphological differences, *T. maculatum* and *T. underwoodii* should be accorded taxonomic recognition as distinct entities.

(77)
Quantitative Considerations of Ecosystem Disturbance by Gamma Irradiation

ARTHUR GARRETT, *Emory University*
(*Present address, U. S. Public Health Service, Southeastern Radiological Health Laboratory.*)

Phenological and quantitative changes occurring in segments of granite outcrop ecosystems were recorded during two year's exposure to gamma irradiation. Chronic dose rates constituted a gradient from 161 to 0.8 Roentgens per hour. Changes in taxonomic composition of the plant and soil arthropod communities

have been quantified by means of several indexes of dominance, diversity and similarity. These index values will be considered in terms of their relationship to photographic and subjective observations. Both subjective and quantitative observations indicate the nature and extent of ecosystem disruption by radiation. In this case, many aspects of ecosystem alteration are similar to the reported effects of other stress factors. Results of the present paper support those who have suggested three phases of ecosystem response: quantitative compositional changes, alteration of dominance and extinction. Radiation is a precisely controllable environmental factor and therefore is useful as a tool in investigating the mechanisms giving rise to the general case effects on ecosystems.

(99)
Effects of Ethanol on Morphogenesis and Distribution of Glycogen in Developing *Rana pipiens*

NORMAN E. GARRISON AND J. E. DAVIS, JR., *Wake Forest College*

Rana pipiens larvae were reared under varying concentrations of ethanol for 95 hours, starting at stage 10. Studies revealed suppressed development and hatching, thoracic abnormalities (gross and histological), and altered glycogen content in all larvae. Decreased glycogen was pronounced in larvae reared in near-lethal concentrations of ethanol. These results support the hypothesis that high concentrations of ethanol cause an alteration in glycogen content and, consequently, in development.

(54)
Separation of Mature and Immature Quail Hypothalami Extracts by Gel Filtration

R. E. GARTH, J. R. FORTMAN, AND K. J. SMITH, *Mississippi State College for Women and Northwestern State College of Louisiana*

The ICSH-releasing factor(s) of male birds is thought to be produced by the hypothalamus. Homoginates of hypothalamic material from mature and immature quail were fractionated by gel filtration on Sephadex G-25 and the fractions bio-assayed by the degree of ascorbic acid depletion in mice ovaries. Consistent differences in the gel filtrates were obtained, but mice ovaries proved to be unsuitable for use in ascorbic acid depletion tests.

(117)
The Effects of Artificial Predation on the Behavior and Population Densities of *Pogonomyrmex badius* Colonies

JOHN B. GENTRY, *University of Georgia*

Twenty colonies of the southern harvester ant, *Pogonomyrmex badius,* were subjected to daily removal of workers for a period of five months during the summer of 1965. Ten colonies lost 10 workers per day and 10 colonies lost 50 workers per day. Ten additional colonies served as controls. One-half (15) of the colonies were excavated at the end of the experiment to determine population densities. Daily activity among the colonies losing 50 workers per day was greatly altered in response to the artificial predation pressure. Although there was no significant difference between the controls and the treated colonies in the number of ants produced (removed plus excavated), the worker population of the 50 per day group showed, upon excavation, a 50% reduction in density. No effect in behavior or worker density among the 10 per day group was noted. The remaining 15 colonies survived the winter and showed normal behavior the next summer.

(124)
Forces Produced by Beating Flagella of *Polytomella agilis*

STEPHEN M. GITTLESON, *University of Kentucky*

Forces produced by the beating flagella of *Polytomella agilis* have been assessed by measuring the displacement of polystyrene spheres (0.365 u in diameter) in suspension about the motile organism. Stokes' law relates the hydrodynamic force directly to the frictional coefficient and velocity of the sphere. Velocity of the polystyrene spheres was measured from 16 mm motion pictures taken at 50 frames/sec at 256X. The spheres had an average velocity of 36.2 u/sec with a range from 21.3 to 52.7 u/sec. *P. agilis* move forward at the average velocity of 80.0 u/sec. The flagella produce a force of about 1.1×10^{-8} dynes. This agrees closely with the 3.0×10^{-8} dyne force exerted by the flagellum of *Trypanosoma brucei* on deforming a red blood cell (Holwill, 1965); and the 1.2×10^{-8} dyne force with which the large abfrontal cilium of *Mytilus edulis* beats in normal sea water (Yoneda, 1960, 1962).

(113)
The Distribution of Seastars of the North Carolina Continental Shelf

I. E. GRAY, *Duke University*

Twenty genera and 30 species of asteriods have been taken on the Continental Shelf off North Carolina. Nine northern species have their southern limits, and sixteen tropical and subtropical species have their northern limits of range here. Only five range both north and south. North-south transition is not indicated; species with different geographical affinities may be in different marine climates at the same latitude. Tropical species are rare north of Cape Hatteras except at the edge of the shelf under the Florida Current; boreal species are not common south of the cape. The most abundant seastars of the shelf are *Astropecten articulatus, Luidia clathrata, Astropecten americanus* and *Asterias forbesii.* Charts showing distribution in relation to biotic provinces of the shelf are presented. The 18-20 species that live in the continuously cold, deep waters beyond the shelf, although in the latitude of North Carolina, are not included. (Supported by NSF grant G-25,128.)

(10)
Sag Pond Vegetation in Northwest Georgia

PHILIP F-C. GREEAR, *Shorter College*

Natural ponds in the Ridge and Valley province of northwest Georgia support coastal plain types of vegetation because climatic, geologic, edaphic and hydrologic factors there are similar to those of the Coastal Plain province. Twenty-three species of vascular plants previously reported only from the Coastal Plain grow there. There are twenty-five other species usually associated with the Coastal Plain which were not previously reported from the Ridge and Valley province. An additional twenty-two species have affinities with coastal plain vegetation. Six other species are related to the

vegetation of northern provinces. Vegetative zones in these ponds are mainly the product of hydroperiodic influences. Duration of hydroperiod depends largely upon the thickness of sapropelic silt deposited in the pond depressions. Relative stages of pond maturity can be recognized by distinctive elements of the vegetative zones.

(142)
A Botanical Case of Mayr's Founder Principle from the Charophyta

DANA G. GRIFFIN, III, *University of Tennessee*

Four populations of dioecious charophytes are now known wherein only one sex is present. Examination of available evidence regarding dispersal mechanisms in this group suggests (*a priori*) that these populations of haploid organisms are clonal or near-clonal, having originated from a single or very few oospores. If such is the case, they would represent rather extreme examples of Mayr's "founder population." Alternative hypotheses concerning their mode of origin are discussed.

(140)
A Further Look at the Biosystematics of *Chara zeylanica*

DANA G. GRIFFIN, III, *University of Tennessee*

Interpreted in the broadest sense, *Chara zeylanica* (Charophyta) can include populations having any one of 4 possible chromosome numbers (n = 14, 28, 42, or 56). Breeding experiments, however, strongly suggest that effective biological isolation occurs between certain subspecific taxa within this complex. The greatest morphological divergence between these taxa appears to occur in that part of the range where they are sympatric. Data from populations outside this area fail to confirm that a similar degree of divergence has taken place.

Of interest, at present, are two putative hybrids from Brazil. Suggestions as to their possible parentage are made.

(104)
Life Cycle of *Procyotrema marsupiformis* Harkema and Miller, 1959 (Trematoda: Alariinae)

ALVA H. HARRIS, R. HARKEMA, AND G. C. MILLER, *N. C. State University*

Intermediate hosts involved in the life cycle of *P. marsupiformis* were determined and larval stages were described. Eggs were obtained from the pancreatic duct of the definitive host and incubated in pond water. Parasite free planorbid snails were exposed to miracidia and the resulting cercariae infected laboratory-raised tadpoles. These tadpoles containing the mesocercarial stage were fed to non-infected raccoons for the recovery of the diplostomula in the lungs and the adults in the pancreatic duct. The miracidium has two eyespots, two pairs of flame cells, and an epidermal plate pattern of 6:9:4:3. It develops into a mother sporocyst in the periesophageal blood sinus of the snail host. Mother sporocysts produce daughter sporocysts which, in turn, produce pharyngeate, longifurcous cercariae. Cercariae possess 4 preacetabular penetration glands and a flame cell formula of 2 [(2 + 2) + (2 + 2 (2))] = 20 total.

(83)
Forest Vegetation Patterns in Southern Beaufort County, North Carolina

GARY S. HARTSHORN, *North Carolina State University*

A vegetation analysis of southern Beaufort County, North Carolina was made during the summer of 1966. The study area, located south of the Pamlico River, is in the outer coastal plain. A sandy ridge, west of the Suffolk Scrap, bisects the area. Elevation ranges from 5 to 60 feet above sea level. Relief, as it affects drainage, is the most variable of the factors affecting vegetation.

Because of the disturbed nature of the area, vegetation patterns were developed in relation to several soil drainage catenas. Soils of the Craven-Lenoir-Bladen-Bayboro catena, characterized by subsoils with greater than 45% clay, are generally dominated by hardwoods. In the Lakeland-Alaga-Albany-Plummer-Rutledge catena, characterized by sandier subsoils, pines dominate the drier sites with broad-leaved evergreens and hardwoods in moister situations.

(15)
Toxicity of Endrin to *Gambusia affinis:* A Comparison of Static and Flow-through Bioassay Systems

JOHN R. HEBERT, BOBBY F. DOWDEN, HARRY J. BENNETT, *Louisiana State University and Mississippi State College for Women*

Toxicity threshold values for *Gambusia affinis* subjected to endrin indicate that values measured in a static bioassay system are significantly greater than those measured in a flow-through system. The usefulness of toxicity thresholds measured in static systems is questionable. All the values measured were significantly lower than endrin concentrations purported to constitute no hazard to wildlife.

(101)
A New *Hystrichis* (Nematoda: Dioctophymidae) from the Common Crow

LARRY HENDRICKS, *North Carolina State University*

One hundred and fifteen crows (*Corvus branchyrhychos*) were collected in North Central North Carolina on April 23, 1966 in conjunction with the Southeastern Crow Hunting Association's Annual Hunt. Twenty specimens of the nematode genus *Hystrichis* were recovered from the lining of the esophagus. Morphological characters appear to be sufficiently different from the known species of *Hystrichis* to warrant description of a new species. North America represents a new locality record for this genus of nematode. This is also the first record of birds in the Order Passeriformes serving as hosts for this nematode in the New World.

(92)
An Innovation in the Paraffin Embedding Technique for the Preparation of Excised Angiosperm Ovules

J. M. HERR, JR., *University of South Carolina*

Accurate determination of spatial relationships in developing ovules from several species has been enhanced by a new technique for precise and repeatable selection

of specific section planes. Ovules removed from fixed ovularies to a glass planchet and prestained in 0.5% safranin in 70% ethanol for ten minutes are advanced at ten minute intervals through a tertiary butanol series. The planchet containing absolute tertiary butanol is transferred to a covered petri dish on a warming table. Chips of aerated paraffin are added over a period of thirty minutes, and the petri cover is then removed. After the alcohol evaporates, the ovules are transferred to fresh paraffin in a special flat dish coated with RTV 60 silicone rubber and, viewed through a dissecting microscope, are then precisely and uniformly arranged on the flat bottom of the dish. The dish is then rapidly cooled. The paraffin cast is shaped for sectioning so that the flat surface against which the ovules are positioned remains unaltered and becomes the front face of the section block. With the alignment of the front face perpendicular to the cutting edge of the knife, the predetermined section plane for the ovules is achieved. The technique is illustrated for ovules from *Ludwigia uruguayensis* (Camb.) Hara.

(74)
The Ecological Status of *Pinus Strobus L.* in Ogle County, Illinois

W. S. Hooks, *Lynchburg College*

An unusual distribution of *Pinus strobus L.* in relationship to topography and certain meterological phenomena raised the question as to the ecological status and origin of the only *P. strobus* stand in the State of Illinois. This stand has been referred to in literature as the extreme southern extension of the Wisconsin *P. strobus* forest. Investigations were initiated in 1956 and concluded in 1966. The techniques of dendrochronology were applied to the stand. A witness tree survey of the study area was made. Presently, developing growths of *P. strobus,* on similar topography and under the same meterological influences have been observed.

Results indicate that the stand is not natural but has developed following the settlement of the area by white man and was due to his interruption of the normal ecological situation.

(16)
Metabolic Rates of Estuarine Fish

Donald E. Hoss, *Bureau of Commercial Fisheries*

Radiobiological Laboratory, Beaufort, North Carolina

The resting metabolism of pinfish (*Lagodon rhomboides*), black sea bass (*Centropristes striatus*), Atlantic croaker (*Micropogon undulatus*), and oyster toadfish (*Opsanus tau*) was measured in the laboratory by means of a flowing-water respirometer. Resting metabolism was related to body weight by the equation $Q = aW^k$, where Q is the metabolic rate, W is the weight of the animal, and the values of a and k are constants derived from experimental data for a species. Some investigators also have stated that k values of various species do not vary significantly from 0.8. This value for k has been used to calculate the resting metabolism of certain species of fish when a was determined experimentally. In my investigations the value of k fluctuated significantly between species. The value 0.8 cannot be used as a constant in calculating metabolic rates for all species of fish for reasons discussed.

(98)
Staining Techniques for the Endocrine Pancreas

Ernest L. Hunt, *Emory University*

Excellent and specific techniques are available for the identification of cell types of the islets of Langerhans, but these techniques have been mainly developed for use with mammalian tissue. In a comparative study of the pancreas from other vertebrates the standard methods are not uniformly satisfactory. This report will indicate certain modifications of routine techniques which have proved useful particularly in the study of fish and of bird pancreatic cell types. The major modification to be discussed is a very rapid method using the standard Gomori aldehyde fuchsin, but substituting Ehrlich's acid hematoxylin for the more usual nuclear stain.

(52)
Possibility of Beryllium-Manganese Antagonism in Amputated Forelimbs of *Triturus viridescens*

Diane Sue Imhoff and Richard E. Garth, *Mississippi State College for Women*

The alterations in the histological pattern of normal salamander limb regeneration which are brought about by beryllium have been previously described. The exact mechanism of this alteration is unknown. The alkaline phosphatase system which may be involved in regeneration has been shown to be inhibited by beryllium *in vitro.* This inhibition can be removed by the addition of manganese. Bilateral amputation of salamander forelimbs and subsequent treatment with various combinations of beryllium and manganese indicate that reversal of beryllium inhibition by manganese is involved *in vivo.* The tentative conclusion is that the alkaline phosphatase system utilized magnesium as an essential activating ion which can be displaced by beryllium. The beryllium in turn can be displaced by manganese which allows a return to normal alkaline phosphatase activity.

(119)
The Reproductive Potential of *D. affinis*

Willard Jinks, *Indiana Central College*

The study of the reproductive potential of *D. affinis* has produced new insight in population studies. Previous investigators have suggested that food yeasts are species specific to the flies involved and may affect reproduction. A study of the fecundity, longevity, viability, and generation time indicates a preference for a yeast as food but not a necessity. The data are as follows: fecundity 136-310 eggs/female, generation time — 14 days, average viability — 63%. Of the larvae ready to pupate — 40%-60% undergo diapause or die in the pupal stage. Unlike *D. melanogaster* which can reproduce in the total darkness, *D. affinis* requires light of a certain intensity and duration in order to maintain maximum fecundity. Preliminary data indicates that *D. affinis* slackens egg production in total darkness. An additional experiment suggests that *D. affinis* requires a minimum volume of space per individual, and preliminary data indicate that when a population is crowded into a small space, fecundity decreases.

(23)
Green Tissues Among Neotropical Frogs

DUVALL A. JONES, *West Liberty State College*

Green pigmentation of bone and other internal tissues of live and newly preserved tropical frogs has been a topic of curiosity for nearly a century. Biliverdin and perhaps other pigments of hemoglobin metabolism appear to be responsible for the green coloration. Since these pigments deteriorate rapidly in preserved specimens, fresh material of more than thirty-five anuran species was studied in the West Indies and Surinam. Adults of sixteen species had green bones; of these, certain species consistently demonstrated plasma and tissues that were variously saturated hues of green. Tadpoles ordinarily lack the green coloration until the onset of metamorphosis. The incidence of green pigmentation is difficult to correlate with phylogeny, ecology, diet, red blood cell count or concentration of blood hemoglobin. Difficulty in determining the cause of pigment accumulation may be due to formation of similar pigments by different mechanisms in the species concerned.

(7)
Habitat Hybridization in *Vernonia* (Compositae)

SAMUEL B. JONES, JR., *University of Southern Mississippi*

A hybrid swarm of *Vernonia* was found on a habitat which was intermediate between the habitats of the two parents (*V. augustifolia Michx. and V. altissima Nutt.*) and to which neither parent was as well adapted as the hybrids. *Vernonia augustifolia* was on a high, dry, sandy, turkey oak-longleaf pine bluff while *V. altissima* was on the edge of a wet swamp forest. These habitats were connected by a highway fill which provided a variety of intermediate ecological situations. This population was observed over a period of five years. Local population samples were collected and experimental crosses were made. When man creates a disturbed or hybridized habitat, hybridization often occurs between species of *Vernonia,* which share the same general geographic distribution but are usually separated by ecological barriers.

(46)
The Luteolytic Effect of Resectioned and Rejoined Pseudopregnant Hamster Uteri

GEORGE C. KENT, JR., *Louisiana State University*

Hysterectomy of hamsters rendered pseudopregnant by sterile mating results in prolongation of hyperemia of the corpora lutea of pseudopregnancy (PS) and postponement of the next psychic estrus until $15.85 \pm .39$ (S.E.M.) days after sterile mating ($N = 78$). Total resection of pseudopregnant uteri followed by immediate rejunction of the uteri in situ on days 1, 2, or 3 of PS gave the same result ($15.59 \pm .42$ days, $N = 32$). Resection and immediate rejunction on days 5, 6, or 7 of PS shortened the duration of PS to $11.58 \pm .50$ days ($N = 31$). To test the hypothesis that the synthesis or release of a luteolytic substance of uterine origin depends partly on intact uterine innervation (aff. or eff.?) on day 4 of PS, pseudopregnant hamsters were treated with analgesic agents during part of day 4 and the subsequent effects on the corpora lutea and on PS were observed. The results of these observations will be discussed.

(93)
A Preliminary Report on Floral Induction in Seedlings of *Chenopodium album* L.

T. W. LUCANSKY AND J. M. HERR, JR., *University of South Carolina*

Chenopodium album L., a short day plant, often grows a meter or more in height before flowering in response to the diminishing photoperiod from June through October. Under controlled conditions, floral induction has been achieved in plants 12 to 24 inches in height by altering the daily photoperiod from 17 hours to 7 hours. In an attempt to induce flowering with further reduction in vegetative growth, seeds obtained from plants grown in nature, in the greenhouse and in growth chambers were planted in sand supplied with minerals and maintained on 2-, 4-, and 6-hour photoperiods. Seeds produced in the growth chambers showed a higher percentage and rate of germination than those from nature or the greenhouse. Seedlings in the 2-hour photoperiod showed extreme etiolation and negligible growth of the epicotyl. Those in the 4-hour regime, slightly etiolated, flowered after producing an average of 21.6 leaves, to include cotyledons, with the average length of the epicotyl 43.7 mm. Seedlings grown in the 6-hour photoperiod were not etiolated and flowered after the epicotyl grew to an average 8.3 mm. with an average leaf number of 12.1. At flower initiation, the smallest seedling had produced 6 leaves and an epicotyl less than 1 mm. long.

(33)
Photosynthesis in Relation to Chlorophyll Content, Stomatal Distribution, and Hill Reaction Activity in Shade and Sun Ferns

C. JOSEPH LUDLOW AND FREDERICK T. WOLF, *Vanderbilt University*

Photosynthetic data, including compensation points, light saturation intensities, and maximal rates of photosynthesis have been earlier determined in two species of ferns which grow in the shade (*Asplenium platyneuron* and *Woodsia obtusa*), and in two sun species (*Botrychium dissectum* and *Pellaea atropurpurea*). It was shown that the quantity of chlorophyll was considerably higher in the shade species. Proportionality between chlorophyll content and photosynthetic rate was found in only one species. Both stomatal number and maximal photosynthetic rates were higher in the sun species. Hill reaction activity of isolated chloroplasts, followed spectrophotometrically by reduction of 2,6-dichlorophenolindophenol was found to correlate well with maximal photosynthetic rates, both of which are higher in sun than in shade species.

(120)
Studies on the Life-History of the Damselfly *Lestes eurinus*

PAUL E. LUTZ, *University of North Carolina at Greensboro*

Extensive field studies were conducted in 1965-1966 in a small woodland impoundment in Guilford County, North Carolina. These studies indicated the duration of the life cycle of *Lestes eurinus* was about one year. Rapid larval growth occurred from July to mid-October with development being arrested by late October. The

population overwintered in the three stages preceding the ultimate instar. Larval growth was resumed in March and progressed rapidly until emergence. Emergency began on May 1, was rather unsynchronized, lasted for two months, and was temperature-dependent. Oviposition occurred during June and July; the females were observed to oviposit only in the abundant emergent burreed *Sparganium americanum*. Eclosion occurred from mid-July until mid-August. The larvae grew rapidly in the sueceeding months and attained the overwintering stages by October. Approximate average durations of the various stages in the life-history were: egg, 6.5 weeks; larva, 35 weeks; and adult, 6.5 weeks. (Support by Grant GB-3654 from the National Science Foundation.)

(75)
Niche Differentiation Between Two Closely Related Species

J. Frank McCormick, Leola Crosthwaite, Carol Damon, Wesley Egan, John Findley, Violet A. Hicks, Richard Leonard and Wilbur H. Rittenhouse, *University of North Carolina*

Sedum pusillum and *Sedum smallii* are endemic to rock outcrops of the Southeastern United States. Although their habitats may be less than one meter apart their distributions on an outcrop do not overlap unless the environment is severely disturbed. Each species occupies a distinct ecological niche. In order to identify the factors which influence niche differentiation population samples of both species were grown under a variety of controlled environments and reciprocal transplants were made on two granite outcrops. Reduced phenotypic variability in controlled environments caused the nearly identical species to appear even more similar than in the field. Experimental results indicate that niche differentiation is based upon differential tolerances to combinations of temperature, competition, frequency and amount of moisture and soil depth. Although light intensity does vary significantly between the two habitats, and light intensity does influence pigmentation of both species, it does not appear to signifieantly influence niche differentiation. Except for responses to light intensity and soil pH, differences in species physiological tolerances can be correlated with differences in the microenvironment of each species.

(127)
Serological Identity of the Mammalian Lethal Components of the Venoms of *Latrodectus mactans* and *L. variolus*

John D. McCrone, *University of Florida*
Robert J. Hatala, *Florida Presbyterian College*

A protein fraction, lethal to mammals, was isolated from the venom of the Southern black widow *Latrodectus mactans* by means of vertical acrylamide gel electrophoresis. An antiserum against this lethal fraction was prepared by injecting a rabbit with homogenized acrylamide gel containing the fraction. A volume of 0.25 ml of the antiserum protected mice against the lethal effects of 5 LD_{50}'s of the venoms of *L. mactans* and the Northern black widow *L. variolus*. The antiserum also produced two major precipitation lines when reacted with each venom in double immunodiffusion tests.

(100)
The Fertilizability of Eggs of *Triturus viridescens* Taken from Different Levels of the Oviduct

Ellen W. McLaughlin, *Emory University*

The oviduct of this species is divided into five recognizable regions designated A through E from anterior to posterior. Each region secretes a distinct jelly coat around the egg, these being designated J1 through J5 from inner to outer (Humphries, A., Devel. Biol. 13: 214, 1966). In order to investigate the relative importance of each jelly layer in fertilization, eggs from the five regions as well as from the body cavity were artificially inseminated with an undiluted sperm suspension from the vas deferens. The following percentages of fertilized eggs were obtained: body cavity, 1% (1/68); region A, 20%, (14/71); region B, 51% (24/47); region C, 63% (52/83); region D, 86% (50/58) and region E, 69% (250/360). The fertilizability of eggs increased with the addition of jelly layers through region D, but eggs from region E showed a somewhat lower percentage of fertilization than those from region D. Cytological examination of inseminated eggs from regions D and E revealed that spermatozoa placed directly on the J4 surface entered the jelly layers in greater numbers than those placed on the J5 layer. This suggests that the physical and/or chemical properties of the J4 layer may be more conducive to fertilization or that the J5 jelly coat acts as a partial barrier to sperm penetration. (Supported by grant GM 09878 from the United States Public Health Service.)

(76)
The Effects of Ionizing Radiation on the Growth of Old-field Species

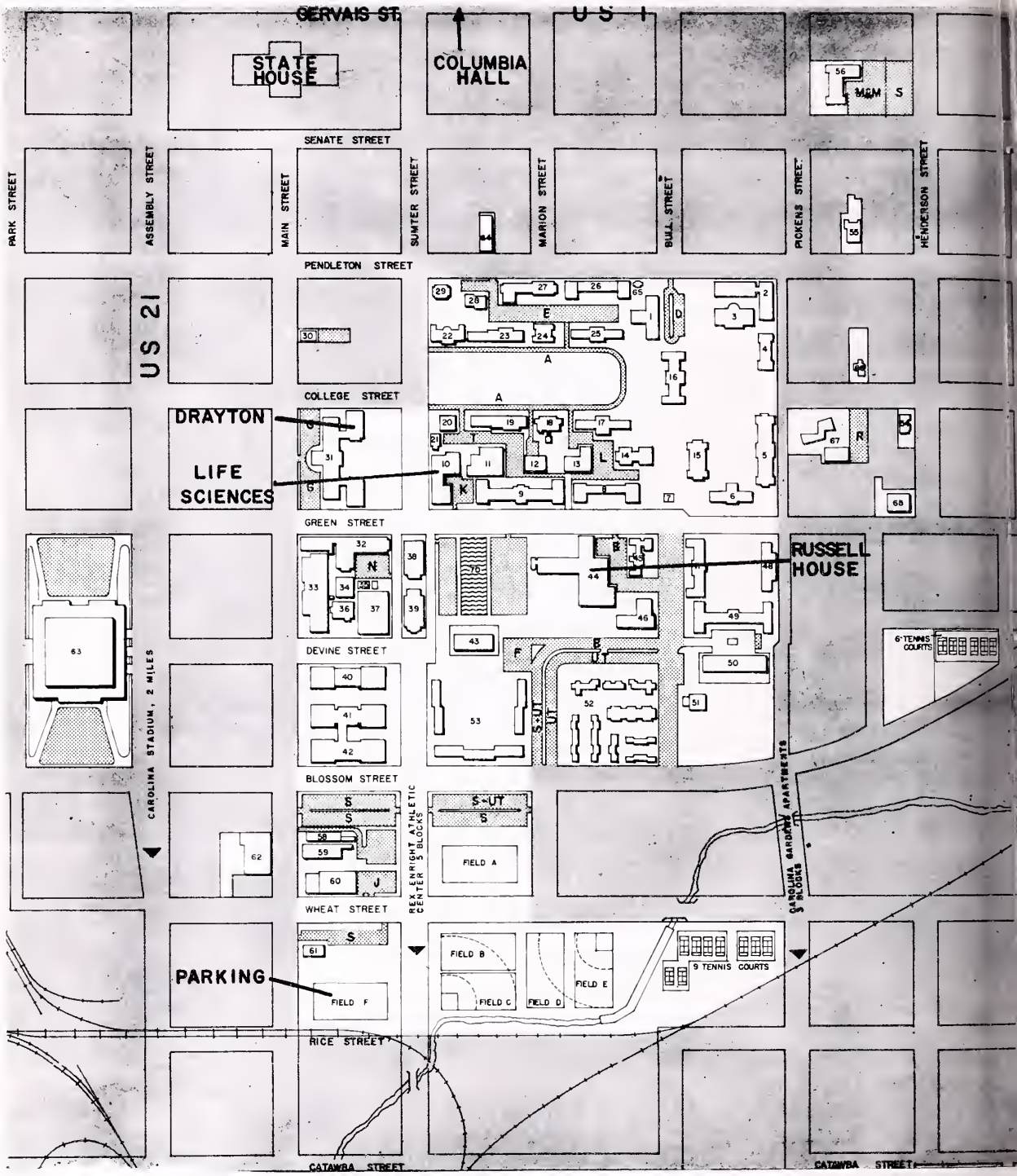
Gary L. Miller, *University of North Carolina*

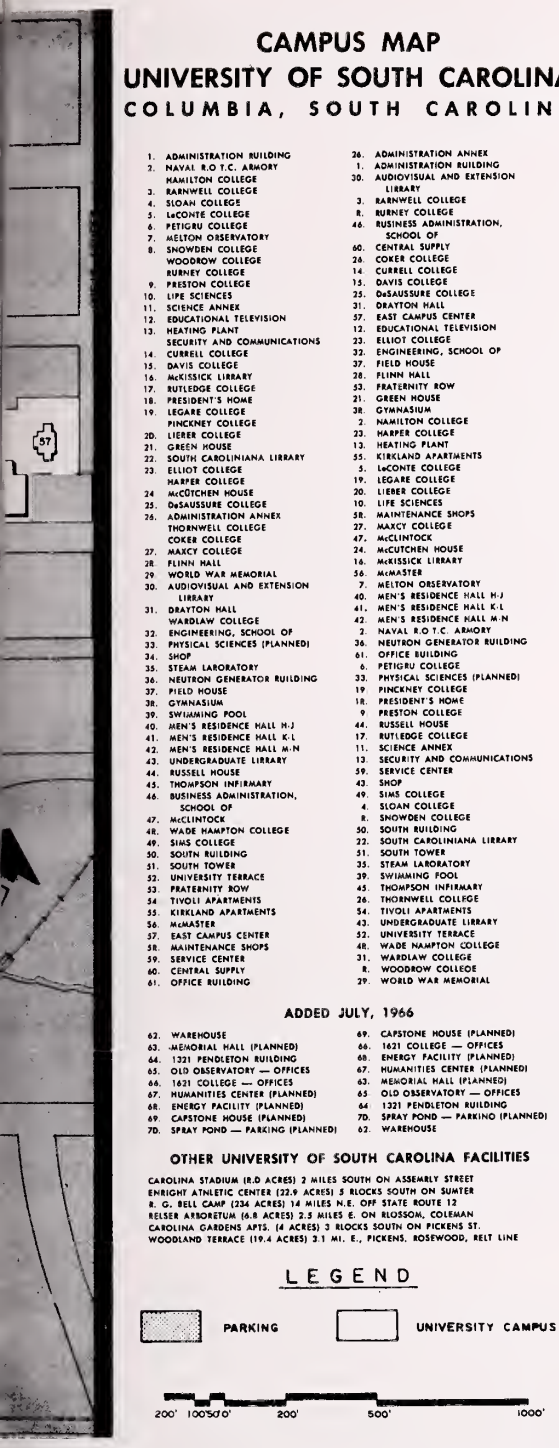
Four sections of a 12 year old-field were seasonally irradiated (April, July, October, January) for twenty-nine days using a portable 9200 curie source. Naturally occurring populations of *Haplopappus divaricatus, Erigeron strigosus, Cassia fasciculata, Andropogon* spp. and *Pinus palustris* were exposed to thirteen gamma radiation levels ranging from 70 r to 210 kr (total dose). Measurements on apical growth, flower, fruit and seed production, germination and dry weight were made. Significant responses in all categories were observed. LD/100's for mature plants ranged from 4.2 kr for *Pinus palustris* to 210 kr for *Haplopappus divaricatus*. It is hoped that these studies, along with others currently going on, will make it possible to predict if the old-field expresses a seasonal radiosensitivity.

(105)
Helminths from Some Wild Mammals in the Southeastern United States

Grover C. Miller and Reinard Harkema, *North Carolina State University*

Studies were conducted on the incidence and distribution of helminths in four species of wild mammals. Sixteen bobcats, twelve from North Carolina and four from South Carolina, contained the following parasites: TREMATODA: 2 species; CESTODA: 4 species; ACANTHOCEPHALA: 1 species; NEMATODA: 7 species. Twenty otters, from North Carolina contained the following: TREMATODA: 2 species. NEMA-


GERVAIS ST.
STATE HOUSE
COLUMBIA HALL
U S 1
SENATE STREET
PARK STREET
ASSEMBLY STREET
MAIN STREET
SUMTER STREET
MARION STREET
BULL STREET
PICKENS STREET
HENDERSON STREET
PENDLETON STREET
US 21
COLLEGE STREET
DRAYTON
LIFE SCIENCES
GREEN STREET
RUSSELL HOUSE
DEVINE STREET
BLOSSOM STREET
CAROLINA STADIUM, 2 MILES
REX ENRIGHT ATHLETIC CENTER
CAROLINA GARDENS APARTMENTS
6 TENNIS COURTS
FIELD A
WHEAT STREET
PARKING
FIELD F
FIELD B
FIELD C
FIELD D
FIELD E
9 TENNIS COURTS
RICE STREET
CATAWBA STREET
M&M



TODA: 3 species. Twenty four grey foxes from North Carolina, South Carolina, and Georgia, contained: TREMATODA: 5 species; CESTODA: 3 species; NEMATODA: 7 species. Five red foxes, four from North Carolina and one from Georgia, contained CESTODA: 1 species; NEMATODA: 5 species.

The 65 mammals harbored 28 different species of helminths. The bobcats collected from coastal counties contained more helminths, both in kinds and numbers, than did the otters or foxes. The otters contained the fewest parasites and the foxes, although collected from widely distributed areas, never showed heavy infections.

(50)
Effects of THAM, Glucose, and Hypothermia Upon Tolerance to Asphyxia in Newborn Puppies

JAMES A. MILLER, JR., MICKEY VIA AND FAITH S. MILLER, *Tulane University*

Neonatal puppies with body temperatures between 42° C and 5° C were asphyxiated in 95% N_2 + 5% CO_2. Those at 15° C survived over 7 times as long as those in the coenothermic range as measured by Time of Last Gasp (T.L.G.). Spontaneous recoveries were recorded for 100% of 15° animals after 4 times, and 50% recovered from 9X - 10X the lethal exposure for warm littermates. During asphyxia, blood glucose, potassium, lactate and hydrogen ions increased and pyruvate decreased. In puppies at 15° all of these changes took place at a slower rate than in warm littermates. In coenothermic animals (37°) controlling pH by infusion of Trishydroxyaminomethane (THAM) increased survival times by 18%, infusion of glucose by 19%, and combining the two by 68%. Cooling to 15° C colonic temperature gave survivals of 655%. Combining THAM and glucose with hypothermia (15° C) gave an average of 1104%. THAM-glucose infusions also permitted recoveries from exposures which were lethal for non-infused animals at the same temperature.

(123)
Endocrine Control of Locomotor Activity in the Crawfish *Faxonella clypeata*

W. C. MOBBERLY, JR., *Northeast Louisiana State College*

Studies were carried out on the movement of *Faxonella clypeata* in a linear maze. Intact crawfish and crawfish with both eyes painted black moved a greater distance in a 15-minute time period than crawfish with both eyestalks ligated or eyestalkless. Animals with the ligature removed showed an increase in movement, but did not obtain the distance achieved prior to ligation. The injection of extracts of eyestalks prepared in van Harreveld's solution produced a decrease in movement in intact animals. The concentrations used ranged from ½ to 4 eyestalks per 0.02 ml of extract injected. Higher concentrations produced less movement than at lower. It would appear that the release of a substance or substances from the eyestalk is involved in regulating the intensity of locomotion in this crawfish.

(115)
Multiple Regression Comparisons of Six Abiotic Parameters with the Distributions of Two Species of *Chironomus* (Diptera, Chironomidae) in a Five Hectare Piedmont Lake

SAMUEL C. MOZLEY, *Emory University*

Chironomus plumosus L. and *C. crassicaudatus* Malloch, both in the plumosus supra-specific group, occur sympatricly in polymictic Lullwater Lake near Atlanta, Georgia. Their distributions are overlapping, but maximal densities are in separate areas. Three stratified random samples were conducted and data were taken at 120 sites on larval density and the following environmental parameters: depth, pH, oxygen tension, substratum composition, and water and bottom temperatures. These data were analyzed using a digital computer, the parameters were ranked according to their ability to predict larval density at each site, and a measure of the goodness of fit of predicted to actual values was computed. Results show that depth is the most important parameter, and substratal types show some relationships.

(133)
Biochemical Mechanisms in the Hormonal Control of Sexual Morphogenesis in *Achlya*

J. T. MULLINS AND D. DES S. THOMAS,
University of Florida

The heterothallic species of the genus *Achlya* consist of a linear series of sexual strains each of which, with the exception of the two terminal strains interacts as ♂ or as ♀, depending upon its position in the series relative to that of its mate. The sexual reproductive process is initiated and coordinated throughout its entire course by a series of specific diffusible hormones. The morphological response of ♂ strains to hormone A, which is produced by ♀ strains, is the production of antheridial initials. The production of these ♂ sexual organ primordia depends upon the induction of the enzyme cellulase. This enzyme appears to "soften" the cell wall which then allows the hyphal contents to be flow-oriented in the direction of maximum strain into fingerlike laterals. The peak of cellulase production corresponds in time with the appearance of the antheridial initials. The response to the hormone depends upon protein synthesis. The mechanism of response of ♀ strains to hormone B, which is produced by sexually induced ♂ strains, is similar to that described for ♂ strains.

Norris, William W. — Please see page 28.

(94)
A Wild Yam

HERMAN O'DELL, *East Tennessee State University*

A species of wild yam was observed blooming at El Verde, Puerto Rico during the summer of 1966. Buds were collected and fixed in the field. Slides were prepared from these specimens by the paraffin method. These slides were examined for different morphological stages.

(128)
The Genus *Clavaria* in the Southeastern U. S.

PAUL D. OLEXIA, *University of Tennessee*

The genus *Clavaria* is separated from other members of the Clavariaceae on the basis of hyaline, smooth spores and the total absence of clamp connections on the medullary hyphae. The genus is divided into two subgenera on the basis of the presence or absence of a bifurcation or wide loop-like clamp connection at the base of the basidium (Holocoryne or Syncoryne respectively). The most common species is *C. vermicularis,* the fruiting bodies of which are shining white fasicles of very brittle clubs generally found in grassy areas. *C. fumosa* is similar to *C. vermicularis* but has a more drab creamy appearance and the tips of the clubs are usually dark brown and withered. *C. rosea* is distinguished from the above species by the fleshy or rosaceous color of the fruiting bodies. *C. purpurea* is similar in form to the above species but is smoky brown or grayish purple and bears large cystidia which are quite evident upon microscopic examination. *C. atroumbrina* is dark brown in color and bears longitudinal ridges on the clubs which are generally individual rather than in fascicles. *C. zellingeri* is relatively easily distinguished from all of the above by its coralloid habit of growth and bright purple coloration. All of the above species belong to the subgenus Synceryne.

C. incarnata is a member of the subgenus Holocoryne and only has been collected three or four times in North America — twice in the southeast. These clubs are solitary and pale pink with a readily distinguishable stipe. *C. acuta,* although its southern-most extension thus far is southern Ohio, probably occurs further south but has not yet been reported. It also bears the proximal bifurcation of the basidium and occurs as solitary or fasciculate clubs on bare soil.

(45)
Differential Reactivity of Urodele Developmental Chromosomes

ROSALYN M. PATTERSON AND ERNEST L. HUNT,
Emory University

Investigations have been conducted to determine the reaction of Urodele chromosomes to low temperature during early embryological stages. Embryonic stages of *Ambystoma punctatum* and *Triturus viridescens* were maintained at 1° C for four days. Control stages were kept at 12° C and at room temperature. The embryos were stained with aceto-orcein and by the Feulgen method. Metaphase chromosomes with cold reactive segments were observed in all experimentally treated embryos. Chromosomes from control embryos did not show such segmented areas. These differentially reactive segments are considered to represent the heterochromatic regions of the chromosomes. Experimental embryos treated with relatively high amounts of colchicine demonstrated a reduction or absence of segmentation of the chromosomes. This may indicate that the differentially reactive chromosomal areas are underspiralized rather than deficient in deoxyribonucleic acid.

(87)
Plant Ecology in the Education of Pre-Medical Biology Undergraduates

E. GIBBES PATTON, *Wofford College*

The core of biology courses required for biology majors in Wofford College includes a fall-and-winter semester of ecology taught by a plant ecologist. The majority of the 20-25 students taking the course are premedical. Two features of the laboratory-centered course have demonstrated special value during the past 3 years:

1. Intensive descriptions of phenology and physical-environmental variables in distinct, contiguous plant communities. Continuing and comparative study by each work-group culminates in a report on its community.

2. Investigation of a local problem in applied ecology — definition of a separate problem by each work-group and ecological analysis of the current solution. The work-group teaches the "lesson" and arranges the field trip.

Objectives and results will be discussed. Sample course materials are available.

(39)
Effects of Dimethyl Sulfoxide and Naphthaleneacetic Acid on Radiosensitivity of Cultured *Cucurbita* calluses

ROBERT A. PEDIGO, *The College of William and Mary*

Summer Squash tissue was grown on media modified with various concentrations of naphthaleneacetic acid (NAA) both with and without dimethyl sulfoxide (DMSO). Exposure of the calluses to 10,400 r of gamma radiation resulted in a decrease in growth associated with increasing NAA concentration. When DMSO was present with the NAA, increasing growth with increasing NAA concentration was found, indicating that DMSO may have been involved in the repair of radiation damage to the cell membrane. Detrimental effects of increased cell wall plasticity caused by the NAA may also be involved in radiosensitivity.

(129)
The Genus *Clavulina* (Fungi, Clavariaceae) in the Southeastern United States

RONALD H. PETERSEN, *University of Tennessee*

The genus *Clavulina* is separated from other genera of clavarioid fungi by its stichic, bi-spored, usually secondarily septate basidia. In the southeastern United States, *Clavulina* is represented by no less than nine species, one of which has remained undescribed. Undoubtedly the most common taxonomic unit in this geographical region is a complex of four taxa, usually referred to as *C. cristata, C. rugosa, C. cinerea* and *C. amethystinoides*. No adequate taxonomic characteristics have been investigated which satisfactorily separate these, and evidence has been presented which indicates that the complex represents a non-speciated evolving gene pool in which most combinations of taxonomic characters are still being exhibited. One undescribed species, belonging to the subgenus *Fusco-clavulina,* is illustrated for the first time.

(85)
Parasitism and Host Range of *Nestronia umbellula* Raf. (Santalaceae)

MARTIN A. PIEHL, *University of Wisconsin*

Nestronia, a monotypic, rhizomatous shrub, was studied at several stations in Georgia and South Carolina where it often occurred within or at margins of pine-hardwood stands. *Nestronia* is a root hemiparasite which produces haustorial connections to underground parts of neighboring plants. Though its haustoria may have the typical bulb-like shape, they are very often strongly clasping, and are comparatively large, although they range from ca. 1 to 15 mm. across. They are unusual because of their reddish-brown surface and conspicuous concentric lines or low ridges. The literature has long stated the hosts are deciduous trees and shrubs, and recently pine was added. However, detailed study has disclosed haustorial attachments to a variety of plants from 23 families, ranging from ferns and self-parasitism to angiospermous and gymnospermous trees; shrubs; monocots; several herbaceous dicots, especially perennials, and another hemiparasite, *Aureolaria*. Though attachments are made to many species, they were not equally successful, but tended to be more vigorous and numerous on certain woody species and herbaceous dicots. (Research aided by NSF G-22079 made to the Highlands Biological Station.)

(86)
Root Grafts and Haustorial Self-parasitism in *Aureolaria* (Scrophulariaceae)

MARTIN A. PIEHL, *University of Wisconsin*

Studies of root parasitism in *Aureolaria,* subg. *Eu-aureolaria,* have demonstrated a remarkably high frequency of self-parasitism. Particularly in *A. laevigata* and *A. flava,* attachments between roots of an individual plant (or of nearby plants) existed not only as the usual bulb-shaped haustoria, but also as simple fusion of roots in close proximity, i.e., root grafts. Though grafts are not uncommon in larger roots, especially near the crown, in various plants, they often involved small roots and occurred over much of the diffuse root system in *Aureolaria*. Most unusual was the abundance of haustorial connections and grafts, resulting in a greatly fused root system of repeatedly anastomosing members. In both types of connections the union of outer tissue was quite complete and continuity of vascular tissue occurred inwardly. The function and adaptive value of self-parasitism in various parasites is generally open to speculation, and an added question in *Aureolaria* concerns the possibility that these plants show root parasitism in primitive (grafts) and more advanced stages (haustoria).

(134)
Accumulation of Radioisotopes in Certain Lichens

G. L. PLUMMER, *University of Georgia*

Concentration values for 9 radioisotopes are shown for 3 lichens. The lichens are similar to those involved in food chains of Alaskan caribou and leading to eskimos. *Parmelia conspersa* probably contains more radionuclides than any other plant in Georgia whereas two species of *Cladonia* generally held 0.1 the radionuclides relative to biomass; but, when density of those lichens is considered, *Cladonia* with more biomass contained more ^{137}Cs. Treatments with as much as 500 nCi/m^2 of ^{134}Cs produced no significant loss of radiocesium after lichens were leached with heavy rainfall. The results suggest that the capacity for species of *Cladonia* and *Parmelia* to accumulate ^{137}Cs is rather unlimited for a while. Accumulation is expected to increase as long as radioactive fallout increases and concentrations relative to biomass shall increase likewise. An "equilibrium" may be expected only if the rate of incoming ^{137}Cs ever equals the rate of radioactive decay. Lichens hold very small amounts of ^{90}Sr probably because the component fungus has very low calcium requirements. Data will show results of monitoring for the past 5 years.

(102)
A New Host Record for *Cepedietta* (=*Haptophrya*) *michiganensis* (Woodhead), 1928 (Protozoa: Ciliata)

VERNON N. POWDERS, *The University of Tennessee*

The astomatous ciliate, *Cepedietta michiganensis,* has been reported in: *Hemidactylium scutatum, Plethodon cinereus, P. glutinosus, Ambystoma jeffersonianum, A. opacum, Desmognathus fuscus, D. phoca, Eurycea bislineata, E. longicauda, Pseudotriton montanus* and *Rana sylvatica. Cepedietta michiganensis* was first observed on May 29, 1966, in *Plethodon jordani* collected in the Great Smoky Mountains National Park. During the periods of April 30 to June 24 and August 29 to September 30, 1966, 641 specimens of *P. jordani* were collected in the GSMNP. *Cepedietta michiganensis* was found in 8.6% of the salamanders examined.

(106)
Altitudinal Distribution of *Cepedietta* (=*Haptophrya*) *michiganensis* (Woodhead), 1928 (Protozoa: Ciliata)

VERNON N. POWDERS, *University of Tennessee*

Infectivity of *Plethodon jordani* and *P. glutinosus* by the astomatous ciliate, *Cepedietta michiganensis,* was studied in specimens collected in the Great Smoky Mountains National Park between August 24 and September 30, 1966. Specimens of *P. glutinosus* were also examined during this period from Knox County, Tennessee. *P. glutinosus* and *P. jordani* were collected at altitudes between 2700 and 4600 feet. *P. jordani* was also collected above 4600 feet. *P. jordani* was not collected below 2700 feet and *P. glutinosus* was not collected above 4600 feet.

Of 61 specimens of *P. glutinosus* from Knox County, Tennessee, 82% were infected. Of 95 specimens of *P. jordani* from altitudes above 4600 feet in the GSMNP, none were found infected. The statistical analysis of the *P. jordani* and *P. glutinosus* data obtained from 2700 to 4600 feet suggests that the infectivity is inversely proportional to altitude, that the decreases in infectivity in both salamander species are equal and that there is no difference in infectivity between the two species. The above data would suggest that some factor, possibly controlled by altitude, plays a reducing and/or limiting role in the vertical distribution of *Cepedietta michiganensis.*

(103)
The Proposed Role of Parasites as Indicators of Host Ancestry

CHARLES E. PRICE, *North Texas State University,* AND PETER S. MAITLAND, *The University, Glasgow, Scotland*

The present authors are currently engaged in a joint study concerning host-parasite relationships of the fishes of Great Britain and their Monogenea. During one phase of the study, we have found reason to believe that in certain cases, gill trematodes can furnish parasitological evidence of host ancestry. The cosmopolitan monogenetic trematode *Discocotyle sagittata* (Leuckart, 1842) was recovered from the gills of two *Coregonus* species, one from Lynn Tegid, North Wales, the other from Loch Lomond, Scotland. *Discocotyle* has apparently evolved from a mazocraeidean-like marine progenitor. As the British whitefish hosts have been land-locked for a minimum period of 15,000 years, their harboring of *Discocotyle* strongly suggests that *Coregonus* evolved from marine ancestors. Other factors are cited.

D. sagittata was comparatively studied, with the resultant opinion that *Discocotyle* is in actuality a monotypic genus.

(11)
Progress Toward Production of a Flora of Mississippi

THOMAS M. PULLEN, *University of Mississippi*

Components of the vascular flora of the entire southeastern region of the United States are not adequately known. This is especially true of the area embraced by Mississippi. This 47,716 square mile area of the Mississippi embayment has doubtless played an important role in speciation as elements of western and eastern refugia have come together. Thorough knowledge of this flora is paramount for a better understanding of phytogeographical and evolutionary problems in the Southeast. In 1963 a project, supported by the Committee on Faculty Research, was initiated to study the vascular plants of this area. In January, 1966 the National Science Foundation provided funds which enabled Samuel B. Jones from the University of Southern Mississippi and J. Ray Watson of Mississippi State University to join me as associates in this study. Many new state records have been recorded and some distribution gaps have been filled.

(4)
A Biosystematic Study of the Genus *Cimicifuga* (Ranunculaceae), with Emphasis on *Cimicifuga rubifolia* Kearney

GWYNN W. RAMSEY, *Lynchburg College*

A biosystematic study of the genus *Cimicifuga* has been made on a world-wide basis. Herbarium specimens of all species and field populations of all North American species have been studied in an attempt to distinguish the biotypes within the genus. Comparisons between the North American and Eurasian species have been made by using several techniques which utilize taxonomic, phytogeographic, ecologic, biometric, and gross morphologic data.

Recent investigations show that *Cimicifuga cordifolia* Pursh and *Cimicifuga racemosa* (L.) Nutt. var. *cordifolia* (Pursh) Gray have not been well understood. They have been confused with *C. rubifolia. C. cordifolia* Pursh appears to be a biotype of *C. americana* Michx. and *C. rubifolia* is a distinct species. The distribution of *C. rubifolia* has been extended beyond its previously published range.

(97)
An Experimental and EM Analysis of the Origin of Langerhans Cells

W. M. REAMS, JR., *Medical College of Virginia and University of Richmond,*
R. B. SCOGGINS, *Medical College of Virginia,* AND
A. S. ZELICKSON, *Universiy of Minnesota Medical School*

Since described by Langerhans in 1868, the gold-positive dendritic cells of the suprabasal layers of the epidermis have challenged skin researchers. Thus far, only circumstantial evidence has been available on the possi-

ble origin and function of the cells of Langerhans. In the present investigation, skin from embryo PET mice, prior to invasion of neural crest cells, was grafted into the coelom of chick embryo hosts and allowed to mature to the equivalent age of a 3-day post partum mouse. The neural crest-free grafts were examined with the electron microscope for the occurrence of Langerhans cells, and cells of known neural crest origin — melanocytes. Since neither Langerhans cells nor melanocytes have been seen with the EM in this neural crest-free skin, it is tentatively suggested that Langerhans cells, like melanocytes, are of neural crest origin in the PET mouse. (Supported by NIH grant ITI AM 5508-01.)

(89)
Comparative Megasporogenesis in Leguminosae, Subfamily Caesalpinoideae

David H. Rembert, Jr., *University of Kentucky*

The present investigation concerns four species: *Cercis canadensis* L., *Cassia abbreviata* Oliv. var. *granitica, Cassia nictitans* L., and *Gleditsia triacanthos* L. In *Cercis canadensis* the archesporium is subhypodermal and may consist of one or two cells. A single hypodermal archesporial cell develops in the other three species. The hypodermal archesporial cell in the *Cassia* species and in *G. triacanthos* divides periclinally to form a parietal cell and a primary sporogenous cell. Parietal cell divisions contribute to the nuclellar mass as the sporogenous cell enlarges to form the megasporocyte. In *Cercis canadensis* the megasporocyte is formed by direct enlargement of the archesporial cell. Meiosis occurs in all species to form a tetrad of megaspores. Frequently, the micropylar dyad member in *Cassia nictitans* fails to undergo the second meiotic division. While only the chalazal megaspore functions in megagametogenesis, there is a tendency for the third megaspore to persist in all species. On one occasion two linear tetrads were observed in an ovule of *G. triacanthos.*

(82)
Distribution of *Tsuga canadensis* (L.) Carr. and *T. caroliniana* Engelm. Along Cascades Creek in the Vicinity of Hanging Rock State Park, Danbury, North Carolina

Hollis J. Rogers, *University of North Carolina at Greensboro*
John D. Barnett, *Superintendent, Hanging Rock State Park*

Moores Knob, a monadnock in the upper piedmont of Stokes County North Carolina is drained primarily by Cascades Creek. This stream originates along the crest of Moores Knob, Moores Wall and Cooks Wall at elevations up to 2579 feet. It forms a spiral around Moores Knob for some five and one half miles to join the Dan River at Moores Springs, elevation 730 feet.

Tsuga caroliniana Engelm. is distributed on the upper drainage of this stream for some three and one half miles but terminates at the Lower Cascades, elevation 1,000 to 900 feet. *Tsuga canadensis* (L.) Carr. occurs with the Carolina Hemlock in the gorge at the Lower Cascades and along the remaining two miles of the stream.

Soil conditions and not elevation is believed to be responsible for the segregation of these two species along Cascades Creek. Carolina Hemlock occupies the rocky cliffs, talus slopes and outcrops in the upper area while the Canadian Hemlock is found on the deeper aluvial soils as the stream reaches the floodplains near the Dan River.

Some species associated with Carolina Hemlock in this area are *Pinus rigida* Mill., *Betula lenta* L., and *Saxifraga michauxii* Britton. Associated with the Canadian Hemlock on the better soils are *Pinus strobus* L., *Betula nigra* L. and *Saxifraga virginiensis* Michx.

(107)
Nucleoside Polyphosphatase Activity in Helminths

Steffen Rogers and Burton J. Bogitsh, *Vanderbilt University*

Nucleoside polyphosphatase activity was investigated in the glands of *Schistosoma mansoni* cercariae, *Hymenolepis diminuta* oncospheres, and *Posthodiplostomum minimum* metacercariae and adults. Cryostat sectioned material was incubated in a modified Gomori calcium-cobalt substrate in which one of several nucleoside polyphosphates was included. The action of inhibitors and activators was demonstrated by the addition to the basic substrate of either BAL, L-cysteine, PCMB, actinomycin-D, various cations, or spermine. The enzyme demonstrated is sulfhydryl-independent, is activated by magnesium cations, and hydrolyzes a wide variety of nucleoside triphosphates. Unlike adenosine triphosphatase found in the muscle, it is not inhibited by lead or PCMB. The physiological role of the enzyme will be discussed.

(43)
Cell Population Dynamics in Irradiated Ehrlich Ascites Carcinoma

W. St. Amand, *University of Mississippi*

Ehrlich ascites tumor cell populations irradiated *in vivo* in the mouse show a dose related increase in average cell size. After doses of X-rays large enough to reduce mitotic index to zero but before massive cell death occurs population shifts can be followed for cells in three series of size classes. The pattern of response is an increase in the number of cells in larger volume classes concomitant with a decrease of cell frequency in classes of unit volume. Differences in rate of response of cells of different volumes suggest that radiation will be a useful tool in the understanding of cell interrelationships in this heterogeneous cell population.

(95)
Histological Changes Induced in Nodal Traces and Petioles of *Ulmus americana* by Culture Filtrates of *Ceratocystis ulmi*

Armstead L. Salters and Lafayette Frederick, *Atlanta University*

Observations have been made on histological changes induced in nodal and petiolar traces of cuttings of *Ulmus americana* by culture filtrates of isolates of *Ceratocystis ulmi.* Extensive vessel wall discoloration, distortion and collapse, discoloration of associated parenchyma cells and tylose formation, vascular dysfunction, erosion of inner surface of vessel walls, and conspicuous occluding of vessel lumina have been noted. Progressive development of these histological changes have been followed and correlated with length of exposure to culture filtrates

and severity of expression of disease symptoms. The extent of vessel lumen area occluded and percentage of occluded vessels in nodal and petiolar traces has been determined. Partial vessel lumen occlusion was found 6 hr after culture filtrate exposure. Complete occlusion of lumina of the majority of vessels in nodal traces and petioles was found 48 hr after exposure. These findings suggest that vessel occlusion in nodal traces and petioles may be primarily responsible for leaf wilt in Dutch elm disease.

(18)
Reproduction in the Southern Studfish, *Fundulus stellifer* (Jordan)

JAMES D. SATTERFIELD, *Georgia State College*

At latitude 34° N in Georgia and Alabama, *Fundulus stellifer* spawns in early spring when water temperatures approach 19° C and continues to spawn into late summer. Spawning usually occurs at the read of riffles in water 5-15 cm deep with surface currents of 10-40 cm/sec. Nests are not constructed. Definite territories are not defended although a male will chase other males away from the vicinity of a female and may be antagonistic toward other species. Eggs are apparently deposited singly in the fine sand bottom. Eggs average 3.1 mm in diameter. Sand grains adhere to filaments on the chorion. At 22° C, eggs hatch in about 19 days. Hatchlings average 7.0 mm in "standard length". The young move to the margins of the streams and are not vulnerable to predation by larger fish. Studfish developing from eggs laid early in the spring probably spawn late in the summer of the following year.

(79)
Seedling Response of Four Dune Grasses to Varying Levels of NaCl

ERNEST D. SENECA, *North Carolina State University*

Salinity experiments employing the use of modified soxhlet-type automatic sand cultures were conducted on seedlings of four dune grasses: *Ammophila breviligulata* Fern., *Panicum amarulum* Hitchc. & Chase., *Spartina patens* (Ait.) Muhl. and *Uniola paniculata* L. Results will be presented based on wet weight data at the end of a twenty-eight day experimental period. The weight data reveal a primarily linear effect, with decreasing weights corresponding with increasing salinity levels, for *A. breviligulata, S. patens* and *U. paniculata.* The response to NaCl by *P. amarulum* is more curvilinear than that exhibited by the other species.

(108)
Autoradiographic and Histochemical Studies of Iron Metabolism in *Haematoloechus Medioplexus*

W. ALLEN SHANNON, *Vanderbilt University*

$Iron^{59}$ and $iron^{55}$ isotopes are used in an autoradiographic study, in conjunction with ordinary histochemical methods, to determine the fate of excess iron ingested by *Haematoloechus medioplexus.*

Specimens have been prepared for paraffin-embedding by formalin-fixation and alcohol dehydration, or by freeze-drying, or by freeze-substitution methods. Stripping film and liquid emulsion techniques are utilized. Observations of the autoradiographed slides are made under light and phase contrast microscopes. (Supported, in part, by National Science Foundation Grant GB-4742.)

(137)
Growth and Survival of Water Microorganisms in Low Nutrient Level Media

J. MILES SHARPLEY, *Sharpley Laboratories, Inc.*

It has been adequately demonstrated by the author and others that customary laboratory media often support poor growth of the normal bacterial flora in water. The genera *Pseudomonas, Achromobacter* and *Micrococcus* are commonly isolated from river water when conventional peptone media are employed. When low nutrient level media (LNLM) are used, *Achromobacter* strains predominate and few micrococci are observed. Pseudomonads are frequent but the species are often different.

It became of interest to determine whether isolates recovered on conventional media could support growth in an environment simulating the nutrient levels found in streams. Three cultures identified as *Pseudomonas, Achromobacter* and *Micrococcus* species were isolated from river water cultured in conventional media and LNLM. Based on the available data, it appears that conventional media fail to recover a significant portion of the water microflora. In addition, such media may be biased to the recovery of non-significant adventitious microorganisms.

(3)
Generic Position of *Campanula americana* L.

STANWYN G. SHETLER, *Smithsonian Institution*
AND
JAMES F. MATTHEWS, *Charlotte College*

The tall bellflower, *Campanula americana* L., is widely distributed in eastern North America, where it is endemic. In habit and floral morphology it is a very characteristic member of the genus *Campanula,* and Small placed it in the monotypic genus *Campanulastrum.* Recent cytological and palynological studies add weight to Small's opinion. The authors present new evidence for recognizing *Campanulastrum* and evaluate this evidence in the broader context of generic limits in the Campanulaceae as a whole. They discuss the great diversity of *Campanula,* which includes perhaps 300 species, and stress the hazards of isolating segregate genera without a thorough knowledge of the whole group.

(88)
Limnetic Carbon Assimilation in Two Virginia Reservoirs

GEORGE M. SIMMONS, JR., *Virginia Polytechnic Institute*

Reservoirs increase in biological productivity soon after impoundment. A decline in productivity usually follows after 5-6 years. Initial high fish yields have led to the inference that carbon assimilation by the phytoplankton would be comparable.

The carbon assimilation rates of the phytoplankton in two reservoirs have been investigated by means of the Carbon-14, light and dark bottle technique. The two reservoirs studied were the 26 year old Claytor Lake Reservoir on the New River in Pulaski Co., Virginia, and 3 year old Smith Mountain Reservoir on the Roanoke River in Franklin Co., Virginia.

Results show that assimilation rates are consistently higher in Claytor Lake than in Smith Mountain. Preliminary conclusions attribute the differences to a higher and more diversified phytoplankton population in Claytor Lake.

(55)
A Method for Investigation of Aldosterone and Corticosterone in *Rana catesbeiana* Plasma

JANE SINE AND C. N. BOEHMS, *Austin Peay State College,* AND D. ISLAND, *Vanderbilt University Medical School*

A double isotope dilution method for the determination of aldosterone and corticosterone in *R. catesbeiana* plasma is described. Solvent partitioning was used to divide the sample into two fractions (Fraction I and Fraction II). To Fraction I, a known amount of D-aldosterone-1,2-H^3 was added and the compound was actylated with acetic anhydride-C^{14}. Conversion from monoacetate to diacetate and back to monoacetate form was instrumental in purification procedures. Purification was accomplished by a series of paper chromatographic isolations. Radioactivity counts were made on the purified sample to quantitatively measure steroid concentration. A known quantity of corticosterone-H^3 was added to Fraction II. Acetylation was performed by addition of pyridine and acetic anhydride-C^{14}. Paper chromatographic purification prepared the sample for radioactivity determinations. By this method it was possible to accurately determine *in vivo* steroid concentrations of less than one microgram per 100 milliliters of plasma. Both free aldosterone and free corticosterone were shown to be present in measurable quantities in the plasma of *R. catesbeiana.*

(21)
A. Allele Necessary for Dilute Coat Color in Horses

W. RALPH SINGLETON, *University of Virginia,* AND ENRIQUETA CARTER BOND, *former graduate student, University of Virginia*

A dilution gene in horses in the heterozygous condition converts a chestnut color to a palomino color. Likewise the same dilution gene changes a bay to a dun or buckskin color. The dilution gene c^{cr} when homozygous results in an animal almost white, a cremello if *b/b,* a perlino if *B/*—. Recent evidence shows that the dominant allele of the pattern gene *A* must be present for any dilution to occur. Two matings of a sorrel mare *a/a b/b C/C* to a perlino stallion produced two dark brown fillies showing no dilution. One of these mares, when bred to a Palomino *A/*— *b/b* C/c^{cr} produced a perlino foal with light, almost white, color and blue eyes characteristic of a perlino, demonstrating conclusively that the mother was heterozygous for the dilution gene, but showing no evidence of it, a complete lack of penetrance of the C^{cr} dilution allele in the absence of A.

(14)
Reliability of the Mark-release Technique of Estimating Numbers of Mice

MICHAEL H. SMITH, *University of Georgia*

The number of mice of two species, *Mus musculus* and *Peromyscus polionotus,* on an abandoned peanut field was determined by live-trapping using the mark-release technique and also by capturing the mice while digging out their burrows. The two sampling methods gave results which were significantly different. Available evidence suggests the latter technique revealed the exact structure of the population, while the mark-release method overestimated the *M. musculus* male population and underestimated the *P. polionotus* female population. Males of both species were more readily trapped than females, especially when the females were pregnant or lactating or both. These results are best interpreted in terms of the relative amount of movement shown by the different types of mice. Greater movement increases the likelihood of encountering a trap, and multiple encounters may increase the probability of the mouse entering the trap.

(126)
The Free Amino Acid Composition and Certain Aspects of the Metabolic Fate of Carbon — 14 Labeled Alpha Alanine and Aspartic Acid in the Aging Female Mosquito, *Aedes aegypti* (L.)

JAMES D. STIDHAM AND JAMES N. LILES, *The University of Tennessee*

The free amino acids of the adult female mosquito, *Aedes aegypti* (L.), were investigated at seven different ages in mosquitoes maintained on two different dietary regimens (sucrose, and sucrose and blood). In addition, certain aspects of the metabolic fate of carbon-14 labeled alpha alanine and aspartic acid were studied. The qualitative and quantitative determination of free amino acids of adult mosquitoes was performed by ion-exchange chromatography (Technicon Auto Analyzer). Twenty free amino acids were consistently present in mosquitoes from both diet groups. However, blood fed insects had higher quantities of amino acids than did those fed sucrose alone, and the acids varied quantitatively with the age of the mosquitoes. Carbon-14 labeled compounds were given in sucrose solution to adult female mosquitoes. Three tissue fractions were analyzed for radioactivity: amino acid extract, lipid fraction and protein fraction. Production of carbon-14 labeled CO_2 was measured as well as radioactivity in the excreta from mosquitoes given carbon-14 labeled compounds. Amount of radioactivity in each case was measured by liquid scintillation counting. The significance of free hemolymph amino acids and the radioactivity of the three tissue fractions will be discussed.

(37)
Probability Values for Chromatid Aberrations

P. L. STRICKLAND AND J. W. DRANE, *Emory University*

X-ray induced chromatid aberrations in *Tradescantia* microspores occur independently in Poisson distributions. Historically, the standard deviation of the mean has been accepted as an indication of the significance limits applicable to a given mean value. A test with equal or greater sensitivity in detecting differences and in this case much simpler to calculate is the Likelihood Ratio Chisquare. It is derived using only the sample size and mean which is the Maximum Likelihood Estimate of the Poisson parameter. Let m_1 equal the mean of one experiment and N_1, the sample size; m_2, the mean of a second experiment and N_2, its sample size; and m, an average of the two means with N the total sample. Assuming the null hypothesis, $m_1 = m_2$, we obtain the

probability that these experiments represent the same population using the equation, $X^2 = 2(-Nmlogm + N_1 m_1 logm_1 + N_2 m_2 logm_2)$, where chi square has one degree of freedom and logs are to the base e. (Research supported by the U. S. Atomic Energy Commission under contract number AT-(40-1)-2669 and U.S.P.H.S. Grant 1 SO1 FR-05064.)

(112)
Ecology of Two Populations of an Aquatic Isopod, *Lirceus fontinalis* Raf.

CLARENCE E. STYRON, *Emory University*

An ecological study of the aquatic isopod, *Lirceus fontinalis* Rafinesque, from the weather pool and intermittent creek population on Mount Arabia and the spring population from the Emory University Lullwater Biological Field Laboratory has been approached through (1) investigation of the biological interactions between the isopods and various environmental stresses, (2) investigation of their behavior patterns, and (3) an attempt to determine the factors or combinations of factors which control the maintenance, growth, and movement of the populations which are in two river drainages. Behavior patterns and physiological responses were observed under natural conditions and then tested experimentally in the field and/or laboratory. In addition to the behavioral and physiological comparisons, chromatographic and morphological comparisons of these populations have been made to establish their taxonomic affinities.

(91)
Some Embryological Features of Taxonomic Significance in the Genus *Nyssa* L.

S. R. TANDON AND J. M. HERR, JR.,
University of South Carolina

Several structural and developmental features of the ovule and megagametophyte in three species of *Nyssa* L., *N. sylvatica* Marsh., *N. biflora* Walt. and *N. aquatica* L., provide support for the recognition of Nyssaceae as a family separate from Cornaceae. Additional evidence clearly establishes *N. biflora* as a separate species rather than a variety of *N. sylvatica*. Although points of similarity appear between any two of the three species, greater similarity exists between *N. biflora* and *N. aquatica* than between either species and *N. sylvatica*. The major points of similarity are the presence of a nucellar beak, the shape of the megasporocyte and functional megaspore, the occasional occurrence of bisporic development, and the growth pattern of the chalazal nucellus and the developing megagametophyte.

(40)
Nuclear Characteristics of *Populus deltoides* Clones

F. G. TAYLOR, JR., *Oak Ridge National Laboratory*

Resistance or sensitivity to ionizing radiation in higher plants is correlated with the average interphase nuclear or chromosome volumes of shoot apical meristem cells. Differences in volume and radiosensitivity between genera and species have been well documented. However, little is known concerning possible nuclear differences within a species due to genotypic variability. Apical meristems from 30 clones of *Populus deltoides* Marsh., representing ecotypes from 8 different states, were studied histologically to determine if any differences in nuclear characteristics existed. Average chromosome volumes of diploid nuclei ranged from $2.38\mu^3 \pm 0.07$SE in a clone of Alabama origin to 4.24 ± 0.16 in a clone of Wisconsin origin. Phenotypic characteristics such as breaking of dormancy (leafing out), development of secondary stems, and leaf fall were noted. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(28)
Red, Far-Red Light Effect on Pollen Tube Elongation and Pollen Germination in *Tradescantia*

TE-HSIU MA, *Smithsonian Institution*

Mature pollen of *Tradescantia paludosa* desiccated in dark for ½ hour or 24 hours, were treated with red (660mμ) or far-red(730mμ) at the intensity of 850 erg/sec cm^2 for 15 minutes. Treated and control pollen were immediately sown on lactose-agar medium coated slides and grown in a moist chamber for 3, 4 or 6 hours in dark. Tube length measurement using an ocular micrometer and a reticle were made on fixed and stained pollen tubes selected at random from each of the treated and control groups. The results of three separate experiments showed the higher rate of elongation and germination in treated groups than the control groups. Far-red light treated pollen had the higher rate of elongation and germination than those treated with red light. Speculations on the presence of phytochrome or other growth regulating pigment in the pollen will be discussed. (Research sponsored by the U. S. Atomic Energy Commission under Contract No. AT(30-1)2373.)

(13)
A Preliminary Survey of the Flora of Several Southwestern Virginia Piedmont Counties

WAYNE THACKER, WILLIAM F. RUSKA, AND
GWYNN W. RAMSEY, *Lynchburg College*

During the summer of 1966 locations in several Southwestern Virginia Piedmont Counties were visited and plant collections were made. Study of the material collected shows that distributional ranges for several taxa have been extended beyond those previously published. Many county and Piedmont records and several state records are established. The results of the study indicate that concentrated floristic studies for the Virginia Piedmont, especially for the southwestern portion, are needed. The summer's work and this report initiate that study.

(51)
Effect of L1210 Leukemia on C11/1431a Carbon Clearance in DBA/2 Mice

J. RICHARD THOMSON AND DAVID A. RINGLE,
Midwest Research Institute, Kansas City, Missouri

We have previously reported the occurrence of a rise in C11/1431a carbon clearance rates in DBA/2 mice at the terminal stage of ascitic-form L1210 leukemia (RES J. Reticuloendothelial Soc. *3*:370, 1966). This finding was unexpected since Biozzi *et al.* (Bull. Assoc. Franc. Etude Cancer 64: 781-791, 1959) earlier reported an apparent terminal decrease in C11/1431a carbon clearance

in mice isologously inoculated with L1210 leukemia. Moreover, a decrease in reticuloendothelial system (RES) function is commonly found at the terminal stage of many neoplastic diseases, including leukemias. Our studies on L1210 ascitic-form leukemia have consistently shown the following effects on carbon uptake in both male and female DBA/2 mice: a marked increase in uptake by the lungs; a greatly decreased uptake by the liver and spleen; and an unusual uptake by cellular aggregations distributed in the peritoneal cavity. Quantitative recovery of carbon from the major RES organs showed that over 40% of the i.v. injected dose could not be accounted for in these organs, whereas in normal mice these organs take up most of the carbon. Additional experiments have suggested that the altered pattern of carbon uptake in L1210 leukemic mice is neither due to serum factors nor to a loss of phagocytes from the liver and spleen.

(125)
C-14 Isoleucine Studies in *Aedes aegypti*

WILLIAM L. TIETJEN, *Ga. Southwestern College*
JAMES N. LILES, *Univ. of Tennessee*

In an attempt to learn more about the role of isoleucine in the metabolism of the adult female *Aedes aegypti* and in its egg production, C-14 uniformily labeled isoleucine was fed to adult females and to larvae. At various post feeding times and stages, groups of mosquitos were sacrificed and the C-14 activity of various biochemical fractions, including lipid, sugars, free amino acids, and protein amino acids, was determined. In addition, eggs produced following C-14 feeding were analyzed in a similar manner. A report is to be made on the results of these studies.

(41)
Nonrandom Nuclear Orientation in the Ascospores of *Neurospora tetrasperma*

R. E. TOTTEN AND H. BRANCH HOWE, JR., *University of Georgia*

Genetic analysis of 80 hyphal-tip pairs from ascospores segregating for four genetic markers has shown that two of the six randomly-expected, heterokaryotic nuclear arrangements are not found. The only arrangements which are found are those giving rise to hyphae which are heterokaryotic for mating type and other markers that segregate consistently at the first division. This finding is interpreted as suggesting that the four nuclei in each ascospore undergo a directed orientation which leads to their nonrandom distribution into the hyphal tips. Cytological analysis suggests that the cause of this nonrandomness is a type of fourth divisional nuclear passing somewhat similar to the nuclear passings already known to occur earlier in ascosporogenesis during the second and third nuclear divisions.

(130)
An Ecological Study of a Fungus Parasite in Mosquito Larvae

CLYDE J. UMPHLETT, *University of North Carolina, Chapel Hill*

Weekly samples of larvae of *Anopheles quadrimaculatus* were taken during the mosquito breeding season in 1966 from two coves, A and B, in University Lake, Chapel Hill, N. C. Larvae from Cove A were infected regularly by *Coelomomyces punctatus* in quantities varying from 6.3% to 80.8% of the samples. No infected larvae were found in Cove B. Environmental conditions in both coves were described from measurements of water and air temperatures, pH, and dissolved oxygen. The dissolved oxygen concentration and pH were much higher in Cove B than in Cove A. These factors, and the higher temperatures observed at times in Cove A, seemed to be exerting some influence on the infection potential of the fungus. In one brief laboratory experiment on emergence of adult mosquitoes from field larval collections, 76% of the larvae from Cove B (uninfected) emerged while 6.3% of those from Cove A (infected) emerged as adults. One infected imago emerged. A role for infected adult mosquitoes in the dispersal of *Coelomomyces* is possible.

(35)
Localization and Rhythmic Enzymatic Development of Essential Oils in Flowers

D. S. VAN FLEET, *University of Georgia*

Esterases, dehydrogenases and peroxidases in glandular cells producing essential aromatic oils are cyclic in their activation. Diurnal and nocturnal rhythmic cycles of mitochondrial division and enzyme activity are not changed by normal variations in temperature, light or removal of flower parts from the plant in *Cestrum nocturnum*. Essential oil end products are inhibitive to the enzymes showing rhythmic activity. Rhythmic mitochondrial and enzyme activity are not sharply detectible in many plants but a general method has been developed with aryl amines for visual localization of cells producing aromatic oils.

(32)
Genetics and Differentiation of Polyacetylenes and Polyenes in Vascular Plants

D. S. VAN FLEET

Genes for development of poly-ynes and polyenes in root, stem and leaf are in linkage groups with genes for differentiation of the endodermis. Dehydrogenase, esterase and haem containing enzymes associated with development of acetylenic and polyeneic molecules are controlled by genes which affect the development of the endodermis. Absorption spectra of double and triple bonds in acetylenic and polyenoic fatty acids allow quantitative and qualitative analysis of polyunsaturated molecules in hybrid crosses and in broad phyletic comparisons. Evolution of gene linkage groups from *Psilotum* through the *Compositae* is a result of survival value and function of the endodermis. Poly-ynes and polyenes in leaves are less common and more variable than in roots. Evolved linkage groups affecting development in leaves are evocative but unsaturation and molecular structure are finally determined by unlinked genes affecting flavone development. Conjugated polyenes may be adventively induced to form in plants lacking genes for their development.

(34)
Peroxidase Localization and Isozymic Alteration Resulting from Infection of Tobacco by *Phytophthora parasitica* var. *nicotianae*

JOSEPH A. VEECH, *University of Georgia*

The blackshank pathogen *Phytophthora parasitica* var. *nicotianae* alters the isozymic pattern (zymogram) in tobacco stem. The sequence of changes in the zymograms as they occur during the development of the disease was demonstrated by micro-disc polyacrylamide gel eletrophoresis. Comparisons were made between susceptible and resistant varieties of tobacco under conditions of health and disease. Results indicate that prior to infection the zymogram of susceptible and resistant varieties are similar. However, upon infection isozymic alterations were observed. Both varieties first show an intensification of what is thought to be lipid-bound isozymes of peroxidase. As the disease progresses zymograms obtained from susceptible plants indicated a lack of stability on the part of the host to cope with the pathogen. Zymograms from resistant plants also showed alteration from the healthy, however, alternations were neither as acute nor as long lasting as those found in the infected susceptible variety.

(135)
Ultrastructure of the Fungus-Alga Association in *Cornicularia normoerica*

ALMA TOEVS WALKER, *University of Georgia*

The thick and compact cortical tissues in contrast with the arachnoid structure of the medullary tissues in the lichen *Cornicularia normoerica* (Gunn.) Du Rietz compounded penetration problems in fixing and staining the 0.5-mm. sections of this lichen for electron microscopy. Crystalline organic deposits secreted by the lichen provided an additional critical problem in securing embedment suitable for thinsectioning. Appropriate preparative techniques and fine structure studies of the fungus-alga association will be presented and discussed.

(5)
A New *Talinum* (Portulacaceae) from the Cedar Glades

STEWART A. WARE AND ELSIE QUARTERMAN, *Vanderbilt University*

The *Talinum* in the cedar glades of middle Tennessee has often been identified as *T. teretifolium* Pursh, but it is more like *T. mengesii* Wolf. In the field, cedar glade plants can be easily separated from these two species by flower and fruit characteristics. Only one of 46 attempted crosses between *T. mengesii* and the cedar glade plants produced the normal seed yield, indicating genetic as well as morphological differentiation. A new species is proposed from the cedar glades, with the name *Talinum calcaricum*. The new species, known only from six counties in the Central Basin of Tennessee and one county in northeast Alabama, is another addition to the list of cedar glade endemics. It appears to be limited to limestone outcrops; *T. mengesii* is its ecological equivalent on the sandstone outcrops of northern Alabama.

(25)
Seed Germination in Two Species of *Talinum* (Portulacaceae)

STEWART A. WARE AND ELSIE QUARTERMAN, *Vanderbilt University*

Talinum calcaricum Ware *sp. nov.* is a succulent perennial herb endemic to the cedar glades of middle Tennessee and northern Alabama. Its seeds, which germinate in the spring, require cold treatment (6 weeks), light, and alternating temperatures for good germination. At constant temperatures, some germination occurs at 25° C, but none at 20° or 30° C. The requirements for cold storage and light are not eliminated by laboratory dry storage, but percent germination at 25° C rises appreciably. Seeds of *T. mengesii* Wolf, a species of sandstone and other outcrops of the southeastern United States, also require cold treatment and light, but germinate better over a wider range of constant temperatures than do seeds of *T. calcaricum*. In *T. mengesii*, germination rises after laboratory dry storage, and is as good at 25° C as at alternating temperatures.

(36)
Respiratory Metabolism in the Heterothallic Water Mold, *Achlya ambisexualis* Raper

CHARLES O. WARREN, *Southwestern At Memphis*

Manometric studies of intact mycelium and spectrophotometric analyses of enzyme activity in mycelial extracts provided basic information concerning the vegetative respiratory metabolism of the heterothallic water mold, *Achlya ambisexualis* Raper (Order Saprolegniales). The measured Respiratory Quotient indicates lipid as the endogenous substrate. Enzymes representing two glycolytic pathways were demonstrated. The Hexose Monophosphate pathway was represented by glucose-6-phosphate dehydrogenase and 6-phosphogluconic acid dehydrogenase. The demonstration of 6-phosphofructokinase, aldolase, PGAL dehydrogenase, phosphoglyceromutase, and enolase indicate the presence of the Embden-Meyerhof-Parnas scheme. The effect of mycelial age on the activity of selected respiratory enzymes was studied. The presence of an operative Krebs Cycle is supported by the demonstration of isocitric dehydrogenase, o-ketoglutaric acid oxidase, succinic dehydrogenase, and malic dehydrogenase. The presence of "malic" enzyme suggests a possible mechanism for CO_2 fixation in this fungus.

Preliminary studies concerning the effects of the sex hormone, hormone A, on the respiratory rate of the male strain of this fungus were conducted.

(49)
Neurochemical Response to Environmental Stimulation

ANNEMARIE S. WELCH AND BRUCE L. WELCH, *University of Tennessee*

The central portions of the autonomic nervous system which utilize norepinephrine, dopamine or serotonin as neurotransmitter or neuromodulatory agents adapt in a very sensitive manner to different levels of demand for neurotransmitter release, such as those brought about by different levels of environmental stimulation. When stimulus is intensified neurotransmitter stores may be markedly reduced, but compensatory mechanisms rapidly

come into play; transmitter stores may increase detectably within 10-30 minutes and continue to increase for at least 1½-2 hours. When mice live in high stimulus environments, neurotransmitter metabolism is sustained at high levels. When mice are removed from such environments, neurotransmitter metabolism is slowed somewhat almost immediately, but it remains higher for at least several days than in mice adapted to living in lower stimulus environments. CNS responsivity and aggressiveness are inversely related to the sustained levels of environmental stimulation and neurotransmitter metabolism.

(31)
The Effects of Soaking Treatments and Foliar Sprays on Rooting of *Sanchezia nobilis glaucophylla*

Booker T. Whatley, Stanley O. Thompson and McKinley Mayes, *Southern University*

A randomized block experimental design with eight treatments replicated five times with one cutting per one-gallon glass jar, filled with continuously aerated distilled water, per treatment for each replication was employed to study the effects of soaking and foliar spray on rooting of *Sanchezia nobilis glaucophylla* terminal cuttings.

Highly significant differences were found among the various treatments. When soaking vs foliar spray were compared, soaking was found to be significantly better than foliar spray. The linear trend indicated that five minutes soaking was significantly better than fifteen minutes soaking which was no better than the control. The quadratic response was highly significant, indicating that ten minutes soaking was significantly better than five minutes soaking.

Foliar spray vs control, linear trend, and quadratic response was not significant, indicating that the application of foliar spray to the stock plants 5, 10 and 15 days prior to taking cuttings was no better than the control.

(138)
Notes on *Tetrasporopsis funescens,* a Fresh-Water Alga of Apparently Wide Distribution

L. A. Whitford, *N. C. State University*

A large palmelloid chrysophyte described from Raleigh, North Carolina in 1943 as *Phaeosphaera perforata* is almost certainly synonymous with *Tetrasporopsis funescens,* (Braun) Lemm. 1899, and synonymous with *T. reticulata* Meyer, 1927 from Lake Baikal. The species is common in late winter along the Atlantic seaboard from Mississippi to New Foundland. It has also been collected in Alaska, Germany, France, Russia and possibly England and India. It is collected in soft-water lakes and streams when water temperatures are below 12 C. Nearly spherical brownish cells are irregularly distributed in a soft, perforate or reticulate, gelatinous cylinder. Spherical silicious cysts and zoospores are produced.

(20)
A Diapause-Resistant Stock of *Mormoniella*

P. W. Whiting, *Oak Ridge National Laboratory*

At the Raleigh ASB meeting it was reported that females of this wasp parasite of blow-fly pupae after about five days of exposure to alternating 6-hour 18° C "days" and 18-hour 12° C "nights" are so conditioned that their eggs develop into larvae which fail to pupate but pass into a dormant state called diapause. These larvae will live at room temperature without food as long as three years. About 60 genetically different stocks were proven thus to respond to these conditions and diapause larvae were obtained for convenient storage. A diapause-resistant stock has now been found which fails to produce diapause larvae or has them in very small numbers, less than 1%, even after the mothers have been in the "day-and-night box" for many days. Genetical data will be reported. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(47)
Interference with Pregnancy in the Rat by an Intracervical Suture

Katherine L. Wieand and D. A. Olewine, *Geisinger Medical Center and Bucknell University*

Intrauterine sutures which penetrate into the uterine lumen have been shown to disrupt pregnancy in the rat. In the present investigation a silk suture (Ethcon 2-0) placed in the cervix where implantation does not normally occur, also interfers with pregnancy. Control and sham-operated animals averaged 6.2 ± 0.4 (S.E.) implantations in each uterine horn. In uteri with sutured cervices the number of implantations was significantly reduced [2.2 ± 0.7 (S.E.)]. When placement of the suture was delayed until day 4 of pregnancy 2.9 ± 0.3 implantations were found in uteri with sutured cervices. Also in these animals there was a significant increase in the number of abnormal implantations [2.5 ± 0.3 (S.E.)] which were consistently located in the cervix around the suture.

(122)
Facultative Diapause in *Trogoderma sternale maderae* Beal, 1954

Billy G. Wilson and J. J. Friauf, *Vanderbilt University*

The genus *Trogoderma* (Coleoptera: Dermestidae) has been studied experimentally for an unusual type of facultative diapause occurring in late larval instars. Investigations have indicated that responsible factors may be restricted space, low (but nutritionally sufficient) food volume, and accumulation of excreta. Results also indicate that low temperature, within the developmental range, will induce this diapause.

It seems to us that the results thus far are inconclusive, and that neither the environmental parameters nor the physiological mechanisms have been clearly elucidated. Accordingly, a factorial experiment was designed in which the effects of temperature, food volume, larval density, relative humidity, diet and photoperiod upon larval development are being evaluated. Among these parameters, those that appear to show a positive relationship with delayed pupation will be more critically examined in further experiments, and it seems certain that further, and perhaps more promising approaches to this total problem of facultative diapause will become evident.

(27)
Interactions of Fast Neutron Radiation and Growth-Dormancy Cycles in Yellow Poplar Trees

J. P. WITHERSPOON, *Oak Ridge National Laboratory*

In general, plants subjected to an acute exposure of ionizing radiation during active growth phases are more affected than those receiving the same exposure during dormant phases. This generalization, however, is based on the normal timing of the plant cycle. Experiments with 2-year-old yellow poplar trees which were irradiated with fast neutrons during either dormant or active phases then forced, prematurely, into opposite phases indicated that this generalization does not hold when natural timing is altered. Irradiated dormant plants were found to break dormancy before controls when forced out of dormancy in environmental growth chambers. The biological effects, however, were greater than when plants were allowed to undergo a normal dormant period. This study indicated that some repair of biological damage occurs during dormancy. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(22-64)
A Comparison of the Skulls of Young Flounders in Three Species of *Paralichthys* Girard

WILLIAM S. WOOLCOTT AND CAPERTON BEIRNE, *University of Richmond*

Eighty specimens (10-56 mm st. lg.), collected in the vicinity of Beaufort, North Carolina, were used in the study. Thirty-four of these were *Paralichthys dentatus*, 27 *P. lethostigma* and 19 *P. albigutta*. Neurocranial elements appeared similar; however, differences in 13 meristic, proportional and descriptive characters of the branchiocranium separated *P. dentatus* from the other two species. In seven characters, significant differences occurred between *P. lethostigma* and *P. albigutta*. Characters that gave the best separation were gill rakers where *P. dentatus* had the greatest number on the first gill arch, and a combination of gill rakers and the total number of left dentary teeth which gave almost 100% separation of the three species. *Paralichthys dentatus* had a longer posterodorsal spine on the left subopercle; on *P. albigutta* it was minute or absent. Also in *P. dentatus* the opercle was usually wider than deep while in the other two fishes depth was greater.

(136)
Interesting Records of Southern Appalachian and Mexican Lichens

I. YOSHIMURA AND A. J. SHARP, *University of Tennessee*

The known ranges of *Pilophoron cereolus, Phylliscum demangeonii* (both new to S. Appalachians), and *Coriscium viride* (new to Mexico) are extended southward. In contrast, the range of *Parmelia densirhizinata* (new to Mexico) is extended northward from Central and S. America. *Anaptychia microphylla* (new to N. America), *Anzia ornata* (new to Philippines) and the genus *Gymnoderma* show classic distribution patterns involving eastern Asia and E. North America. A new species of *Anzia* (the third *Anzia* known in North America) shows a disjunctive distribution between the Southern Appalachians and the Mexican Highlands. *Cladonia formosana* is a synonym of *Cladonia subpityrea,* which shows a disjunctive distribution between eastern Asia and the Mexican Highlands.

(*Continued from page 14*)

C. Ritchie Bell: Having been associated with the ASB since he came to the University of North Carolina from the University of Illinois in 1955, Dr. Bell served on the ASB Executive Committee from 1963 to 1965. He is Director of the North Carolina Botanical Garden, Chairman of the CUEBS Panel on Biological Facilities, and a Council Member of the American Society of Plant Taxonomists.

Burton J. Bogitsh: Dr. Bogitsh has served the ASB as both Chairman and member of the Research Committee. He is now Associate Professor of Biology at Vanderbilt University, having come there after serving as Assistant Program Director with the N.S.F. Prior to 1963 he was Assistant Professor at Georgia Southern College. His interest lie in the field of helminthology.

Anna Josephine Bridgman: Dr. Bridgman is Professor and Chairman of the Biology Department of Agnes Scott College — a position she has held since 1952. Her research interests deal with the encystment of, and radiation effects on, ciliates. She has been a member of the ASB since 1939, and has served on the Executive Committee.

Dorothy L. Crandall: Dr. Crandall is an Associate Professor of Biology at Randolph-Macon Woman's College. Her interests are in Plant Ecology, and she has served as Chairman of the ASB Resolutions Committee in 1962 and 1966. She has been a member of the ASB since 1950.

John Mervin Herr: A member of the ASB since 1955, Dr. Herr has served as South Carolina State Correspondent since 1964. His interests lie in the fields of tracheophyta morphology and angiosperm embryology — areas in which he has published over 20 papers. Dr. Herr is Associate Professor of Biology at the University of South Carolina.

James C. McDonald: At the time of the Wake-Forest College ASB meeting in 1962, Dr. McDonald served well as Chairman of the Local Arrangements Committee. A botanist, Dr. McDonald has been a member of the ASB since coming to Wake-Forest from the University of Missouri in 1960. His research is on the Myxobacterales.

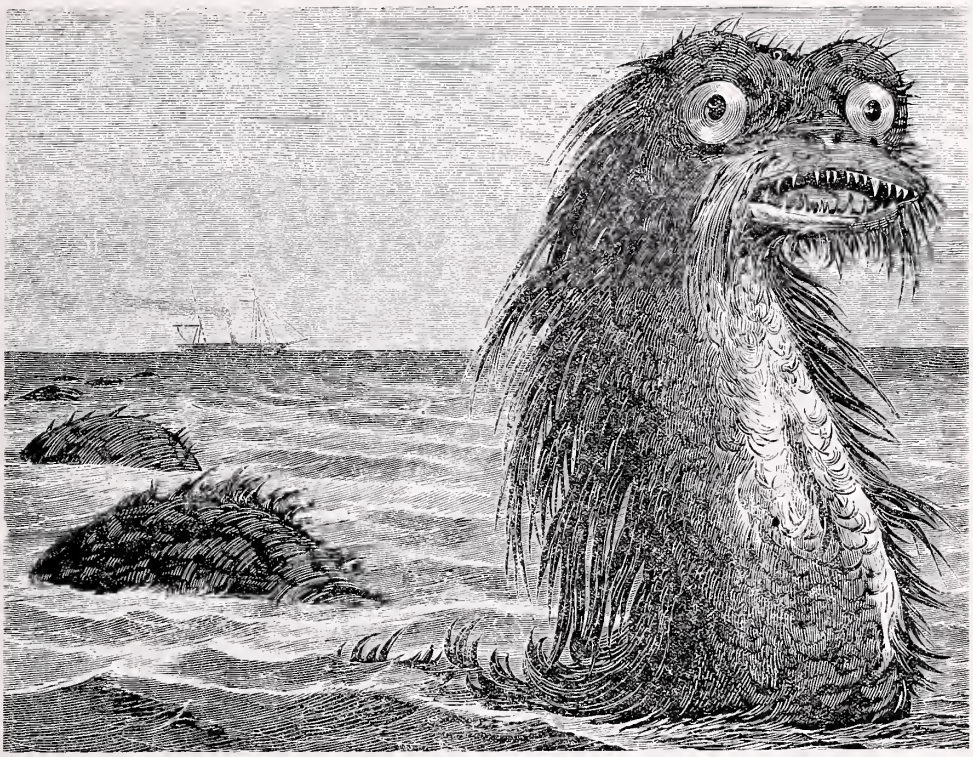
Margaret Y. Menzel: Dr. Menzel, Associate Professor of Biology at Florida State University, has been a member of the ASB since 1949, served on the Goethe Travel Awards Committee from 1962 to 1964, and has been Secretary since 1964. Her research interests are in the

fields of cytology, cytogenetics, and plant evolution — and she was recipient of the ASB Research Award in 1950. Her husband, R. W. Menzel, is also an ASB member.

Faith S. Miller: Dr. Miller, Associate Professor of Anatomy at Tulane University, has been a member of the ASB since 1959. Her research is in the fields of asphyxia of newborn mammals, resuscitation from asphyxia and low body temperatures, and embryology of Tubularia. In 1959 she shared the ASB's research prize with Dr. J. A. Miller.

Robert B. Short: Dr. Short has been associated with the ASB since 1951, and has served two terms on the Executive Committee (from 1959 to 1962 and from 1965 to 1968). Professor of Biology at Florida State University, Dr. Short's research interests lie in parasitology — trematodes (especially schistosomes) and in dicyemid mesozoans.

Frances E. Silliman: Dr. Silliman, Professor of Biology at Bridgewater College, has been a member of the ASB since 1953. A botanist, she is a member of the AAAS, the Botanical Society of America, the American Society of Plant Taxonomists, and the Southern Appalachian Botanical Club.



Books and Periodicals

PROTIDES OF THE BIOLOGICAL FLUIDS, Volume 13 of a series on Proteins. H. Peeters, Editor. Elvsevier Publishing Company, New York, 1966. 476 pp.

This book is the result of a Colloquium held in Bruges, Belgium. The academic lecture presented by Z. Dische is a resume of biochemistry during the past 20 years involving conjugated proteins in "informational processes." The suggestion is intriguing that glycoprotein functions as a carrier of biological information. It is particularly interesting that in the presentation of the universal animal concept, a sugar conjugated with a hydrophobic group in some form is universal and functions in developmental processes.

Four major areas are treated by individuals from several countries. A few of the presentations are in the native language but these have summaries in English. The material in the book includes neuroproteins (53%), lipoproteins (31%), dispersion phenomena (9%), and "various papers" (7%). The "various papers" section ranges from studies of the Klinefelter syndrome, to immunopolymerisation (German), to immunological reactions (French).

The composition and metabolism of neuroproteins of the central nervous system and peripheral nerves were discussed in relation to anabolism and catabolism. Synthesis and breakdown activities of enzymes were the primary concern with rather complete methods of experimentation accompanying the data presented. As a corollary, additional information is presented about the intercomplexities of nervous tissue components and constituents.

Some of the more recent results of European workers' findings in magnetic and optical dispersion in the field of protein research are contributing to the rapidly expanding information. — JOHN F. DIMMICK, *Wake Forest College.*

THE BIOLOGY OF POPULATIONS. Robert MacArthur and Joseph Connell. John Wiley & Sons, New York. 200 pp. 1966. $5.95.

This is one of three books in a "levels of organization" series (Cells, Organisms, Populations). Although one's understanding of the relation of properties and behavior at one level to each of the other levels would be enriched by reading the entire series, the volume concerned with populations may be profitably read alone by anyone exposed to the basic concepts of biology. In the foreword the authors state their intent to present science as a process as well as a body of knowledge. As a result the evidence and reasoning leading to each concept of population biology is explained in detail with extraordinary clarity but with a remarkable economy of words. Thus the book serves to introduce the student to the intellectual revolution which biology is undergoing and enables established biologists to reexamine some cherished concepts and beliefs. The book is divided into three parts: 1. *The Patterns* which includes such subtopics as the challenge of a fluctuating environment, some patterns in space, the patterns of single-species populations, and the general circulation of the atmosphere. 2. *The Evolution of Populations* with discussions of the process of natural selection, the maintenance of variability, group selection, and other related topics. 3. *The Functioning of Populations* which constitutes nearly half the text covers population integration, growth, regulation, various population interactions, ecological communities and allied topics. I enjoyed reading this book and will undoubtedly do so many more times. JOHN CAIRNS, JR., UNIV. OF KANSAS.

BASIC ARTHROPODAN STOCK, with Special Reference to Insects. A. G. Sharov. Pergamon Press, Oxford; New York. xii + 271 pp.

Phylogeny continues to interest biologists. Our minds are such that we take the same (perhaps childish) delight in knowing (or believing) that insects are related to snails as we do in knowing (or believing) that our colleague is descended from Irish kings; and a phylogeny is a scheme of relationships, a genealogy, that serves as a test of our theories of systematics and our classifications and as an important confirmation of theories of the mechanisms of evolution. Yet successful phylogenies are rare, and in the broad sense of a scheme expressing the genealogies of major groups of organisms, perhaps non-existent.

It was with some anticipation, then, that I received a review copy of this book by the eminent Russian student of insectan palaeontology, a member of U.S.S.R. Academy of Sciences. There are ten chapters, unnumbered sections entitled "Introduction" and "Conclusions", a long list of references (many to titles in Russian and other languages of which American students often may not be aware) and what appears to be an adequate index. From the Zoology Division of the Pergamon Press' "Series on Pure and Applied Biology", the book is well made and printed and the illustrations are beautifully done.

Not many American students, I suppose, will be pleased with Sharov's classification in which all annelids and arthropods are grouped in four subphyla under the Cuvieran phylum Articulata. Still fewer will accept the conclusion, reached after a review of the classical theories of annelidan origins have been presented, that the annelids are descended from cteno-

phores or that the polychaete family Spintheridae is composed of primitive annelids. Unfortunately Sharov wrote either before R. B. Clark's work (1964. Dynamics in Metazoan Evolution. Clarendon Press. Oxford.) on the significance of the hydrostatic skeleton in the evolution of the burrowing ancestors of the annelids or without a knowledge of Clark's work, though, of course, Clark had numerous predecessors. One cannot any longer believe that the earliest annelids were flattened, creeping forms or that their coelomic spaces were derived from the gastric pouches of coelenterates or ctenophores.

In the second chapter on the origin of arthropods from proto-annelids and the relationship of arthropods to molluscs there is much of interest, though the use of unfamiliar names, e.g., Malocopoda (or is it Malacopoda? both spellings occur) for the Onychophora, unnecessarily increases the difficulty of the chapter. And I was surprised to learn that the pycnogonids, assigned to a new superclass Proboscifera, are closely related to the first arthropods. This conclusion is based upon a presumed resemblance between the proboscis of pycnogonids, that of the Middle-Cambrian *Opabinia regalis* Walcott and the "erectile" (eversible) pharynx of some modern annelids. Sharov has a truly impressive knowledge of fossil arthropods and has read amazingly widely in the literature of arthropod anatomy and phylogeny, but one is startled by such dogmatism as that on page 44, "Størmer was in error . . .", when a careful reading of the evidence leaves one unconvinced of the "truth" of either Størmer's or Sharov's views. This sort of thing occurs frequently in Sharov's book.

Eight chapters and approximately 175 pages are devoted to the palaeontology, anatomy, embryology and relationships, derived from such studies, of the insects to other arthropods, particularly to the Crustacea and/or those primarily terrestrial groups known as the Mandibulata or Labiata (but not so-called by Sharov). Here one not versed in insect morphology (I am not) may find sticky going. But there is a wealth of information about fossils and though the arguments and counter-arguments of all the prominent students (e.g., Crampton, Snodgrass, Tiegs, Manton and many others) of insect phylogeny are reviewed and the conclusions frequently seem indecisive, I suppose no one will be greatly opposed to the author's decision concurring in the removal of the Protura, Collembola and Diplura as separate classes from the class Insecta for which is retained the traditional division into the subclasses Apterygota (the orders Monura, for a machilid-like Permian fossil, and Thysanura) and the subclass Pterygota.

The book concludes with a few pages of "Conclutions" and a brief phylogenetic "tree", which Sharov says is the thesis of his entire book, which derives Onychophora and Arthropoda as separate subphyla from lobopod annelids; the primitive arthropods were Proboscifera (an extinct class and the Pycnogonida); these gave rise to Trilobitomorpha which in turn produced Crustacea on one hand and Chelicerata on the other; and, finally, the Crustacea gave rise to what the author calls the Atelocerata (those mandibulate arthropods with one pair or no antennae).

The merit of this book, particularly for those of us who have perhaps too closely followed Snodgrass, is the wealth of palaeontological material and the discussions of the views of many students of arthropod phylogeny. From the standpoint of a neontologist, the demerits center around a slighting of considerations of the adaptive values of the changes that have produced the varied groups of arthropods. As one highly speculative matter, there is not here (and I know of no place where there is) any real consideration of the origin of the feature which makes an arthropod, the chitinous, usually sclerotized, exoskeleton. Sharov believes the annelids arose from crawling forms on the bottom of the sea and arthropods from similarly bottom crawling annelids, a sort of "straight-line" evolution that as presented leaves me with the uncomfortable feeling that there is some mysticism here. I would like to commend to the students of annelid-arthropod evolution the views of Clark (*op. cit.*) on the origins of the coelom and metamerism as adaptive features, at least among the annelids, to a burrowing existence. And why didn't the exoskeleton arise as an adaptation to a strand-line existence? It seems the hazards of alternate wetting and drying, the dangers of exposure to direct sunlight, the increased "need" for support for semi-terrestrial organisms, protection against the abrasive effects of a pounding surf that may have worked on rather large pieces of plant material as well as sand and gravel, among possibly other factors, including a rich source of food in the strand-line debris, could have constituted a set of circumstances conducive to, through quite usual processes of natural selection, the evolution by annelids of the exoskeleton and jointed legs that made arthropods of some of them. — Perry C. Holt, Department of Biology, Virginia Polytechnic Institute.

Books Recently Received

Reinhold Publishing Corp.

Langley, L. L. and E. Cheraskin. 1965. PHYSIOLOGY OF MAN (third edition). 658 pp. $8.50.

Polikarpov, G. G. 1966. RADIOECOLOGY OF AQUATIC ORGANISMS. 314 pp. $16.50. This book presents the first systematized account of substantiation of concepts and problems on the laws of interrelation between marine organisms and radioactive environment. Full data are reported on the concentration factors of radioactive isotopes and their carriers from 8 groups of the periodic system of chemical elements by marine plants and animals, as well as material on radiosensitivity and radioresistance of

various hydrobionts. The book is intended for specialist in radioecology, radiobiology, hydrobiology, ecology, oceanology, biochemistry, and conservation of natural resources.

Wood, E. J. Ferguson. 1965. MARINE MICROBIAL ECOLOGY. 243 pp. This book presents the reader with a comprehensive survey of the subject, indicating the most recent developments in this relatively new discipline. It discusses the microbes of the sea which, from the surface of the ocean to its depths, play a vitally important role at the first trophic level where solar energy is converted into biologic energy, and at the last trophic level where organic matter is degraded and destroyed.

Prentice-Hall, Inc.

Bradshaw, L. Jack. 1966. INTRODUCTION TO MOLECULAR BIOLOGICAL TECHNIQUES. 171 pp. (paper). This book was written for undergraduate majors in biology, with the background of general chemistry and physics. The experiments, therefore, have been chosen to illustrate techniques in as simple a way as possible — and the major purpose of this work is to introduce the student to the idea that good research methods must often be developed as an art, and that some experience is necessary to make the techniques consistently reliable.

Brock, Thomas D. 1966. PRINCIPALS OF MICROBIAL ECOLOGY. 306 pp. $7.75. This book is the first to integrate the sub-fields, such as soil microbiology, food microbiology, marine microbiology, medical microbiology, etc. and to provide a unified treatment of the entire subject. Among its features are indications of how modern techniques of microbiology and molecular biology can be applied to ecology problems. An extensive review of the literature is provided, citing over 450 references.

Davis, Bernard D. and Leonard Warren. 1967. THE SPECIFICITY OF CELL SURFACES. 290 pp. $10.25. This volume comprises papers presented at a symposium held under the auspices of the Society of General Physiologists at Woods Hole, Mass., 1-4 September 1965. The contributions survey present knowledge of surface macromolecules that have lent themselves to chemical analysis, describe systems that still await analysis, and discuss techniques for the purification of cell membranes.

Hayashi, Teru and Andrew G. Szent-Györgyi. (eds.) 1966. MOLECULAR ARCHITECTURE IN CELL PHYSILOGY. 252 pp. $7.50. This volume comPHYSIOLOGY. 252 pp. $7.50. This volume comprises the papers presented at a symposium held under the auspices of The Society of General Physiologists at its annual meeting at The Marine Biological Laboratory, Woods Hole, Massachusetts, 8 through 11 September, 1964. The four sections included in the book are "basic chemical theory", "molecular architecture of proteins", "molecular architecture and cell information", and "molecular architecture and biological structures."

Hoar, William S. 1966. GENERAL AND COMPARATIVE PHYSIOLOGY. 815 pp. $15.50. An integrated account of the principals of physiology, emphasizing the evolution of animal processes in relation to the environment. Ecological physiology is treated in sections dealing with compensation for environmental changes, temperature, gases, salinity, light, and pressure. Examples are drawn from many levels to stress the probable physiological mechanisms whereby animals acquire food, channel it into chemical energy, dispose of waste, and integrate these many operations.

Kihlman, Bengt A. 1966. ACTIONS OF CHEMICALS ON DIVIDING CELLS. 260 pp. $7.50. This book presents selected studies of the effects of certain widely used chemicals on chromosome structure and itosis. The studies were done primarily on mammalian cells in tissue culture and on root-tip cells of higher plants. Emphasis is on the mechanism of action of the chemicals. Attempts have been made to explain the cytological effects in biochemical terms. Over 500 references are included.

Ross, Herbert H. 1967. UNDERSTANDING EVOLUTION. 175 pp. $4.95. Stressing the ever increasing complexity of living things, Ross cites the great variation and development of the two million or more kinds of plants and animals now in existence. He contends that the steady flow of mutations, the process of natural selection, and the geotectonic factor with its changing of the earth's crust — all acting perpetually and simultaneously — have resulted in the intricate organization of life that we see in the world today. The process of evolution still continues, Ross observes, and "the one certainty about the universe and life upon this planet is that they always have changed and always will."

Stebbins, G. L. 1966. PROCESSES OF ORGANIC EVOLUTION. 191 pp. $2.50 (paper). This book is design to serve as a basic or supplementary text, presenting the undergraduate student with an account of the basic processes of evolution as they have been analysed and clarified during the past 40 years.
analyzed and clarified during the past 40 years.

University of Illinois Press

Daubs, Edwin Horace. 1965. A MONOGRAPH OF LEMNACEAE. 118 pp. $4.50 (cloth), $3.50 (paper). (Monograph 34).

Brandon, Ronald A. 1966. SYSTEMATICS OF THE SALAMANDER GENUS *GYRINOPHILUS*. 86 pp. $5.50 (cloth), $4.50 (paper). (Monograph 35).

List, James Carl. 1966. COMPARATIVE OSTEOLOGY OF THE SNAKE FAMILIES TYPHLOPIDAE

AND LEPTOTYPHLOPIDAE. 112 pp. $4.75 (cloth), $3.75 (paper). (Monograph 36).

Schmidt, Anthony J. 1966. THE MOLECULAR BASIS OF REGENERATION: ENZYMES. 78 pp. $4.50 (paper), (Monograph and Medical Sciences, 6(4).)

McGraw-Hill Book Company

Morris, Ramona and Desmond. 1966. MEN AND APES. 271 pp. $7.95.

Morris, Ramona and Desmond. 1966. MEN AND PANDAS. 233 pp. $7.95.

Pergamon Press, Inc.

Mamikunian, G. and M. H. Briggs (eds.). 1965. CURRENT ASPECTS OF EXOBIOLOGY. The contributed papers in this volume present the early stages in the scientific formulation of exobiology, and indicate the multidisciplinary impetus of the physical and biological sciences that collectively constitute the working apparatus of exobiology. The search for other life within our solar system is perhaps the most difficult undertaking of our era. The biological exploration of Mars is planned for opposition opportunities of 1969, 1971, and 1973 — and should any of these missions indicate the presence of biota, exobiology must then meet the challenge as an established discipline in its own right.

John Wiley & Sons

Boolotian, Richard A. (ed.). 1966. PHYSIOLOGY OF ECHINODERMATA. 822 pp. $45.00. Thirty-one authorities in the field give a detailed, scholarly account of existing knowledge of the biology and biochemistry of the echinoderms. Previously unpublished information is presented, and attention is focused on unanswered questions. A bibliography of all major publications dealing with echinoderms is presented.

Borkovec, Alexej B. 1966. INSECT CHEMOSTERILANTS. 143 pp. $6.95. A compilation of the pertinent information currently available on chemosterilants. The author is primarily concerned with the diverse features of chemosterilant compounds and their varying effects on different insect species. A bibliography, complete up to April, 1966, is presented.

Buchner, Paul. 1965. ENDOSYMBIOSIS OF ANIMALS WITH PLANT MICROORGANISMS. (Revised English version.) 909 pp.

Greulach, Victor A., and J. Edison Adams. 1967. PLANTS: AN INTRODUCTION TO MODERN BOTANY. 636 pp. $8.50. Although the book is designed for a one-term course, it can be effectively used for the first term of a year course in botany, or for a year course in general biology in conjunction with a one-term zoology text.

W. H. Freeman

McGaugh, James L., Norman M. Weinberger, and Richard E. Whalen (eds.). 1967. PSYCHOBIOLOGY: THE BIOLOGICAL BASES OF BEHAVIOR. 381 pp. $10.00 (cloth); $5.45 (paper). This book contains 45 papers selected to provide a representative view of some of the basic research areas in psychobiology — the study of the biological mechanisms underlying behavior. The papers, reprinted from Scientific American, impart an appreciation of the issues and methodology in the field, and each article is provided with an introduction that puts it in perspective and gives it focus.

American Elsevier Publishing Company, Inc.

Kershaw, Kenneth A. 1964. QUANTITATIVE AND DYNAMIC ECOLOGY. 183 pp. $5.00.

Barron's Educational Series, Inc.

Rodgers, C. Leland. 1967. ESSENTIALS OF BIOLOGY. 551 pp. $2.50 (paper). This book presents a compilation of subjects often used in the beginning course, and interpretations are in conformity with modern practice. It is an up-to-date study guide, reference, and review book on the basic topics essential for a good foundation in modern biology. Included are cell structure and function, the role of D.N.A. and RNA, the release and harvesting of energy, and a glossary of over 450 biological terms.

Dover Publications, Inc.

Allen, Robert Porter. 1942. THE ROSEATE SPOONBILL. 142 pp. $2.00 (paper).

Chapman, Frank M. 1895. HANDBOOK OF BIRDS OF EASTERN NORTH AMERICA. 581 pp. $3.00 (paper).

Kalm, Peter. 1937. TRAVELS IN NORTH AMERICA: THE AMERICA OF 1750. 2 Volumes. 797 pp. $2.50 per volume (paper).

Kofrad, Carl B. 1953. THE CALIFORNIA CONDOR. 154 pp. $2.00 (paper).

Singh, Jagjit. 1966. GREAT IDEAS IN INFORMATION THEORY, LANGUAGE AND CYBERNETICS. 338 pp. $2.00 (paper).

Tanner, James T. 1942. THE IVORY-BILLED WOODPECKER. 111 pp. $2.00 (paper).

PROCEEDINGS of the Second Annual American Water Resources Conference (sponsored by the American Water Resources Association and held at the University of Chicago, Chicago, Illinois on November 20-22, 1966) have been published. They contain 42 papers presented at the Conference. The price of the PROCEEDINGS is $6.00 plus postage. It is $5.00 for members of American Water Resources Association and for Conference participants, if prepaid. Send orders to: Circulation Manager, AWRA, P. O. Box 434, Urbana, Illinois 61801.

NATIONAL SYMPOSIUM on GROUND-WATER HYDROLOGY SAN FRANCISCO, CALIFORNIA NOVEMBER 6-8, 1967

A National Symposium on Ground-Water Hydrology will be held in San Francisco, California, on November 6-8, 1967, sponsored by the American Water Resources Association.

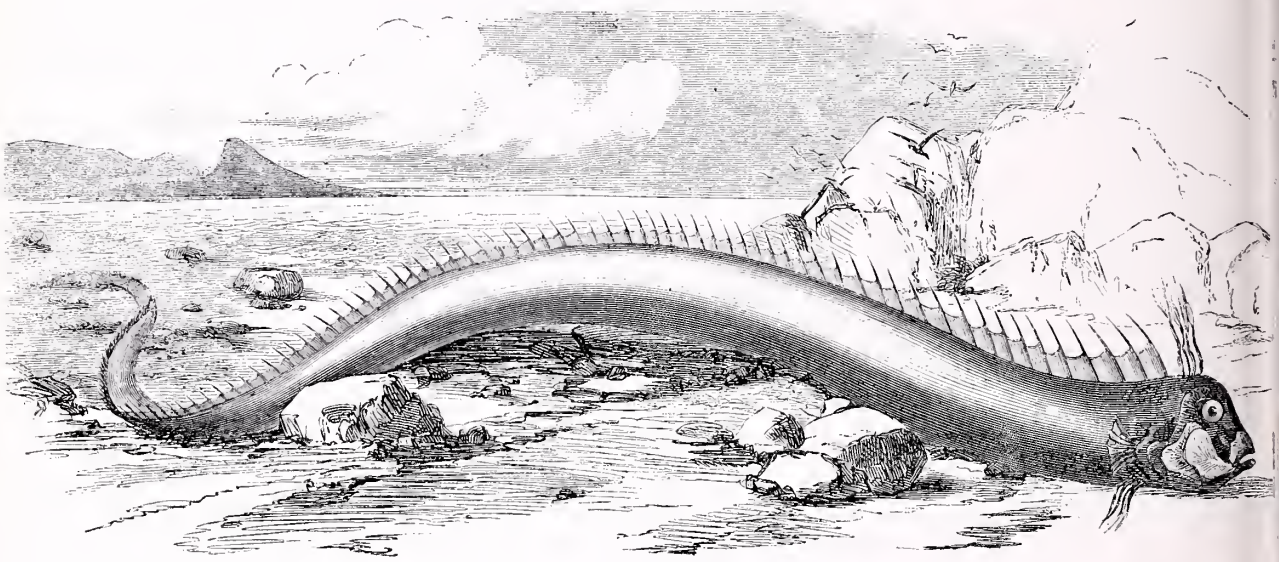
The Symposium will be divided into four sessions: (1) Occurrence of Ground Water in Different Geologic Environments, (2) Ground-Water Movement and Well Hydraulics, (3) Sea-Water Intrusion, Artificial Recharge, and Surface Water-Ground Water Relationships, and (4) Model and Radioisotope Techniques in Ground-Water Resources Investigations.

Further details on the Symposium may be obtained from: Program Chairman, Symposium, AWRA, P. O. Box 434, Urbana, Illinois 61801.

THIRD (ANNUAL) AMERICAN WATER RESOURCES CONFERENCE SAN FRANCISCO, CALIFORNIA NOVEMBER 8-10, 1967

The Third American Water Resources Conference will be held in San Francisco, California, on November 8-10, 1967, sponsored by the American Water Resources Association. The deadline for submitting abstracts of papers for consideration is July 1, 1967.

For further information please write to the Chairman of the Program Committee, Archie E. Stone, Vice-President, International Engineering Company, 74 New Montgomery Street, San Francisco, California 94105, or to The Secretary, American Water Resources Association, P. O. Box 434, Urbana, Illinois 61801.



News of Biology in the Southeast

NOTICE. — To facilitate further news coverage by the *ASB Bulletin,* a repository for news items will be provided at the registration desk during the Columbia meetings. Items thus submitted *will* be used in the July issue.

About People

William W. Miller, III, Associate Professor of Biology, Samford University, Birmingham, has been appointed Viee-President of the Biologieal Sciences Section of the Alabama Academy of Science for 1967.

William Mike Howell, has been appointed Assistant Professor of Biology, Samford University, Birmingham. He was formerly at the University of Alabama.

R. Winston Menzel, Associate Professor, Department of Oceanography, Florida State University, has received a grant from the NSF for a two year period entitled "Cytotaxonomy of related species of pelecypod mollusks." The major portion of the research will be on the species of quahog clams (*Mercenaria*) and species of oysters of the genus *Crassostrea.*

L. A. Whitford, Department of Botany, North Carolina State University, Raleigh, and **G. J. Schumacher,** New York State University, Binghamton, are preparing a manual of the fresh-water algae of North Carolina. The manual will comprise some 340 pages and illustrate and note the distribution of over 1700 taxa.

The annual invitation lecture of the Phycological Society of America will be given by **L. A. Whitford,** Department of Botany, North Carolina State University, Raleigh, at the AIBS meetings, College Station, Texas, August, 1967.

Jay Barton, II, became Chairman of the Department of Biology, West Virginia University, January 1, 1967, succeeding **Earl L. Core,** who had been head of the department since 1948. Dr. Core will remain on the staff as Professor of Botany and will continue his work on the Appalachian flora.

On April 24, **Stanwyn G. Shetler,** Associate Curator in the Smithsonian Institution's Department of Botany and secretary of the Editorial Committee of Flora of North America, will give a seminar at Duke University, Durham, N. C., on the topic *"Flora of North America — A New Synthesis."* Time is set for 4:15 PM in the Department of Botany.

During the past six months members of the Smithsonian Institution's Department of Botany (U. S. National Herbarium) have actively engaged in foreign travel in connection with their researches. Last summer **Dan H. Nicolson** and family left for a year in Nepal, where Dr. Nicolson will serve as a "Research Botanist" under the Fulbright Scholars' program, and **Egbert H. Walker** did fieldwork in the Ryukyu Islands on its flora. Both Dr. Walker and **Mason E. Hale** attended the Pacific Science Conference in Tokyo. During the fall months, **Thomas R. Soderstrom** headed an exhibits expedition to the Paramo in Columbia; **Velva E. Rudd** attended the Mexican Botanical Congress and did fieldwork in Mexico and Jamaica; and **Lyman B. Smith** studied types of the Bromeliaceae in numerous European herbaria, financed by a grant from the Smithsonian Research Foundation. **Wallace R. Ernst** was also awarded a grant from the Foundation to study collections of Papaveraceae in European herbaria, and he left in early February, 1967, for a 4-6-month tour of herbaria, including principally those in Western Europe but also, hopefully, the herbaria in Leningrad and Moscow. He expects to spend some time in the field in the Mediterranean region.

Denzel E. Ferguson, Professor of Zoology, Mississippi State University, has been named Editor-elect of *Herpetologica,* published by the Herpetologist's League. He will assume the office 1 January, 1968, succeeding **William Tanner,** Brigham Young University. Dr. Ferguson is also Vice-president and Program Chairman of the Southeastern Section of the American Society of Ichthyologists and Herpetologists, which group will meet with ASB in Columbia.

Sylvia A. Earle, Resident Director of the Cape Haze Marine Laboratory, has been appointed Research Fellow at the Farlow Herbarium, Harvard University for 1967-1968. During this time, Dr. Earle will be studying

marine plants collected during expeditions aboard the R/V Anton Bruun.

On January 1, 1967, **Richard T. Hanlin** transferred to the University of Georgia, Athens, as Associate Professor, Department of Plant Pathology and Plant Genetics, where he will help develop a graduate program in mycology. Dr. Hanlin will also serve as curator of the mycological herbarium.

John E. Pauly, Associate Professor of Anatomy, Tulane University, recently received a Lederle Medical Faculty Award for 1966-1969. Dr. Pauly has been carrying on research on circadian rhythms, and on electromyography. In addition he has just published, with **Hans Elias**, the 3rd Edition of "Human Microanatomy."

C. R. Austin, Professor of Embryology, Department of Anatomy, Tulane University, and Head, Genetic and Developmental Disorder Research Program, Delta Regional Primate Center, has accepted the offer of a Chair at Cambridge University entitled The Charles R. Darwin Chair of Reproductive Physiology, and will return to England in October, 1967.

James A. Miller, Jr., Chairman, Department of Anatomy, Tulane University, was an invited speaker at a Ross Conference on Pediatric Research held in San Juan, Puerto Rico, on January 23, 24, and 25. The central theme of the conference was "Brain Damage in the Fetus and Newborn from Hypoxia or Asphyxia," and Dr. Miller spoke on "Effects of Hypothermia, THAM and Glucose upon tolerance to Asphyxia in Newborn Mammals."

W. Ralph Singleton, Miller Professor of Biology, University of Virginia, was elected Vice-president of the American Genetic Association on 25 January 1967. Dr. Singleton has just completed a term as secretary of the Association.

Raymond L. Taylor, Associate Administrative Secretary of AAAS, has retired as of 31 January 1967, after eighteen years of service. Among various expressions of appreciation, he was made a life member of AAAS. Dr. Taylor is and remains an active, faithful member of ASB. The editor understands that Dr. Taylor intends to remain active in science and continue his many fine contributions. Dr. Taylor has been succeeded by **Daniel Thornhill**, Meeting Manager, who was formerly an official of the Engineering Division of NAS-NRC, and by **Walter G. Berl**, Meeting Editor. Dr. Berl will still spend two-thirds of his time at the Johns Hopkins Applied Physics Laboratory, Silver Springs, Maryland.

On October 1, 1966, **George Sprugel, Jr.** became Chief of the Illinois Natural History Survey, Urbana, Illinois. For several years prior to that time he served as Chief Scientist in the Washington office of the National Park Service.

Irwin R. Konigsberg has joined the Faculty of the University of Virginia as Professor of Biology. He received his doctorate at The Johns Hopkins University and has served previously as Staff Member, Carnegie Institute of Washington, Department of Embryology. His major researeh interests are: The cytodifferentiation of skeletal muscle cells, the developmental properties of clonal populations of embryonic cells in vitro, and the role of cell interactions in cytodifferentiation in vitro.

W. Gerald Robison, Jr. has joined the Faculty of the University of Virginia as Assistant Professor of Biology. He received his doctorate at University of California (Berkeley) in genetics where he also served as Postgraduate Research Geneticist and Postdoctoral Research Fellow in Anatomy. His major research interests are: Sperm differentiation, cell motility, cell biology, and electron microscopy.

M. Lüscher, Professor, University of Bern, Switzerland is working as a visiting seientist in the biological laboratories of the University of Virginia during the period between October, 1966 and March, 1967. Dr. Lüscher is interested in insect endocrinology.

Isabelle B. Sprague, Professor, Department of Biological Sciences of Mount Holyoke College, Mount Holyoke, Massachusetts, is working as a visiting scientist in the biological laboratories of the University of Virginia during the period between September, 1966, and June, 1967. Dr. Sprague is interested in insect development and physiology.

Heinz-Werner Kuethe is working in the biological laboratories of the University of Virginia as a postdoctoral fellow during the period between February, 1965, and April, 1967. Dr. Kuethe received his doctorate from University of Marburg, Germany and is interested in insect embryology.

Volprecht Maul is working in the biological laboratories of the University of Virginia as a post-doctoral fellow during the period between November, 1966 and September, 1967. Dr. Maul received his doctorate from University of Marburg, Germany and is interested in insect embryology.

Elias Shaaya is working in the biological laboratories of the University of Virginia as a post-doctoral fellow during the period between September, 1966 and August, 1967. Dr. Shaaya received his doctorate from The Hebrew University of Jerusalem and is interested in insect hormones.

About Institutions and Projects

The Smithsonian Institution now has available two new bibliographies by **Elaine R. Shetler** which will be of interest to high school and college teachers of botany: "Selected Guides to the Wildflowers of North America", and "Floras of the United States, Canada, and Greenland – A Selected Bibliography with Annotations." Both will be sent free upon request to the Chairman, Department of Botany, Smithsonian Institution, Washington, D. C. 20560.

The Editorial Committee of Flora of North America held its first meeting at the Smithsonian Institution on January 30-31, 1967, to lay the groundwork for the project, now officially underway. Members of the Committee are: **Peter H. Raven** (chairman), Stanford University; **Stanwyn G. Shetler** (secretary), Smithsonian Institution; **John H. Beaman,** Michigan State University; **Kenton L. Chambers,** Oregon State University; **Robert Kral,** Vanderbilt University; **Walter H. Lewis,** Missouri Botanical Garden; **John T. Mickel,** Iowa State University; **Roy L. Taylor,** Plant Research Institute, Ottawa; **John H. Thomas,** Stanford University. The meeting was organized and financed by the Smithsonian Institution, with **William L. Stern,** Chairman of the Department of Botany, serving as chairman *pro tem* of the Steering Committee of FNA. Attending *ex officio* was **Robert F. Thorne,** Santa Ana Botanic Garden, chairman of the Advisory Council of FNA. Also, Professor **V. H. Heywood,** secretary of the Editorial Committee of *Flora Europaea,* was brought over by the Smithsonian to consult with the FNA eommittee at this first meeting. Following the two-day meeting, Prof. Heywood gave a public seminar on February 1 at the Smithsonian on the subject "*Flora Europaea,* Its Conception and History." After his visit to Washington he spent several days at the University of Texas in the laboratory of **B. L. Turner.**

The Institute of Ecology, University of Georgia, will conduct studies, under the general management of Battelle Memorial Institute, Columbus, Ohio, of movement and storage of potential fallout radionuclides in the tropical forest ecosystems of Panama and Colombia. The work is related to bioenvironmental feasibility studies for the possible use of nuclear devices for construction of a sea-level canal in the American isthmian region. A research team consisting of faculty members and graduate students under the direction of **Frank B. Golley** and **John T. McGinnis** will be in the field during the year 1967 collecting data on forest elemental storage and cycling characteristics and the nature by which radionuclides might be transmitted to man via food chains. The University of Georgia work is part of a large scale hazard analysis program using mathematical models containing information obtained from the studies of terrestrial, agricultural, freshwater, estuarine and marine environments as related to human ecology. These studies are being conducted for the Nevada Operations Office of the U. S. AEC as a part of the overall feasibility study of the Atlantic-Pacific Interoceanic Canal Commission.

The 17th Annual Wildflower Pilgrimage sponsored in part by the Department of Botany, The University of Tennessee, will be held at Gatlinburg, Tennessee, in the Great Smoky Mountains National Park April 27-29, 1967. For further details write to the Department of Botany, University of Tennessee, Knoxville, Tennessee 37916.

SOUTHEASTERN FLORA PROJECT

This project is now essentially organized and underway. Its general objectives are:

a) To survey floristically the forested region of the southeastern United States west to the prairie and north to the terminal moraines. The states to be included are Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Tennessee, Kentucky, and West Virginia. Notation of presence in the adjacent states of Texas, Oklahoma, Missouri, Illinois, Indiana, Ohio, Pennsylvania, and New Jersey will be made.

b) To produce a Manual which will include keys, diagnostic illustrations of at least one species per genus or section, descriptions, habitats, distributional data, and pertinent synonymy to every vascular species growing without cultivation in Southeastern United States.

The resulting manual should be useful to taxonomists, geographers, ecologists, foresters, wildlife workers, conservationists, garden club members, teachers, and amateurs. The research will be based on existing herbarium material, new field collections and pertinent literature.

The total project is to be directed and edited by an Editorial Board composed of **Lloyd H. Shinners,** Southern Methodist University; **Earl L. Core,** West Virginia University; **Wilbur H. Duncan,** University of Georgia; **Robert L. Wilbur,** Duke University; **James W. Hardin,** North Carolina State University; **C. Ritchie Bell** and

Albert E. Radford (Chairman), University of North Carolina, Chapel Hill.

The author contributors will be: **W. P. Adams**, DePauw University; **J. R. Baird**, Washington & Lee University; **C. R. Bell**, University of North Carolina; **J. R. Bozeman**, University of North Carolina; **E. T. Browne, Jr.**, University of Kentueky; **R. C. Clark**, University of North Carolina; **R. T. Clausen**, Cornell University; **E. L. Core**, West Virginia University; **D. S. Correll**, Texas Research Foundation; **P. J. Crutchfield**, Methodist College; **C. E. DePoe**, Northeast Louisiana State College; **H. R. DeSelm**, University of Tennessee; **Gordon DeWolf**, Georgia Southern College; **W. H. Duncan**, University of Georgia; **W. R. Ernst**, Smithsonian Institution; **Murray Evans**, University of Tennessee; **Shirley A. Graham**, Kent State University; **J. W. Hardin**, North Carolina State University; **Francia Hommersand**, University of North Carolina; **J. H. Horton**, Western Carolina College; **F. C. James**, University of North Carolina; **S. B. Jones, Jr.**, University of Southern Mississippi; **Carl Keener**, Pennsylvania State University; **Robert Kral**, Vanderbilt University; **Sidney McDaniel**, Florida State University; **K. A. Nicely**, Western Kentucky University; **D. M. Porter**, Samford University; **T. M. Pullen**, University of Mississippi; **A. E. Radford**, University of North Carolina; **G. S. Ramseur**, University of the South; **P. H. Raven**, Samford University; **J. D. Ray**, University of South Florida; **R. W. Read**, University of West Indies; **C. M. Rogers**, Wayne State University; **N. H. Russell**, Central State College; **A. J. Sharp**, University of Tennessee; **Lloyd Shinners**, Southern Methodist University; **L. B. Smith**, Smithsonian Institution; **D. E. Stone**, Duke University; **J. W. Thieret**, University of Southwestern Louisiana; **J. L. Thomas**, University of Alabama; **G. E. Tucker**, Arkansas Polytechnic College; **D. B. Ward**, University of Florida; **H. A. Wahl**, Pennsylvania State University; and **R. L. Wilbur**, Duke University.

The exchange contributing institutions and local collectors are:

Delaware — Delaware State College, **N. H. Dill.**

Maryland — University of Maryland, **R. G. Brown**; Frostburg State College, **M. L. Brown.**

Virginia — Virginia Polytechnic Institute; Longwood College, **A. M. Harvill**; Lynchburg College, **G. W. Ramsey**; Virginia Military Institute, **Oscar Gupton**; Old Dominion College; College of William and Mary, **G. W. Hall.**

North Carolina — Appalachian State College, **I. W. Carpenter**; Atlantic Christian College, **J. P. Tyndall**; Campbell College, **L. S. Beard**; Davidson College, **Tom Daggy**; Duke University, **R. L. Wilbur**; East Carolina College, **Christine Wilton**; Methodist College, **P. J. Crutchfield**; North Carolina State University, **J. W. Hardin**; Pembroke State College, **R. F. Britt**; Pfeiffer College, **John Speer**; University of North Carolina at Chapel Hill, **A. E. Radford**; University of North Carolina at Charlotte, **J. F. Matthews**; Wake Forest College, **R. L. Wyatt**; Warren Wilson College, **R. C. Dunton**; Western Carolina College, **J. H. Horton**; Wilmington College, **D. E. Harrison.**

South Carolina — University of South Carolina, **W. T. Batson**; Converse College, **R. W. Powell, Jr.**; Erskine College, **W. L. Ellison**; Furman University, **C. L. Rodgers**; Lander College, **Shelton Stewart.**

Georgia — University of Georgia, **W. H. Duncan**; Georgia Southern College, **Gordon DeWolf**; Oglethorpe University, **Judy T. Morgan**; Valdosta State College, **W. R. Faircloth.**

Florida — University of Florida, **D. G. Ward**; Florida State University, **Sidney McDaniel**; University of South Florida, **R. W. Long.**

Alabama — University of Alabama, **J. L. Thomas**; Alabama College, **P. G. Beasley**; Florence State College, **A. L. Hershey**; Auburn University, **A. C. Koelling.**

Mississippi — University of Mississippi, **T. J. Pullen**; University of Southern Mississippi, **S. B. Jones, Jr.**; Delta State College, **H. J. Jacob.**

Louisiana — University of Southwestern Louisiana, **J. W. Thieret**; Northeastern Louisiana State College, **C. E. DePoe.**

Arkansas — University of Arkansas, **E. E. Dale, Jr.**; Arkansas State University, **E. L. Richards**; Arkansas Polyteehnic College, **G. E. Tucker.**

Tennessee — University of Tennessee, **A. J. Sharp**; Vanderbilt University, **Robert Kral**; Austin Peay State College, **W. H. Ellis**; University of the South, **G. S. Ramseur.**

Kentucky — University of Kentucky, **E. T. Browne, Jr.**; Murray State University, **G. E. Hunter**; University of Louisville, **W. S. Davis**; Western Kentucky University, **K. A. Nicely.**

West Virginia — West Virginia University, **Elizabeth A. Bartholomew.**

Texas — Southern Methodist University, **L. H. Shinners.**

Oklahoma — Oklahoma State University, **U. T. Waterfall.**

Missouri — Southwest Missouri State College, **P. L. Redfearn, Jr.**

Illinois — University of Southern Illinois, **R. H. Mohlenbrock.**

Indiana — Indiana University, **C. B. Heiser, Jr.**

Ohio — Kent State University, **T. S. Cooperrider.**

Pennsylvania — Carnegie Museum, **L. K. Henry**; Pennsylvania State University, **Carl Keener.**

New Jersey — Rutgers, The State University, **D. E. Fairbrothers.**

The project is being supported by the National Science Foundation, and the Manual will be completed by 1975. Others interested in contributing to the project as authors of genera or unassigned families, or collectors, should contact **Albert E. Radford**, Chairman of the Editorial Board, University of North Carolina, Chapel Hill, N. C.

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ASB BULLETIN

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CONTENTS

Notes on Preparation for a Botanical Field Trip to Mexico

D. R. Windler and C. R. Bell
University of North Carolina at Chapel Hill

Abstract. — This article presents information we hope will be helpful to people planning a botanical field trip to Mexico. Comments are made on such topics as auto permits, tourist cards, auto insurance, food and lodging, auto travel, currency, mail service, immunizations, clothing, botanical equipment and photography. Pertinent references and addresses are provided wherever possible.

A field trip to Mexico by a United States biologist who has not previously made the trip is usually preceded by gathering of information from others who have made the trip in the past. Information of this type is not usually available in print. The notes below bring together references and comments pertinent to such a trip. It is hoped that as other information becomes available additions can be made to this paper.

Auto Permits and Tourist Cards

Free auto permits, valid for 180 days, are issued at the border. The driver must be prepared to show his registration card and title of automobile ownership, or a notarized affidavit of ownership. If the owner is not in the traveling company, the driver must also present a notarized authorization from the owner.

Free tourist cards, also valid for 180 days, are issued at the border or by any Mexican consul in the United States. Proof of United States citizenship is required for issuance. In the past, fees of three to five dollars have been levied for the tourist card, but this fee has recently been abolished. (See **Immunizations** below)

Auto Insurance

It is most advisable to have automobiles insured while in Mexico. Since United States Auto insurance policies are not valid, insurance must be purchased from a Mexican firm. Sanborn's, with head offices in McAllen, Texas, represents the largest Mexican insurance company (largest number of claims agents) and is probably the best. In addition to their insurance they also provide an excellent travelogue on Mexican routes (See Travel Information). Information can be obtained at any of the company's offices which are located in all of the United States border towns.

Travel Information

The Sanborn's travelogue which is included with their auto insurance is probably the best available. It includes many general travel tips for the American tourist. The log keeps a running count of mileage between the larger cities and lists the names of most small towns along the route. This allows you to travel confident that you are on the right road, since road mileage and direction signs are rare. The log also lists hotels and restaurants along the routes which have been checked by Sanborn's for cleanliness, quality, and price. The American Automobile Association (AAA) puts out an excellent guide to Mexico for its members. In addition to information on hotels and restaurants, it includes information on history, industry and points of local interest. Both books are a must for the American in Mex-

ico. Another helpful booklet, *Motoring in Mexico* is offered for 25 cents by the Pan-American Union. It may be secured from: Pan-American Union, General Secretariat, Organization of American States, Washington, D. C. A book entitled *Mexico on 5 Dollars a Day* will also prove helpful in selecting low cost accommodations in some of the cities. Additional general information on Mexico can be secured by writing to the Mexican Government Tourism Department (TURISMO) at Paseo De La Reforma 35 in Mexico City, D. F.

Auto Information

In Mexico the government controls all production and sales of gasoline (Brand = Pemex). The middle and top Pemex grades are comparable to regular and premium U. S. grades and cost about the same amount. Pemex stations are well scattered throughout Mexico, but unfortunately, not all the local station operators are reliable (e.g. short change, water in gas, etc.). Sanborn's travelogue points out both reliable and unreliable stations along the routes. Service station restrooms, if provided, are frequently not as clean as would be desired but, Pemex is currently trying to upgrade them. Most major United States motor oil brands can be obtained in Mexico.

A reserve 5 gallon can of gasoline should be standard equipment on a trip. Other items which should be included as auto equipment are: a good light, a tow cable, 4 *good* tires and one *good* spare, a good jack, a tool kit and lug wrench, a shovel, an extra fan belt, spark plugs, points and a fire extinguisher.

Most cities of any size have good mechanics trained to work on the common makes of foreign and American cars. A list of automobile agencies may be found in the AAA guide. Volkswagen agencies are also quite common in Mexico and will tend to become more common after the completion of their new Puebla plant. A booklet listing all North American VW Agencies may be obtained from any U. S. VW agency.

Night driving should be avoided. A driver never knows what he will find over the next hill or just past the range of his headlights. Trucks frequently park half on and half off the highway, cars and buses are driven at night with only parking lights, and cattle, goats and burros commonly wander onto the road. Furthermore, there may not be center lines or guard rails on potentially dangerous stretches of highway.

Mail Service

General air mail letter delivery between Mexico and the United States is good and air postal costs are similar to those in the United States (80 centavos or 6.4 cents American for up to ten grams). Due to differing customs and mail regulations of the United States and Mexico, packages (especially of biological material) are frequently held for long periods of time and are occasionally lost. If possible, have packages of biological material sent thru some Mexican academic or research institution and addressed to a similar United States institution.

Immunizations

Proof of smallpox vaccinations is required for entrance into Mexico and is also required upon reentry to the U. S. Botanists working in the field probably should take several others: Tetanus, Rocky Mountain spotted fever, Typhoid and Typhus are advised. A yellow fever vaccination is officially recommended for Guatemala. If the party plans to visit Southern Mexico, having this protection would also be advisable.

An international immunization card on which these vaccinations are listed can be obtained at public health offices and at most travel agencies. Every immunization received must be registered on the card by the administering physician and be validated by a Public Health official. This card should be carried at all times while in Mexico.

Spanish

Although it is extremely helpful to speak fluent Spanish, it is not necessary. A number of good Spanish phrase books are available and with their use most people can politely make their needs known and even engage in *simple* discussion. Some helpful pocket size books to aid in communication in Spanish are:

1. Berlitz "Spanish for Travelers"
2. Follett's "Instant Spanish"

3. Follett's "Vest Pocket Spanish Dictionary"
4. Holderman's "Let's Say It In Spanish!"

These and others are available through Sanborn's McAllen, Texas and at other book stores.

It is advisable to carry a letter from an official of your home institution, in both English and Spanish, which explains the purposes of your trip. The Spanish letter helps account for equipment and chemicals carried as you pass the several customs offices inside the border.

Food and Water

Almost any kind of food may be taken into Mexico from the United States. On an extended trip it might be wise to take a variety of canned meats, fruits and fruit juices, cookies, peanut butter, and mustard. Bread can be easily purchased in towns. Mexican fruits which can be peeled are entirely safe and are very good. As a general rule, well cooked Mexican food is safe. Any fresh food which may have come in contact with the soil should not be considered safe. Most dairy products are not pasteurized and should be avoided. Excellent food is available in Mexican Super-Mercados in the larger towns and cities. Sanborn's travelogue lists many good restaurants and gives further tips on food. When possible, it is best to follow their recommendations.

Water in Mexico is a problem mainly because of habits Americans have developed at home. All hotels have purified bottled water in the halls for drinking. This is the only water which should be consumed. Jugs may be filled in the hotel for field trips. Every person should have his own personal, well marked, plastic gallon jug and a canteen. Powdered flavoring with one of the new liquid sweeteners helps to make the frequently warm water more palatable. Bottled carbonated beverages and beers are excellent and safe, but they should be chilled in the bottle since ice is frequently made from unpurified water.

Most restaurants serve American dishes as well as the spicy Mexican foods. An abrupt change to a spicy diet may cause diarrhea which frequently leads a person to think he has contracted one of the numerous forms of dysentery.

Some guides (Sanborn's among them) recommend the constant use of a dysentery medicine. This is probably not needed and some doctors maintain that it is improper treatment. If you become ill while in Mexico, do not hesitate to see a Mexican doctor. His knowledge of tropical diseases and recommendations for treating them will probably be more reliable than that of your own physician at home.

If meals are to be eaten in the field, several other items will be useful. Among these are a compact single burner campstove, whose case doubles as a saucepan and frying pan (available through Coleman). Paper towels and large bags for refuse are also useful. (Don't be a litterbug!)

Clothing

A tendency on any type of trip is to pack more clothing than is needed, but on extended field trips "city clothes" and "field clothes" adequate for the time of year and length of stay should be included. Field clothes are not appropriate in many of the new motels and restaurants. Womens slacks and shorts are not considered to be proper attire in towns. The following list should be kept in mind when packing:

Shoes: Comfortable pair for driving and town wear
Leather boots for the field
Tennis shoes and/or moccasins
Jacket: 1, light weight
Raincoat: (A must in the rainy season) Light raincoat or poncho
Sweatshirts: 2 (one with a hood is good at high altitudes)
Bathing Suit: Many reasonably priced hotels have pools for guest use.
Laundry Bag
Hat or Cap: Mexican straw hats are cool and may be purchased for 40-80 cents (American) in the markets.
Towels: Furnished in hotels. Washcloths are rarely furnished.

Personal Equipment

Toothbrush and toothpaste: Be careful to dip your brush into a glass of purified water instead of holding it under the faucet! Tap water is *not* purified!

Tobacco: Even if you don't smoke, it may be advisable to take a couple of cartons of

American cigarettes along. American cigarettes are roughly 2-3 times as expensive in Mexico as they are in the United States and make good tips in return for services rendered.

Toilet Paper: Hotels will have it, but the consistency in quality is poor. Some should definitely be taken along.

Shaving equipment: Non-electric is the most reliable.

Plastic soap box and a number of small bars of soap

Bug bomb (to spray auto and room if needed)

Insect repellent (several bottles per person)

Alarm clock *Wrist watch*

Sun glasses *Stationary*

Collection Times

If the collector is working on a particular genus, the best time can frequently be determined by examination of large herbarium collections of the group. For general collections the best times would be after the end of the rainy season (October 20th-December 15) or at the beginning of the rainy season (March 15-May 1). Other dates are also acceptable, but these seem to be the peak flowering times.

Collection Regulations

A recent notice published in the ASB Bulletin (Anonymous, 1967) discusses and enumerates Mexican collection regulations. Appropriate addresses are provided from which animal and plant collection permits can be obtained.

An identified duplicate specimen of each collection should be sent to the Mexican National Herbarium at the following address:

Herbario National del Instituto de Biologia
Universidad Nacional de Mexico,
Casa del Lago, Chapultepec,
Mexico, D.F., Mexico

Botanical Equipment

It is realized that personal preference and the type of research will play a large part in the choice of equipment. The check list presented below will, however, cover most needs.

Machete: A high quality machete with good leather sheath may be purchased reasonably in Mexican hardware stores.

Data Books and pencils *Fixatives*

India Ink pen *Vials*

Felt Markers *100% rag paper labels (for fixatives)*

Wax pencils *Plastic bags*

Knife and sheath *String*

Pruners *Rubber bands*

Stringed labels *Tape measure*

Compass *Shoulder pack*

Packets for fruits *Blotters*

Cardboard ventilators *Specimen sheets, bundles of 200*

Backs and straps for 6-8 presses

Drying of pressed specimens can be a problem, especially during the rainy season. A car top carrier which allows air to circulate around the specimens is useful, but should not be the only means available. A method which has been shown to be effective is one in which a 3-foot plant press is placed against a wall of the room with the narrow side toward the wall. A small electric room heater (1200 watts) with a fan is then placed along the wall so that it blows toward the open end of the cardboard corrugations. Two four foot poles or sticks are then placed from the top of the press to the top of the heater. A tarp stretched over the frame work forms a wind tunnel. The distance between the heater and the press should be adjusted so that a slow drift of warm air can be felt at far side of the press. An extension cord (heavy duty, 20' long) is often necessary. Other driers are discussed in "Manual for Tropical Herbaria" which is offered for sale by the International Association for Plant Taxonomists, Utrecht, Netherlands.

After the specimens are *dry* they may be tied securely between two cardboards and placed in large plastic bags (garbage can liners, Sears & Roebuck). The bags, once sealed, can then be placed inside cardboard boxes. The plastic bags will keep specimens protected from moisture and insects.

If the plants are to be mailed back to the U.S., masking tape and wrapping paper will also be needed as part of the supplies. Air freight is considered to be the safest way of sending the specimens back to the United States. If mailing specimens is contemplated, pack expendable

materials in boxes of a size which can be used to ship specimens.

Books

There are currently few books on the Mexican flora. Stanley's Trees and Shrubs of Mexico (1920-6) is probably the single major work on Mexico. The completed portion of the *North American Flora* also includes Mexican plants (Britton, 1905-). Pesman's *Meet Flora Mexicana* (1962) is keyed to a popular audience, but is worthy of examination. It contains a vegetation zone map reprinted from a paper by A. Starker Leopold (1950). Either this map or the one in the original publication will aid in understanding the general lay of vegetation and may help in planning a trip. A book, only recently published, on the flora of the Misantla region of Veracruz (Spanish) by Arturo Gomez-Pompa (1966) would be helpful in that region. It is encouraging to learn that the National Herbarium of Mexico has undertaken the development of a flora of the coastal state of Veracruz and currently has a number of full time collectors in the field. A good source of references on Mexican botany has recently been compiled by Ida Kaplan Langman (1964). Article titles are arranged by years under the author's name. The index includes plant names, authors and localities. Several additional books and references are listed under Literature Cited at the end of this paper.

First Aid Supplies

Most large towns have a hospital, but it is nevertheless wise to carry some first aid supplies. The list below suggests possible items which could be included:

Aspirin
Chapstick
Bandaids and bandages
Adhesive tape
Gauze
Cotton
Eye cup and bath
Snake-bite kit
Antiseptic
Salve for burns
Halozone tablets for water
Matches
Scissors and tweezers (forceps)
American Red Cross First Aid Manual

If a prescription can be acquired from a doctor, it may be wise to get some strong pain pills to relieve pain till you can get to a doctor with broken bones, etc. These items may be stored in an "army surplus" ammunition box which is watertight and usually inexpensive.

Photography in Mexico

Camera equipment brought into Mexico may include one still and one movie camera per person with 12 rolls of film for each camera. Film should be purchased in the U.S. since the Mexican cost is roughly double that of the U.S. list price. It may be advisable to carry the film in an insulated air tight case with a drying agent to protect it from the high heat and humidity in some of the tropical regions, or to buy film specially packed for the tropics. Other equipment that might prove helpful are extra lenses, a light meter, a tripod, a lens brush, and lens tissue. A booklet, available from Eastman Kodak Company, entitled *Notes on Tropical Photography* (Kodak Service Pamphlet #c-24) is helpful.

Sending exposed film to U.S. developing plants from Mexico by mail is not recommended. U.S. visitors frequently keep all exposed film with them and have it developed after returning to the United States. Good, reasonable processing services are available in the larger cities, and should be used on extended trips.

United States Plant Importation Permits

Pressed dried specimens or fixed material enters the U.S. without a permit. All soil, however, must be removed from the roots. Permits and regulations governing the entry of seed and cuttings may be obtained from:

Agricultural Research Service
Plant Quarantine Division
209 River Street
Hoboken, N.J. 07030

Camping

Although open air camping is not recommended, it is possible to camp in many parts of Mexico and a few camping trailer camps are being developed. A book entitled *Mexico Auto Camper and Trailer Guide* is available from Sanborn's for $3.50. Another entitled *Trailering in Mexico* is sold by Trail-R-Club, Box 1376, Beverly Hills, California 90213 for $2.75.

Cost of Trip

Cost varies with the group making the trip and the vehicle used. Living in moderation, it is possible for several people to make the trip for an average of 5 to 6 dollars per person per day for food and lodging. Living in expensive hotels and eating in the very best restaurants will raise this figure substantially, whereas, camping would reduce the cost. The extra time required to make and break camp must be weighed against the time available for the botanical work.

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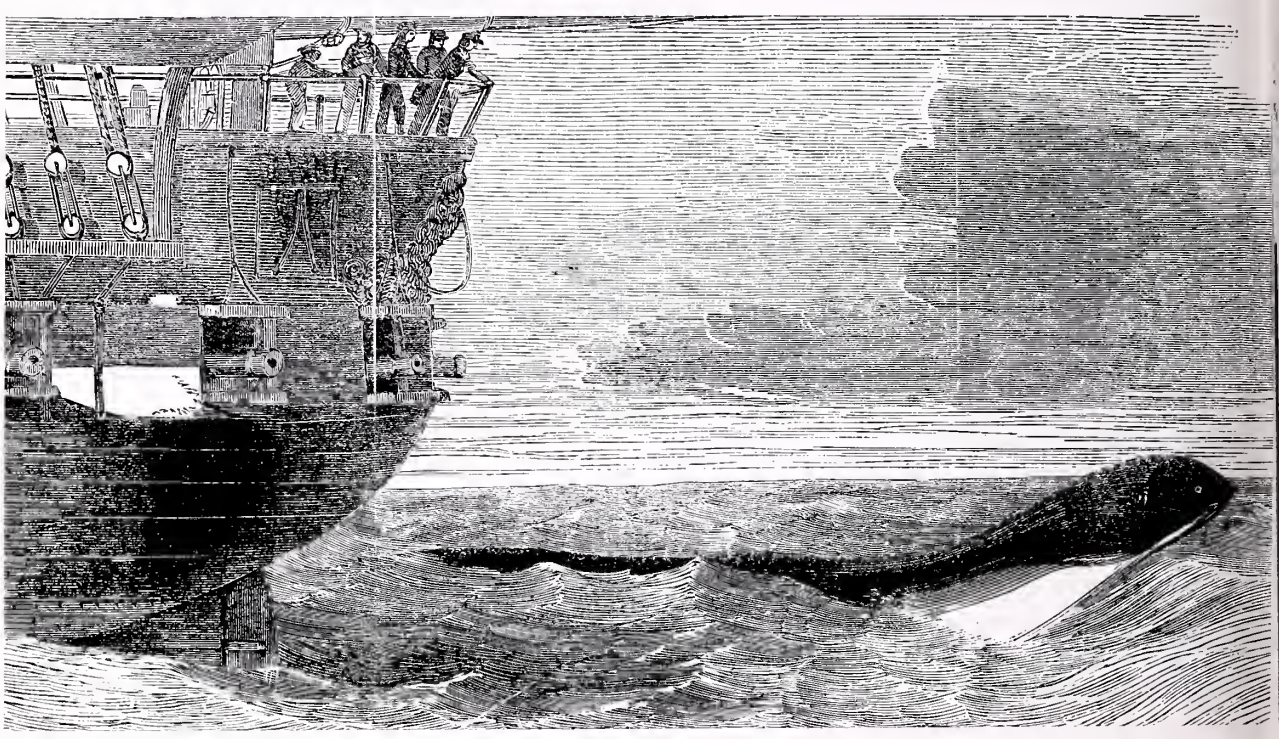


Books and Periodicals

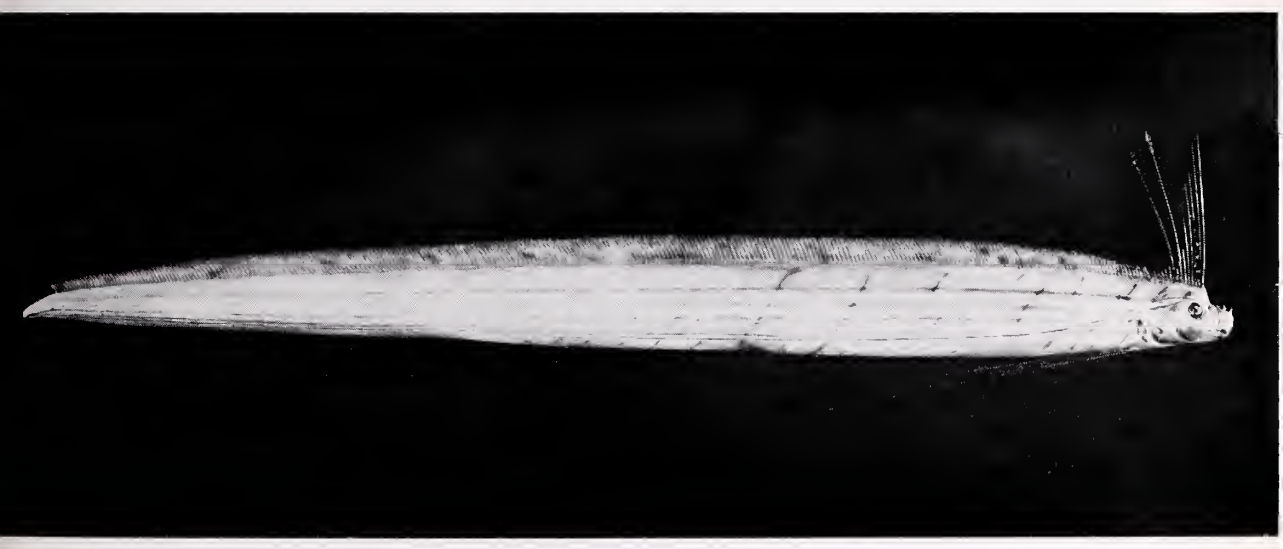
SPORES: THEIR DORMANCY AND GERMINATION, by Alfred S. Sussman and Harlyn O. Halvorson. 1966. Harper & Row, New York. XI + 354 pp. $14.00.

The authors' choice of the spore as a model system for a discussion of dormancy is based on several factors, such as the uniqueness of the spore as both an end point and a beginning in a biological system, the practical importance of the spore in such areas as food preservation and pathology, and actual data available on the subject. The authors state that, "To retain an historic as well as introspective analysis, this book is largely restricted to discussions of dormancy in microbial systems in which biochemical aspects have been analyzed in some detail." It is, perhaps, not surprising that references to *Neurospora* and *Bacillus* predominate, especially in view of the authors' personal interests and investigations in these genera. Their long acquaintance with problems of dormancy in microorganisms well qualifies them to write a book on the subject.

Mechanically, this book is excellent. The format is attractive and the text is well written. A few typographical errors are present but they do not detract from the text. There are numerous graphs and illustrations, including electron micrographs of uniformly high quality. Many of the data compiled from the literature, such as factors affecting spore germination, and longevity of spores, are presented in the form of tables, for easy comparison of species. Previously these data were available only in scattered publications. A list of references concludes each chapter. For the 11 chapters in the book there are 1,778 references, including duplications.

To the applied biologist the most useful feature of this book may well be the compilations of data on the influence of various factors on spore germination and survival. These will enable the worker interested in germinating a troublesome fungal or bacterial spore to readily find the information he needs. References are also provided for all of the information in each table. It is unfortunate, however, that no index is provided to the genera of organisms mentioned. Such an index would have facilitated its use as a reference book. Another minor, but annoying, omission is the lack of titles of publications in the references. While it may seem sufficient to give only the author and source for an article, it must be remembered that there are many who do not have ready access to great libraries such as those at Michigan and Wisconsin. This is especially true of our colleagues in foreign countries. Such publications must be obtained on microfilm, but this requires knowing the title of the article desired. Authors Sussman and Halvorson will no doubt be willing to furnish this information when necessary.

In summary, this book represents an excellent monograph on the subject of spore dormancy and germination, and will be essential reading for anyone interested in this subject. It would seem, however, that the almost total lack of references to organisms other than fungi and bacteria will prove disappointing to workers in other fields, such as zoology. If this book is to truly serve as a reference work on basic principles in biological dormancy, it would seem worthwhile to have included at least a chapter stressing the parallels between dormancy mechanisms in microorganisms and other organisms, such as higher animals. The authors chose, however, to leave this to the individual reader. — Richard T. Hanlin, *University of Georgia.*



ZOONOSES. Edited by J. Van der Hoeden. Elsevier Publishing Company, Amsterdam, London, New York. 774 pp. 1964. $40.00.

The opening line is a quotation, "Zoonoses are those diseases and natural infections which are naturally transmitted between vertebrate animals and man." This is taken from the Second Report of the Joint World Health Organization/Food and Agriculture Organization Expert Group on Zoonoses, 1958.

The Introduction gives some definitions and indicates the character of the information to follow. Because of the enormous amount of knowledge on the zoonoses recently acquired, limitations of materials are necessary. Only essential historical information is included; diagnostic and therapeutic methods and systems are not described in detail. Most emphasis is placed on the discussion of epidemiological problems, comparative nosology, and preventive medicine. Some diseases, rare in man, or of questionable transmissibility to man, are omitted.

There are 21 contributors to the book distributed by countries, as follows: Israel, 10; The Netherlands, 9; Belgium, 1; and the United States of America, 1.

The subject matter is divided into 7 chapters, viz.: Bacterial Diseases, Rickettsial Diseases, Viral Diseases, Fungal Diseases, Protozoal Diseases, Zooparasitic Diseases, and Diseases of Man Transmissible Through Animals. There are 110 figures in the text which are helpful in illustrating various aspects of the diseases being described.

The material is presented in a lucid and readable manner. Readers in the Western Hemisphere may be impressed by the relative emphasis upon these diseases in Europe as compared to the rest of the world. On the whole, however, the information presented appears to be fairly well-balanced.

There is considerable inconsistency in the presentation. As an example, in the discussion on toxoplasmosis, no mention was made of treatment, although with some other diseases of much less importance in man, some of the drugs used for treatment are mentioned.

There is a large distracting number of misspellings. Perhaps one of the most disturbing features to the serious reader is the inconsistency in the handling of the references. Often references in the text are not shown under references cited at the end of the chapter, while some of those listed at the end are not cited in the text. There is also much irregularity in the manner of listing the references. Sometimes the author's initials are omitted, the same names are handled differently in different parts of the text, and only one or all of the authors of a paper might be shown. There are also errors in listing the volume numbers of the journals shown.

This book contains much information of interest concerning zoonoses. However, the numerous errors and inconsistencies do not recommend it as a reference. — MARTIN D. YOUNG, Sc.D., *Gorgas Memorial Laboratory.*

PRINCIPLES OF MICROBIAL ECOLOGY. Thomas D. Brock. Prentice-Hall, Inc., 1966. 306 pp., $7.75.

This is an exciting book with a unique and original approach. Concepts and results from a wide assortment of disciplines are applied to various ecological problems in a stimulating and thought-provoking fashion. It is, I suppose, inevitable that each reader will find some of his favorite papers on microbial ecology are missing. However, one is also equally likely to find papers that one really should have read and somehow missed reading.

The first three chapters (Introduction, The Microbial Environment, and The Ecology of the Cell) furnish essential background material though not in depth. The short chapter (4) on dispersal contains some of the recent results on mechanisms involved but little discussion of the ecological consequences. The chapters (5 thru 9, pages 89-289) on populations and population interactions make up the bulk of the text and represent a most original analysis of ecological problems. Brock has explored many areas not covered in "The Biology of Populations" by MacArthur and Connell also published in 1966.

I was particularly pleased with the discussion of population interactions which digests and relates a substantial body of comparatively recent information. Many of the papers discussed conflict with established dogma and it is especially important that a unified, balanced analysis of microbial ecology be available at this time as a foundation for future research in this important field. — JOHN CAIRNS, JR., *University of Kansas.*

THE COCCIDIAN PARASITES (PROTOZOA, SPOROZOA) OF RODENTS. Norman D. Levine and Virginia Ivens. Illinois Biological Monographs No. 33, University of Illinois Press, Urbana, 1965. 365 pp. $7.50.

Since most parasitologists and protozoologists are already aware of this excellent monograph, this review is directed toward those in other biological disciplines who also serve on library committees. This important volume should be in every well-balanced biology library. It contains 47 plates with 443 figures which supplement detailed species descriptions so well that any microscopist should be able to use this as a working reference. Available data on the geographic distribution, pathogenicity, cross-transmission studies, and prevalence is also given. For a publication likely to be subjected to frequent laboratory use, it is rather surprising that the binding and cover were not made of more durable materials. — JOHN CAIRNS, JR., *University of Kansas.*

News of Biology in the Southeast

About People

Ralph D. Amen, Assistant Professor of Biology, Wake Forest College, Winston-Salem, North Carolina, has been promoted to associate professor and appointed chairman of the Department of Biology at Wake Forest. Both appointments are effective July 1, 1967.

Newton E. Kingston, Geneva College, Beaver Falls, Pennsylvania and **Lewis A. Follansbee,** Orange Coast College, Costa Mesa, California, received Academic Year Extension Grants under the Research Participation for College Teaehers program of the National Science Foundation to continue their work during the next year and a half. The grant from the NSF is $2,000 for each investigator. Both are associated with the Virginia Institute of Marine Science, Gloucester Point.

The University of Virginia has awarded grants totaling $9,385 to three Virginia Institute of Marine Science, Gloucester Point, investigators: **M. N. Nichols,** Head of Geologieal Oceanography Department; **Frank Perkins** of the Microbiology-Pathology Department; and **Kenneth L. Webb** of the Environmental Physiology Department, who are also members of the faculty of the Department of Marine Science of the University of Virginia.

Margaret Peaslee joined the Biology faculty of Florida Southern College, Lakeland, in September, 1966, as Assistant Professor after receiving her doctoral degree at Northwestern University in Animal Physiology. **Carla Huddleston,** Assistant Professor of Biology, has been granted educational leave to return to Northwestern University to complete her doctoral degree in Cellular Physiology.

Robert A. Pedigo, formerly Associate Professor of Biology, College of William and Mary, Williamsburg, has accepted a position at St. Andrew's Presbyterian College, Laurinburg, North Carolina.

Beryl C. Franklin, Associate Professor of Biology, Northeast Louisiana State College, Monroe, is the 1967-68 President of the Louisiana Academy of Sciences.

Alan G. C. White, formerly Professor of Biochemistry, Tulane University, New Orleans, will become Professor and Head of the Department of Biology, Virginia Military Institute, Lexington, on 31 August 1967.

Leslie L. Ellis, Professor of Zoology, Mississippi State University, State College, has been appointed Editor of the *Journal of the Mississippi Academy of Sciences* succeeding Walter Abbott, Senior Biologist, Gulf Coast Research Laboratory, Ocean Springs, Mississippi. A major revision of editorial policies will result in the appointment of a board of Associate Editors.

Walter K. Taylor has been appointed Assistant Professor of Zoology, Mississippi State University, State College, effective September, 1966. He received his doctorate from Arizona State University in Zoology, specializing in Ornithology.

In January and March **William D. Burbanck** participated in two regional conferences on the International Biology Program in Washington, D. C. at the National Academy of Sciences. The international program will operate from July 1967 to June 1972.

William D. Burbanck will be on leave from the Biology Department of Emory University during the spring quarter. He and Mrs. Burbanck (Dr. Madeline P.) will spend five months at Woods Hole, Massachusetts continuing their research on the isopod *Cyathura*.

Martin D. Young, Director, Gorgas Memorial Laboratory, Panama, Republic of Panama, has received a grant from the U. S. Army Research and Development Command, to determine if human malarias will grow in Panama monkeys. **James A. Porter, Jr.,** has joined the project as co-investigator.

Martin D. Young, Gorgas Memorial Laboratory, Panama, R. P., has been appointed Visiting Professor of Epidemiology, Alabama Medical Center, and a member of the Malaria Commission, Armed Forces Epidemiological Board, Washington, D. C.

Greensboro College announced that the Research Committee of the College had awarded two grants-in-aid in the biological sciences. **Kemper Callahan** was made an award to continue his studies on virus-infected elm pollen, the results of which may have broader applications in forest pathology. **Arnold Van Pelt** was recipient of funds to continue his studies on a hairloss mutant in mice, a condition which past studies have shown to imply a hormonal imbalance.

Herbert P. Riley of the University of Kentucky has been appointed Visiting Professor at the University of California, Irvine, for the academic year 1967-1968. This appointment is for one year, after which Dr. Riley will return to the University of Kentucky.

J. Frances Allen, formerly with the National Science Foundation, has recently become Chief, Water Quality Requirements Branch, Federal Water Pollution Control Administration, Washington, D. C.

About Institutions

A consortium of 13 private colleges of the Mid-Appalachian region (Mid-Appalachia College Council, Inc. – MACCI) is establishing a Field Biology Teaching and Research Center on Norris Lake in Campbell County, Tennessee. The first class is to be given at the Center this Summer. A. Randolph Shields, Chairman, Biology Department, Maryville College, Maryville, Tennessee, is the Director.

A new science building is under construction at Maryville College, Maryville, Tennessee. The two-story building will house Biology, Psychology, Chemistry and Physics. The biology quarters diverge from the standard laboratory setup by providing individual work areas for upperclassmen and audio-tutorial facilities for lower level courses. General Biology has been eliminated from the curriculum.

The Science Department, Methodist College, Fayetteville, N. C., recently received a matching fund grant of $14,205 for the purchase of instructional scientific equipment from HEW. Ten years after being chartered by the State of North Carolina and after seven years of operations, Methodist College was recently granted full accreditation by the Southern Association of Schools and Colleges.

William J. Hargis, Jr., Director of the Virginia Institute of Marine Science, Gloucester Point, has announced that the Old Dominion Foundation has awarded the Institute a grant of $10,000 to expand its oceanographic library.

An Hitachi HU-11-B-1 Electron Microscope has been recently installed in the Microbiology-Pathology Department of the Virginia Institute of Marine Science, Gloucester Point. It will be used in the study of pathogens of marine organisms, the microorganisms themselves, and cells and tissues.

NSF has awarded grants to the Virginia Institute of Marine Science, Gloucester Point, for the conduct of a Research Participation for College Teachers program in which four post-doctoral participants will be selected. An Undergraduate Research Participation program providing research experience for ten undergraduate students and a Cooperative College-School program with the city of Norfolk for training Junior High School science teachers are also available. Information about these programs may be obtained by writing Robert S. Bailey, Director, NSF Programs, Virginia Institute of Marine Science, Gloucester Point, Virginia 23062.

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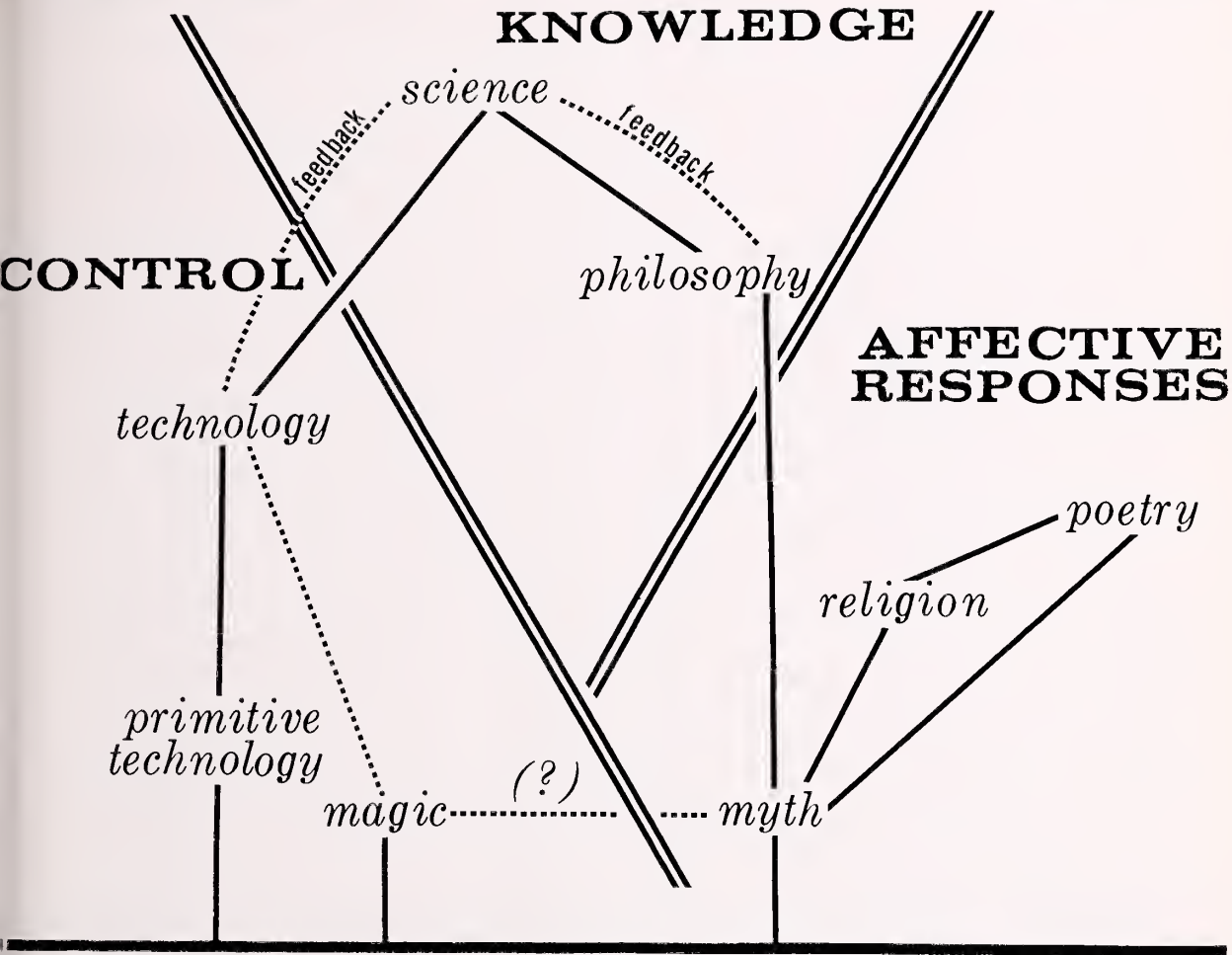

(See *Notes on the Natural History of Science*, p. 71)

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EDITOR

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JOSEPH F. FITZPATRICK, JR.,
News Editor

JOHN CARPENTER, Business Manager

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ASSOCIATION AFFAIRS

From the President

In order that the Association of Southeastern Biologists may have an appropriate and effective means of expressing the general feeling of the membership concerning conservation problems, a five-member committee has been appointed.

It is the duty of the new Conservation Committee to evaluate such problems, especially in the southeastern states; to express their opinion, to recommend a course of action, or to oppose an imminent action that would damage or destroy a natural area which it appears to be in the public interest to preserve. The committee is authorized to make public resolutions of their own at any time. With conservation problems of major importance on which action is not required promptly, the committee may bring the matter before the membership at the annual meeting and perhaps present a resolution for possible adoption by the ASB as a whole.

The committee will also serve as a means of communication between the Association and various conservation agencies who will thus be able to determine the viewpoint of ASB concerning current problems and, in many cases, gain the Association's support in what they are trying to do. Conversely, the Association will have an agency authorized to convey the opinion of the membership on conservation problems and proposals and

(*Continued on page 78*)

Notes on the Natural History of Science

Perry C. Holt
Department of Biology
Virginia Polytechnic Institute

Things have a way of getting all jumbled in my mind. This, I contend, is not because I'm unusually scatter-brained, but because that is the way the world is. Is my colleague my friend or my enemy? At times I don't know which he is. When does day end and night begin? What are the limits of my neighborhood? At the next street over or four and a half light-years away at the edge of the galaxy? And so on.

Such problems we try to resolve by processes of analysis, definition and classification. At present I am concerned with a cluster of problems arising from the similarities and differences between and the origins of a group of activities that man has engaged in at one time or another. These human activities are called magic, mythology, philosophy, technology and science. In discussing them, I may more or less adventitiously touch upon two others, poetry and religion. Don't be disturbed: I have neither the erudition nor the time to do more than a little elementary classification in my attempts to unjumble these things in my mind. But I am a taxonomist by trade and rather naturally, when presented with a job to do, reach for the tools of my craft.

A number of things have occurred in recent years to bring these problems to my attention. The text we use in our course in General Biology at the Virginia Polytechnic Institute in the inevitable attempt to explain to the novice scientist what it is he is about, makes the statement that science began in tribal magic. An erudite colleague objected that this was a damned lie. I, having read the anthropologist, Malinowsky, and various historians of science, was inclined to agree with the author of our zoology text. That was one thing. Then some of my reading (an issue of *Daedalus*; Tolkien) led me to wonder as to the nature and function of myth. I have always been interested in the relationships between science and philosophy, including in the latter term both mythology and religion which in their explanatory and dogmatic aspects, at least, are proto-philosophic in nature. Practically, of course, if I'm to teach a science to our youth, it behooves me to know what science is. Thus, for several reasons, the attempt to clarify in my mind the relations, including, in part, questions of origin, between science, magic, myth and technology.

I began, as a scientist always does, with a vague and not too precisely formulated question. This in the true spirit of the scientific method was followed by tentative and not too well organized pryings into various likely and unlikely corners I either already knew about or discovered, almost by accident, in the course of my pryings. Such pryings are usually referred to by scientists as preliminary investigations with the clear implication that they are directed by a well conceived and quite logical plan. Except for Master's theses, this is mostly not so.

One result of my investigations was that I quickly rediscovered something that I already knew: neither enough years are left to me nor enough intelligence bestowed upon me in the beginning for me to hope to learn all the archaeology, anthropology, history, philosophy and psychology, among other pertinent fields of learning, necessary for a truly scholarly solution, based upon the evidence, of my problem.

Since this paper purports to be more than a record of the failure of a project — we early learned not to report negative results — I must have decided upon something other than the *tour-de-force* of scholarship that I have implied would be necessary. What I shall do is to attempt to identify what a taxonomist would call the diagnostic characters of the objects of this study and

further, on the basis of similarities that are in perhaps more than an analogical sense homologous, work out a phylogeny, a system of relationships, for these types of human behavior. That I don't know all there is to know about such areas of study as mythology and philosophy perhaps will not completely negate my efforts: a zoological taxonomist, whose classifications may be very sound, never claims to know more than a very little of all that can be known of his animals.

To begin.

Magic. A practical art of early man aimed at controlling the "powers" of the world, both animate and inanimate, including other men.

A suggestion of John Wilson's in a book entitled "Before Philosophy" is significant for an understanding of both magic and mythology. To early man (Wilson is talking of Egyptians, but I think the idea can be safely generalized) an object in the world outside himself was a "thou", a person, with feelings, emotions and thoughts similar to his own. Persons, if one knows and says (I speak not at all metaphorically) the right words of power, can be controlled to the will of the speaker and possessor of power. This, of course, is still a matter of daily observation and must have been at the basis of the very structure of primitive society. Magic develops, on this view, then, very simply by extending the techniques, or some of them with modifications, for influencing people to the other "people" who were the rain or the sun, the hunted animals, the cultivated plants or the "Bright Ones" above all these.

Magic will be seen to share some features in common with myth. This is all right, magic and myth are species of the same genus and should be much alike.

The personal power of the "thou" of the nonhuman world is the "mana" of the Polynesians. American aborigines had a number of words for the same concept and modern man when he curses the stone over which he stumbles is expressing a thinned-out version of the same view.

The techniques for controlling the powers of nature, the mana of the Polynesians, need not be reviewed here. It is enough to recall the fertility rites practiced at the time of seed planting, the voo-doo doll and the pins, even such a weak survival as knocking on wood which some of you have probably done. The point is the validity of my taxonomic diagnosis: magic is a practical art aimed at controlling, cajolling and propitiating the powerful, often awesome, and frequently capricious, forces of the natural world.

Myth: stories, usually oral in transmission, sometimes written, which have for their subjects the "thous" of the outside world, primeval ancestors, racial heroes and similar characters. Often, no doubt, told purely for entertainment, myths may, however, be recognized by their objectives as well as by their subject matter: they are most often in some sense stories of origin and and hence addressed to the problem of explaining the world and how it came to be and, secondarily, they inculcate a pattern of behavior, usually by explaining why the tribe is as it is or the duties it owes to the power or powers of nature, or by example, simply holding up the behavior of the heroes as that which all should strive to follow. More succinctly, myth is primitive theology. No examples of myth will be presented here: simply take the sacred writings of any culture other than your own and the parts that are devoted to accounts of origins, explanations of the nature of the powers (divinities is the usual word) and the relationship of man to the world and its powers and you have a mythology.

Obviously, myth is related to magic in the sense that myth attempts to explain or to elucidate the nature of the powers that magic attempts to control. The method of myth is the narrative, the telling of a story; its objective is an explanation of the world, its beginnings and all that is in it. In the latter respect myth is also related to philosophy, another species of the genus.

Philosophy: a polytypic species, difficult of diagnosis. Lord Russell speaks of philosophy as the study of those important questions for which there are no empirically determinable answers. Philosophy is civilized mythology. The questions which a myth will pose vaguely and by implication are clarified and made explicit and more precise in philosophy. The answers, instead of being imaginative poetic stories, are based explicitly upon reasoned argumentation. Mythology, in general, appeals to the emotions, the affective behavior of man; philosophy purports to appeal to the intellect.

It should be noted that there is an important subspecies of philosophy, represented by Russell, Wittgenstein and some of their colleagues, which conceives its task to be the clarification of the meaning of statements and language. The only question considered in their philosophy is "What does it mean to say 'such and such'?" This paper is a rather weakly and presumably non-viable specimen of this subspecies.

Another subspecies of philosophy is what is more properly, perhaps, called methodology, a study of the rules or principles for the practice of an art. A common example is the "philosophy of education" as a subject taught in teacher's college. Of course, philosophy, in the sense of the nomi-

nate subspecies, is not taught in such a course. And, if there are other subspecies of philosophy, I shall not deal with them here.

The typical method of philosophy is dialectic: talking, one hopes, logically. In some forms of philosophy this has been reduced to elaborate symbolisms such as those known as mathematics and symbolic logic. The objectives of philosophy have been stated: they are derived from those of myth, as Cornford has shown in "From Religion to Philosophy".

Philosophy is related on the one hand to mythology and religion; on the other hand to science. It differs from both most strikingly in method. Philosophy uses dialectic instead of the narrative-poetic method of myth and the empirical methods of science.

Technology: thought by some, for instance, engineers and agriculturists, to be a subspecies of science, but here considered as a separate species, is the total complex of man's manual skills, that is, the use of hands, tools and machines to manipulate and control natural objects for utilitarian purposes. Though technologies may be based, as is medicine, upon complex sets of principles and theories, they are always practical and the goal is always some improvement of the material conditions of human life.

Technology began when man first began to use tools, by neolithic times it was well developed. It has always been based upon experience and common sense and may well demand the most difficult thinking man is capable of. A savage would consider you more than stupid if you suggested that magic alone, no matter how powerful, would insure a good crop of yams with no regard to seasons, weather, protection from pests, etc., matters in which the neolithic farmers were quite skilled.

Technology is related to magic in its objectives: it is utilized for the control of objects that experience has taught man he can control with his hands and tools. Technology is related to science in its methods which are fundamentally the same. This has led to confusion. There was no science until the empirical methods of technology were systematically used in pursuing the objectives of philosophy.

Science: my diagnoses of magic, myth, philosophy and technology, while not original in any true sense, are couched in my own words. But a better taxonomist than I has recently defined science. I quote George Gaylord Simpson: "Science is an exploration of the material universe that seeks natural, orderly relationships among observed phenomena and that is self-testing."

The questions of science, or the aims of science, are in part those of philosophy: science would answer all the questions about the world that can be answered on the basis of empirical observations. The motives of the scientist are the same as those of the philosopher: as complete a knowledge as possible of things as they are. The methods of science are those of technology, which accounts, perhaps, for why the agricultural technologist across the hall from me claims to be a scientist. There is, of course, no reason why a man cannot be both a technologist and a scientist, sometimes applying the methods common to both fields for purposes of control, sometimes for the purpose of acquiring knowledge about the world.

Something more should be said about the methods of science. I rely again upon Simpson. First, in spite of Francis Bacon, Karl Pearson, innumerable physicists and James Conant, there is no one method. In general, observations are made that raise a question about general ideas, relationships and interrelationships among phenomena. A tentative answer is formulated that is testable. The tests may be of quite different types, but they must be, in principle at least, repeatable by any competent observer and the more of them there are the more confidence is placed in the tentative answer that we can now call a theory or principle. It is to be noted that the tests of a hypothesis are not necessarily experiments and that nothing is said about prediction. Experiments may constitute strong tests and predictions based on a hypothesis that are fulfilled are powerful, but not necessarily, conclusive, support for the hypothesis.

Science, briefly characterized as to aims and methods, is seen to be most closely related to philosophy, particularly to the philosophy of the ancient Greeks which has been misidentified as science by most writers up to now. There was really no science until the modern period, no science in Babylonia or, Egypt or Greece or medieval Europe, though most historians of science have said so in their descriptions of ancient and medieval technologies. There were, of course, precursors ("mutations") in the ancient and medieval worlds in the unsystematic recognition by a few philosophers of the possibilities for philosophy of empirical verification.

Science differs from philosophy in that the materials of science, the phenomena about which questions are asked are just that, materials, observable, tangible objects, and in the methods which are more nearly allied to those of technology than to the dialectic of philosophy. Which, however, is not to deny that science has inherited, as part of its methods, perhaps, its use of model

building and deductive logic from philosophy. Science began when the craftsmen of the late Middle Ages taught the philosophers a surer method than dialectic for answering real questions about real things. It didn't begin until then and it is only in our lifetime that it is escaping from the paternal dominance of its father.

My limited little task is complete. It was to state what is in effect a taxonomic hypothesis. Many of the concepts upon which it is based are derived from Simpson. My erudite colleague is right and the author of our freshman text wrong.

To summarize that hypothesis as taxonomists often do, I present a phylogenetic tree (cover) showing the relationships of magic, myth, philosophy, technology and science. Keep in mind that there is a great unity here, all of these are activities of a single species (in the true zoological sense) of an animal. Certainly, early man did not compartmentalize his life. He was not a magician on Monday, a farmer-technician on Tuesday, a philosopher at some other time, a scientist at another who practiced his religion on Sundays. At all times he did more or less all these things.

Myth arose from the confrontation of man with the powers (which he thought of, in the only terms he knew, as personal) of nature and an attempt to explain them.

Magic was a supplement to technology; a method of control. It has survived in religious ritual and popular superstition, but has proved sterile as a progenitor of other forms of behavior (culture) or thought. It is, like the sponges, an evolutionary *cul-de-sac,* a blind alley.

Philosophy arose when the critical intellects of the Ionian Greeks could no longer be satisfied with the theology which had developed from the primitive Indo-European mythology. Philosophy was their attempt, using the resources of their minds to the fullest, to answer questions about the nature and relations of phenomena.

Religion and poetry I pass over; subspecies of myth, I think, but the problems here are great and they hardly enter into the phylogeny of science.

My phylogenetic tree is botanical in a metaphorical sense; the sort of hybridization that the botanists are familiar with has occurred. Or to use the German expression, science is a bastard whose parents were technology, the elderly mother, earthly of the earth, and heavenly philosophy, aspiring to the secrets of the universe. The aspirations of the offspring are those of the father; the hands — the methods — are those of Martha.

Letters

I showed your paper to a couple of people here at the Museum -- and a very lively, almost heated, discussion was the result. Like in so many things both extremes are impractical and the truth lies in the middle. It is very good that you started this action and pointed out the many stupid and senseless abbreviations that are being used. Personally I feel that one could abbreviate the title of a periodical, but should try not to abbreviate words. The title of our journal: "Zoologische Mededelingen uitgegeven door het Rijksmuseum van Natuurlijke Historie te Leiden" is too cumbersome for repeated citation, but if cited "Zoologische Mededelingen, Leiden," no mistake is possible.

Abbreviations for words that are very similar (Annales, Annals, Annali, Annalen, Analele, Annuaire, Annuario; Nature, natural, national, etc.) cause endless trouble. It would be much easier to have them all written out in full. An abbreviation, if used, should be such that even outsiders cannot mistake its meaning. J. for Journal is senseless with words around like Jornal, Jahrbuch, Jahresbericht, etc. Journ., which I use myself, also is absurd, as it saves only one letter. On the whole (with the restrictions just pointed out) I agree with you, but do not know whether it is not too late for me to switch over with my card file – which in the course of time has become quite extensive, and is consistently abbreviated.

L. B. HOLTHUIS
Rijksmuseum van Natuurlijke Historie
Leiden, Netherlands

The above letter refers to an article, "Literature Citation Abbreviations — A Waste of Time," by C. W. Hart, Jr. and Betty Ursomarso, that appeared in The ASB Bulletin, 11(3): 71-73. Reprints of this article are available on request from the editor of the ASB Bulletin.—Ed.

The only criticism I have of the ASB Bulletin is the lack of identification of the wonderful old engravings in recent issues — e.g. *14:* #3 July '67, page 64. Even without captions these have been put on our bulletin board and have been admired.

JANE C. BELCHER
Sweet Briar College

I noticed on pages 64 and 65 of the July, 1967, ASB Bulletin, pictures of a "sea serpent" and an oarfish. Neither picture is accompanied by a caption, and I can find no word of explanation in the Bulletin. This lack of identification and/or explanation seems strange in a scientific journal.

We are involved in a study of oarfish, fourteen of which have been washed ashore on the lower west coast of Florida during the past several years. I would like to know the *source* of your picture, *and* if the original picture is in color. This would help us tremendously in our research.

CARL R. KEENER
Manatee Junior College

The old engravings referred to appeared as space fillers in the ASB BULLETIN *in both the April and July, 1967, issues. The oarfish appeared in the July, 1967, issue. All had originally been published accompanying an article, "Do Sea Monsters Exist?" by Dana M. Slaymaker, that appeared in* FRONTIERS *magazine in October, 1966 (vol. 31, no. 1, pp. 4-8).* FRONTIERS *is published by the Academy of Natural Sciences of Philadelphia. The old engravings came from various volumes in the Academy's library; the oarfish picture is from the American Museum of Natural History, but I do not know if the original was in color or where the specimen was from. The illustrations were intended only as space fillers, and I apologize for not giving due credit to the source of the illustrations. — Ed.*

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
(Act of October 23, 1962, Section 4369, Title 39 United States Code)

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I certify that the statements made by me above are correct and complete. (Signature of editor, publisher, business manager, or owner) ▶ CW Hart

POD Form 3526 Jan 1967

News of Biology in the Southeast

About People

William W. Miller, III, has been appointed Associate Professor of Biology, Northeast Louisiana State College, Monroe. He was formerly at Samford University, Birmingham, Alabama.

Thomas F. Redick, Professor of Biology, Frostburg State College, Frostburg, Maryland, is using the facilities of the Radiobiological Laboratory, U. S. Fish and Wildlife Service, Beaufort, North Carolina, for a summer project involving the primitive circulation of the tunicates.

Joseph W. Angelovic, Radiobiological Laboratory, U. S. Fish and Wildlife Service, Beaufort, North Carolina, was appointed to the Executive Committee of the Atlantic Estuarine Research Society.

Paul M. Patterson, Chairman of the Division of Natural Sciences and Mathematics and Chairman of the Department of Biology, Hollins College, Virginia, retired May, 1967, after 33 years of service. He will continue his professional activity in the position of Professor of Biology at Methodist College, Fayetteville, North Carolina.

Alice Louise Bull, Associate Professor of Biology, Hollins College, Virginia, has been appointed Chairman of the Department of Biology.

Charles Morlang, Jr., has been appointed Associate Professor of Biology, Hollins College, Virginia. He received his Ph.D. from Columbia University and his research involves problems of fern development and hybridization.

Kathleen Klimkiewicz has been appointed Instructor in Biology, Hollins College, Virginia. She received her B.S. and M.S. from Radford College and has research interests in mammalogy and ornithology.

Edward G. Roberts, Professor of Forest Production, Mississippi State University, State College, has received a grant from the National Park Service to locate and check validity of areas which have been reported as unique in some ecological or geological respect. A "Registry of Natural Landmarks" is maintained by the National Park Service of such areas.

Floyd Scott, Lloyd Scott, and **Eugene Wofford** have all been appointed Instructors in the Department of Biology, University of South Alabama, Mobile. All received their B.S. and M.A. (Ed.) from Austin Peay State University, Clarksville, Tennessee. Mr. F. Scott was trained in the field of herpetology and Msrs. L. Scott and Wofford were trained in plant taxonomy.

Perry C. Holt, Professor of Biology, Virginia Polytechnic Institute, Blacksburg, is spending the current academic year at the United States National Museum, Washington, D. C. This is made possible by a Senior Investigator Fellowship from the Smithsonian Institution.

Among the 25 biologists participating in the recent Smithsonian Institution Summer Institute in Systematics were the following Southeastern biologists: **Jack H. Esslinger** and **Alfred E. Smalley,** Tulane University, New Orleans; **J. F. Fitzpatrick, Jr.,** and **Leon W. Hepner,** Mississippi State University, State College; **John R. Hol-**

singer, East Tennessee State University, Johnson City; **John D. McCrone,** University of Florida, Gainesville; **Glen E. Woolfenden,** University of South Florida, Tampa; and **Ralph W. Yerger,** Florida State University, Tallahassee. Co-directors were **Robert P. Higgins,** Wake Forest University, Winston-Salem, North Carolina, representing the American Society of Zoologists, and **Ellis L. Yochelson,** U. S. Geological Survey, Washington, D. C., representing the Society of Systematic Zoology. **Richard S. Cowan,** Head, Office of Systematics, Museum of Natural History, acted as host for the Smithsonian Institution. The Institute was supported financially by NSF, USAF Office of Research and the Smithsonian Institution.

C. W. Hart, Jr., and **Dabney Hart,** Academy of Natural Sciences of Philadelphia, were participants in an international conference on ostracods in Hall, England, last Summer. They presented a paper on the functional morphology of entocytherid ostracod copulatory appendages.

Willie M. Reams, Jr., associate professor of biology, University of Richmond, has been appointed Head of the recently formed Division of Biology at the Virginia Institute for Scientific Research. The biology program at the VISR will complement his research in progress through his academic affiliations.

Willie M. Reams, Jr., University of Richmond, and **Robert B. Scoggins,** Medical College of Virginia, as co-investigators, have received a grant for 3 years from NIH for $64,622.00 in direct costs to study the origin and differentiation of Langerhans cells in the skin of the PET mouse.

Richard P. Sutter, formally Adjunct Biochemist, Presbyterian-St. Luke's Hospital, Chicago, Illinois and Instructor of Biological Chemistry, University of Illinois Medical School, has been named Assistant Professor in the Department of Biology at West Virginia University, Morgantown, West Virginia.

Lila Abrahamson, Assistant Professor, Department of Botany, University of Chicago, has been named Associate Professor, Department of Biology, West Virginia University, Morgantown, West Virginia.

William E. Collins, Ford Foundation Consultant in reproductive physiology recently returned from India, has been named Assistant Professor in the Department of Biology, West Virginia University, Morgantown, West Virginia.

Norman Lin, Assistant Professor of Zoology, Ohio State University, has been named Assistant Professor in the Department of Biology at West Virginia University, Morgantown, West Virginia.

Three new members will be added to the faculty of the Department of Botany, University of North Carolina, during 1967-68. **Lindsay S. Olive,** who has for some time been Professor of Botany at Columbia University, has accepted a position as Professor of Botany effective January 1, 1968. Dr. Olive received his Ph.D. from UNC in 1942 and is one of the leading mycologists in the country. The appointment of **Helmut Lieth** of Stuttgart, Germany, as Associate Professor of Botany was announced in our last issue. Dr. Lieth, who is an ecologist and an authority on world vegetation, will assume his duties July 1, 1967. **Clifford Parks** of the Los Angeles Arboretum, a taxonomist and geneticist who is primarily interested in chemotaxonomy and is also an authority on camellias, has accepted a position as Assistant Professor effective August 1, 1967.

Kenan Professor **John N. Couch,** Department of Botany, University of North Carolina, has reached the manditory retirement age of 70 and is retiring on June 30, 1967, after a distinguished career of 45 years at UNC. Dr. Couch has published two books, over 80 papers, and has directed the work of numerous mycology graduate students, many of whom have become leaders in the field. Dr. Couch has established an international reputation as a mycologist and has received numerous awards, including membership in the National Academy of Science, Honorary Fellow of the National Academy of Science of India, Walker Grand Prize of the Boston Society of National History, Meritorious Teaching Award of the Association of Southeastern Biologists, Golden Jubilee Merit of North Carolina, and honorary Sc.D. degrees from Catawba College and Duke University. Although Dr. Couch will no longer be teaching we are pleased to report that he will devote full time to continuation of his research.

Promotions: The following assistant professors in the Department of Botany, University of North Carolina, have been promoted to associate professorships effective September 1: **Edward Barry, Clyde J. Umphlett,** and **A. Domnas.**

About Institutions

All of the science departments at **Hollins College,** Virginia, are now enjoying the extended space and additional facilities provided by a new science building which was completed in September.

The School of Forest Resources, **Mississippi State University, State College,** served as host to the annual meeting of the Southern Forest Environment Research Council in June.

Oak Ridge National Laboratories, Oak Ridge, Tennessee, has continued its excellent biological activities with

numerous seminars and training programs this summer. Participants, in addition to the permanent staff, were from all over the world.

The University of Georgia was awarded a $3,719,000 grant by the National Science Foundation Tuesday, with the money to be used for development of a "center of excellence" in the biological sciences.

The Federal funds, to be allocated over the next three years, will be augmented with an additional $6.8 million in University support. A NSF spokesman in Washington said the grant was made as a part of "a major Foundation effort to increase the number of first-rate scientific institutions in the United States. The program is designed to provide significant financial aid to academic institutions that are not among the foremost in science but have substantial present strength and, in addition, have shown sound planning for future improvement."

About $1.5 million of the total grant will be used for new facilities. Another million will go for equipment and a million more will be budgeted for additional personnel.

New facilities will include an earth and plant sciences building, a new wing for the present biological sciences building, and renovation of existing facilities in the departments of entomology, biochemistry and biopsychology.

It is expected that 18 new faculty positions will be added, as well as additional supporting staff positions and positions for post-doctoral fellows and graduate assistants. New post-doctoral programs are to be added, and existing graduate training programs strengthened.

New equipment to be purchased with grant funds include a mass spectrometer and three electron microscopes. The balance of the funds will be used to "substantially augment resources for the sophisticated research programs being developed."

NSF has awarded nearly $100 million to more than 25 other institutions of higher education in its three years of existence. The University of Georgia is the only institution, however, to receive an award designated specifically for the biological sciences.

(*Continued from page 70*)

to communicate with appropriate government or private agencies. The new committee will provide a new and more effective means of promoting the restoration or preservation of natural areas or resources in the southeastern states than ever beefore and, hopefully, before it is too late to act.

While growth in membership of the Association of Southeastern Biologists during the past decade has been generally upward, there seems to be reason to doubt that it has kept pace with the increase in active, professional biologists of the southeastern states. No concerted effort for new members, no membership drives, have been undertaken for some time. Growth has been the result of individual activity of the more dedicated meembers.

There are many educational institutions in the Southeast, and many non-educational institutions employing biologists, in which there are no ASB members at all. These biologists may never have been invited to join. In many of the larger educational institutions there are biological science departments with no ASB members. These biologists may be somewhat isolated from active members who make it a point to extend personal invitations to prospective members.

On the assumption that much of the above speculation is true, your president feels that a modest effort toward inviting new members should be initiated this winter. The goal is not to gain a large number of new members *per se,* but to try to bring into ASB those non-member biologists who would be likely to contribute to the goals of the Association and to the general welfare of biologists and biological science in the Southeast. Those who have to be pressured or urged to join usually do not become very active and may not remain with ASB. But there must be many potentially good members who have not been invited.

Accordingly, approval of the Executive Committee for the printing of a new supply of membership application forms and for their widespread distribution will be sought at the October interim meeting at Emory University in Atlanta. (In fact, it may already have been done by the time you read this.) We will then ask an ASB member in every institution represented to distribute membership forms to each biologist in his institution who is not already a member. We shall also attempt to contact a biologist in those institutions not at present represented in the ASB roster, invite him to join, and also ask him if he will distribute membership forms to other biologists in his organization.

The whole process will take some time but it could result in a noticeable increase in membership before the next annual meeting at the University of Geeorgia, not just an increase in num-

bers but an increase in the kind of biologists who have made the ASB a respected, effective, and distinctive organization.

So if you are asked to help in this endeavor, we hope you will feel free to suggest procedures, institutions to be contacted, and potential new members. — HAROLD J. HUMM

SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

PRESIDENT-ELECT .....

VICE-PRESIDENT .....

TREASURER .....

EXECUTIVE COMMITTEE MEMBERS (2 for 3-year terms) .....

Deadline: January 1

Mail to: DR. ELSIE QUARTERMAN
Box 1616, Station B
Vanderbilt University
Nashville, Tennessee 37203

MERITORIOUS AWARD NOMINATIONS

As in previous years, an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contriibutions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)
1961. Dr. Warren Deacon (Vanderbilt)
1962. Dr. Septima C. Smith (Univ. of Alabama)
1963. Father Patrick H. Yancey (Spring Hill College)
1964. Dr. Ruskin S. Freer (Lynchburg College)
1965. Dr. Harwell P. Sturdivant (Western Maryland College)
1966. Dr. Charles Ray, Jr. (Emory Univ.)
1967. Dr. H. J. Oosting (Duke University)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting material to *Dr. H. Branche Howe, Jr., Dept. of Bacteriology, Univ. of Georgia, Athens, Ga. 30601, by February 1, 1968.*

COMMITTEE
LEWIS BERNER
WADE T. BATSON
H. BRANCH HOME, JR., *Chairman*

ASSOCIATION RESEARCH PRIZE

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Elon College, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Papers submitted in competition are judged by eminent scientists in the various fields of biology. These individuals are selected by the Research Committee and are from schools outside the Southeast. Every effort is made by the Research Committee to keep the authors of submitted papers anonymous. Criteria for the award are left to the discretion of the judges' panel, who may withhold said award if no paper is considered to have sufficient merit.

5. Papers must be submitted *in triplicate* and in their entirety not later than *February 15, 1968, to Dr. R. W. Hull, Dept. of Biological Sciences, Florida State University, Tallahassee, Florida 32306.* One copy of the prize-winning paper will

remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

IVEY F. LEWIS FELLOWSHIP AT MOUNTAIN LAKE BIOLOGICAL STATION

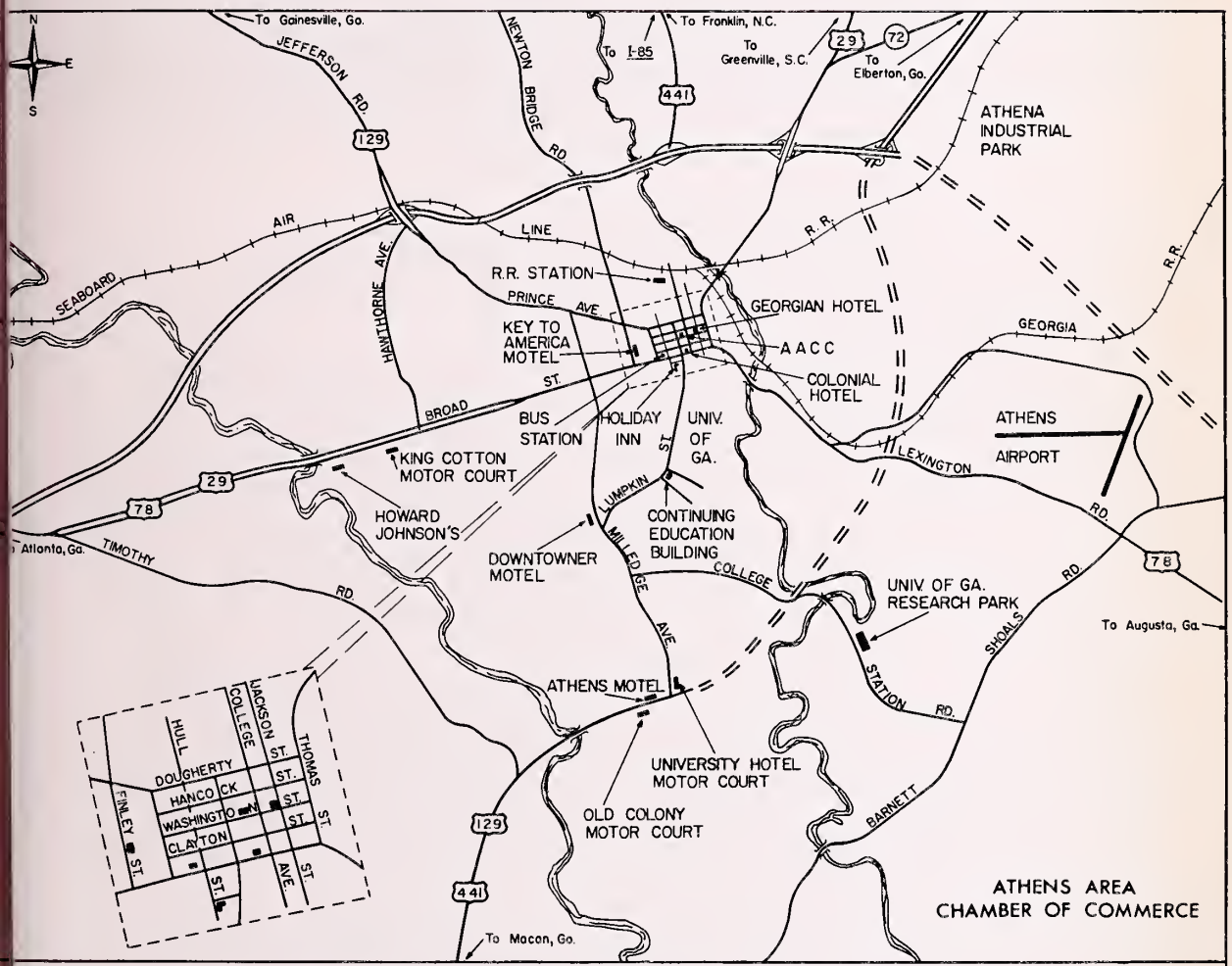
A Research Fellowship of $150.00 for summer course study or research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. This fellowship, formerly known as the *Phipps and Bird Research Fellowship,* was re-named at the request of the Phipps and Bird Company. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and especially in the case of younger workers, by references and educational data. Applications should be sent to *Dr. J. J. Murray, Dept. of Biology, Univ. of Virginia, Charlottesville, Virginia 22903* not later than 15 March 1968. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the reecipient will be made at the annual meeting of the ASB.

COMMITTEE

J. J. Murray, *ex officio*
James Riopel, *ex officio*
Donald Caplenor
Thomas L. Quay
R. W. Hull, *Chairman*

The ASB BULLETIN

Volume 15, Number 1 January 1968



Map of the Athens, Georgia, Area

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The Association of Southeastern Biologists

ASB BULLETIN

Volume 15, Number 1 - January 1968

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C. WILLARD HART, JR.
EDITOR

DOROTHY L. CRANDALL
Associate Editor

JOSEPH F. FITZPATRICK, JR.,
News Editor

JOHN CARPENTER, Business Manager

CONTENTS

About the Athens Meeting

The Association of Southeastern Biologists will hold its 29th annual meeting 18-20 April, 1968, at the University of Georgia, Athens, Georgia. Registration and most of the other activities will be in the Georgia Center for Continuing Education. The program Thursday evening will begin with the General Session, which will be held at 7:30 in the Auditorium. The General Session will be followed by a smoker in the main lobby and adjacent dining rooms of the Center. Exhibits will be on display in the adjacent lounge. Paper sessions and the annual business meeting will be held Friday. The Friday evening banquet and presentation of awards will be held in the dining room of the Georgia Center. The retiring President's address will follow in the auditorium.

Dates of meeting — 18-20 April

Executive Committee Meetings

Georgia Center
1:00 P.M., Thursday
8:00 A.M., Saturday

Registration

Georgia Center
4:00 P.M. to 7:15 P.M., Thursday
8:00 A.M. to 11:00 A.M., Friday
Fee — $2.00

Exhibits

Georgia Center, Main Lounge
2:00 P.M. to 11:00 P.M., Thursday
8:00 A.M. to 5:00 P.M., Friday
8:00 A.M. to 11:00 A.M., Saturday

Paper Sessions

Georgia Center, Auditorium and Meeting Rooms, Friday.

On Thursday the Southern Section, American Society of Plant Physiologists will hold their paper sessions in Lecture Rooms of the Biological Sciences Building.

GENERAL INFORMATION

Athens is a city of 50,000 located in the Piedmont Province at about 550-750 feet above sea level. It is 45 miles from the Blue Ridge Province and 65 miles from the Coastal Plain. The

surrounding area is largely of pasturelands and extensive wooded areas which are predominantly of pine or mixed hardwoods and pine. Over 100 manufacturing firms operate in Athens-Clarke County. The University of Georgia, however, is by far the largest organization financially. It covers more than 3,500 acres and is housed in more than 80 buildings. Enrollment is over 15,500. A 300-acre Research Park is located just southeast of Athens. Several state and federal research laboratories have already located in the Park.

There are many things of interest at the University of Georgia, the Research Park, and near and in Athens. Information about some of these is given be'ow. Other information may be obtained at the Registration Desk, or by writing in advance to the appropriate person(s) indicated below.

Travel to Athens

Suggested automobile routes to Athens are as follows: *From the south* follow I75 to Forsyth, Ga83 to Madison, and US441 to Athens. — *From the east* follow US78 (or US378 to Washington and then US78). — *From the northeast* follow I85 to intersection with US441 and then south on US441 to Athens. — *From the north* use US441. — *From the northwest* follow I75 and US41 to Atlanta and then US285 bypass and I85 to intersection with US129 which follow to Athens. — *From the west and southwest* go to Atlanta and take I20 to Conyers (don't take first exit), Ga138 to Monroe, and US78 to Athens.

The Seaboard Railroad, and the Southeastern Stages, Greyhound, and Trailways Bus lines provide ground transportation to Athens. Southern Airways is the only airline serving Athens. However, air taxi service is available at $10.00 one way both from and to Atlanta, through the Athens Aviation, Inc. If reservations cannot be obtained through usual means, write Athens Aviation, Inc., Athens, Georgia, 30601, or phone them (Area 404-543-5000). Limousine fare from the Athens Airport to the Georgia Center is available at $1.00 one way for a passenger and baggage.

The Georgia Center is located on South Lumpkin Street in the west edge of the University of Georgia Campus.

Parking

Ample parking facilities are available in the main parking lot behind the Georgia Center. This lot is the large one just north of the Coliseum. Parking elsewhere on the University campus is essentially impossib'e. Automobiles are towed away from reserved parking spaces on the campus. However, the Science Center buildings are located in a group and within a short distance from the Georgia Center.

Dining Facilities

There is a dining room and a small coffee shop at the Georgia Center. The coffee shop is usually crowded between 12:00 and 12:45. These eating facilities, at some meals, probably will not be able to handle all those who would like to eat there. Since parking is no prob'em at the Georgia Center, those having automobiles may wish to drive to motels or hotels serving meals, if the above facilities are crowded. The University cafeteria in Bolton Hall on Baxter Street adjacent to Creswell Hall, a nine-story dormitory, can serve a good number of people. The waiting lines are usually short, except for 20 to 30 minute periods beginning about 11:00 A.M., 12:15 P.M., and 1:20 P.M. Other University eating facilities are usually very crowded or are essentially inaccessible. There are a number of other public eating establishments in Athens. Several are on Baxter Street which begins at Lumpkin Street near the stadium and ends at Beechwood Shopping Center, where there is a cafeteria.

Local alcohol mores

Beer and wine are sold at package stores and are served in many restaurants, but no hard liquors are sold.

Placement Service

A registry of employers and potential employees will be established. Interviews will be arranged, if possible. The usual employment opportunity bulletin board service will also be available. Registry of employers and potential emp'oyees may be done at the registration desk or by writing to Lynn Raulerson, Department of Zoology.

Field Trips

Pending expression of interest, a number of field trips are planned. Those persons interested should, if possible, contact the individual(s) planning the trip(s) before arriving in Athens.

1. Wednesday and Thursday — Mycologists of the A.S B. are planning two trips, one on Wednesday which is to be all day and returning to Athens that night. The second trip is to be half day, Thursday morning, the group returning to Athens for lunch. Any interested person should contact Dr. Richard T. Hanlin, Department of Plant Pathology and Plant Genetics for particulars.
2. Thursday — For early arrivals at least one short trip near Athens is being arranged. For information about this and other suggested activities for the afternoon, see below under "Other Activities."
3. A Saturday morning trip to Echols Mill granitic outcrop about ten miles northeast of Lex-

ington, Georgia, is being planned by Dr. Samuel Jones and Dr. J. Bruce Wallace. This trip is to feature aquatic biology as well as ecological and floristic aspects of communities typical of granitic outcrops. Temporary and permanent pools of water and a stream which runs for some distance over the rocks provide plant and animal life which should be of interest to biologists. The granitic habitats are especially interesting. In addition to species typical of such habitats, there are some of unusual occurrence, such as species disjunct from the Coastal Plain. The group will return to Athens by noon. Those in private automobiles may instead proceed directly home. For particulars, contact Dr. Jones of the Botany Department or Dr. Wallace of the Entomology Department.

4. Two Saturday trips are being planned by the Southeastern Division of the American Society of Ichthyologists and Herpetologists. For those interested in fishes, there will be collecting in the headwaters of the Ogeechee River. For those interested in herptiles, collecting north of Gainesville, Georgia, should provide an array of salamanders. Interested persons should contact Dr. John P. Kerr, Zoology Department.
5. A Saturday trip to the Savannah River Ecology Laboratory at the AEC Savannah River Plant near Augusta, Georgia, is being planned by Robert J. Beyers, Director. Travel from Athens to the Savannah River Plant will be by private car, leaving Athens at 8:00 A.M. An escorted tour by bus will include laboratory and field research facilities. A nominal fee will be required for lunches. The program will terminate at approximately 4:00 P.M. Because this Laboratory is located on a U. S. reservation, it is required that all visitors be citizens of the United States, and be 18 years of age or older. All persons planning to attend must register with Dr. Beyers, SREL, P. O. Box A, Aiken, South Carolina, prior to Thursday, April 18. Because of security regulations, no late registrations can be accepted. Also, no cameras or binoculars may be taken on the tour.

OTHER ACTIVITIES

Thursday afternoon

1. A short tour of local laboratory and field research facilities will be conducted by Dr. John McGinnis and Dr. Eugene Odum. Interested persons should meet at the main entrance of the Georgia Center at 4:00 P.M.

2. The Southeastern Water Laboratory will conduct a guided tour of their laboratories from 3:00 to 5:00 P.M. Persons having special interests are invited to ask that conferences be set up with specific staff members anytime during the day on Thursday or Friday. Interested persons should write Dr. H. Paige Nicholson, of the Southeastern Water Laboratory.

Thursday and Friday 8-5, Saturday 8-12

The following collections will be open with attendants present to assist visitors:

1. Mycological Herbarium. Room 213, Barrow Hall.
2. Herbarium of vascular plants, bryophytes, and lichens. Room 529, Biological Sciences.
3. Insect Museum. Room 420, Biological Sciences.
4. Bird and Mammal Range. Room 304, Biological Sciences.
5. Herpetological and Ichthyological Ranges. Room 302, Biological Sciences.

Persons interested in visiting personnel or facilities of various departments may go to the main offices for information and directions. Office locations are as follows:

Botany — 505 Biological Sciences
Entomology — 415 Biological Sciences
Microbiology — 831 Biological Sciences
Plant Pathology and Plant Genetics — 215 Food Science
Zoology — 724 Biological Sciences

Visitors are invited to discuss aspects of the new Introductory Biology program with Dr. Hope Ritter, Room 409A or Dr. Joseph Hindman, Room 510, on Thursday or Friday. (See article on page 7.)

Thursday and Friday 9-5, Saturday 9-12

The Art Museum near the north end of the campus will be open for visitors. The nearest available parking will probably be at meters on the edge of the Athens business district. *Caution:* Automobiles are towed away from reserved parking spaces on the campus.

Thursday thru Saturday

A self-guided tour of Athens has been organized. Brochures may be obtained at registration or by writing Dr. Joe Edmisten, Department of Botany. Those wishing to have transportation provided for a tour of Athens and the University should write Dr. Edmisten before the meetings. The tour will begin at 2:00 P.M. Friday, if a sufficient number of people are interested.

The University swimming pool in Stegeman Hall, west of the stadium, will be open to A.S.B. visitors on Thursday and Friday between 2:30 and 5:30 P.M.

ACCOMMODATIONS

It is advisable to make reservations by 15 March. Write directly to the hotel or motel. The Georgia Center will handle their reservations and require double occupancy of all rooms to insure convenience in housing to the maximum number of persons. Room rates are given below. The symbols following name of establishment indicate the following:

(—) — number in parenthesis indicates mileage to the Georgia Center.
R — Eating facilities. S — Swimming pool.

	No. of Units	Type Room	Price
GEORGIA CENTER (0) R			
University of Georgia	138	Double	$10.00
UNIVERSITY INNS, INC. (0.2) R			
998 S. Lumpkin St.	50	Single	$ 5.00
Men only!		Double	7.00
Connecting baths only.			
DOWNTOWNER MOTOR INN (0.6) RS			
Milledge and Lumpkin	71	Single	$ 8.00
		Double	10.50
		Twin	12.00
		First Floor	1.00 extra
HOLIDAY INN (0.9) RS			
2 blocks from Broad and Lumpkin	98	Single	$ 9.00
		Double	12.00
		Twin	14.00
COLONIAL HOTEL (1.0)			
179 E. Broad	few	Single	$ 3.50
		Double	5.00
		Twin	5.50
GEORGIAN HOTEL (1.2)			
247 E. Washington	125	Single	$ 5.00-$ 7.00
		Double	7.00- 9.00
		Twin	8.00- 9.00
KEY TO AMERICA (1.3) RS			
230 N. Finley	87	Single	$ 8.00
		Double	12.00
		Twin	12.00
UNIVERSITY HOTEL COURT (1.9) S			
US 441 South	81	Single	$ 8.00
		Double	10.00
		Twin	12.00
ATHENS MOTEL (2.3) S			
US 441 South	56	Single	$ 7.00
		Double	9.00
		Twin	10.00
		Efficiencies	2.00 extra
OLD COLONY MOTOR INN (2.4)			
US 441 South	31	Single	$ 8.00
		Double	10.00
		Twin	11.00
KING COTTON MOTOR COURT (3.3)			
US 78 West	15	Single	$ 6.00
		Double	7.00
		Twin	8.00
HOWARD JOHNSONS (3.6) RS			
US 78 West	60	Single	$ 9.00
		Double	13.00-$14.00
		Twin	14.00- 16.00
BULLDOG INN (5.0)			
US 441 North	31	Single	$ 8.00
		Double	10.00
		Twin	12.00

Most of the above have rooms which hold more than two persons, the additional person rate usually being $1.00 or $2.00 each.

CAMPING FACILITIES

The nearest campsites are as follows: 17 miles south of Athens on Ga15 in Oconee National Forest. 25 miles W of Athens on Ga81 in Fort Yargo State Park near Winder. 28 miles southeast of Athens off US278 in Hard Labor Creek State Park near Rutledge. 30 miles north-northeast of Athens off US29 in Victoria Bryant State Park. 47 miles north of Athens and east of Cornelia at Lake Russell in the Chattahoochee National Forest. Hot and cold showers are available at Hard Labor Creek State Park.

LOCAL ARRANGEMENTS COMMITTEE

Co-Chairmen	W. H. Duncan
	D. S. Scott
Housing and Family Activity	J. A. Edmisten
Banquet, Food Services	C. D. Monk
Smoker, Exhibits	G. E. Michaels
Publicity	G. L. Plummer
Field Trips	S. B. Jones
	J. B. Wallace
	R. J. Beyers
Meeting Rooms, Audio-Visual	W. C. Carlton
	Grace Thomas
Transportation	J. A. Edmisten
Registration	Alma Walker
	A. B. Weathersby
	H. R. Hermann
	Lynn Raulerson
Placement Service	Lynn Raulerson
Finance	E. E. Byrd
Program	D. S. Scott
	W. H. Duncan

MARY GLIDE GOETHE TRAVEL AWARDS

For the tenth year there will be funds available through the generosity of the late Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meet-

ings, to be held this year at the University of South Carolina, Columbia, S. C. Approximately $300 will be available from the contributions of Mr. Goethe, and it is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from Columbia.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe Committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1967 meeting of the Association of Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

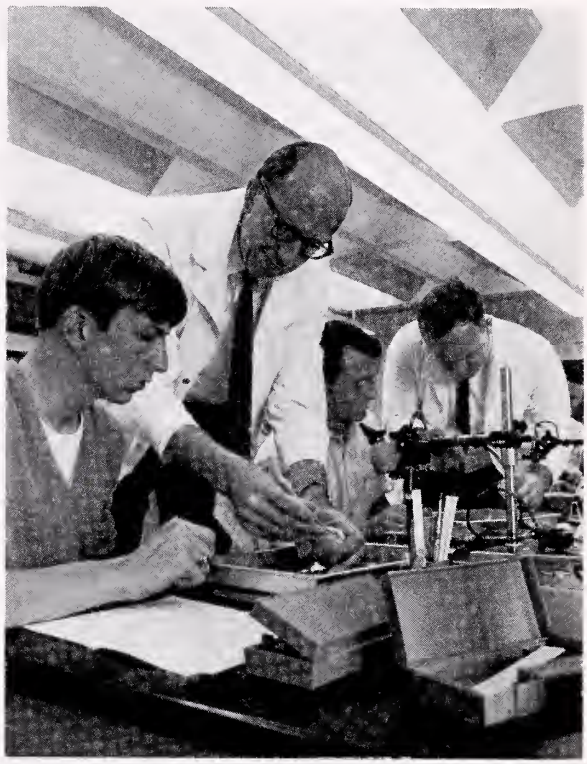
1. Indicate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.
2. Give information as to whether or not a paper is being presented by the applicant.
3. In a paragraph, give a brief history of your education to date, of how many years you have been — and plan to be — in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.
4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.
5. Have your major professor or departmental head write a letter supporting your application.
6. Applications and supporting letters, both in triplicate, should be in the hands of *Dr. C. J. Umphlett, Dept. of Botany, Univ. of North Carolina, Chapel Hill, N. C. 27514,* by 1 March 1968. Applicants will be notified of the decision of the Committee during March.

PAUL C. BAILEY
WILLIAM E. BRILLHART
C. J. UMPHLETT, *Chairman*

Multi-Lecturer Approach Used at University of Georgia in Introductory Biology Classes

How to make a science course meaningful to a student who is one of hundreds in a room, who may have had virtually no secondary preparation for the course, and who may be taking it simply because he has to is a challenge Dr. Hope Ritter and Dr. Joseph Hindman are tackling at the University of Georgia.

They're working with a "multi-lecturer approach." Instead of one teacher presenting the entire introductory biological sciences course, eight professors this quarter are participating.



Dr. Hope Ritter (left) and Dr. Joseph Hindman Work in 'Multi-Lecturer' Program. University of Georgia Biologist Strive For Personal Contact With Students.

Each one lectures in the particular area of biological science which is his specialty. Next quarter, 12 to 15 faculty members will present one or more lecture.

"The students realize they're getting the best this way," says Ritter, "although many of them prefer the security of becoming accustomed to only one lecturer. Of course, this approach doesn't reduce the number of students in the class, but Dr. Hindman and I try to compensate for that.

"We try to make them feel they are being regarded as individuals who are eligible to consult with their professors by appointment. We encourage them to ask questions, and they respond. Many times we lecture up the aisle in order to be closer to the student."

Ritter points out that the small group meetings in the laboratory allow for additional close contact. In addition to two teaching assistants and Ritter and Hindman, senior level faculty members also circulate among the students in the laboratory sections from week to week. As in the classroom, the teacher's approach to laboratory learning is also a break from tradition.

"Biology is the science of living things," says Ritter, "but the traditional approach has been one presenting preserved specimens — no life, no red blood, no yellow fat. But through a local supplier, we get live clams and squid from the Chesapeake Bay area to illustrate both organizations at this level of complexity as well as the principle of adaptive radiation commonly seen in living things.

"Too, the students are trained in the use of the best microscopes available, fitted with phase-contrast optics. They see living things at microscopic level with a clarity that introductory biology students elsewhere are not afforded."

Ritter says that other universities are converting to an audio-visual type program of teaching in the attempt to solve the problem of large classes in introductory courses.

"That puts a student in a booth with programmed information and a faceless professor," he protests. "I don't think anyone can replace an enthusiastic team of teachers willing to take time from their research in the attempt to make biology interesting and meaningful — teachers who want students to be stimulated to the point of going into the lab with bounce and zest."

Ritter credits John O. Eidson, Dean of the College of Arts and Sciences, and Donald C. Scott, Head of the Division of Biological Sciences, with the vision that has resulted in a truly contemporary biology program.

"Also, the atmosphere at Georgia is healthy for combining teaching with research. Research is my life also; without it the academic experience is incomplete. Here, I can conduct research without pressure and relate it in its place to the students, but at a realistic level that does not result in student neglect."

Ritter says they try not only to teach students biology but also to instill in them an awareness of their importance as biological units themselves in time and space.

"Biology is constantly exciting," he feels. "Creation of some form of 'test tube life' is almost at hand. Regardless of what a student is majoring in, we want him to feel this excitement."

One student's reaction to the course perhaps indicates a degree of success: "I made a D+ and it was the hardest course I've ever taken. But I got a lot out of it, and I could have done better if I had studied more effectively."

This instructional program is indicative of the activity in Biological Sciences which earned for the Division a $3,719,000 grant this summer from the National Science Foundation. The grant will be used for development of a "center of excellence" in biological sciences and was awarded on the basis of "substantial present strength" and "sound planning for future improvement."

Non-Petrified Fossil Fungi

Frederick A. Wolf, *Duke University*

The word fossil, as defined in Webster's Unabridged Dictionary means "Any impression or trace of an animal or plant which has been preserved in the earth's crust; in scientific usage not restricted to remains of a stony nature." But in common parlance fossils are regarded as very old, petrified remains of animals or of plants. In the present account consideration is given to fungal spore remains that are "not of a stony nature," and that occur in the lacustrine deposits of various bodies of water in East Africa. It has been well established by limnologists that lake sediments contain the corpses of many species of animals and plants that presently are living in or near lakes and their influents or that once lived there. Additionally, it has been found that such sediments contain both pollen and fungal spores conveyed to the lakes, even for considerable distances, by air currents. In a very real sense, therefore, lakes must be regarded as natural history museums or repositories that provide abundantly for studies of both contemporary and extinct faunas and floras.

It is to paleontologists from their examinations of carbonaceous, calcified, and silicified specimens, that we owe our knowledge primarily of the kinds of animals and plants that formerly lived on our planet. They have established that many of both groups became extinct millions of years ago. But, palynologists by examination of deposits in peat bogs, first found, only about 50 years ago, that pollen of many kinds of plants

occurs in such sites. Since the pollen was so perfectly preserved they were able to identify the genera, and in some instances even the plant species that produced this pollen. Subsequently they found that pollen is always present in sediments of swamps, marshes, ponds, lakes, streams and various other sites that contain alluvial material. By use of carbon dating and of related techniques, close approximations have been established of the time of deposition of any given sediment at different depths or levels. As a result of these findings it is deduced that such conditions as favor pollen preservation in sediments should also favor the preservation of fungal spores for hundreds and perhaps thousands or millions of years. To date, however, meager consideration has been given to determining the incidence of the kinds, and the age of fungi in deposits from any of these aforementioned sites.

Palynologists have indicated that the several factors which contribute to the preservation of pollen in lacustrine deposits include (1) dearth of oxygen and light, (2) uniformity of temperature and moisture, (3) the chemical nature of the constituent organic and inorganic materials, (4) and the acidity or alkalinity of the sediment. Each of these factors, as well, may contribute to the preservation of fungal spores. The chemical nature of the spore wall itself, i.e. whether the constituents of the walls are or are not resistant to decomposition in sediment may be anticipated to constitute an additional factor.

Different species of pollen have been found to occur at different depths in sediments. Palynologists have interpreted this finding as evidence of sequential changes that have transpired in the floras of given regions. Their results suggest that it should be possible to correlate the kinds of spores in lacustrine deposits with the kinds of pollen and thus with sequences in types of vegetation. The writer will consider the results of his attempts to establish whether such correlation can be shown to exist.

Materials and Methods

The samples of sediment examined in my studies were collected by Dr. D. A. Livingstone and Mr. Robert Kendall, Duke University, Department of Zoology, and Dr. J. L. Richardson, Franklin and Marshall College, Department of Biology. The oldest of these sediments date from the termination of the Ice Age. Samples were prepared from cores taken from the following lakes in Uganda, Kenya, Zambia, and Tanzania: Bujuku, Chila, Chishi, Kitandara, Naivasha, Mahoma, Shiwa Ngandu, Tanganyika, and Victoria. Samples of sediment, taken from the interface of water and sediment from several other smaller lakes and from water holes, were also examined.

The coreing devices used are adequately described in Kummel's "Handbook of Paleontological Techniques" (Wright, Livingstone, and Cushing, 1964). The cores ranged in length from a few meters to approximately 30 meters. Samples, consisting of 0.10 cc or 1.00 cc of core material, were selected at 0.10 meter depth intervals. They were treated according to the acetolysis method devised for pollen analysis by Erdtman (1960). This method employs treatment with strong acids and alkali, repeated centrifugation, and washing, finally to secure a residue that is mounted on microscopic slides.

Findings

The results of microscopic examination of sediments from the several East African bodies of water have been interpreted to support the following conclusions:

(1) The number and kinds of fungal spores contained in the sediments of different lakes differ. The number of spores, moreover, present at different depths in any given lake also differ, spores being most abundant in the upper portions of the deposits. An entirely satisfactory explanation for such occurrence is not available at this time. The number of spores per cc of sediment ranges from none to nearly 60,000. (2) Both hyaline and pigmented spores are found. Spores may become discolored as a consequence of acetolysis. Since the presence or absence of pigment in spores is regarded as a basic taxonomic feature it becomes difficult to classify genera by examination of acetolyzed material. (3) The spores from sediment appear to be intact. They have retained their shape and pattern of septation but lack protoplasmic contents. Spore walls may re-

sist decomposition whereas cell content is readily decomposed. (4) The shape and septation of spores found in sediments is like that of contemporary genera and on this basis, with a reasonable degree of assurance, they can be assigned generic names presently given to contemporary genera. Others remain without tentative identification. Little basis appears to exist for employing the suffix "ites" to generic names of ancient kinds. (5) Several interrelated factors, for which proof of their influence is lacking, may be established to be causally related to the paucity of spores in sediments of certain lakes, and to account for differences in numbers of spores at different levels. These factors are postulated to be (a) year after year burning of the vegetation in the area surrounding the given lake, a practice widely employed to provide grazing for the animals and to facilitate hunting, (b) protracted periods of drought that may extend over several years, (c) sporadic eruption of nearby volcanoes with consequent accumulation of volcanic ash, (d) erosive effects of heavy rainfall and accompanying soil movement into the lakes, (e) and grazing pressures from herds of both domestic kinds of animals and of indigenous kinds. (6) The fungus flora of East Africa is insufficiently known. Until extensive mycological surveys have been made it will remain impossible to correlate the kinds of spores found in lake sediments with the types of vegetation, past and present. The surveys should stress the fungus flora found on aquatic seed plants and on terrestrial species growing in the immediate area surrounding the lakes. (7) It was anticipated that spores of certain widely-prevalent genera would be found in the lacustrine deposits, but they were found to be sparse or else totally lacking. Explanation for such non-occurrence was sought by experimentation involving acetolyzing known kinds of spores and by subjecting known kinds to decomposition under conditions that simulate, to a degree, natural conditions in lakes. As a resu!t it was learned that the spores of some species of fungi are destroyed by acetolysis, others remain intact, and that some kinds are decomposed if stored for a few months in sediment, whereas others withstand decomposition. These findings constitute partial explanation for the absence of fungal spores of certain species in sediments. They also indicate that more should be learned about the chemical nature of spore walls and their biosynthesis than is presently known. Additional explanations are being sought to account for the presence and absence of fungal spores in sediments. (8) It is becoming increasingly obvious that some genera of fungi have not undergone morphological changes during the time that has elapsed since the Ice Age, and we should not be surprised if the age of spores in sediment or in shale will be found to extend to millions of years. This is not to say that evolutionary changes in physiology of some species have not taken place, with the passage of time. The inevitable conclusion is that fungi, in order to survive, have accommodated themselves to the vicissitudes of climatic and other environmental changes.

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News of Biology in the Southeast

Joseph F. Fitzpatrick, Jr. — Editor

About People

Robert F. Smart, Professor of Biology and Dean of Richmond College, University of Richmond, Virginia was appointed Provost of the University, effective 1 March 1967. He will be in charge of all academic affairs of the seven colleges which eonstitute the University of Richmond.

L. R. Hesler, Dean and Professor of Botany, Emeritus, Department of Botany, University of Tennessee, Knoxville, has recently published a book, "Entoloma in Southeastern North America." This taxonomic work on mushrooms is provided with keys and is copiously illustrated.

Frank B. Golley has been appointed Executive Director of the Institute of Ecology of the University of Georgia. **Robert J. Beyers** will replace Dr. Golley as Director of the Savannah River Ecology Laboratory, Aiken, South Carolina, which facility is operated by the Institute of Ecology for the U. S. AEC. **Eugene P. Odum** continues as Director of the Institute.

New staff members of the Institute of Ecology of the University of Georgia include **I. Lehr Brisbin, D. A. Crossley, Dirk Frankenberg, J. Whitfield Gibbons, John T. Hays, Philip L. Johnson, R. Larry Marchington,** and **William J. Wiebe.**

Jerry H. Cromer has been appointed Assistant Professor of Biology, Converse College, Spartanburg, South Carolina. He will assume his duties at the beginning of the Spring Semester of 1968.

Louis G. Williams has joined the staff of the Biology Department, University of Alabama, Tuscaloosa. He is returning to academic life after ten years of research activities with the federal government.

New staff members of the Department of Biology, East Tennessee State University, Johnson City are: **Jasper H. B. Garner,** Associate Professor, Dr. Garner formerly was a member of the faculty of the Department of Botany of the University of Kentucky, received his Ph.D. from the University of Iowa and is interested in bark fungi and Gasteromycetes; **W. Donald McGavock,** Associate Professor, Dr. McGavock is a former member of the staff at Wofford College, was awarded the terminal degree by the University of Tennessee and is interested in cestodes; **Milo E. Richmond,** Assistant Professor, Dr. Richmond received his terminal degree from the University of Missouri and is interested in vertebrate reproduction; and **Franklin D. Robinson,** Assistant Professor, Mr. Robinson is completing the requirements for the Ph.D. degree, with research in plant ecology, at Vanderbilt University.

Two members of the staff of the Department of Biology, East Tennessee State University, Johnson City, have been awarded the Ph.D. degree in the summer of 1967. Virginia Polytechnic Institute awarded the degree to **James E. Lawson** who presented a dissertation on the systematics of pseudoscorpions. **Wallace A. Tarpley** offered a dissertation in the ecology of insects to the University of Georgia for his degree.

Herman O'Dell, Professor of Biology, East Tennessee State University, Johnson City, is currently on leave of absence to Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Harry L. Powe, Associate Professor of Biology, East Tennessee State University, Johnson City, is Secretary-Treasurer of the newly-formed Southern Appalachian Club of the Society of the Sigma Xi.

W. Dwight Billings, Duke University, Durham, North Carolina, has been promoted to James B. Duke Professor of Botany. These professorships are the highest academic rank awarded at Duke. Dr. Billings' research interests are in plant ecology.

William Lee has joined the faculty of the Department of Zoology and Physiology, Louisiana State University, Baton Rouge, where he will teach in his research area of mutagenesis. Dr. Lee comes to L.S.U. after sojourns at the Universities of New Hampshire and Texas, fol-

lowing receipt of his degree from the University of Wisconsin.

Mason E. Hale, a student of lichens, has been appointed Acting Chairman, Department of Botany, Smithsonian Institution, Washington, D. C., for the year 1 July 1967 to 30 June 1967. Dr. Hale suceeeds **William L. Stern** who resigned to become Professor of Botany at the University of Maryland, College Park.

Stanwyn G. Shetler, Associate Curator of Phanerograms, Department of Botany, Smithsonian Institution, Washington, D. C., was awarded a one-year grant of $32,800 by the Smithsonian Research Foundation to continue his research on North American Campanulaceae and to develop a computer data-processing program for the Flora of North America Project. In connection with his role as Secretary of FNA he has spent several weeks in Canada and Europe this fall and attended the Symposium on Information Problems in the Natural Sciences in Mexico City in December.

Among the botanists of the Smithsonian whose research problems have carried them abroad during the fall are: **Thomas R. Soderstrom** (grasses), to Indonesia and Ceylon; **Edward S. Ayensu** (anatomy), to West Africa; and **David B. Lellinger** (ferns), to Costa Rica where he participated in the teaching program of the Organization for Tropical Studies prior to his field activities.

Stanley R. Gemborys has been appointed Assistant Professor of Biology, Hampden-Sydney College, Hampden-Sydney, Virginia, effective September 1967. He received his doctorate from Auburn University in Botany, specializing in ecology.

Three new staff members of the Department of Biology, Samford University, Birmingham, Alabama, all with the rank of Assistant Professor, are: **Ellen McLaughlin,** an embryologist with a terminal degree from Emory University; **Bennie R. Ford,** a parasitologist with the Ph.D. from the University of Oklahoma; and **Allan Hayse,** a physiologist graduated from Louisiana State University. Their appointments began in September 1967.

Four new faculty members have joined the staff of the Biology Department, Richmond Professional Institute, Richmond, Virginia. These include **James C. Harlan,** a rccent Ph.D. from the University of Mississippi; **T. Dan Kimbrough,** formerly a member of the faculty of Birmingham Southern College; **John D. Reynolds,** formerly of the faculty of the University of Southern Mississippi, and **J. Miles Sharpley** of Sharpley Laboratories, Inc., Fredricksburg, Virginia.

Philip E. Hildreth joined the University of North Carolina, Charlotte, in September 1967, as Chairman and Distinguished Professor of Biology. Dr. Hildreth is the first Distinguished Professor at the Charlotte campus. He was formerly associated with the Lawrence Radiation Laboratory at the University of California, Berkeley, where he was an associate of Curt Stern.

G. Richard Hogan joined the University of North Carolina, Charlotte, in September 1967, as Assistant Professor of Biology. He was formerly with the Laboratory of Radiobiology, School of Medicine, University of California, San Francisco Medical Center.

L. A. Hetrick, Professor of Entomology, University of Florida, Gainesville, has been elected President of the Florida Entomological Society for 1968.

Charles E. Miller, Associate Professor of Botany, Ohio University, Athens, Ohio, has been awarded an NSF grant to study taxonomic characteristics of chytridiaceous and other phycomycetons fungi.

Bosiljka Ristanovic, Fulbright Research Scholar, Department of Botany, Athens, Ohio, from the Biological Institute University of Sarajevo, Yugoslavia, has received a Fulbright-Hays award to study aquatie phycomycetous fungi with **Charles E. Miller** for a ten-month period beginning September 1967.

G. W. Hunter, III, Lecturer in Microbiology and Biological Sciences, College of Medicine, University of Florida, Gainesville, retired and became "Emeritus" on 31 December 1967. He has taught parasitology courses in the College of Medieine and Department of Zoology since joining the University in 1956. One of his publications, "A Manual of Tropical Medicine", co-authored with W. W. Frye and J. C. Swartzwelder, has just announced a first reprinting of the fourth edition. He will retire to Sun City Center, P. O. Box 5418, Florida 33570.

William T. Penfound, formerly Professor of Botany at the University of Oklahoma, has recently become Chairman of the Department of Biology, Warren Wilson College, Swannanoa, North Carolina.

New members of the faculty of the Department of Biology, Georgia State College, Atlanta are **John Parker** and **John Payne.** Dr. Parker received his degree from Stanford University working under the direction of A. C. Giese. Dr. Payne is a virologist formerly with the University of Alberta.

Peter E. Gaffney of the Department of Biology, Georgia State College, Atlanta, is on a one-year leave of absence while he acts as a Fulbright-Haynes Lecturer. He is in residence at the University of Ireland, Dublin.

J. F. Celecia has been appointed Associate Professor and Chairman of the Biology Department, Belmont Abbey College, Belmont, North Carolina. Dr. Celecia was formerly Head of the Biology Department, Central Piedmont Community College, Charlotte, North Carolina.

Ernest D. Seneca has been appointed Research Associate in the Departments of Botany and Soils, North Carolina State University, Raleigh. Dr. Seneca is a recent graduate of the University and interested in the grasses of the dunes of the Outer Banks. He will also teach ecology in the Departments of Botany and Zoology.

William H. Hatheway has been appointed Adjunct Professor in the Department of Botany, North Carolina State University, Raleigh. Dr. Hatheway is developing a research program in quantitative ecology and taxonomy, using the facilities of the Triangle Universities Computing Center. He is a former director of the Organization for Tropical Studies, and a member of the Rockefeller Foundation Staff in Columbia and Mexico. His interests are in tropical botany and he has spent the last two years working in Costa Rica.

The current faculty of Mars Hill College, Mars Hill, North Carolina, includes **Cornelia Ann Serota,** M.S. North Texas State University, interested in cytogenetics; **Fred H. Diercks,** Sc. D., University of Pittsburgh; **Norman E. Garrison,** M.A. Wake Forest University, interested in embryology; **Joseph R. Taylor,** Ed. D., Auburn University; and **L. M. Outten,** Ph.D., Cornell University, interested in the natural history of the lower vertebrates. Dr. Outten is chairman of the department and announces that Biology is now a required course for all students as a part of the development of a core curriculum for the general education program.

Eugene Jones has been appointed Associate Professor of Biology, University of South Alabama, Mobile. Dr. Jones received his Ph.D. from the University of North Carolina and does his research in protozoology. **Donald Linzey** has been appointed Assistant Professor of Biology. Dr. Linzey received his degree from Cornell University with research in mammalogy. **Harrison Lynn** has been named Assistant Professor of Biology. Dr. Lynn's Ph.D. was awarded by the University of Georgia, with research in microbiology.

W. D. Buchanan, has joined the faculty of Atlanta [Georgia] University. He will be Part-time Visiting Professor of Biology and teach graduate courses in entomology and serve as research supervisor. Dr. Buchanan was formerly associated with the U. S. Forestry Service as an entomologist.

Two new members will join the faculty of the Department of Biology, University of Miami, Coral Gables, Florida. **Howard J. Teas,** formerly Chairman of the Division of Biological Sciences at the University of Georgia, will join the department as a full Professor. Dr. Teas has been a visiting professor at Miami during the last academic year. His research interests have been in the area of plant biochemistry and genetics. He is a member of the board of the Organization for Tropical Studies and of the Consultant's Bureau, Commission on Undergraduate Education in Biological Sciences. One of the major responsibilities of his new job will be to coordinate the department's interdisciplinary ecology program. **Peter Luykx** will become Assistant Professor of Biology. Dr. Luykx's research interests are in the area of cell reproduction, heredity, and growth. Following receipt of his degree from the University of California, Berkeley, in 1964, Dr. Luykx was Assistant Professor of Zoology, University of Minnesota. He will supervise the department's electron microscope facility.

James H. Gregg, Professor of Zoology, University of Florida, Gainesville, has received an NIH Research Career Development Award for an additional five years to continue his research on the development of the cellular slime molds.

E. Clifford Johnson has joined the Department of Zoology, University of Florida, Gainesville, as Associate Professor. Dr. Johnson received his degree from the University of Texas and will teach a course in ecological genetics in addition to continuing his research on population genetics of damselflies.

Brian **K. McNabb,** Associate Professor of Zoology, University of Florida, Gainesville, has returned after a year's leave of absence spent in Brazil where he conducted research on the ecology and physiology of tropical bats. This research was sponsored by grants from NSF and the American Philosophical Society.

Paul R. Elliott, Assistant Professor of Zoology, University of Florida, Gainesville, has been appointed Assistant Dean for Pre-Professional Education of the Medical School. His concerns will be in the areas of premedical education and counseling and in relationships between the College of Medicine and other colleges at the University.

Archie F. Carr, Graduate Research Professor of Biology, University of Florida, Gainesville, has just published a new book, "So Excellent a Fishe: A Natural History of Sea Turtles." The book, written for the general reader, is based on the author's ten-year study of marine turtles and contains evaluations of the problems awaiting solution.

The News Editor regrets to report that he has been informed by his attorneys that **Gordon B. Woolcott,** Southwestern College, Georgetown, Texas, is deceased. No other details were provided.

Edward Brandt and his wife, **Faydine Brandt,** are joining the staff of the Biology Department, North Carolina Wesleyan College, Rocky Mount, as Assistant Professors; Mrs. Brandt will have a half-time appointment.

The Brandts have been appointed effective with the Spring Semester of 1968 and are in the graduate program of the Department of Biology, Florida State University, Tallahassee. In addition, Mr. Brandt will serve as assistant to the Academic Dean of the College.

New additions to the staff of the Department of Biology, Clark College, Atlanta, Georgia, include **Miriam Fryer,** BS-ASMT, Coordinator of Paramedical Studies; **Clyde Johnson,** Ph.D., Associate Professor of Physiology; **Charles Hubert,** Ph.D., Associate Professor of Embryology; and **Winfred Harris,** Ph.D., Associate Professor of Genetics. Mrs. Fryer directs a program in Medical Technology funded by a Title III grant of $28,000 by the U. S. Office of Education. Dr. Johnson received a matching funds equipment grant of $6,000 from NSF.

Scott M. Weathersby, Professor of Zoology, Louisiana Polytechnic Institute, Ruston, was elected to the office of President-elect of the Louisiana Academy of Sciences at its annual meeting in April.

Robert K. Burns has retired as Interim Professor of Biology, Bridgewater College, Bridgewater, Virgina.

David J. Brusick has joined the staff of Bridgewater College, Bridgewater, Virgina as Assistant Professor of Biology.

Three new assistant professors have been added to the Department of Biological Sciences at the University of Florida, Gainesville. **Jonathan Reiskind,** Ph.D., Harvard University; **Mary A. Heimerdinger,** Ph.D., Yale University; **Dana Griffin,** Ph.D., University of Tennessee.

After an 18 month leave of absence from the Department of Biological Sciences and Zoology at the University of Florida, Gainesville, **Dr. John H. Kaufmann** has returned from Australia. He has been conducting research on kangaroos under the sponsorship of an NSF grant.

Lewis Berner, Chairman of the Department of Biological Sciences, University of Florida, Gainesville, was awarded a plaque for his distinguished service on the faculty. The award was presented by The Florida Blue Key Honor Fraternity.

John McCrone has recently been appointed jointly as Associate Professor in the Biological Sciences and Zoology Departments, University of Florida, Gainesville. He will continue his research on the "venoms of the black widow spider" along with his teaching duties.

James L. Wolfe will join the faculty of the Department of Zoology, Mississippi State University, State College, as Assistant Professor on 1 February 1968. Following receipt of his Ph.D. from Cornell in 1966, Dr. Wolfe served as Assistant Professor of Biology at the University of Alabama. His research interests are in mammalian behavior and ecology.

New staff members at the University of Virginia, Charlottesville, include **Rolf Benzinger,** Assistant Professor of Biology; **Fred A. Diehl,** Assistant Professor of Biology; and **Robert Kretsinger,** Associate Professor of Biology. Dr. Benzinger received his doctorate from Johns Hopkins University and served previously as a Postdoctoral Fellow in Munich, Germany, and Geneva, Switzerland; his research interests are in biochemical genetics and microbiology. Dr. Diehl received his doctorate from Western Reserve University and served as an Instructor at the same institution; he is interested in development and physiology of the lower invertebrates, especially Cnidaria. Dr. Kretsinger, who received his doctorate from the Massachusetts Institute of Technology, comes to the University after service as a Research Fellow at the Helen Hay Whitney Foundation, Cambridge, England, and Geneva, Switzerland.

Robert Arking, a graduate of Temple University, is a post-doctoral fellow at the University of Virgina, Charlottesville, from June 1967 to May 1968. His research interests are in developmental and biochemical geneties of *Drosophila.* **Gerda Schwabl,** who received her doctorate from the Universität Wien, Austria, is also a postdoctoral fellow. Her appointment began in January, 1967, and her research interests lie in genetics.

Melvin L. Conrad, formerly at Oxford College of Emory University, Oxford, Georgia, has accepted a position in the Department of Biology at Northeastern Missouri State College, Kirksville.

J. F. Landt, Associate Professor of Biology, has been appointed Chairman of the Division of Mathematies and Natural Sciences at the Oxford College of Emory University, Oxford, Georgia.

William M. Leach has been selected to head the Radiation Cytology Laboratory of the Radiation Bio-Effects Program, National Center for Radiological Health, Rockville, Maryland. Dr. Leach came to the Program from the University of Tennessee, Knoxville, in September 1966, as a research biologist. The Center is part of the U. S. Publie Health Service.

Leland Shanor, Professor and Chairman, Department of Botany, University of Florida, Gainesville, Florida, has been appointed to the Board of Governors of CRICISAM (Center for Research in College Instruction of Science and Mathematics), located in Tallahassee, Florida. His appointment was effective September 29, 1967. Other biologists on the Board of Governors of CRICISAM are: **Joshua R. C. Brown,** Department of Zoology, University of Maryland, College Park, Md., **T. W. Johnson, Jr.,** Department of Botany, Duke University, Durham, N. C., **George C. Kent,** Department of Zoology and Physiology, Louisiana State University, Baton Rouge,

La., and **H. F. Robinson,** Administrative Dean for Research, North Carolina State University, Raleigh, N. C.

C. W. Hart, Jr. and **Dabney G. Hart,** Academy of Natural Sciences of Philadelphia, have recently returned from Australia and New Zealand where they collected ostracods and worked at the University of Canterbury in Christchurch, N. Z. and at the Australian Museum in Sydney. En route Mr. Hart gave a seminar on entocytherid ostracods at the University of Hawaii, and also collected crayfishes and their associated ostracods which have been introduced there from the Southeast.

Martin D. Young, Gorgas Memorial Laboratory, Panama has been appointed a Member of the Parasitic Disease Commission, Armed Forces Epidemiological Board, Washington, D. C., and also as Professor Ad-Honorem, Tropical Medicine and Clinical Hematology, University of Panama.

Neal Foster of the Academy of Natural Sciences recently travelled to Jamaica to collect certain species of endemic cyprinodont fishes for laboratory studies. Working closely with personnel of the Institute of Jamaica at Kingston, he was very successful. The live stocks of three species of poeciliid (live-bearing) forms are now being studied by **Luis Rivas** at the Biology Department of the University of Miami (Florida) and two species of cyprinodontid (egg-laying) forms by **Dr. Foster** at the Limnology Department of the Academy of Natural Sciences of Philadelphia.

About Institutions

The **Savannah River Ecology Laboratory,** Aiken, South Carolina, recently conducted a very successful open house for the faculty and graduate students of the University of Georgia. Included among the tours were visits to areas not normally open to the general public.

The **University of the South,** Sewanee, Tennessee, has a $2-million science facility under construction. The new building, scheduled for occupancy in September 1968, will house the Departments of Biology, Chemistry, Physics and Psychology.

Kuhn Science Building at **Converse College,** Spartanburg, South Carolina is now occupied. Most of the ground floor of this million dollar facility is devoted to the Department of Biology and $20,000 worth of new equipment has been provided for animal physiology.

The Department of Botany, **Duke University,** Durham, North Carolina, has received a grant from NSF for graduate assistantships in plant systematics. Assistantships will be awarded on a competitive basis. Financial support includes a stipend, travel and subsistence for domestic and foreign field work, and costs for capital equipment and supplies.

Duke University, Durham, North Carolina, has been elected a member institution of the Organization for Tropical Studies, based in Costa Rica. Donald E. Stone, Associate Professor of Botany, has been named OTS board member representative.

The Department of Botany, **Duke University,** has established a four-acre experimental plot for graduate and staff research and teaching in ecology, physiology and biosystematics. The plot includes a laboratory building, a permanent weather station and other pertinent facilities. A portion of the costs were borne by a grant from the Special Facilities Program of NSF.

The Department of Zoology and Physiology, **Louisiana State University,** Baton Rouge, has established a Hemophilia Research Laboratory. The laboratory has a colony of dogs in which hemophilia is manifest in both sexes. The laboratory is under the direction of H. Bruce Boudreaux and Blanche E. Jackson.

A new $2-million science facility at **Hampden-Sydney College,** Hampden-Sydney, Virginia, will provide new quarters for the Department of Biology. Occupancy is scheduled for Summer, 1968, and the facilities will include modern teaching laboratories, private faculty research quarters, a walk-in cold room and climate controlled animal and instrument rooms.

The Department of Biology, **Hampden-Sydney College,** Hampden-Sydney, Virginia, is undertaking a revision of its curricula. Some innovations will include an examination of auto-tutorial teaching methods, an interdisciplinary science program designed to separate B.A. candidates from B.S. candidates and the introduction of courses that lie at the interface of biology and theology and biology and political science. The revision is supported, in part, by NSF through its College Science Improvement Program.

The biology faculties of **six colleges and universities in western Kentucky and Tennessee** are in the initial stage of organizing a regional biological association. The purposes are to exchange ideas about teaching and research, promote fellowship among local biologists with common problems, examine undergraduate biology curricula, and procure lecture programs of interest. The first meeting at the **University of Tennessee, Martin,** was well attended and generated enthusiasm. A steering committee was elected to implement the organization: **C. M. Chandler,** Bethel College, McKenzie, Tennessee (chairman); **Lois Lord,** Lambuth College, Jackson, Tennessee; **Morgan Sisk,** Murray State University, Murray, Kentucky; **Charles Smith,** Paducah Junior College, Paducah, Kentucky; **Elsie Smith,** Union University, Jackson, Tennessee; and **Jim Trentham,** University of Tennessee, Martin. Among current plans are a cooperative biological station for use by the member institutions and quarterly meetings at one of the member institutions.

In August 1967, a new science building providing facilities for teaching all the natural sciences was inaugurated at **Belmont Abbey College,** Belmont, North Carolina. The new facilities and additional courses implement the inauguration of a major in biology in the next academic year. Also major sequence courses in physics and mathematics are made possible by the new building.

North Carolina State University, Raleigh, has been awarded a grant of $40,000 by the Cotton Producers Institute. The grant will become effective 1 January 1968 and will initiate a research program to develop physical, chemical and biological data needed to establish specifications for improved cotton planting methods and machinery. The Department of Botany will participate through research programs on the physiology and biochemistry of cotton seed germination and ultrastructural studies of various phases of cotton seed germination and development. Principal Investigators are **R. J. Downs** and **G. R. Noggle.** Provisions are made for pre-doctoral and post-doctoral work. Other cooperating departments are Biological and Agricultural Engineering and Soils.

The Department of Botany, **North Carolina State University,** Raleigh, has added a second electron microscope (Siemans IA) to its new electron microscope laboratory. The older microscope is used in the beginning biology course, as well as advanced courses and faculty research. The fully equipped laboratory is under the direction of Royall T. Moore of the Department of Botany and Rod McCurry, EM Technician.

Yancey Hall, **Spring Hill College**'s (Mobile, Alabama) new half million dollar biology building will be dedicated 14 January 1968. The building is named in honor of **Father Patrick H. Yancey, S.J.,** who became Professor and Chairman of Biology, Emeritus in 1966. Among Father Yancey's many accomplishments are appointment to the original Board of NSF by President Truman in 1950 and the Outstanding Teacher Award from ASB in 1963. The principal speaker at the dedication will be Dr. Louis Levin, Associate Director of NSF, a former classmate of Father Yancey. A. F. Hemphill suceeeded Father Yancey as Chairman of Biology.

An RCA EMU-4 electron microscope was reeently installed in the Department of Biology, **Atlanta** [Georgia] **University.** The microscope will be used for research on fine structure of larval connective tissue cells, spores and spore development in imperfect fungi, and xylem elements of elm infected with **Ceratocystis ulmi.**

The first of two units of the new Life Sciences Complex, **University of Florida,** Gainesville, is scheduled for occupancy around 1 March 1968. This new facility will provide 25 research laboratories, offices for the staff of the Department of Zoology, the Department of Biological Sciences and the Division of Biological Scienees and will house in excess of 20 graduate students.

Bridgewater College, Bridgewater, Virginia, announces that a new laboratory equipped for work in biochemistry, eell physiology, and microbiology has been put into use this session.

The **University of Virginia** announces that eight graduate courses emphasizing field biology will be given at the Mountain Lake Biological Station this summer. Three types of National Science Foundation awards are available for research and study at the Station: (1) Postdoctorate for research, stipend $1300; (2) Pre-doctorate for supervised research, stipend $500; and (3) Postgraduate for training in field biology, stipend $400. Preference is given for studies concerned with the biota of the region. Applieation blanks for these awards may be secured from the Director, Department of Biology, University of Virginia, Charlottesville, Virginia 22903 and must be submitted before May 1, 1968.

Research scientists of **Oak Ridge National Laboratory Biology Division** are participating, in cooperation with the University of Tennessee, in the operation of the new Graduate School of Biomedical Sciences at Oak Ridge, Tennessee. The school has a small full time University of Tennessee faculty and a large shared faculty of Biology Division personnel. While plans are being developed for a building on land adjoining the Biology Division, the school is housed within the Division in rented space which includes student lounge and office area, as well as teaching facilities. The first students entered in September, 1967, and will do their Ph.D. thesis research in the Division under the supervision of senior staff members. Areas of study include: microbiology, cell physiology, immunology, biochemistry, biophysics, cytology, radiation biology, virology, developmental biology, carcinogenesis, plant physiology and photosynthesis, experimental pathology, genetics (including mammalian), and problems of aging.

Inquiries are welcomed, and should be addressed to: **R. C. Fuller, Director, Graduate School of Biomedical Sciences, Oak Ridge National Laboratory Biology Division, P. O. Box Y, Oak Ridge, Tennessee.**

Tentative plans are being made for an Annual W. A. Murrill Mycological Foray, possibly to be held each spring in conjunction with the meeting of the Association of Southeastern Biologists. Since the ASB will be meeting this year at the University of Georgia, April 19 and 20, arrangements are being made for collecting trips to include one full day April 17 and one half-day April 18. Dr. Richard T. Hanlin, Department of Plant Pathology and Plant Genetics, University of Georgia, Athens, Georgia, is in charge of local arrangements. For additional information, contact **Dr. Hanlin or Dr. Henry C. Aldrich, Department of Botany, University of Florida, Gainesville.**

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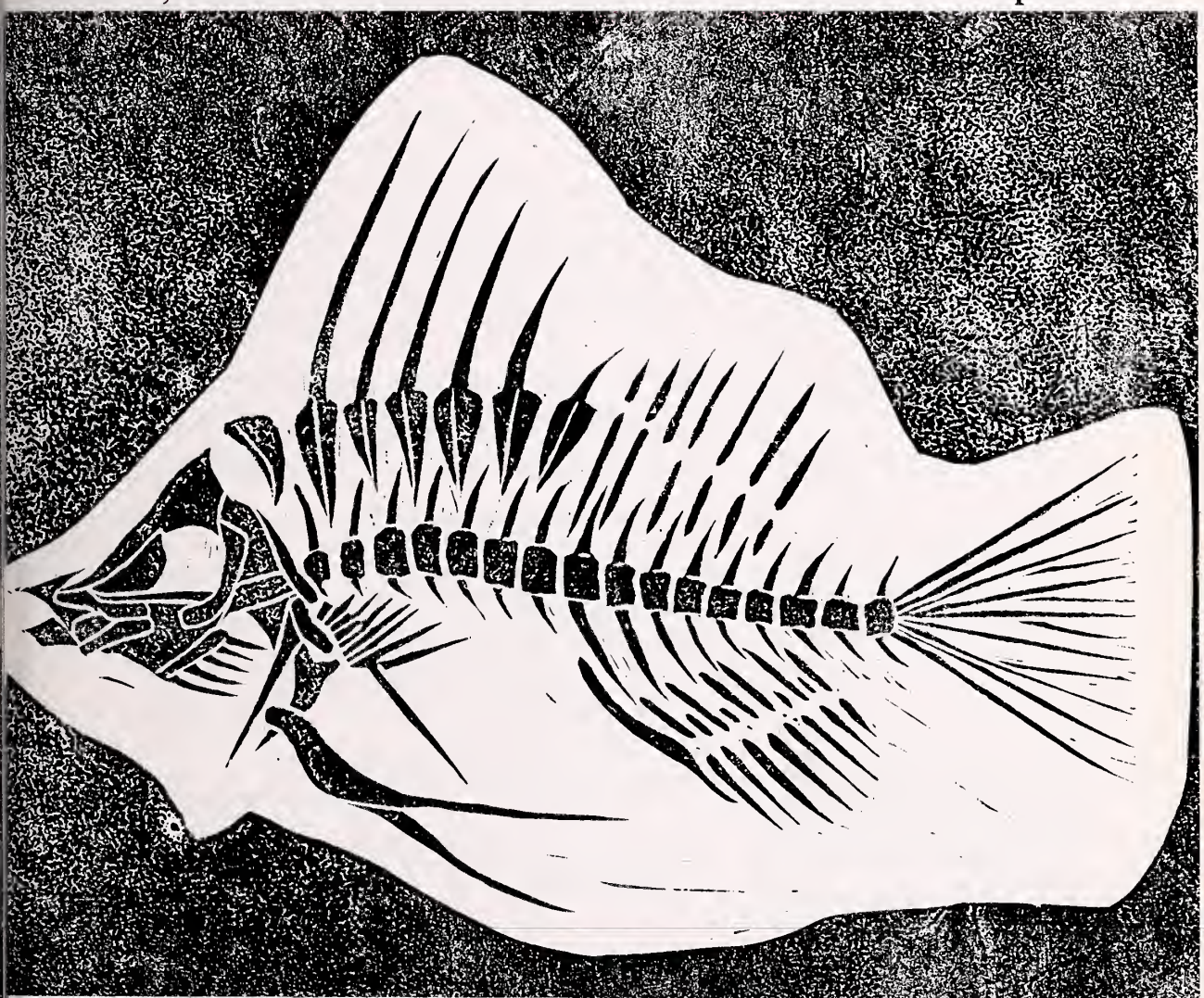

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News Editor

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COVER ILLUSTRATION: Linoleum-block print of a fish skeleton, executed by Dr. Selwyn Roback of the Academy of Natural Sciences of Philadelphia. This print is an artists interpretation of a detailed pen and ink drawing of the skeleton of *Parahollardia lineata* (Longley) that appeared on the cover of the ASB Bulletin in October, 1966. The 1966 drawing was by Dr. James Tyler, also of the Academy of Natural Sciences of Philadelphia.

ASSOCIATION AFFAIRS

The Nominating Committee has selected the following slate of nominees for the various ASB offices that will be vacated this year. Voting will take place at the Business Meeting of the ASB, which will be held at 11:45 A.M., Friday, April 19, in the auditorium of the Georgia Center.

President Elect

John Carpenter — Margaret Menzel

Vice-President

James Hardin — Herbert A. McCullough

Treasurer

David Cotter — J. C. McDonald

Executive Committee

G. T. Cowley — Dolores Dundee
A. E. Radford — John D. McCrone

Program of the 29th Annual Meeting of the Association of Southeastern Biologists

University of Georgia, Athens, Georgia

A joint meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, Southern Section of the American Society of Plant Physiologists, Southeastern Division of the American Society of Ichthyologists and Herpetologists, and the Southeastern Region of Beta Beta Beta National Honorary Biological Society.

WEDNESDAY, APRIL 17

8:00 A.M. **Field Trip:** All day mycological foray to mountains of North Georgia. Information available from Dr. Richard T. Hanlin, Department of Plant Pathology and Plant Genetics, University of Georgia.

THURSDAY, APRIL 18

8:00-12:00 **Field Trip:** Mycological foray in vicinity of Athens. Information available from Dr. Richard T. Hanlin, Department of Plant Pathology and Plant Genetics, University of Georgia.

8:00- 5:00 **Biology Departments Open to Visitors:** Information and directions may be obtained at the registration desk or the departments.

8:30-11:00 A.M. **Paper Sessions:**
Plant Physiology
Session 1A. Room 404C Biological Sciences.
Session 1B. Room 404D Biological Sciences.

11:00 A.M. **Business Meeting, Southern Section of American Society of Plant Physiologists:** Room 404D Biological Sciences.

1:30 **Executive Committee Meeting, Association of Southeastern Biologists:** Room J, Georgia Center.

2:00- 5:00 **Symposium:** Plant Physiology, Session 2. Root-Soil Relationships. Room 404E, Biological Sciences.

2:00-11:00 P.M. **Exhibits:** Lobby Lounge, Georgia Center.

3:00- 5:00 **Guided Tour of Southeastern Water Laboratory on College Station Drive:** Under direction of Dr. H. Paige Nicholson.

4:00 **Tour of Local Laboratory and Field Research Facilities:** Conducted by Dr. John McGinnis and Dr. Eugene Odum. Meet at main entrance of Georgia Center.

4:00- 7:15 and after General Session until 10:00 **A.S.B. Registration:** Lobby Lounge, Georgia Center.

Placement Service Registration: Lobby Lounge, Georgia Center.

6:00 **Beta Beta Beta Smorgasbord:** Georgian Hotel.

7:30 **A.S.B. General Session:** Auditorium, Georgia Center. Dr. Harold J. Humm, presiding.
Address of Welcome: Dr. Fred C. Davison, President, University of Georgia.
Response: Dr. Harold J. Humm, President, The Association of Southeastern Biologists.
Invitational Address: "Our Taste Receptors." Dr. Lloyd M. Beidler, Professor of Biophysics and Director of the Sensory Research Center, Florida State University.
Smoker: Lobby and Patio, Georgia Center.

FRIDAY, APRIL 19

7:00 **Breakfast and Business Meeting, Southern Appalachian Botanical Club:** Banquet Area, Georgia Center.

8:00- 5:00 **Biology Departments Open to Visitors:** Information and directions may be obtained at the registration desk or the departments.

8:00-11:45 A.M. **A.S.B. Registration:** Lobby Lounge, Georgia Center.

8:00-10:00 A.M. **Placement Service Registration:** Lobby Lounge, Georgia Center.

8:00- 5:00 **Exhibits:** Lobby Lounge, Georgia Center.

8:00- 9:00 A.M. **Beta Beta Beta Registration:** Main Lobby, Biological Sciences.

8:30-11:30 **Paper Sessions:**
Plant Physiology — Session 3A, Room G, Georgia Center. Session 3B, Room K, Georgia Center. 11:00 A.M. Special Paper, Room K, Georgia Center.
Plant Taxonomy — Auditorium, Georgia Center.
Cryptogamic Botany — Room A, Georgia Center.
Plant Autecology and Aquatic Biology — Room B, Georgia Center.
Ecology — Room L, Georgia Center.
Animal Physiology — First Floor Conference Room, Georgia Center.
Ichthyology and Herpetology — Basement Auditorium, Georgia Center.

9:00-11:45 A.M. **Beta Beta Beta Paper Sessions:**
Eastern Division — Room 404C, Biological Sciences.
Western Division — Room 404D, Biological Sciences.

11:00 **Business Meeting, Southeastern Division of American Society of Ichthyologists and Herpetologists:** Basement Auditorium, Georgia Center.

11:45 **Business Meeting, Association of Southeastern Biologists:** Auditorium, Georgia Center.

1:00- 2:00 **Beta Beta Beta General Meeting:** Room 404C, Biological Sciences.

1:45 **Business Meeting, Southeastern Section, Botanical Society of America:** Auditorium, Georgia Center.

2:00- 5:30 **Paper Sessions:**
Plant Physiology — Session 4A, Room F, Georgia Center. Session 4B, Room G, Georgia Center.
Morphogenesis and Invertebrate Zoology — Room L, Georgia Center.
Parasitology and Histology — First Floor Conference Room, Georgia Center.
Genetics, Cytology, and Plant Morphology — Room A, Georgia Center.
Ecology — Room K, Georgia Center.
Plant Ecology — Auditorium, Georgia Center.
Ichthyology and Herpetology — Basement Auditorium, Georgia Center.

7:00 P.M. **A.S.B. Banquet and Presentation of Awards:** Banquet Area, Georgia Center.
Association Research Prize. Sponsored by Carolina Biological Supply Company.
Meritorious Teaching Award. Sponsored by Will Scientific, Inc., Georgia.

After Banquet **Past President's Address:** Dr. Elsie Quarterman — "Cedar Glades — Challenge and Opportunity." Auditorium, Georgia Center.

SATURDAY, APRIL 20

8:00 A.M. **Breakfast and Meeting, Southern Section of the American Society of Plant Physiologists.**

8:00 A.M. **Trip to Savannah River Ecology Laboratory at the AEC Savannah River Plant near Augusta, Georgia.** Led by Robert J. Beyers. Registration must be prior to Thursday, April 18.

8:00 A.M. **Field Trips:** Details at registration desk. Please sign up during registration.
1. Aquatic and terrestrial habitats at Echols Mill Granitic Outcrop. Led by Dr. Samuel Jones and Dr. J. Bruce Wallace.
2. Ichthyological trip north of Gainesville, Georgia. Organized by Dr. John P. Kerr.
3. Herpetological trip in the headwaters of the Ogeechee River. Organized by Dr. John P. Kerr.

8:00-12:00 noon **Biology Departments Open to Visitors:** Information and directions may be obtained at the registration desk or the departments.

8:00-11:00 **Exhibits:** Lobby Lounge, Georgia Center.

8:30 A.M. **Executive Committee Meeting, Association of Southeastern Biologists:** Room J, Georgia Center.

SCHEDULE OF PAPER SESSIONS

THURSDAY MORNING — APRIL 18

PLANT PHYSIOLOGY

SESSION 1A. Absorption, Mineral Nutrition, and Translocation.

Room 404C, Biological Sciences

Presiding: Dr. Joseph C. O'Kelley, University of Alabama

8:30 1. SUTTON, DAVID L., D. W. JONES, C. W. LAUGLIN AND M. G. HALE (Virginia Polytechnic Institute). Absorption of 2-chloro-4, 6-bis (ethylamino) -s-triazine (simazine) by Excised Roots of *Hordeum vulgare* L. (var. Wong).

8:45 2. SUTTON, D. L. AND C. L. FOY (Virginia Polytechnic Institute). Influence of Diquat, Paraquat and Several Surfactants on the Loss of Betanin from Beet Root Discs *in Vitro*.

9:00 3. SHEAR, G. M. (Virginia Polytechnic Institute). Calcium Translocation in Bean Seedlings.

9:15 4. SCHMID, WALTER E. (Southern Illinois University). On the Effects of DMSO in Cation Transport by Excised Barley Roots.

9:30 5. LAHAYE, PHILIP A. AND JAMES G. GOSSELINK (Louisiana State University). Dual Mechanisms of Phosphorus Uptake in *Euglena gracilis* Klebs.

9:45 Recess

10:00 6. JOHANSON, LAMAR AND H. E. JOHAM (Texas A and M University). Effect of Sodium Substitution for Calcium on the Translocation of Carbohydrates in Excised Cotton Roots.

10:15 7. JOHAM, H. E. AND M. C. PAREKH (Texas A and M University). Sodium and Magnesium Interactions in Cotton Nutrition.

10:30 8. BONDS, ELDON AND JOSEPH C. O'KELLEY (Tennessee Wesleyan College and University of Alabama). Effects of Ca and Sr on Maize Seedling Primary Roots.

PLANT PHYSIOLOGY

SESSION 1B. Growth Regulators

Room 404D, Biological Sciences

Presiding: Dr. Page W. Morgan, Texas A and M University

8:30 9. RIZK, TAWAKOL Y. AND W. C. NORMAND (Louisiana State University). Histological and Mitotic Changes in Excised Cotton Roots in Response to Trifluralin or Nitralin Treatments.

8:45 10. NORRIS, W. E. JR. (Southwest Texas State College). The Reversal of Ethionine-Induced Inhibition of Elongation of *Avena* Coleoptiles by Various Compounds.

9:00 11. MORGAN, PAGE W. (Texas A and M University). Stimulation of Ethylene Production and Abscission.

9:15 12. MCHALE, JANIECE S. AND LEWIS D. DOVE (Tulane University). Anomalous Responses of Young Tomato Leaves to Phytokinin Treatment.

9:30 13. JONES, D. W. AND C. L. FOY (Virginia Polytechnic Institute). Tracer Studies with Three ^{14}C-Labeled Herbicides, DMSO and Tween 80 in Black Valentine Bean.

9:45 14. HENDERSON, JAMES H. M. AND CECELIA PHILLIPS (Tuskegee Institute). Extraction and Partial Identity of Unknown Phenolic Derivative in *Avena* Coleoptile.

10:00 Recess

10:15 15. FOY, C. L. AND D. E. SEAMAN (Virginia Polytechnic Institute and Syracuse University). Residue Studies with a ^{14}C-Labeled Endothall Defoliant Formulation in Cotton.

10:30 16. COATS, G. E. AND C. L. FOY (Virginia Polytechnic Institute). Effect of Tween 80 and DMSO on the Absorption and Translocation of Three Phloem-Mobile Herbicides in *Verbascum thapsus* L.

10:45 17. BEYER, ELMO JR. AND PAGE W. MORGAN (Texas A and M University). Effects of Ethylene on Auxin Transport and Abscission.

THURSDAY AFTERNOON — APRIL 18

PLANT PHYSIOLOGY

SESSION 2. Symposium: Root-Soil Relationships.

Presiding: Dr. Lewis D. Dove, Tulane University

2:00 Ion Accumulation by Plants, James E. Leggett, Mineral Nutrition Laboratory, USDA, ARS, SWCRD, Beltsville, Maryland.
Roots as Absorbing Surfaces, Paul J. Kramer, Department of Botany, Duke University, Durham, North Carolina.
Soil Conditions that Influence Plant Root Development and Function, Robert W. Pearson, USDA, Alabama Agricultural Experiment Station, Auburn, Alabama.

FRIDAY MORNING — APRIL 19

PLANT PHYSIOLOGY

SESSION 3A. Enzymology

Room G, Georgia Center

Presiding: Dr. Aubrey W. Naylor, Duke University

9:00 18. BEMILLER, J. N., D. O. TEGTMEIER, AND A. J. PAPPELIS (Southern Illinois University). Non-Induced Cellulolytic Enzymes of *Diplodia zeae* (Schw.) Lev.

9:15 19. WOLF, FREDERICK T. (Vanderbilt University). Enzymatic Activities in Leaves of Light-grown and Dark-grown Wheat Seedlings.

9:30 20. RIZK, TAWAKOL Y. AND W. C. NORMAND (Louisiana State University). Changes with Plant Age in the Activities of Two Invertases of Louisiana Sugarcane.

9:45 21. MACKEY, BRENDA LEE AND AUBREY W. NAYLOR (Duke University). Studies on Glutamic Acid Decarboxylase from *Cucurbita pepo* L. cv Summer Crookneck.

10:00 Recess

10:15 22. HABER, ALAN H. AND LARRY L. TRIPLETT (Oak Ridge National Laboratory). Cancelling Errors in the Quantitative Determination of Alpha-Amylase Activity.

10:30 23. GARRARD, L. A. AND T. E. HUMPHREYS (University of Florida). Phosphofructokinase and Glycolysis in the Corn Scutellum.

10:45 24. SCHWARTZ, OTTO J. AND G. R. NOGGLE (North Carolina State University). The Preliminary Characterization of Cholinesterase Activity from Etiolated Pea Seedlings (*Pisum sativum* var. Alaska).

PLANT PHYSIOLOGY

SESSION 3B. Water Relations

Room K, Georgia Center

Presiding: Dr. James E. Pallas, Jr., Southern Piedmont Research Center

9:00 25. WEATHERSPOON, CHARLES P. (Duke University). The Effects of Temperature on Water Potential and Water Movement in Plants.

9:15 26. MCMICHAEL, BOBBIE L. AND ROBERT D. POWELL (Texas A and M University). The Effect of Temperature and Moisture on Flowering and Boll Development in *Gossypium hirsutum* L. (Cotton).

9:30 27. LORIO, PETER L. JR. AND JOHN D. HODGES (Southern Forest Experiment Station). Oleoresin Exudation Pressure and Relative Water Content of Inner Bark as Indicators of Moisture Stress in Loblolly Pine.

9:45 28. LAWLOR, DAVID W. (Duke University). Analysis of Polyethylene Glycol in Plant Material and its Absorption by Corn, Bean and Cotton.

10:00 Recess

10:15 29. HELSETH, FRANK A. (Southeastern Forest Experiment Station). Manometric Measurement of Turgor Pressures in the Bole of Slash Pine.

10:30 30. BARRS, HENRY D. AND BETTY KLEPPER (Duke University and C.S.I.R.O., Australia). Causes of Cyclic Changes in Transpiration in Pepper, Sunflower and Cotton Plants.

10:45 31. BARRS, HENRY D. (Duke University and C.S.I.R.O., Australia). Water-Use Efficiency during Cyclic Variation in Gas Exchange in Cotton and Pepper.

11:00 32. HELMERS, HENRY (Duke University). The Phytotron: A Tool for Botanical Research in the Southeast.

PLANT TAXONOMY

Auditorium, Georgia Center

Presiding: Dr. Robert W. Long, University of South Florida

8:30 33. REYNOLDS, JOHN D. (Richmond Professional Institute). Infrared Spectrophotometry: A Plant Taxonomic Tool.

8:43 34. SHETLER, STANWYN G. (Smithsonian Institution). The Computer in the Flora North America Project.

8:56 35. LAMPTON, ROBERT K. (West Georgia College). The Moss Flora of Georgia. Interesting Species Which Have Been Found in the State.

9:09 36. PARKS, JAMES C. (Vanderbilt University). Hybridization in the Genus *Melanthera* Rohr (Compositae).

9:22 37. WOFFORD, B. EUGENE AND WILLIAM H. ELLIS (University of South Alabama and Austin Peay State University). A Preliminary Biosystematic Study of *Erythronium americanum* Ker (Liliaceae) in the Southeastern United States.

9:35 38. EGGERS, DONNA MARIE (Vanderbilt University). Genetic Fruit Polymorphism in *Valerianella umbilicata* (Sull.) T. & G. (Valerianaceae).

9:48 39. DRAPALIK, DONALD J. (University of North Carolina). Natural and Artificial Pollination in Southeastern U. S. *Matelea* (Asclepiadaceae).

10:01 40. PULLEN, THOMAS M., SAMUEL B. JONES, JR. AND J. RAY WATSON, JR. (University of Mississippi, University of Georgia, and Mississippi State University). A Preliminary Report on the Vascular Flora of Mississippi.

10:14 41. CLARK, ROSS C. (University of North Carolina). The Woody Flora of Alabama.

10:27 42. MATTHEWS, J. F. AND W. H. MURDY (University of North Carolina at Charlotte and Emory University). A Study of *Isoetes* Common to the Granite Outcrops of the Southeastern Piedmont.

10:40 43. BROWNE, EDWARD T. JR. (Memphis State University). Correlation of Environmental Factors and Known Distribution of *Taxus canadensis* Marsh, in Kentucky.

10:53 44. SHARP, A. J. (University of Tennessee). Tennessee Plants of Interest.

CRYPTOGAMIC BOTANY

Room A, Georgia Center

Presiding: Dr. M. B. Huneycutt, University of Mississippi

8:30 45. MCDONALD, JAMES C. (Wake Forest University). Fruiting Myxobacteria from the North Carolina Seacoast.

8:43 46. BLAND, CHARLES E. (University of North Carolina). Ultrastructure of *Pilimelia anulata* (Actinoplanaceae).

8:56 47. CLAUSZ, JOHN (University of North Carolina). A Technique for Counting Saprolegniaceous Propagules in a Water Sample.

9:09 48. RISTANOVIC, BOSILIJKA AND CHARLES E. MILLER (Ohio University). Experimental Taxonomy of Some Members of the Saprolegniaceae.

9:22 49. KOCH, WILLIAM J. (University of North Carolina). Flagellar Retraction in Posteriorly Uniflagellate Fungi.

9:35 50. WHITE, JOSEPH C. AND LAFAYETTE FREDERICK (Atlanta University). Taxonomic Studies on the Genus *Dinemasporium*.

9:48 51. HANLIN, RICHARD T. (University of Georgia). Uncommon Soil Fungi Isolated from Peanut Fruits in the Southeastern United States.

10:01 52. FREDERICK, LAFAYETTE, CHESTER R. BENJAMIN, AND JOSEPH C. WHITE (Atlanta University and USDA, Beltsville, Maryland). Studies on Soil Fungi from West Pakistan.

10:14 53. Bostick, P. E. (Emory University). The Use of Glass Micro-beads in the Study of Soil Fungi.

10:27 54. Hale, Mason E. (Smithsonian Institution). Growth Rate of the Lichen *Parmelia caperata.*

10:40 55. Ott, Donald William (University of North Carolina). Unrecorded or Otherwise Unusual *Vaucheria* from North Carolina.

10:53 56. Smosky, Jerry and G. T. Cowley (University of South Carolina). Growth and Energetics of *Chlorella pyrenoidosa* Chick.

11:06 57. Hurd, Maggie P. and Lafayette Frederick (Atlanta University). The Effect of Gibberellic Acid on Mycelial Growth and Toxin Formation in Isolates of *Ceratocystis ulmi.*

PLANT AUTECOLOGY AND AQUATIC BIOLOGY

Room B, Georgia Center

Presiding: Dr. Edward E. C. Clebsch, University of Tennessee

8:30 58. Hicks, Violet Ann (University of North Carolina). Autecological Study of Roadside and Field-Pasture Populations of *Helenium amarum* (Raf.) H. Rock.

8:43 59. Mellinger, A. Clair (University of North Carolina). Causes of Endemism in *Viguiera porteri.*

8:56 60. Baskin, Jerry M. and Carol Caudle (University of Florida and Vanderbilt University). Germination of 12 Species from the Middle Tennessee Cedar Glades.

9:09 61. Caudle, Carol and Elsie Quarterman (Vanderbilt University). Hydro-economy of *Astragalus tennesseensis* (Leguminosae).

9:22 62. Foster, William A. and Linda Stroud (North Carolina State University). Utilizing the Pattern of Growth of *Juncus roemerianus* to Estimate Net Leaf Production.

9:35 63. Williams, Richard B. and Marianne B. Murdoch (Oak Ridge National Laboratory and U.S. Bur. Commercial Fisheries). Compartmental Analysis of Production and Decay of *Juncus roemerianus.*

9:48 64. Teas, Howard J. and Florence Montgomery (University of Miami and University of Georgia). Ecology of Red Mangrove Seedling Establishment.

10:01 65. Dillon, C. R. (University of North Carolina). Distribution and Production of the Macrobenthic Flora of a North Carolina Estuary.

10:14 66. Neubert, Steve A. (University of Miami). Modern Carbonate Sediments: Algae and Marl Sediments in Coastal Marshes, Everglades National Park.

10:27 67. Wolf, Frederick A. (Duke University). Non-Petrified Fossil Spores in Sediments.

10:40 68. Meyer, Kenneth A. (University of North Carolina). Seasonal Fluctuation of Phytoplankton Composition and Production in a Freshwater Lake.

10:53 69. Rhoads, Peter B. and Robert Pope (University of Miami). A Comparison of Phytoplankton of Open Everglades and an Alligator Hole.

11:06 70. Marland, Frederick C. and Stuart E. Neff (Marine Institute, University of Georgia and Virginia Polytechnic Institute). The Apparent Cultural Eutrophication of Mountain Lake, Virginia.

11:19 71. Crawford, Claude C. (North Carolina State University). Uptake of Amino Acids in Natural Water.

ECOLOGY

Room L, Georgia Center

Presiding: Dr. William D. Burbanck, Emory University

8:30 72. Rittenhouse, W. H. (University of North Carolina). A Functional Classification of Forest Litter Arthropods Based upon Response to Resource Enrichment.

8:43 73. Tramer, Elliot J. (University of Georgia). Bird Species Diversity and Ecological Succession.

8:56 74. Haecker, Mary H., Robert J. Beyers and Michael H. Smith (Savannah River Ecology Laboratory). A Colorimetric Method for Determining Oxygen Concentration in Terrestrial Systems.

9:09 75. Odum, Eugene P., Gary W. Barrett and H. Ronald Pulliam (University of Georgia). Testing Pesticides at the Ecosystem Level.

9:22 76. Bamforth, Stuart S. (Tulane University). Iron Neuston Communities.

9:35 77. Stern, Michele S. and Daniel H. Stern (Tulane University and Louisiana State University in New Orleans). A Limnological Study of the Invertebrates of a Tennessee Cold Springbrook.

9:48 78. Parrish, Fred K. and Felicia H. Hollingsworth (Georgia State College). A Limnological Reconaissance of the Eastern Prairies of the Okefenokee Swamp.

10:01 79. Blessing, Ronald W. and Michael H. Smith (Savannah River Ecology Laboratory). Supplementary Food and Population Dynamics of the Old-Field Mouse.

10:14 80. Van Hook, Robert I., Jr. and D. A. Crossley, Jr. (Oak Ridge National Laboratory). Biological Assimilation and Turnover of Three Radioisotopes by Crickets (*Acheta domesticus*).

10:27 81. Smith, K. L., Jr., James D. Howard and Taylor Mayou (University of Georgia and University of Iowa). Application of X-ray Radiography to the Study of Burrowing Marine Organisms.

10:40 82. Smith, K. L., Jr. (University of Georgia). Decapod Crustacean Burrows of Callianassids as Possible Paleoenvironmental Indicators.

10:53 83. Nelson, Gideon E. (University of South Florida). Some Attributes of an Amphioxus (*Branchiostoma caribaeum*) Population in Old Tampa Bay, Florida (Leptocardii, Amphioxi, Branchiostomidae).

ANIMAL PHYSIOLOGY

First Floor Conference Room, Georgia Center

Presiding: Dr. George C. Kent, Jr., Louisiana State University

8:30 84. Catching, Charles A. and William W. Norris, Jr. (Northeast Louisiana State College). A Numerical Evaluation of the Cells of the Corpora Lutea of Pregnancy of the Golden Hamster (*Mesocricetus auratus* Waterhouse).

8:43 85. Keith, William B. and Kenneth I. H. Williams (The Worcester Foundation for Experimental Biology). The Conversion of Radioactive 17β-Estradiol to Urinary 2-Hydroxyestrone by Euthyroid, Hypo- and Hyperthyroid Hamsters.

8:56 86. Johnson, Clyde Edgar, Jr. (Clark College). Comparative Physiology of Bovine and Porcine Spermatozoa.

9:09 87. Kuenzel, Wayne J. (University of Georgia). Ventromedial Hypothalamic Lesions and Their Effects on Fat Deposition and Other Physiological Phenomena in Migratory Birds.

9:22 88. Moore, Jack H., Daniel P. Griswold, Jr., Charles A. Kelley and Donald J. Dykes (Southern Research Institute). Studies on the Metastasis of the Fortner Plasmacytoma to the Brain and Other Tissues of Hamsters.

9:35 89. Jones, Duvall A. (Carnegie-Mellon University). Hemolysis as a Cause of Green Tissues Among Neotropical Frogs.

9:48 90. Bursey, Robert G. and Wilbur A. Wellband (Medical College of Georgia). Experimental Demonstration of Lymphatic Blockage.

10:01 91. Foreman, Charles W. (University of the South). Hybridization of *Peromyscus* and Human Hemoglobins.

10:14 92. Dowden, Bobby F. (Louisiana State University in Shreveport). Effects of Five Insecticides on the Oxygen Consumption of Bluegill Sunfish, *Lepomis macrochirus.*

10:27 93. Mobberly, William C. (Northeast Louisiana State College). Electrophoretic Analysis of the Molt-Inhibiting Hormone in Crawfish.

10:40 94. Tietjen, William L. and James N. Liles (Georgia Southwestern College and The University of Tennessee). Metabolic Fate of ^{14}C-Isoleucine in Non-Egg-Laying Female *Aedes aegypti* (L.).

10:53 95. Tate, Laurence G. and Larry T. Wimer (University of South Carolina). Changes in the Carbohydrate Content During Metamorphosis of the Blowfly, *Phormia regina.*

11:06 96. Wimer, Larry T. (University of South Carolina). The Non-Glycogen Carbohydrates of the Larval Hemolymph and Fat Body of *Phormia regina.*

ICHTHYOLOGY AND HERPETOLOGY

Basement Auditorium, Georgia Center

Presiding: Dr. Carter R. Gilbert, University of Florida

8:00 97. Gentry, Glenn (Donelson, Tennessee). Notes on Collecting Amphibian Eggs for Research.

8:20 98. Byrd, William W. (Mississippi State University). Sun Compass Orientation in *Gastrophryne carolinensis.*

8:35 99. Shipp, Robert L. (Florida State University). A New Species of Pufferfish (genus *Sphoeroides*) from the Western Gulf of Mexico.

8:50 100. Blaney, Richard M. (Louisiana State University). Systematics of *Lampropeltis getulus* in the Southeastern United States.

9:10 101. Wall, Benjamin R. (University of Alabama). Studies of the Fishes of the Bear Creek Drainage of the Tennessee River System.

9:25 Recess

9:35 102. Rosato, Peter (Mississippi State University). The Potential Danger to Predators of Feeding on Pesticide-resistant Fish.

9:50 103. Podgorny, George (Winston-Salem, North Carolina). Ophidism: A Hazard of Herpetology.

10:10 104. Caldwell, R. Dale (Alabama College). Some Interesting Records of Fishes in the Yellow Creek Drainage, Tishomingo County, Mississippi.

10:25 105. Paxton, John H. (University of Georgia). The Uptake and Metabolism of Trifluralin by Goldfish, *Carassius auratus* (Linnaeus).

10:40 106. Dobie, James L., Robert H. Mount, and George Folkerts (Auburn University). Systematic and Phylogenetic Considerations of the *Graptemys* complex.

FRIDAY AFTERNOON — APRIL 19

PLANT PHYSIOLOGY

SESSION 4A. Phytochemistry, General Metabolism

Room F, Georgia Center

Presiding: Dr. Frederick T. Wolf, Vanderbilt University

2:00 107. Tuck, Linda S. and Raymond W. Holton (University of Tennessee). Further Studies on Water-Soluble Cytochromes from Blue-Green Algae.

2:15 108. Hale, M. G. (Virginia Polytechnic Institute). Loss of Organic Compounds from *Arachis hypogaea* L. Growing in Gnotobiotic Conditions.

2:30 109. Hodges, John D. and Stanley J. Barras (Southern Forest Experiment Station). Carbohydrates and Nitrogenous Compounds in the Inner Bark of Loblolly Pine: Influence of the Southern Pine Beetle and Associated Stain Fungi.

2:45 110. Warren, Charles O., Nora Harvin and William Turner (Southwestern Tennessee,

Memphis). Lactic Acid Fermentation in *Achyla ambisexualis* (Order Saprolegniales).

3:00 Recess

3:15 111. ROBERTS, DONALD R. (Southeastern Forest Experiment Station). Effect of Wounding on the Composition of Slash Pine Oleoresin: A Preliminary Report.

3:30 112. MOHAPATRA, S. C. AND H. E. PATTEE (North Carolina State University and ARS, USDA). Biochemical Changes in Immature Peanuts in Response to Curing Temperature.

3:45 113. LUQUIRE, KAREN B., LINDA B. EDWARDS AND RAYMOND W. HOLTON (University of Tennessee). Studies on Respiration of Pine Pollen.

4:00 114. JOHNS, ELIZABETH B., H. E. PATTEE AND A. E. PURCELL (North Carolina State University and ARS, USDA). Changes of Carotenoids and Lipoxidase Activity in Peanuts during Maturation and Curing.

PLANT PHYSIOLOGY

SESSION 4B. Growth and Development

Room G, Georgia Center

Presiding: Dr. Claud L. Brown, University of Georgia

2:00 115. POWELL, ROBERT D. AND PAGE W. MORGAN (Texas A and M University). Physiology of Hypocotyl Hook Opening.

2:15 116. MULLINS, J. THOMAS (University of Florida). A Model for the Regulation of Hyphal Branching in the Water Molds.

2:30 117. ROUX, STANLEY J. AND JOHN T. MCHALE (Loyola University of the South). Sequence of Ultrastructural Changes in Mesophyll Cells of Senescing Tomato (*Lycopersicon esculentum,* var. Marglobe) Leaves.

2:45 118. RICHARDSON, B., F. W. WAGNER AND B. E. WELCH (USAF School of Aerospace Medicine). Growth of the Oxygen Tolerant Strain of *Chlorella sorokiniana* at Hyperbaric Oxygen Pressures.

3:00 Recess

3:15 119. OMRAN, R. G. AND ROBERT D. POWELL (Texas A and M University). Chilling Effect and Related Changes in *Hibiscus esculentum* L. Plants.

3:30 120. O'DELL, D. H. AND D. E. FOARD (Oak Ridge National Laboratory and East Tennessee State University). Using Colchicine to Determine the Number of Cells Initially Forming A Lateral Root Primordium.

3:45 121. FOARD, D. E. (Oak Ridge National Laboratory). Pattern of Incorporation of Labeled Nucleic Acid Precursors in Wheat Root Pericycle.

4:00 122. BURNS, ROBERT E. (Georgia Experiment Station). Reserve Carbohydrates and Regrowth Pattern of *Lespedeza cuneata.*

4:15 123. AMIN, J. V. (Texas A and M University). Growth and Development of Cold-Injured Cotton Plants.

4:30 124. CARTER, MARYETTE R. AND JOHNNY JACKSON (Atlanta University). The Effects of Ethanol on the Growth of Corn and Pea Roots.

MORPHOGENESIS AND INVERTEBRATE ZOOLOGY

Room L, Georgia Center

Presiding: Dr. J. M. Herr, Jr., University of South Carolina

2:00 125. JENNER, CHARLES E. AND ANNE B. MCCRARY (University of North Carolina and Wrightsville Marine Bio-Medical Laboratory). Marine Commensal Bivalve Mollusks from North Carolina.

2:13 126. DUNDEE, DEE S. (Louisiana State University). Preliminary Survey of Introduced Molluscs of Eastern North America.

2:26 127. HERMANN, PAT W. (University of Georgia). *Omalonyx unguis* (Gastropoda: Pulmonata: Succineidae) from Ecuador.

2:39 128. FRIAUF, JAMES J. (Vanderbilt University). Psammolittoral Gastrotricha (Macrodasyoidea) of the Mississippi Sound Area.

2:52 129. PAULIN, JEROME J. AND WILLIAM B. COSGROVE (University of Georgia). Ultrastructural Changes in the Life Cycle of *Crithidia fasciculata* (Zoomastigophorea, Kinetoplastida, Trypanosomatidae).

3:05 130. HARRISON, FREDERICK W. (University of South Carolina and Presbyterian College). Epidermal Morphology of *Corvomeyenia sp.*

3:18 131. FITZPATRICK, J. F. JR. (Mississippi State University). The Subspecies of the Crawfish *Procambarus hagenianus* (Faxon) (Decapoda; Astacidae).

3:31 132. SPOONER, JOHN D. (Augusta College). Reproductive Behavior of the Fork-tailed Katydid, *Scudderia furcata*: Copulation.

3:44 133. SPOONER, JOHN D. (Augusta College). Reproductive Behavior of the Fork-tailed Katydid, *Scudderia furcata*: Egg-laying.

3:57 134. HERMANN, HENRY R. (University of Georgia). The Poison Apparatus of *Dasymutilla occidentalis* (Hymenoptera: Mutillidae).

4:10 135. SINGHAS, CHARLES A. (Wake Forest University). Teratogenic Effects of Direct X-irradiation on the Otic Vesicle of the Chick Embryo.

4:23 136. DAVIS, J. E. JR., AND NORMAN E. GARRISON (Wake Forest University). Mean Weights of Chick Embryos Correlated with the Stages of Hamburger and Hamilton.

4:36 137. CHEEVERS, SANDRA P. AND ROY HUNTER, JR. (Atlanta University). Some *In Vitro* Effects of Potassium and Sodium Thiocyanate on the Notochord of *Rana catesbeiana* Larvae.

4:49 138. REAMS, W. M. JR., W. H. DORMAN, AND R. E. SHERVETTE (University of Richmond). Hormones and PET Mouse Melanocytes.

5:02 139. MCCRADY, EDWARD (University of North Carolina). *In Vitro* Culture of *Drosophila* Wing Discs.

PARASITOLOGY AND HISTOLOGY

First Floor Conference Room, Georgia Center

Presiding: Dr. Burton J. Bogitsh, Vanderbilt University

2:00 140. WITHERS, JOHN D. (Clark College). A Guide to the Formed Elements in Human Blood Stained with Wright's Stain.

2:13 141. MILLARD, WILLIAM R. AND IOLA T. MCCLURKIN (University of Mississippi). A Histological Study of the Gastric Cardiac Gland in the Beaver (*Castor canadensis*).

2:26 142. MARRA, MARIETTA AND GERALD WISLER ESCH (Wake Forest University). Carbohydrates in Adult and Larval *Proteocephalus ambloplitis* (Cestoda: Proteocephala: Proteocephalidae) from the Small Mouth Bass, *Micropterus dolomieu.*

2:39 143. ROGERS, STEFFEN H. (Vanderbilt University). Aspects of Respiration in *Schistosomatium douthitti.*

2:52 144. SHANNON, W. ALLEN (Vanderbilt University). Ultrastructure of the Caecum of *Schistosomatium douthitti.*

3:05 145. BUCKELEW, THOMAS P. AND FELIX H. LAUTER (University of South Carolina). A Study of the Glycogen Content of the Miracidial Organelles of *Diplodiscus temperatus* (Stafford, 1905).

3:18 146. DAVIS, DONALD A., B. J. BOGITSH, AND D. A. NUNNALLY (Vanderbilt University). Nonspecific Esterase Activity in the Caecum of *Haematoloechus medioplexus.*

3:31 147. NUNNALLY, D. A., B. J. BOGITSH, AND D. A. DAVIS (Vanderbilt University). Nucleases of *Haematoloechus medioplexus.*

3:44 148. POWDERS, VERNON N. (Georgia Southwestern College). Incidence of Parasitism in Two Species of *Plethodon* (Amphibia: Plethodontidae) by *Brachycoelium* (Trematoda: Brachycoeliidae).

3:57 149. KRISSINGER, WAYNE A. AND KRISHNA N. MEHRA (Georgia Southern College). Studies on the Biology of *Proterometra albacauda,* Anderson and Anderson, 1967, an Azygiid Trematode.

4:10 150. WHICKER, MARTHA H. AND FELIX H. LAUTER (University of South Carolina). A Preliminary Report on Gametogenesis and Fertilization in the Heterogonic Life Cycle of *Rhabdias ranae* Walton, 1929.

4:23 151. HOBBS, H. H. III (Mississippi State University). The Possibility of Host Specificity in the Genus *Ornithocythere* (Ostracoda, Entocytheridae).

4:36 152. STEPHENS, RALPH E., MADISON B. COLE, JR., ADA A. COLE, AND J. GORDON CARLSON (The University of Tennessee). Parasitization of *Chortophaga viridifasciata* Eggs by Larvae of *Scelio bisulcus.*

4:49 153. COLLINS, RICHARD F. (Wake Forest University). Helminths of *Natrix spp.* and *Agkistrodon piscivorus* in Eastern North Carolina (Reptilia: Ophidia).

5:02 154. BECKERDITE, FRED W., GROVER C. MILLER, AND REINARD HARKEMA (North Carolina State University at Raleigh). A Review of the Genus *Pharyngostomoides* (Trematoda: Diplostomatidae).

5:15 155. PRICE, CHARLES E. (Augusta College). The Death of Classical Parasitology?

GENETICS, CYTOLOGY, AND PLANT MORPHOLOGY

Room A, Georgia Center

Presiding: Dr. Charles Ray, Jr., Emory University

2:00 156. VARMA, BASUDEO (Georgia Southern College). Interaction between Virus and Susceptibility Gene for Tumor Development in Mice.

2:13 157. BATH, DANIEL W. (University of Mississippi). Linkage Studies on X-ray Induced Semisterility in the Mouse.

2:26 158. BIGGERS, CHARLES J. (University of South Carolina). Serum Protein Polymorphisms in *Peromyscus polionotus.*

2:39 159. FETNER, R. H. AND M. V. ZEHR (Georgia Institute of Technology). Chromosome Aberrations in the Cells of Chinese Hamster (*Cricetulus griseus*) Embryos after Paternal X-radiation.

2:52 160. COLE, MADISON B., JR., ADA A. COLE, AND J. GORDON CARLSON (University of Tennessee). Action of Puromycin Dihydrochloride on Protein Synthesis and Mitosis.

3:05 161. RISINGER, LARRY D. AND FELIX H. LAUTER (University of South Carolina). A Morphological and Cytochemical Study of *Hexamitus batrachorum* Swezy, 1915.

3:18 162. ALDRICH, HENRY C. (University of Florida). Ultrastructure of Mitosis in Plasmodia and Myxamoebae of *Physarum flavicomum.*

3:31 163. CALHOUN, FORD AND H. BRANCH HOWE, JR. (University of Georgia). Nuclear Movement During Development of Four-Spored and Eight-Spored Asci in *Neurospora tetrasperma.*

3:44 164. BALLAL, S. K. AND NICHOLAS P. FARRELL (Tennessee Technological University). The Effectiveness of Phenanthrene as a Radiomimetic Agent.

3:57 165. BEATTY, A. V. AND H. L. DAVIS (Emory University). Electron Microscopic Studies on the Periplasmodium of *Tradescantia.*

4:10 166. DAVIS, H. L. AND A. V. BEATTY (Emory University). The Ultrastructure of Irradiated Microspores.

4:23 167. TAYLOR, FRED G., JR. (Oak Ridge National Laboratory). Tissue Anomalies in Tree Species Following Fast Neutron or Gamma Irradiation.

4:36 168. YEATS, FRED T. (University of Mississippi and University of South Carolina). Development of the Gametophyte of *Woodwardia areolata* in Sterile Culture: The Effects of Exogenous Sucrose.

4:49 169. HERR, J. M., JR. AND DAVID H. REMBERT, JR. (University of South Carolina). Some Effects of Low Temperature Treatment on Sporocarp Germination and Gametophyte Development in *Marsilea* L.

5:02 170. REMBERT, DAVID H., JR. (University of South Carolina). Megaspore Tetrad Patterns in Leguminosae.

5:15 171. ANDERSON, C. E. AND R. W. SEIBERT (North Carolina State University). Seedling Development in *Juncus roemerianus.*

ECOLOGY

Room K, Georgia Center

Presiding: Dr. Dirk Frankenberg, University of Georgia

2:00 172. TENORE, KENNETH R. (North Carolina State University). Effect of Bottom Substrates on the bivalve, *Rangia cuneata.*

2:13 173. BURBANCK, W. D. AND B. J. M. KELLEY, JR. (Emory University). Effects of Salinity and Acute Gamma Irradiation on the Osmoregulation of Juvenile and Adult Anthurid Isopods, *Cyathura polita.*

2:26 174. MENZEL, R. W. (Florida State University). The Species and the Distribution of Quohog Clams (*Mercenaria*).

2:39 175. MCCASKILL, VON H. AND RUDOLPH PRINS (Clemson University). Stoneflies (Plecoptera) of Northwestern South Carolina.

2:52 176. GITTLESON, STEPHEN M. (University of Kentucky). Specific Gravities of Microorganisms.

3:05 177. WHITING, P. W. (Oak Ridge National Laboratory). How Long Will Diapause Larvae of *Mormoniella* Live?

3:18 178. WILLIAMS, ROGER G., MICHAEL H. SMITH, AND JAMES L. CARMON (University of Georgia). Influence of Temperature Upon the Susceptibility to Acute Irradiation in *Peromyscus polionotus.*

3:31 179. WELLS, J. R., J. L. CARMON, AND M. H. SMITH (University of Georgia). The Effect of Temperature and Radiation on Litter Size in *Peromyscus polionotus.*

3:44 180. WAGNER, C. KENYON (University of Georgia). Environmental Control of Oxygen Consumption in Cotton Rats.

3:57 181. MOORE, CLIFTON H., RONALD BLESSING, AND MICHAEL H. SMITH (Savannah River Ecology Laboratory). Variation of Pelage Color in Species of Mice.

4:10 182. JACKSON, CRAWFORD G., JR. (Mississippi State College for Women). A Study of Allometric Growth in *Pseudemys concinna suwanniensis* Carr (Order: Testudinata).

4:23 183. MAHONEY, JOSEPH J., JR. (University of Georgia). Photoperiod Acclimation of High Temperature Tolerance in Tropical and Temperate Frogs.

4:36 184. HARVEY, MICHAEL J., JAMES W. HARDIN, AND ROGER W. BARBOUR (Memphis State University and University of Kentucky). Movements of the Eastern Worm Snake, *Carphophis amoenus amoenus.*

4:49 185. MCCAULEY, ROBERT W. (Waterloo Lutheran University). Upper Lethal Temperatures and the Distribution of Fresh Water Fish.

PLANT ECOLOGY

Auditorium, Georgia Center

Presiding: Dr. A. W. Cooper, North Carolina State University

2:00 186. WITHERSPOON, J. P. (Oak Ridge National Laboratory). Genetic Factors Relating to Radiosensitivity of *Populus deltoides.*

2:13 187. DAYTON, BRUCE R. (University of North Carolina and Savannah River Ecology Laboratory). Cycling of Radiostrontium by Loblolly Pines (*Pinus taeda* L.).

2:26 188. MILLER, GARY L. (University of North Carolina). The Influence of Season on the Radiation Sensitivity of an Old Field Community.

2:39 189. EDMISTEN, JOE A., REX CRAIG, MIKE HARRELSON, AND JANE WATTS (University of Georgia). Leaf Epiphytes and Nitrogen Fixation.

2:52 190. DUEVER, MICHAEL J. (University of Georgia). A Structural Description of Second Growth Vegetation in Eastern Panama.

3:05 191. CHILD, GEORGE I. (University of Georgia). Four Tropical Forests of Eastern Panama; a Structural Comparison.

3:18 192. WHIGHAM, DENNIS (University of North Carolina). Vegetational Patterns Along an Altitudinal Gradient — Community or Continuum?

3:31 193. STALTER, RICHARD (University of South Carolina). An Ecological Study of a Mature Stand of *Pinus taeda* of the Congaree Swamp.

3:44 194. BATSON, WADE T. (University of South Carolina). Preliminary Report of a Botanical Survey at Georgetown, South Carolina.

3:57 195. WARE, STEWART A. (College of William and Mary). Southern Mixed Hardwood Forest in the Virginia Coastal Plain.

4:10 196. BURK, C. JOHN (Smith College). Phytogeography of Three Sections of the Massachusetts Coast.

4:23 197. ALEXANDER, TAYLOR R. (University of Miami). Effects of Hurricane Betsy (September '65) on the Florida Southeastern Saline Everglades — A Two Year Study.

4:36 198. PLUMMER, G. L. (University of Georgia). Remote Sensing for Plant Ecological Studies on a Watershed in Georgia.

4:49 199. RIVERS, ROBERT H. AND G. L. PLUMMER (University of Georgia). Moisture Depletion Within Crop-Soil Sites.

5:02 200. STUBBLEFIELD, SAMUEL M., JR. (Tennessee Technological University). Correlations between Soil Moisture and Vegetational Types of an Island.

5:15 201. ROGERS, HOLLIS J. (University of North Carolina). Conservation of Plant Species.

ICHTHYOLOGY AND HERPETOLOGY

Basement Auditorium, Georgia Center

Presiding: Dr. Denzel E. Ferguson, Mississippi State University

2:00 202. WILLIAMS, JAMES D. AND HERBERT T. BOSCHUNG (University of Alabama). Distribution and Variation of the Flame Chub, *Hemitremia flammea* (Jordan and Gilbert).

2:15 203. WARD, JAMES W. (University of Mississippi Medical Center). Hematological Studies on the Australian Lungfish, *Neoceratodus forsteri* Krefft.

2:30 204. SEAMAN, WILLIAM (University of Florida). Distribution and Variation of the American Cyprinid Fish *Notropis hudsonius* (Clinton).

2:45 205. SMITH, GARY C. (University of Georgia). Territorial Behavior of the Dwarf Cichlid, *Apistogramma ramirezi.*

3:05 206. HASTINGS, ROBERT W. (Florida State University). Ecology and Life History of the Diamond Killifish, *Adinia xenica* (Jordan and Gilbert).

3:20 Recess

3:30 207. GIBSON, JAMES R. (Mississippi State University). Sources of Error in the Fish-brain Acetyl Cholinesterase Activity as a Monitor for Pollution.

3:45 208. GILBERT, CARTER R. (University of Florida). A Mass Shoreward Movement of Demersal Fishes on the East Coast of Florida in September, 1962.

4:00 209. WOOLCOTT, WILLIAM S. (University of Richmond). Hybridization Between the Percid Fishes *Percina notogramma* (Raney and Hubbs) and *Percina peltata* (Stauffer) in Virginia.

4:15 210. SWIFT, CAMM C. (Florida State University). Variation and Distribution of the American Cyprinid Fishes *Notropsis texanus* and *Notropis chalybaeus.*

4:30 211. LUDKE, JAMES LARRY AND CHARM MCINGBALE (Mississippi State University). Oxygen Consumption in Susceptible and Endrin-resistant *Gambusia* During Sublethal and Acute Endrin Exposure.

4:40 212. RELYEA, KENNETH (Jacksonville University). Comments on the Distribution and Systematics of Southeastern Killifishes (family Cyprinodontidae).

5:00 213. BERRY, FREDERICK H. (Tropical Atlantic Biological Laboratory). BCF Field Guides to Western Atlantic Fishes: Carangidae.

Conference on Distributional History of Invertebrate Biota of Southern Appalachians to be Sponsored by Virginia Polytechnic Institute and ASB

A conference on the distributional history of the invertebrate biota of the Southern Appalachians will be held at Virginia Polytechnic Institute from June 27 to 29, 1968. The conference will be sponsored by Virginia Polytechnic Institute and the Association of Southeastern Biologists — and is being arranged by Dr. Perry C. Holt and Dr. Harrison R. Steeves, III, both of Virginia Polytechnic Institute.

Participants in the conference will address themselves to such questions as: a) Evidence that the Southern Appalachians have been an important center of speciation and evolution, b) The geological antiquity of the area and its effects on the evolution of organisms, c) The parts played by geographical barriers and ecological changes on organisms, d) Geographical relations between the Southern Appalachians and other areas of the world, and e) Evidences that the region has been an important refugium during past climatic changes.

The program, based on five formal sessions and an evening informal discussion, will consist of thirteen invited papers — and additional systematists with known interests in the area will be invited to attend and participate in the discussions. Invited participants in the symposium include the following: **Dr. Thomas C. Barr,** University of Kentucky, carabid beetles; **Dr. John Burch,** University of Michigan, land snails; **Dr. George Byers,** University of Kansas, mecoptera; **Dr. Joseph F. Fitzpatrick, Jr.,** Mississippi State University, crayfishes; **Dr. John T. Hack,** U. S. Geological Survey, geology; **Mr. C. W. Hart, Jr.,** Academy of Natural Sciences of Philadelphia, entocytherid ostracods; **Dr. Horton H. Hobbs, Jr.,** U. S. National Museum, crayfishes; **Dr. Richard L. Hoffman,** Radford College, millipedes; **Dr. John Holsinger,** East Tennessee State University, amphipods; **Dr. Perry C. Holt,** Virginia Polytechnic Institute, branchiobdellid worms; **Dr. William R. Murchie,** University of Michigan, earthworms; **Dr. Robert D. Ross,** Virginia Polytechnic Institute, geology; and **Dr. Harrison R. Steeves, III,** Virginia Polytechnic Institute, isopods.

Abstracts of Papers Presented at the 29th Annual Meeting of the Association of Southeastern Biologists

The number in parenthesis at the top of each abstract refers to the number of that paper in the program.

(162)
Ultrastructure of Mitosos in Plasmodia and Myxamoebae of *Physarum flavicomum*

HENRY C. ALDRICH, *University of Florida*

Mitotic divisions in the plasmodial or diploid stage of *Physarum flavicomum* are of a strikingly different type than those in the myxamoebae or haploid stages. Plasmodial mitosis is characterized by an intranuclear spindle and the absence of centrioles and asters at the poles, much as in protozoa. In contrast, mitosis in the myxamoeba is characterized by breakdown of the nuclear envelope at prometaphase and the presence of centrioles and asters at the poles, details of the process being similar to mitosis in animal cells. Possible applications of this observation in determining ploidy of a given stage in the life cycle, as well as the phylogenetic aspects, will also be discussed.

(197)
Effects of Hurricane Betsy (September '65) on the Florida Southeastern Saline Everglades — A Two Year Study

TAYLOR R. ALEXANDER, *University of Miami*

Salt water flooding and impoundment caused a salinity level in soil-water approaching sea water in concentration that selectively affected plants over a large area. Damage was severe even on some salt-tolerant species. Tree islands and the surrounding marl prairies were affected to different degrees by the salt water. Plant kill for some species such as sawgrass was as high as ninety six percent in the marl soils. Most of the West Indian broad-leaved plants failed to survive in the tree islands. Monthly chloride and electrical conductivity measurement of soils showed that the area returned to normal salinity values within one to two months after the storm. Measurements of plant recovery indicate a slow rate. There are areas in which one plant species has been replaced by another. The most spectacular is the replacement of sawgrass (*Cladium jamaicense* Crantz) by spikerush (*Eleocharis cellulosa* Torr) in the marl prairie.

(123)
Growth and Development of Cold Injured Cotton Plants

J. V. AMIN, *Texas A & M University*

The results of a study of growth and development of cold injured cotton plants indicate that the extent of cold injury in cotton plants may be determined by an interaction of plant physiological malfunction and environmental stress. The climate immediately after the cold exposure appears to influence the recovery of the plants. Expression of chill damage may be increased if the low temperature period is followed immediately by bright sunny days, however if the low temperature period is followed by cloudy weather damage may be decreased. Also, night temperatures below 15 C may retard the recovery of damaged cotton.

The effects of vitamins and IAA on the recovery of the plants suggested that the chilled cotton plants develop temporary metabolic lesions during their recovery. These results also indicate that it may be possible to use chemicals to overcome the effects of low night temperatures and to establish rapid recovery in chilled injured cotton plants.

(171)
Seedling Development in *Juncus roemerianus*

C. E. ANDERSON AND R. W. SEIBERT, *North Carolina State University*

Seeds of *Juncus roemerianus* have been germinated in the laboratory. Although *Juncus roemerianus* is primarily a brackish water species, the seeds germinate readily in distilled water while various salt concentrations tend to inhibit germination. The seed itself seems to contain a simple fleshy cotyledon. Germination procedes at the micropylar end with elongation of the cotyledon-petiole. Roots are initiated at the base of the cotyledon-petiole, and a plumule is formed inside it. The plumule protrudes through the side of the petiole and emerges as the primary leaf.

(164)
The Effectiveness of Phenanthrene as a Radiomimetic Agent

S. K. BALLAL AND NICHOLAS P. FARRELL, *Tennessee Technological University*

It has been known for a long time that certain chemicals have radiomimetic and carcinogenic properties. Phenanthrene belongs to the family of suspected carcinogens, and the male sex hormones are the cyclopentaphenanthrene derivatives. For this reason phenanthrene was chosen to study its possible effectiveness as a radiomimetic agent. Root meristems of onion, rye grass, and clover were treated with 50% phenanthrene in well-ground alumina for 24 hours, after which the root tips were fixed in 3:1 Carnoy's for 24 hours. The tissue was hydrolysed in 6N HCl and stained with Feulgen's for one hour, and examined. There was no significant aberrated figures noticed in clover and onion root tips. However, in the case of rye grass, the number of cell divisions had increased considerably over the controls, and a slight radiomimetic effect was evident as measured by the induction of aberrations in the chromosomes, the single and double bridges being more common than the single and double dot deletions.

(76)
Iron Neuston Communities

STUART S. BAMFORTH, *Tulane University*

Shallow standing waters of high organic content often support associations of iron filamentous bacteria and/or *Anthophysa* at the surface. The sheaths and stalks of these organisms provide an elaborate branching substrate for non-filamentous bacteria, and with the numerous spaces, a mixing place for swimming, gliding, and interface protists. The latter represent all taxons, exhibit all body types, and occur at all trophic levels. Such associations provide excellent examples for the study of diversity indices. Iron organisms are "gradient organisms"

from the standpoint of pH-Eh considerations, and the occurrence of these associations in waters of widely different ionic concentrations presents interesting problems in the ecology of free-living protists.

(31)
Water-Use Efficiency during Cyclic Variation in Gas Exchange in Cotton and Pepper

HENRY D. BARRS, *Duke University and C.S.I.R.O., Australia*

Water-use efficiency, measured as the ratio of photosynthesis to transpiration, was followed during induced cyclic variation in gas exchange in a controlled environment. The variations in photosynthesis and transpiration were in phase, and water-use efficiency remained constant over a wide range of gas exchange rates, even though considerable water stress developed at peak exchange rates. Water-use efficiency similarly remained constant as gas exchange rates declined following the excision of a sunflower leaf which was not showing cyclic behaviour.

These results are consistent with the view that mesophyll resistance to inward diffusion of CO_2 is unimportant in these species. They also suggest that foliar application of chemical antitranspirants is unlikely to increase water-use efficiency.

(30)
Causes of Cyclic Changes in Transpiration in Pepper, Sunflower and Cotton Plants

HENRY D. BARRS AND BETTY KLEPPER, *Duke University and C.S.I.R.O., Australia*

Using plants grown in culture solution and transferred to a controlled environment, cyclic changes in stomatal aperture, transpiration, and leaf water potential were measured. Such changes could occur spontaneously in cotton, although they were usually induced by illumination following a 20 minute dark period. For cycling to occur in pepper and sunflower, additional treatment of the roots was necessary.

The roots are identified as the site of the major resistance to water flow through the plant. Root resistance varied diurnally, increasing at night. This resistance was considered to be the first link in the chain of events leading to cycling. Hydropassive stomatal movements facilitated cycling in pepper and cotton, but were apparently absent in sunflower. Plant resistances may indirectly be of importance in the movement of water from the plant to the air.

(60)
Germination of Twelve Species from the Middle Tennessee Cedar Glades

JERRY M. BASKIN, *University of Florida* AND CAROL CAUDLE, *Vanderbilt University*

Requirements for the germination of 12 species from the cedar glades of Middle Tennessee were investigated. Treatments which induced high germination percentages included stratification, after-ripening in dry storage, low temperature, and imbibition in solutions of gibberellic acid and thiourea. The germination requirements of these 12 species will be discussed in relation to germination and seedling establishment in nature.

(157)
Linkage Studies on X-Ray Induced Semisterility in the Mouse

DANIEL W. BATH, *University of Mississippi*

Thirty-eight semisterile lines have been established from the progeny of irradiated male mice (640r or 700r of X-rays) with markers in six linkage groups. Semisterility is inherited in each of the lines and appears due to reciprocal translocations. This has been cytologically verified in some lines. Genetic analysis for association of markers has been carried out on all lines. Five lines show linkage between two of the markers employed. Of these, three show association of linkage groups I and VIII. Chi square values for independence are 25.7 ± 2.5, 11.8 ± 1.5, and 15.0 ± 1.9, with indicated recombination frequencies of 15.7 ± 5.1, 21.9 ± 7.3, and 23.3 ± 6.4 per cent. Two lines show associations between linkage groups III and XIV (Chi square for independence, 12.6 ± 1.9; indicated recombination frequency 24 $\pm$ 8.5 per cent) and between VIII and XIV (Chi square for independence, 14.9 ± 1.9; indicated recombination frequency, 29.1 ± 4.9 per cent). The line involving VIII and XIV is known cytologically to have a reciprocal translocation.

(194)
Preliminary Report of a Botanical Survey at Georgetown, South Carolina

WADE T. BATSON, *University of South Carolina*

An inventory of the green plants and a study of certain related ecological considerations on the Belle W. Baruch Foundation plantation at Georgetown, South Carolina, were initiated during the summer of 1967. To date, the accomplishment of three objectives has been undertaken. They are: 1) a qualitative and seasonal distribution study of the fresh water algae, 2) a floristic analysis of the vascular flora with relation to soil type, and 3) an ecological study focused on the salt marshes with an effort to recognize and describe the physical features, map the vegetation zones, find the factors influencing the distribution of the plants occurring there, and to study productivity.

(165)
Electron Microscopic Studies on the Periplasmodium of *Tradescantia*

A. V. BEATTY AND H. L. DAVIS, *Emory University*, Atlanta, Ga.

Developing microspores between meiosis and the first microspore division in the anthers of *Tradescantia paludosa* have been studied. The material was fixed either in 5% potassium permanganate for two minutes at room temperature or in glutaraldehyde-osmium tetroxide series in an ice bath. The material was embedded either in methacrylate or epon-araldite mixtures. Some of the organelles in the periplasmodium which was formed by the breakdown of the cell walls of the tapetal cells seem to be in an active state. A comparison will be made between these organelles and those found inside of the developing microspore.

(154)
A Review of the Genus *Pharyngostomoides* (Trematoda: Diplostomatidae)

Fred W. Beckerdite, Grover C. Miller, and Reinard Harkema, *North Carolina State University at Raleigh*

An investigation was undertaken to determine whether two morphological forms presently designated as *Pharyngostomoides procyonis* Harkema, 1942, are actually two species. The morphology of the larval and the adult forms is described. The development of the fluke from the egg to the production of cercariae is described.

Due to the differences in morphology of both the cercariae and the adults, it is concluded that there are two species. *Pharyngostomoides procyonis* is redescribed to include only one form. *Pharyngostomoides ovalis* Chandler and Rausch, 1946, is reinstated as the second species.

(18)
Non-Induced Cellulolytic Enzymes of *Diplodia zeae* (Schw.) Lev.

J. N. BeMiller, D. O. Tegtmeier, and A. J. Pappelis, *Southern Illinois University*

The cellulolytic enzymes of *Diplodia zeae* appear to be constitutive. Cellulolytic activity is found even in high concentrations of D-glucose, with or without cellulose in the medium. This activity occurs on the surface of the fungal hyphae and is released to the culture medium only when most of the available carbohydrate is used up. It is suggested that enzyme release plays an important role in measurements of enzyme production and control of enzyme synthesis. Cellulolytic enzymes are released from the hyphal surface by polygalacturonate, lignosulfonate, and 2-mercaptoethanol, suggesting that it is bound in part by electrostatic forces. These same compounds release cellulolytic activity adsorbed on cellulose particles.

(17)
Effects of Ethylene on Auxin Transport and Abscission

Elmo Beyer, Jr. and Page W. Morgan, *Texas A & M University*

The ability of ethylene to inhibit basipetal auxin transport is directly related to the length of the ethylene fumigation period. Previously, we reported such a time sequence effect of ethylene on auxin transport. Extended studies of this phenomenon using refined techniques demonstrate that ethylene significantly reduces auxin transport in cotton stem sections after plants are fumigated for only 3 hours. The magnitude of this reduction in transport, as well as an increase in the rate of IAA-1-^{14}C decarboxylation, parallels the length of the ethylene fumigation period. Preliminary studies also indicate an ethylene mediated reduction in transport velocity. The significance of changes in decarboxylation and transport velocity are discussed with regard to the phenomenon of ethylene mediated transport reduction.

Results of abscission tests of intact cotton plants fumigated with ethylene show that the change in auxin transport precedes by several hours ethylene induced abscission. This observation strengthens the previous suggestion (Morgan and Gausman, Plant Physiol. 41:45, 1966) that exogenous ethylene accelerates abscission, at least in part, through its effect on auxin transport.

(158)
Serium Protein Polymorphisms in *Peromyscus polionotus*

Charles J. Biggers, *University of South Carolina*

Serum protein polymorphisms were investigated in 180 oldfield mice, *Peromyscus polionotus,* collected from three major localities along an eighty mile transect in South Carolina. Transferrins, albumins and other proteins were separated by polyacrylimide gel electrophoresis. Transferrin activity was confirmed by the Ornstein procedure. Six transferrin variants consisted of three single band and three double band phenotypes. Two of the six transferrin variants occurred at the northeastern-most collection site, whereas all six variants were found at the southernmost locality. Albumin variants appeared both in mice collected from the wild and within a laboratory colony of *P. polionotus* established from mice collected in Aiken County, S. C. Two variants of pre-albumin and three post-albumin variants also appeared. Geographical distribution of these variants is of interest in the evolutionary development of this species.

(46)
Ultrastructure of *Pilimelia anulata* (Actinoplanaceae)

Charles E. Bland, *University of North Carolina*

The ultrastructural features of the hyphae and sporangia of a keratinophilic member of the Actinoplanaceae, *Pilimelia anulata,* were studied with electron microscopy. Colonies growing on hair were found to be composed of two hyphal types; substrate or vegetative hyphae, and palisade or sporangium forming hyphae. The substrate hyphae, which branched throughout the inner matrix of the hair, contained numerous intracytoplasmic membranous bodies which were often closely appressed to the finely fibrillar nuclear material.

The sporangia, which appeared to be formed by a process similar to that described by Lechevalier, Lechevalier, and Holbert (1966) for other members of the Actinoplanaceae, contained parallel rows of cylindrical spores that originated from a source at the base of the sporangia. A single membranous body was observed in almost every spore sectioned. The membranous bodies of the spores appeared to arise from the plasma membrane and then to become closely associated with the nuclear region. Possible functions of the membranous bodies of *P. anulata* were considered in the light of functions proposed by other investigators for similar structures in *Streptomyces sp.* and other bacteria.

(79)
Supplementary Food and Population Dynamics of the Old-Field Mouse

Ronald W. Blessing and Michael H. Smith, *Savannah River Ecology Laboratory*

Supplementary food, 50 pounds of wild bird seed every ten days, was added to one half of a 9 acre field. The population was censused by live trapping and burrow counts at periodic intervals. Mice on the treated half (food added) built more burrows, showed a higher reproductive rate, less movement between successive captures, an increased density during the winter but not during the summer, and approximately the same average body weight as the mice on the untreated half of the field. At the end of the first year, we doubled the amount of food added per unit time per unit area. Similar trends are apparent in the data for the first half of

the second year. Thus, food appears to be important as a limiting factor in the population dynamics of the old-field mouse, *Peromyscus polionotus,* in South Carolina.

(8)
Effects of Ca and Sr on Maize Seedling Primary Roots

ELDON BONDS, *Tennessee Wesleyan College* AND JOSEPH C. O'KELLEY, *University of Alabama*

Either Ca or Sr in a mineral nutrient medium prevented toxic effects of other nutrient ions an aerated primary roots of maize; other monovalent and divalent cations substituted for these did not. Calcium in the complete nutrient solution, or as $CaCl_2$ alone, stimulated the division of apical meristem cells in these roots, but Sr did not. However, the replacement of Ca in the nutrient medium by Sr resulted in the development of additional secondary roots, probably by decreasing the rate of cell division in the apical meristem of the primary root and diminishing apical dominance.

(53)
The Use of Glass Micro-beads in the Study of Soil Fungi

P. E. BOSTICK, *Emory University*

One of the characteristics of soil that is usually neglected in field and laboratory studies of soil microbiology is its particulate nature. A method is described whereby fungi may be cultivated hydroponically in containers filled with glass micro-beads saturated with a nutrient solution. Four bead sizes are commercially available and these correspond to three of Wentworth's particle size classes: 1-1.05 mm dia. ("very coarse sand"), 0.45-0.50 and 0.25-0.30 mm dia. ("medium sand"), and 0.17-0.18 mm dia. ("fine sand"). Czapek-Dox liquid medium at pH 7.2 seems to be satisfactory for the growth of most fungi in these systems. Growth may be measured as millimeters of gas evolved, weight loss from the entire system, and by dry weight of the mycelium. An example of correlation of field observations with laboratory micro-bead experiments will be presented.

(43)
Correlation of Environmental Factors and Known Distribution of *Taxus canadensis* Marsh, in Kentucky

EDWARD T. BROWNE, JR., *Memphis State University*

Until 1967 *Taxus canadensis* in Kentucky was known from only two locations in one county. Last year a second county record was reported, and it has since been discovered in a third. In all known localities this species has been determined to grow in soils derived from limestone, and all localities thus far reported are situated along rivers or creeks at points where these cross either the Pottsville or Waverly escarpment. Exposure does not seem to be a factor involved since stations occur on north, west and south slopes. However, climatological data may help to explain the disjunct distribution of this species since correlations may be observed between January and July mean maximum and minimum temperatures and other factors. These factors would seem to indicate that *T. canadensis* probably occurs over a much wider range than has been heretofore suspected.

(145)
A Study of the Glycogen Content of the Miracidial Organelles of *Diplodiscus temperatus* (Stafford, 1905)

THOMAS P. BUCKELEW AND FELIX H. LAUTER, *University of South Carolina*

The miracidia of *Diplodiscus temperatus* (Stafford, 1905) were stained by the Bauer-Feulgen Method specific for glycogen. Two variables were presented in the study. First, the miracidia were allowed to swim in filtered pond water for specific intervals of time. After swimming for varying lengths of time, the miracidia were stained by the Bauer-Feulgen Method. Secondly, the filtered pond water in which the miracidia were swimming was aerated to determine the effect of aeration on the utilization of glycogen. A control was effected in the use of 5% diastase to hydrolyze the glycogen. The purpose was to determine in which organ or organelle the glycogen was located, how fast it was depleted, and to what extent it was present. From these premises, it was concluded that the glycogen content diminished as the miracidia approached terminal time. The aeration of the filtered pond water decreased the utilization of glycogen and the length of terminal time. These results provided a number of postulations.

(173)
Effects of Salinity and Acute Gamma Irradiation on the Osmoregulation of Juvenile and Adult Anthurid Isopods, *Cyathura polita*

W. D. BURBANCK AND B. J. M. KELLEY, JR., *Emory University*

The ability to osmoregulate was determined by cryoscopic measurement of the depression of freezing points of the body fluid of juvenile and adult cyathurans which received a dose of about 44,000 r from the Cs 137 source at Emory University and were subjected to salinities of from 0 to 40 o/oo. Laboratory experiments were performed on animals obtained from St. John's River at Green Cove Springs, Florida (0.5 o/oo salinity). At low salinities (experimental period of 3 hours) adults and juveniles were equally able to regulate, but at 40 o/oo (NaCl), adult *C. polita* were better able to osmoregulate than juveniles whether irradiated or non-irradiated, and non-irradiated animals regulated better than irradiated ones. Pilot studies of non-irradiated adult and juvenile cyathurans exposed to sea water dilutions for 24 and 48 hours again showed reduced ability of juveniles to regulate at higher salinities. This differential ability may cause a high mortality of juveniles in nature and in part account for the disjunct estuarine distribution of *C. polita.* (Work supported by NSF Grant GB-3122, AEC Grant AT-(40-1)-2412, and McCandless Fund, Emory University.)

(196)
Phytogeography of Three Sections of the Massachusetts Coast

C. JOHN BURK, *Smith College*

Tundra vegetation probably existed on Nantucket Island when Outer Cape Cod and the Elizabeth Islands were under the ice of the last glaciation. These three sections were part of a common land mass of glacial deposits lying over an ancient coastal plain in eastern Massachusetts which were separated by the rising sea level not more than 5000 years ago at a time when the climate was as warm as the present or warmer. At pres-

ent a greater number of native vascular plant species occurs in all three sections than would be predicted if the floras of the sections were composed of species randomly distributed from a common source; any two sections (Nantucket-Outer Cape, Elizabeth Islands-Outer Cape, Nantucket-Elizabeth Islands) share nearly the number of species predicted on this basis; and the number of independently-held species for each section is greater than predicted. The phytogeography will be discussed in relation to these factors.

(122)
Reserve Carbohydrates and Regrowth Pattern of *Lespedeza cuneata*

ROBERT E. BURNS, *Georgia Experiment Station*

The persistence of Sericea (*Lespedeza cuneata* cum de cours G. Don) is affected by cutting late in the season prior to senescence. In this study, roots were collected at the time of clipping for hay between mid-July and early September and again in January from similarly treated plants. The reserves in the roots collected at time of harvest were larger in those clipped after mid-August. The reserves in the January samples declined abruptly in those plants clipped after mid-August. Regrowth of plants clipped before mid-August was from stem buds, and after mid-August from root buds. This latter growth pattern apparently depleted the root reserve and caused decrease in stands in subsequent years.

(90)
Experimental Demonstration of Lymphatic Blockage

ROBERT G. BURSEY AND WILBUR A. WELLBAND,
Medical College of Georgia

Dilatation of retrosternal lymphatic channels in rats has been observed radiographically following the intraperitoneal injection of a fine suspension of barium sulfate (Micropaque). The functional status of these vessels is unclear and is the subject of the present paper. Varying concentrations of Micropaque were injected intraperitoneally in 65 rats, while 55 controls received Ringer-Locke solution. After 30 days all rats were given intraperitoneal injections of protein bound Evans blue dye, intradermal injections of formalin, and ear crush. The animals were sacrificed 4, 5, 7, and 10 hours later. A blood sample was obtained and the degree of lymph vessel coloration and dye extravasation in the skin lesions noted.

Dye extravasation at injury sites appeared later in experimental rats and seldom attained the intensity of controls. The degree of lymph vessel coloration and plasm dye concentration in the Micropaque treated animals was significantly less than the control rats. Thorax x-rays confirmed dilatation of the retrosternal and diaphragmatic lymphatics in experimental rats. It was concluded that intraperitoneal injections of Micropaque produced a partial block in the lymphatics draining the peritoneal cavity.

(163)
Nuclear Movement During Development of Four-Spored and Eight-Spored Asci in *Neurospora tetrasperma*

FORD CALHOUN AND H. BRANCH HOWE, JR.,
University of Georgia

Serial dissections of approximately 100 wild type, four-spored asci with homokaryotic ascospores showed that the m/m, m/m, +/+, +/+, allelic pattern occurred exclusively. The four-spored ascus is therefore linearly ordered, and the occurrence of nuclear passing is indicated at both the second and third divisions during ascus development. This species produces eight-spored asci, and a smaller proportion of four-spored asci, in crosses which are heterozygous for the *E* locus. Serial dissections of 273 eight-spored asci from such crosses, which were also segregating for several other markers, showed that about half of the asci were linearly ordered, in that members of each of the four spore-pairs were identical; with respect to a centromere marker, all three allelic arrangements (4:4, 2:2:2:2, and 2:4:2) were found. The remainder of the eight-spored asci analyzed showed varying degrees of disorder, in that members of one or more spore-pairs were non identical. Certain second divisional nuclear movements are postulated as the cause of the ordered and disordered ascospore patterns observed. About 100 four-spored asci from these same heterozygous *E* crosses showed the same single allelic pattern that had been found in the wild type, four-spored asci in which *E* was not present.

(124)
The Effects of Ethanol on the Growth of Corn and Pea Roots

MARYETTE R. CARTER AND JOHNNY JACKSON,
Atlanta University

Corn grains (*Zea mays* L. var. Hasting's Prolific) and pea seeds (*Pisum sativum*, var. Alaska) were cultured in the dark for 3 days in distilled water or in various dilute solutions of ethyl alcohol (0.0001-4.0%). The results showed that root elongation and root dry weight were increased significantly in both kinds of plants by the more dilute concentrations of alcohol (0.0001 and 0.001%). However, at higher levels (2.0 and 4.0%) severe retardation of root growth was apparent. Insofar as the enhancement of total root elongation and total root dry weight, corn was considerably more responsive to the alcohol treatment than peas. Yet, the promotive effect of ethanol on cell elongation appeared not to differ significantly between the two types of plants. These results support the concept that dilute ethanol may materially affect growth and metabolism in plants where it is used as a solvent for certain growth regulating substances.

(84)
A Numerical Evaluation of the Cells of the Corpora Lutea of Pregnancy of the Golden Hamster (*Mesocricetus auratus* Waterhouse)

CHARLES A. CATCHING AND WILLIAM W. NORRIS, JR.,
Northeast Louisiana State College

The weight and absolute cell numbers of developing hamster corpora lutea were measured at 3, 6, 9, 12, and 15 days of pregnancy. The weight of the corpora lutea increased from approximately 0.00025 g. at 3 days to approximately 0.00130 g. at 15 days. The corpora lutea were homogenized and the nuclei counted in a hemocytometer. The total number of cells per corpus luteum increased from day 3 to day 6 and from day 6 to day 9, appeared to decline from day 9 to day 12, and declined rapidly from day 12 to day 15. The number of luteal and non-luteal cells per corpus luteum followed a similar pattern. The percent luteal cells averaged near 30% for all corpora lutea evaluated.

(61)
Hydro-economy of *Astragalus tennesseensis* (Leguminosae)

CAROL CAUDLE AND ELSIE QUARTERMAN,
Vanderbilt University

Astragalus tennesseensis Gray is a herbaceous perennial legume endemic to the cedar glades of Middle Tennessee and northern Alabama. During the summer, when the shallow layer of soil in the cedar glades becomes very dry, *A. tennesseensis* does not become dormant but remains active. An investigation to determine the adaptations of *A. tennesseensis* to this seasonally-arid habitat included transpiration studies. Results indicate that transpiration rates were greatly reduced when soil moisture was near permanent wilting percentage. However, prolonged exposure of plants to drought conditions, produced by different intervals of watering, did not reduce transpiration rates per unit area of leaf at the conclusion of drought conditions. Plants responded to drought periods of 9 days or longer by losing leaves. Thus, reduction of total transpiring surface to achieve hydro-economy is an adaptation of *A. tennesseensis* to its seasonally-arid habitat.

(137)
Some *In Vitro* Effects of Potassium and Sodium Thiocyanate on the Notochord of *Rana catesbeiana* Larvae

SANDRA P. CHEEVERS AND ROY HUNTER, JR.,
Atlanta University

Several *in vivo* studies on the notochord have demonstrated the remarkable ability of this structure to become hyperdeveloped in the presence of thiocyanate ions and other animalizing substances. Generally, these ions did not produce hyperdevelopment in the ectodermal and endodermal regions of the embryo, but did transform cells of the somite region into notochord. In order to study the *in vitro* effects of thiocyanate ions, axial cylinders were removed from excised tails of *Rana catesbeiana* larvae. After the notochords were removed from their sheaths, groups of them were cultured from 48-120 hr. at 37° C. in various solutions of potassium and sodium thiocyanate, dissolved in Dextrose-Holtfreter's fluid. Tissues showed pycnotic nuclei, an increase in cell number, and no observable change in normal DNA and RNA activity. Chondrification of the notochord was observed in the controls as well as the experimentals. It was concluded that sodium and potassium thiocyanate produced "limited" cell senescence, and induced hyperdevelopment of the notochord.

(191)
Four Tropical Forests of Eastern Panama: A Structural Comparison

GEORGE I. CHILD, *University of Georgia*

The structure of four distinct tropical forests in eastern Panama were compared. The forest types were typical of a wide range of tropical environments viz., salt and brackish water swamps, freshwater swamps, lowland areas, and wet montane conditions. Studies were conducted on ¼ ha. sites in conjunction with biomass studies. Structural characteristics compared included; stratification, DBH-Height relationships, maximum tree heights, DBH distributions, basal areas, spatial distribution, canopy cover, abundance of individuals, leaf surface areas, and gross physiognomy.

(41)
The Woody Flora of Alabama

ROSS C. CLARK, *University of North Carolina at Chapel Hill*

On the basis of field work accomplished within the past two seasons, there is now more material available for forming working hypotheses regarding the distributions of woody taxa in Alabama. Extensive collections of the woody plants have been made in all but four counties of Alabama, which were judged beforehand to be fairly well-collected. These collections amount to over 10,000 numbers. Several types of distributional patterns are now recognizable, and it is possible to relate some of them to geology and other factors. Additional patterns should emerge with further study of some of the difficult genera, and supplementation of distributional records from major herbaria in the Southeast. It is hoped that collections from adjacent states will also help to augment understanding of the distributions of Alabama woody plants.

(47)
A Technique for Counting Saprolegniaceous Propagules in a Water Sample

JOHN CLAUSZ, *University of North Carolina*

A plating technique for obtaining quantitative data on the concentration of Saprolegniaceous propagules in samples of water was devised. A 10 ml. water sample was injected into 15 ml. of melted and cooled corn meal agar (CMA) containing antibiotics (100 mg./l. penicillin G and 200 mg./l. streptomycin sulfate). The agar was made up with 60% of the recommended volume of water. Experimentation showed that CMA containing antibiotics was the best culture medium. After 18 hours the inoculated agar plate was examined for germlings of species of the Saprolegniaceae which, when found, were removed and cultured for identification. By combining this technique with continuous-flow centrifugation, it was possible to determine the number of propagules in large volumes of water collected from the field. Enumeration by this technique disclosed that species exhibit periodic occurrence and variation in patterns of propagule distribution within the body of water studied.

(16)
Effect of Tween 80 and DMSO on the Absorption and Translocation of Three Phloem-Mobile Herbicides in *Verbascum thapsus* L.

G. E. COATS AND C. L. FOY,
Virginia Polytechnic Institute

Intermediate leaves of common mullein plants (8 to 10-leaf stage) were treated with 10 ul (0.1 uc) of either ^{14}C-labeled picloram (4-amino-3,5,6-trichloropicolinic acid), dicamba (2-methoxy-3,6-dichlorobenzoic acid) or 2,4-D (2,4-dichlorophenoxyacetic acid). Each compound was tested alone and in combination with 0.5% Tween 80 (nonionic surfactant containing polyoxyethylene sorbitan monooleate), 30% DMSO (dimethylsulfoxide), or both additives. Wetting and penetration were obviously impaired by the hirsute character of the leaf surface. In general, absorption and translocation of all three herbicides were relatively poor as indicated by autoradiography and counting. Picloram and dicamba appeared to be slightly more mobile than 2,4-D. Uptake and mobility of all three herbicides was facilitated slightly by addition of Tween 80. DMSO penetrated poorly, evaporated slowly and did not enhance the up-

take of either herbicide. Tween 80 alone was apparently as effective as the combination of both additives.

(160)
Action of Puromycin Dihydrochloride on Protein Synthesis and Mitosis

MADISON B. COLE, JR., ADA A. COLE, AND J. GORDON CARLSON, *The University of Tennessee*

Incubation of embryos of the grasshopper, *Chortophaga viridifasciata* (DeGeer), in 10 ug of puromycin per ml of culture medium for less than 1 hr inhibits the incorporation of DL-leucine-4,5-H^3 into neuroblasts, as demonstrated by autoradiography. On the other hand, exposure to as much as 100 ug puromycin per ml of culture medium for up to 6 hr, does not alter the percent of neuroblasts in midmitosis (prometaphase + metaphase + anaphase). The percent of midmitotic neuroblasts is increased significantly by exposure to 2×10^{-6} *M* colchicine for 4 hr when compared with a 1 hr exposure, but with the addition of 10 ug puromycin per ml of colchicine-containing medium, no significant difference can be detected. Our interpretation is that inhibition of protein synthesis by puromycin blocks the mitotic progress of neuroblasts both into and out of midmitosis. (This study was supported in part by Atomic Energy Commission Contract AT-40-1-2575).

(153)
Helminths of *Natrix spp.* and *Agkistrodon piscivorus* in Eastern North Carolina (Reptilia: Ophidia)

RICHARD F. COLLINS, *Wake Forest University*

Studies were conducted on the incidence and distribution of helminths in *Natrix s. sipedon, Natrix s. fasciata, Natrix erythrogaster, Natrix taxispilota,* and *Agkistrodon piscivorus. Natrix spp.* contained the following:

Trematoda: 7 species; Cestoda: 1 species; Acanthocephala: 1 species; Nematoda: 2 species. *Agkistrodon piscivorus* contained the following: Trematoda: 3 species; Cestoda: 2 species; Acanthocephala: 1 species; Nematoda: 2 species; Pentastomida: 1 species. The snakes from ponds and streams were more heavily infected, both with individual species and total numbers, than were the snakes from swamps. New locality and host records are recorded.

(71)
Uptake of Amino Acids in Natural Water

CLAUDE C. CRAWFORD, *N. C. State University*

When low concentrations of ^{14}C-labeled amino acids were added to natural waters they were found to be taken up by the bacteria. Their uptake followed the Michaelis-Menten enzyme-substrate equations. From these calculations the turnover time, that is the time required for removal of all the substrate, and a maximum value for velocity of uptake of natural substrate and for natural substrate concentration can be found. In an estuary during August, arginine had a turnover time of 5.5 hrs while glycine took 29.4 hrs.

In one estuarine experiment the natural substrate concentrations were known and actual velocities of uptake could be found. Glycine, valine, serine, and methionine were found to be most important in the flux of amino acids through the dissolved organic fraction.

(146)
Nonspecific Esterase Activity in the Caecum of *Haematoloechus medioplexus*

DONALD A. DAVIS, B. J. BOGITSH AND D. A. NUNNALLY, *Vanderbilt University*

The cytochemical localization of nonspecific esterase was investigated in the frog lung fluke, *Haematoloechus medioplexus*. Cryostat sections of fixed or fresh material were incubated in Holt's bromoindoxyl acetate medium at pH 5.4. Inhibitors or activators such as NaF, $AgNO_3$, Eserine Sulfate, PCMB (p-chloromercuribenzoate), β-phenyl propionic acid or E600 (diethyl-p-dinitrophenyl phosphate) were incorporated into the basic substrate medium. The enzyme was found to be organophosphate resistant and activated by PCMB. It was primarily localized as droplets dispersed irregularly in the gastrodermal lining rather than in the lumen of the gut. The possible significance of this enzyme in the digestive process will be discussed. (Supported, in part, by National Science Foundation Grant GB-4742.)

(166)
The Ultrastructure of Irradiated Microspores

H. L. DAVIS AND A. V. BEATTY, *Emory University*

Inflorescences of *Tradescantia paludosa* were irradiated with various doses of x-rays. The anthers were ruptured and the microspores fixed in buffered glutaraldehyde-osmium tetroxide or potassium permanganate prior to embedding. The microspores were embedded in a mixture of Araldite and Epon and sectioned at approximately 600 Å using a Porter-Blum ultramicrotome, model MT-2. Sections were examined for ultrastructural morphology with a Zeiss electronmicroscope, model EM 9a. Examination revealed little change in the gross morphology of the microspores, however changes in ultrastructure of cytoplasmic organelles were observed.

(136)
Mean Weights of Chick Embryos Correlated with the Stages of Hamburger and Hamilton

J. E. DAVIS, JR., AND NORMAN E. GARRISON, *Wake Forest University*

A total of 1125 normal chick embryos, representing 25 each of the 45 stages of Hamburger and Hamilton, were removed, fixed in Boulin's solution, stored in 70% ethanol and weighed with a semi-micro analytical balance. Entire blastoderms of stages 1-8 were weighed, whereas only embryos-proper were weighed in stages 9-45. As a consequence, results constituted two groups, each of which showed a geometric rate of growth marked only by minor deviations which were related to specific events of normal growth and development.

(187)
Cycling of Radiostrontium by Loblolly Pines (*Pinus taeda* L.)

BRUCE R. DAYTON, *University of North Carolina and Savannah River Ecology Laboratory*

Seven loblolly pines (3-4 in. d.b.h.) were stem-inoculated in July 1966 with 3 millecuries each of radiostrontium and the cycling of the element studied until November 1967. Movement of strontium through the pine-dominated ecosystem was relatively slow. Very little turnover of the element occurred by foliar leaching or by excretion or leaching from roots, most of the turnover occurring by needle fall. At the conclusion of the study the element was distributed in the system in

the following manner: 37.3% in wood; 53.7% in foliage; 8.8% in litter and understory vegetation; <1% in soil and fibrous roots. Compartmental rates of radiostrontium accumulation over the last 12 months of the study (−57.8% in wood; +665% in foliage; +1885% in litter) indicate that strontium and other alkaline earth elements tend to accumulate in the litter of young pine stands.

(65)
Distribution and Production of the Macrobenthic Flora of a North Carolina Estuary

C. R. Dillon, *University of North Carolina*

Two vascular and nine algal species comprise the macrobenthic flora of Bogue Sound, North Carolina. These species occurred in 55% of the sample plots, ranging in density from one individual to four thousand individuals m^{-2}. *Zostera marina* L. contributes 87.3% of the total production of this flora. Production increases as water depth decreases from east to west. Macrobenthic organic production is estimated to be 799 kcal m^{-2} yr^{-1}.

(92)
Effects of Five Insecticides on the Oxygen Consumption of Bluegill Sunfish, *Lepomis macrochirus*

Bobby F. Dowden, *Louisiana State University in Shreveport*

The effects of three concentrations (0.1, 1.0, and 5.0 parts per billion) of five insecticides (chlordane, DDT, lindane, malathion, and parathion) were measured in a flow-through respirometer and analyzed statistically. There were highly significant differences between the effects of the insecticides on bluegill oxygen consumption, regardless of concentration. Statistical differences were also noted between the effects of the three concentrations of the five insecticides tested. The statistical analyses showed that each of the insecticides tested acts differently over the range of concentrations tested. No statistical differences were noted in the comparisons of the effects of elapsed time with the insecticides without consideration of concentration and of concentrations without consideration of insecticides.

During the tests, the fish were noted to produce great quantities of mucus when exposed to the chlorinated hydrocarbon insecticides, lesser amounts in the organic phosphorus insecticides, and relatively little in the controls.

(39)
Natural and Artificial Pollination in Southeastern U.S. *Matelea* (Asclepiadaceae)

Donald J. Drapalik, *The University of North Carolina*

The natural pollinators of *Matelea* are small flies belonging to the families Chloropidae and Milichiidae. While a fly is obtaining nectar, a pollinium apparatus may get attached to the fly's proboscis. As this fly visits another nectary the attached pollinium may get lodged against an anther slit ensuring pollination. While natural hybrids appear to be rare, different species can be crossed experimentally. With the aid of a dissecting scope in the field artificial pollination was conducted using the species cited under *Odontostephana,* Alexander in Small, *Manual Southeast Flora.* In general the plants are self-incompatible. The following F_1 hybrids have been produced and grown to the flowering stage: *M. carolinensis* X *M. flavidula, M. carolinensis* X *M. baldwyniana, M. baldwyniana* X *M. obliqua,* and *M. obliqua* X *M. decipiens.* Preliminary findings show that some of the F_1 plants appear to be fertile since F_1 plants from the last two of the above hybrids produced outcross fruit in the Botanical Garden during summer 1967.

(190)
A Structural Description of Second Growth Vegetation in Eastern Panama

Michael J. Duever, *University of Georgia*

Three stages of second growth vegetation in eastern Panama were intensively studied during July and October, 1967. The sites were located in areas used for Milpas or "slash and burn" agriculture. The stages represented two, four, and six years of regrowth after cultivation. On each study area, of ¼ hectare, all vegetation was cut, sorted into compartments by structural characteristics, and weighed. Roots, litter, and soils were also sampled and described. The three regrowth stages and second growth in other parts of the tropics were compared using the wet and dry weight biomass by compartments, canopy heights, light penetration, composition, and other structural characteristics.

(126)
Preliminary Survey of Introduced Molluscs of Eastern North America

Dee S. Dundee, *Louisiana State University*

A project involving the cataloging of the land and freshwater molluscs which have been introduced into North America (east of the Rockies) is underway. Attempts will be made where possible to determine if the introduction has become established.

(189)
Leaf Epiphytes and Nitrogen Fixation

Joe A. Edmisten, Rex Craig, Mike Harrelson, Jane Watts, *University of Georgia*

Surveys have been made of leaf organisms (epiphyllae) of tropical rain forests in Puerto Rico, Panama, Colombia, and Peru. Bacteria, fungi, lichens, algae, and liverworts have been isolated and identified from intact leaves in the field and in Athens. Leaf fungi include Phycomycetes, Ascomycetes and Deuteromycetes; algae include *Trentepohlia, Phycopeltis,* and several bluegreens. Lichens are chiefly *Strigula* and liverworts include *Radula* of Lejeuneaceae. Microkjeldahl tests show higher nitrogen content in epiphyllae than in host leaves. ^{15}N experiments in Puerto Rico showed that mixed epiphyllae fixed about 10% of their total nitrogen from $^{15}N_2$ during a 48-hour exposure period. The leaves from which the epiphyllae were scraped had 1% of their total nitrogen as ^{15}N suggesting transfer. The successional sequence of epiphyllae establishment is being studied. Attempts are being made to grow N_2-fixing epiphyllae on crop plants such as *Citrus.* Ektachrome and infrared slides of epiphyllae will be shown.

(38)
Genetic Fruit Polymorphism in *Valerianella umbilicata* (Sull.) T. & G. (Valerianaceae)

Donna Marie Eggers, *Vanderbilt University*

Valerianella umbilicata (Sull.) T. & G., *V. patellaria* (Sull.) T. & G., and *V. intermedia* Dyal present a common distributional pattern throughout most of eastern North America. Distinct differences in fruit morphology are all that distinguish these plants, commonly found

growing mixed together in various combinations. When patellaria-type fruits from a population containing all three entities were sown, some of the progeny produced patellaria-type fruits, but others produced umbilicata-type fruits. When umbilicata-type fruits from this same population were sown, some plants produced umbilicata-type fruits, but others produced intermedia-type fruits. This, plus data from other populations studied, indicates that these entities are three fruit-forms of one species, genetically polymorphic with respect to fruit morphology. Since *V. umbilicata* is the oldest epithet, the appropriate names are *V. umbilicata* forma *umbilicata, V. umbilicata* forma *patellaria,* and *V. umbilicata* forma *intermedia.*

(159)
Chromosome Aberrations in the Cells of Chinese Hamster (*Cricetulus griseus*) Embryos after Paternal X-Radiation

R. H. Fetner and M. V. Zehr,
Georgia Institute of Technology

Preliminary experiments have been designed to determine if irradiation of male hamsters will result in chromosome aberrations being produced in the embryonic tissue of their progeny, and to determine the frequency and types of such aberrations. Adult males were irradiated with 400 rads of 250 kv x-rays delivered at 80 r per minute and then mated with proven females. Gravid females were sacrificed after 12 days, individual embryos were minced and grown *in vitro* for 5 days, at which time slide preparations were made for metaphase analysis. Karyotype analyses of all readible metaphases were made for each preparation and cells were classified as to the type and frequency of chromosome aberrations they contained. These preliminary findings will be presented.

(131)
The Subspecies of the Crawfish *Procambarus hagenianus* (Faxon) (Decapoda; Astacidae)

J. F. Fitzpatrick, Jr., *Mississippi State University*

In 1938 (*Iowa St. Coll. J. Sci.,* 13: 75-76) Lyle indicated that the burrowing crawfish *Procambarus hagenianus* (Faxon) exists in four identifiable subspecies by the publication of *nomina nuda.* No subsequent data were published. Because of the habits of the animal, collection of specimens is difficult, and Lyle's specimens were lost. Lyle's specimens were found by the writer, additional specimens collected, and the species studied. Peculiarities of the male and female chela, the antennal scale, and apparent substrate preference validate the subspecies as indicated by Lyle (*op. cit.*). (Supported in part by NSF Grant GB-4719).

(121)
Pattern of Incorporation of Labeled Nucleic Acid Precursors in Wheat Root Pericycle [1]

D. E. Foard, *Oak Ridge National Laboratory*

Autoradiographs of wheat root sections reveal that tritiated thymidine and tritiated uridine, although incorporated into different cell parts, have similar incorporation patterns when observed at the tissue level. In seminal roots longer than 10 mm, cells of basal regions are unlabeled with two exceptions: (1) scattered cortical and vascular parenchymatous cells and (2) cells in localized regions of the pericycle where lateral roots are arising. The labeling pattern in the pericycle is interesting because it closely parallels certain cytological changes. Cells are intensely labeled in the apical region of the pericycle; these cells are rich in cytoplasmic structure and are growing and dividing. Cells are unlabeled in basal regions; cytoplasmic structure becomes degenerate, and growth and cell division cease. Localized groups of labeled cells appear in basal regions of the pericycle where, associated with lateral root initiation, cytoplasmic structure is rejuvenated, and cell division and growth occur.

[1] Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.

(91)
Hybridization of *Peromyscus* and Human Hemoglobins

Charles W. Foreman, *University of the South*

Mixtures of specific hemoglobins were dialysed at low pH to effect dissociation into subunits. The subunits were then allowed to recombine slowly by dialysis at neutral pH. Human and different specific *Peromyscus* hemoglobins recombined in this manner yielded hybrid molecules of electrophoretic mobility different from those of any parental hemoglobins. Mixtures of different specific *Peromyscus* hemoglobins treated similarly yielded no electrophoretically separable recombinants. These results are consistent with the hypothesis that *Peromyscus* hemoglobins share either an alpha or a beta chain of identical electric charge.

(62)
Utilizing the Pattern of Growth of *Juncus roemerianus* to Estimate Net Leaf Production

William A. Foster and Linda Stroud,
North Carolina State University

The living and total lengths of individual leaves were measured repeatedly at approximately monthly intervals under field conditions. Leaves with 2.5 cm or less dead material were classified as green and those with more than 2.5 cm dead but with some green were classified as green-dead. The rate of growth of the whole leaf and the rate of death of the living portion were much greater in the summer than in the winter. Consequently the rates of transfer of leaves from the green to green-dead and from the green-dead to dead categories were much greater in the summer than in the winter. The number of green and green-dead leaves present at seven sample periods was obtained from clip-plot samples. Net leaf production can be calculated by combining the rates of transfer between categories with the number of leaves present at the beginning of each time interval.

(15)
Residue Studies with a ^{14}C-labeled Endothall Defoliant Formulation in Cotton

C. L. Foy and D. E. Seaman,[1] *Virginia Polytechnic Institute* and *Syracuse University Research Corporation*

Portions of mature greenhouse-grown cotton (*Gossypium hirsutum* L.) were sprayed with a defoliation-accelerating formulation containing ^{14}C-labeled 7-oxabicyclo [2.2.1] heptane-2,3-dicarboxylic acid (endothall). Absorption, distribution and residue patterns of ^{14}C were determined by autoradiography and liquid scintillation counting (following Schöeniger flask combustion). Variables studied were (a) test location (plant populations having different histories and boll loads); (b) defoliant formulation (alone and in 1:1 combination with commercial tributyl phosphoratrithioite defoliant); (c) rate

of defoliant (recommended rate and twice the amount); (d) spray volume (10 and 25 gpa, simulating air and ground application, respectively); and (e) harvest date (3 and 10 days after treatment). Plant parts above and below the treated portion contained radioactivity in general distribution, indicating translocation of endothall-^{14}C metabolites. Fuzzy seed coats contained radioactivity either from direct spraying or contamination during mechanical delinting. Seed coats from acid delinted samples were free of radioactivity, with one exception. Seed meats contained no detectable ^{14}C residues.

[1] Both authors, formerly University of California, Davis, California.

(52)
Studies on Soil Fungi from West Pakistan

LAFAYETTE FREDERICK, *Atlanta University*,
CHESTER R. BENJAMIN, *USDA, Beltsville, Maryland*, and
JOSEPH C. WHITE, *Atlanta University*

Cooperative studies are being conducted on the composition of the mycoflora in Pakistanian soils. Several isolation techniques and a variety of culture media are being employed in these investigations. Imperfect fungi have been found to be the predominant forms with *Aspergillus, Penicillium,* and *Fusarium* species the most abundant. Next in frequency of occurrence are species representing the genera *Paecilomyces, Ulocladium, Curvularia, Helminthosporium, Fusidium,* and *Trichoderma.* Among the species of *Aspergillus* isolated some are especially noteworthy and may represent hitherto undescribed species. Other unusual and rarely reported imperfect fungi isolated include *Acrophialophora nainiana,* and species in the genera *Hansfordia* and *Beauveria.* Noteworthy ascomycetous isolates include species of *Emericella* and an apparently undescribed homothallic species of *Neurospora.* A noteworthy zygomycetous fungus isolated is the rarely reported *Zygorhynchus japonicus.* (Research supported by Agricultural Research Service Cooperative Research Contract No. 12-14-100-8390 (34), U. S. Department of Agriculture.)

(128)
Psammolittoral Gastrotricha (Macrodasyoidea) of the Mississippi Sound Area

JAMES J. FRIAUF, *Vanderbilt University*

Few studies concerning the marine interstitial fauna of North American coasts have been undertaken, and this is especially true for the Gulf of Mexico with particular regard to the Gastrotricha. A preliminary report is given on a survey conducted during the summer of 1967 to ascertain, as fully as possible, the psammolittoral macrodasyoid species in the Mississippi Sound area. Those found within the genera *Tetranchyroderma, Turbanella* and *Acanthodasys* are indicated. Some physical and chemical parameters of the sampling stations also are discussed briefly.

(23)
Phosphofructokinase and Glycolysis in the Corn Scutellum

L. A. GARRARD AND T. E. HUMPHREYS,
University of Florida

In slices of the corn scutellum, a strong aerobic alcoholic-fermentation is triggered by the addition of glucose or fructose to the ambient solution. Glycolysis in these slices does not appear to be controlled at the point of phosphorylation of fructose-6-phosphate by phosphofructokinase (PFK). The properties of the corn scutellum PFK are discussed in relation to changes in metabolic intermediates during an increased rate of glycolysis. It is suggested that in the absence of exogenous sugars the rate of glycolysis is limited by the rate at which endogenous substrates become available.

(176)
Specific Gravities of Microorganisms

STEPHEN M. GITTLESON, *University of Kentucky*

Specific gravities of microorganisms have been studied by determining in which concentrations of Renografin-76 solutions (Squibb, methylglucamine diatrizoate) organisms become suspended. The pycnometer method was used to measure specific gravities of these Renografin solutions at 14°, 20°, and 26° C.

The protozoa — *Polytomella agilis, Polytomella caeca, Euglena gracilis* v. *bacillaris, Tetrahymena pyriformis*; yeast — *Saccharomyces cerevisiae*; bacteria — *Vitreoscilla* sp. strain UNH-L, *Bacillus cereus* strain T (vegetative) and *Bacillus cereus* strain T (dormant spores) have specific gravities respectively of 1.020, 1.020, 1.040, 1.060, 1.080, 1.060, 1.240 and 1.320. The higher specific gravity of *Bacillus cereus* spores compared with vegetative forms may be associated with a higher content of calcium-dipicolinate and dehydration of the spore. Generally, bacteria and yeast with thicker cell walls are more dense than protozoa which contain larger amounts of lipid. (This study has been supported by the University of Kentucky Research Foundation.)

(22)
Cancelling Errors in the Quantitative Determination of α-Amylase Activity

ALAN H. HABER AND LARRY L. TRIPLETT,
Oak Ridge National Laboratory

Determination of α-amylase activity using starch-iodine color has been based on absorbancy decreases being proportional to enzyme concentration and reaction time. Provided the reagent-blank absorbancy is proportional to starch concentration, we find the enzyme-induced absorbancy decrease is proportionately greater for smaller than for larger values of the product of enzyme concentration and reaction time, which product is nevertheless constant for any given absorbancy decrease. Previous findings that the absorbancy decrease appeared proportional to enzyme concentration and time may be explained by combining this error with a second possible error: lack of proportionality between absorbancy and starch concentration apart from any hydrolysis. The two errors tend to cancel each other. Since determinations should not depend upon cancelling errors, quantitative assay should not be based upon the magnitude of the absorbancy change but upon the constant product of enzyme concentration and reaction time to produce a given absorbancy change. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(74)
A Colorimetric Method for Determining Oxygen Concentration in Terrestrial Systems

MARY H. HAECKER, ROBERT J. BEYERS, AND
MICHAEL H. SMITH, *Savannah River Ecology Laboratory*

This method utilizes essentially the same principles of the manganous hydroxide potassium iodide oxidation-reduction reactions (Winkler method) for determining concentrations of oxygen in water. The method has been adapted for use with samples of gas. The amount of iodine released in the reaction is directly proportional to

the oxygen concentration in the sample. The relationship between absorbance at 500 mu and 0_2 concentration is linear ($r = .99$). This technique is especially valuable for field research and is accurate over a relatively wide range of oxygen concentrations.

(54)
Growth Rate of the Lichen *Parmelia caperata*

MASON E. HALE, *Smithsonian Institution*

Growth rates of *Parmelia caperata* on rocks in the vicinity of Washington, D.C., have been measured for a continuous period of almost three years. Photographs are being taken at intervals of three days to six weeks, and using large prints as a base the rates can be determined with an accuracy of 0.01 to 0.10 mm. In general growth appears to be stepwise, occurring during periods of precipitation and as long thereafter as the plants remain moist but ceasing for as much as 2-3 weeks in dry spells. The strongest correlation is with length of cloudy period that follows rainstorms rather than with total amount of rain. There is measurable growth in every month. Total annual growth is near 8 mm and maximum rates are of the order of 1.5 mm per month.

(108)
Loss of Organic Compounds from *Arachis hypogaea* L. Growing in Gnotobiotic Conditions

M. G. HALE, *Virginia Polytechnic Institute*

The loss of organic compounds from plants is a well documented occurrence. Loss may occur from all organs and most of the compounds found within plants have been found outside living plants under one condition or another. Such compounds have been implicated in ecological relationships which involve interactions between plant-and-plant, and between plant-and-microorganisms. Little information is available on quantities released, effects of various environmental factors on this release, and the sources of released compounds. In quantitative and qualitative studies it is necessary to resort to aseptic culture techniques because of the possibility of rapid degradation of these organic compounds by microorganisms. Techniques of aseptically culturing peanut plants, *Arachis hypogaea* L., results of analyses of materials released from roots and fruits and their possible significance will be discussed.

(51)
Uncommon Soil Fungi Isolated from Peanut Fruits in the Southeastern United States

RICHARD T. HANLIN, *University of Georgia*

During a survey of the fungous flora of peanut (*Arachis hypogaea* L.) fruits grown in six southeastern states, several fungi were isolated which appear to be uncommon in this area. Four of these fungi are described here. All were isolated from peanut fruits that had been surface-sterilized to eliminate external fungi. *Scytalidium lignicola* Pesante (Dematiaceae) was found in peanuts in North Carolina, Alabama, and Virginia; *Trichurus spiralis* Hasselbring (Stilbaceae) was found in Virginia peanut seed; *Starkeyomyces koorchalomoides* Agnihothrudu (Tuberculariaceae) was isolated from peanut fruits in Georgia, North Carolina, Virgina, Oklahoma, and Texas; and a white mutant of *Aspergillus flavus* Link ex Fr. was found on peanut seed in Georgia.

(130)
Epidermal Morphology of *Corvomeyenia sp.*

FREDERICK W. HARRISON AND FELIX H. LAUTER, *University of South Carolina* AND *Presbyterian College*

Specimens of the fresh-water sponge *Corvomeyenia sp.* were grown in the laboratory on microscope slides or on cover slips. The outgrowth region of tissue was separated from the original sponge. Fixed outgrowths were stained by various histological and histochemical techniques. Living outgrowth preparations were studied with phase contrast microscopy. These studies show that epidermal regions of *Corvomeyenia sp.* are normally cellular. Local areas of the upper epidermis may be syncytial when undergoing reduction. All ameboid cell types are present upon the surface of the upper epidermis. Porocytes are present. Pinacocytes are sometimes nucleolate. Pinacocytes are characterized by little histochemically demonstrable cytoplasmic RNA, carbohydrate, or lipid. Basal pinacocytes utilize filopodia and lobopodia in phagocytotic activities. Acid phosphatase activity in these cells is possibly localized in phagosomes.

(184)
Movements of the Eastern Worm Snake, *Carphophis amoenus amoenus*

MICHAEL J. HARVEY, JAMES W. HARDIN, *Memphis State University,* AND ROGER W. BARBOUR, *University of Kentucky*

Movements of ten eastern worm snakes (*Carphophis amoenus amoenus*) were studied using radioisotope tagging and tracing techniques. The study was conducted at Robinson Forest, Breathitt County, Kentucky, from early May to late October, 1966. Snakes were tagged subcutaneously, using a hypodermic needle and plunger apparatus, with 50-80 microcurie Co^{60} alloy wire tags. Detection apparatus consisted of a model 489 Thyac II survey meter equipped with earphones, shoulder strap, and scintillation probe mounted at one end of a 3 m tubular aluminum pole. Each snake was located 46-89 times. Home ranges were calculated using the minimum area method and averaged 253 m^2 (range, 23-486 m^2). The longest known movement during a 24 hr period was 45 m (in 14 hr 30 min). Most movements were made at night. Periods of inactivity ranged from a few minutes to over 14 days. Snakes displaced distances of 150, 400, and 800 m from where captured, exhibited no homing ability.

(32)
The Phytotron: A Tool for Botanical Research in the Southeast

HENRY HELLMERS, *Duke University*

The two unit Phytotron at Duke University and North Carolina State University is currently undergoing final testing. By late spring it will be ready for full use as a botanical research tool. The physical facilities of the Southeastern Plant Environment Laboratories, as the phytotron is officially named, will be described. Approximately 100 individually controlled environmental areas will be available for growing and testing plants. The criteria for establishing and the accuracy of controlling the various parameters of the environment will be presented. Examples of some types of experiments that best can be conducted in the phytotron will be discussed.

(29)
Manometric Measurement of Turgor Pressures in the Bole of Slash Pine

FRANK A. HELSETH, *Southeastern Forest Experiment Station, Olustee, Florida*

Oleoresin exudation pressure (O.E.P.) in slash pine (*Pinus elliottii* Engelm.) results from (1) the quantity of oleoresin in the duct and (2) turgor pressure changes in the epithelial cells lining the ducts. The quantity of oleoresin in a single tree can be considered as constant for short periods of time. However, there is considerable variation among trees which may influence the minimum O.E.P.

The diurnal patterns of O.E.P. clearly reflect dehydration and rehydration of cells and tissues. Pressures are maximal (9-12 atm.) just at dawn and minimal (3-5 atm.) in the afternoon, corresponding to increases in moisture stress. Upon opening of the stomates in the morning, pressures begin to decrease rapidly in the upper crown, proceeding basipetally with the transmission of moisture tensions down the bole. These diurnal pressure changes are positively correlated with atmospheric relative humidity and negatively correlated with changes in temperature and needle moisture stress (by pressure bomb). Pressures at the base of the bole normally exceed those in the crown, the gradient usually approximating 1 atm./10 m. at night and increasing during the day.

(14)
Extraction and Partial Identity of Unknown Phenolic Derivative in *Avena* Coleoptile

JAMES H. M. HENDERSON AND CECELIA PHILLIPS, *Tuskegee Institute*

Flavonoid complexes extracted from dark-grown *Avena* coleoptiles were isolated by column chromatography, yielding two fractions, designated as B and C. Ultraviolet spectral analysis of the fractions revealed absorption maxima at 227, 275, 281, and 267 millimicrons for fraction B, and one absorption peak at 255 millimicrons for fraction C. Paper chromatography of the two fractions gave R_f values of 0.9, 0.43, and 0.20 for fraction B, and 0.92 and 0.20 for fraction C.

These fractions and their alkaline and acid hydrolysates were assayed using the *Avena* first internode test and compared with similar assays of synthetic flavanoids, kaempferol and quercitin. The results indicate that both of these exhibit a stimulatory effect on the growth of excised internode sections, but only in the presence of exogenous indoleacetic acid.

The data obtained from the assays of the unknown compounds reveal that fraction B contains a factor which stimulates elongation in the presence of indoleacetic acid. These results are analagous to those obtained with kaempferol and quercitin. Based on pervious evidence by physical methods, the tentative conclusion may be made that the unknown factor in the extracts of *Avena* coleoptile is kaempferol.

(134)
The Poison Apparatus of *Dasymutilla occidentalis* (Hymenoptera: Mutillidae)

HENRY R. HERMANN, *University of Georgia*

The basic constituents of the poison apparatus of *Dasymutilla occidentalis* (L.) are similar to those found in most other hymenopterous insects. However, several of the sclerites have undergone some modification so that the apparatus functions as an extremely important defensive mechanism.

(127)
Omalonyx unguis (Gastropoda: Pulmonata: Succineidae) from Ecuador

PAT W. HERMANN, *University of Georgia*

Life history data on the snail, *Omalonyx unguis* (Férussac), are presented, including habitat, food preference, and reproduction.

(169)
Some Effects of Low Temperature Treatment on Sporocarp Germination and Gametophyte Development in *Marsilea* L.

J. M. HERR, JR. AND DAVID H. REMBERT, JR., *University of South Carolina*

Scarified sporocarps of *Marsilea* sp. placed in water and subjected to a temperature of 40° F (4.4° C) for 42 hours germinated slowly to produce elongated sorophores. Megaspores and microspores were released approximately 2 hours after the germinated sporocarps were returned to room temperature. Within the next 24 hours, the megaspores produced mature megagametophytes with protruding archegonia. Concomitantly, the microspores produced endosporic microgametophytes. With dehiscence of the microspore walls, however, whole antheridia instead of motile sperm were shed. Later, the antheridia released spherical sperm apparently none of which achieved motility and function. In the next 48 hours, most of the archegonia enlarged markedly in simulated calyptra development. Of these archegonia, designated calyptroids, many became chlorotic and gradually disintegrated. Several calyptroids, apparently through apogamy, formed sporophytes which were characteristically slow in growth and short lived. These apogamous plants otherwise departed from the features of typical, diploid sporophytes in pattern of growth, vascular distribution, and structure of the early, spatulate leaves.

(58)
Autecological Study of Roadside and Field-Pasture Populations of *Helenium amarum* (Raf.) H. Rock

VIOLET ANN HICKS, *University of N. C. at Chapel Hill*

Helenium amarum (Raf.) H. Rock, the common sneezeweed or bitterweed occurring throughout the coastal and piedmont areas of the Southeast, has been observed to differ greatly in appearance. When roadside populations of bitterweed are compared with field and pasture populations, the former are considerably shorter, have fewer branches and flower heads, etc. Autecological studies were conducted comparing 15 roadside populations and 15 field-pasture populations to discover whether the distinctions observed in the natural populations are due entirely to environmental conditions. In an attempt to determine if these populations are simply ecophenes, seed germination, growth-chamber, greenhouse, and botanical garden experiments were established. In several studies differences in appearance of the populations were retained in the progeny grown from seed.

(151)
The Possibility of Host Specificity in the Genus *Ornithocythere* (Ostracoda, Entocytheridae)

H. H. HOBBS, III, *Mississippi State University*

The discovery of a new species of the ostracod genus *Ornithocythere* in Northern Mississippi presents evidence

for the possibility of host specificity in the family Entocytheridae. *O. waltonae* Hobbs, Jr. is commensal with *Procambarus a. acutus* and *Cambarus d. diogenes* at the type locality. Elsewhere, it is found only on *C. d. diogenes*. Likewise, the new species found in Mississippi is also in association only with *C. d. diogenes*.

The general agreement is that the Entocytheridae are not parasitic on their crayfish hosts. With this in mind, the development of host specificity is hard to imagine. Whether or not this apparent specificity is related to the crayfish habitat or other factors is unknown, but at present some definite association between the genus *Ornithocythere* and the burrowing crayfish *C. d. diogenes* appears to exist. (Supported in part by NSF Grant GB-4719.)

(109)
Carbohydrates and Nitrogenous Compounds in the Inner Bark of Loblolly Pine: Influence of the Southern Pine Beetle and Associated Stain Fungi

John D. Hodges and Stanley J. Barras,
Southern Forest Experiment Station

Inner bark contains at least 34 free amino acids, of which 20 appear in the protein fraction. Storage of cut bolts for two weeks at 75° F. and 60-70% relative humidity resulted in a marked decrease in free amino acids and non-reducing sugars and an increase in protein-bound amino acids. Infestation by the southern pine beetle (*Dendroctonus frontalis* Zimm.) and/or associated stain fungi caused an additional decrease in free amino acids, soluble N, reducing sugars, and non-reducing sugars, and an increase in protein amino acids, insoluble N, and total N. Reducing sugars apparently were utilized before non-reducing sugars by the stain fungi as a carbon source.

(57)
The Effect of Gibberellic Acid on Mycelial Growth and Toxin Formation in Isolates of *Ceratocystis ulmi*

Maggie P. Hurd and Lafayette Frederick,
Atlanta University

Six isolates of *Ceratocystis ulmi,* varying in pathogenic capacity, have been cultured on media containing 10, 50, 100, 400 and 1000 ppm of gibberellic acid (GA) in order to determine the effect this growth regulator has on mycelial growth and toxin formation. Mycelial growth was determined in two ways. Data on radial mycelial growth were obtained by culturing isolates on a synthetic nutrient agar medium. Data on mycelial yield were determined as dry weight of mycelium and were obtained by growing isolates in shake culture in a liquid nutrient medium. Some evidence of a stimulatory growth response was exhibited by some isolates at GA concentrations of 10 and 50 ppm. Mycelial growth of all isolates were inhibited at the higher GA concentrations.

Filtrates from shake cultures sterilized by filtration, were assayed for toxin titres. Titres were determined as the extent of wilting induced in 4 to 5 week-old tomato cuttings by culture filtrates. Filtrates from isolates cultured at 10 and 100 ppm of GA generally induced high wilting percentages. Filtrates from isolates cultured at 400 and 1000 ppm of GA induced low wilting percentages. The highest reduction in toxin titre were found in filtrates from isolates classed as moderately pathogenic.

(182)
A Study of Allometric Growth in *Pseudemys concinna suwanniensis* Carr (Order: Testudinata)

Crawford G. Jackson, Jr.,
Mississippi State College for Women

A biometrical study of allometry in the Suwannee terrapin was made of the natural population of Fannin Spring in north-central Florida. Between November, 1960, and November, 1967, 230 randomly-collected individuals were measured, marked, and released. Separate records for each individual were kept, and consisted of 6 linear measurements: carapace length, carapace width, plastron length, anterior plastron width, posterior plastron width, and width of bridge. During the 7-year period of investigation, 140 individuals (61%) were recaptured from 1 to 12 times. From original measurements and those obtained at subsequent recaptures, relative and absolute growth rate analyses were made with respect to size and sex. With the data available from 62 males and 57 females, rate of increase of carapace length is greater in females (Kg = .189 versus Kg = .170) as is the absolute rate of the 5 other linear shell measurements analyzed. Anterior plastron width, posterior plastron width, and bridge width exhibit isometric growth with respect to carapace length in females. The greatest sexual difference in relative growth occurs in the rate of increase of bridge width, while the least sexual difference occurs in the rate of increase of plastron length. (Supported in part by a Sigma Xi-ReSA Grant-in-Aid.)

(125)
Marine Commensal Bivalve Mollusks from North Carolina

Charles E. Jenner and Anne B. McCrary,
University of North Carolina, Chapel Hill, and
Wrightsville Marine Bio-Medical Laboratory, Wilmington

Recent studies on the coast of North Carolina at Wrightsville Beach have revealed an exceedingly interesting, but almost completely unknown, faunal element involving species of bivalve mollusks living commensally with various invertebrates. Seven species have been recorded from the following hosts: a sea cucumber (*Leptosynapta inherens* (O. F. Muller), brittle stars, a capitellid annelid (two species), a polynoid annelid, *Squilla impusa* Say, and an echiurid worm. All of the above species of clams except the species associated with the last host listed belong to the Superfamily Erycinacea. Many of these show remarkable morphological modifications associated with commensalism. Their structure and biology will be described, including an account of the extreme degree of sexual dimorphism in *Montacuta percompressa* Dall (commensal on *L. inherens*). In this species the males are dwarf and degenerate and occur as parasites in the mantle tissue of the female. This phenomenon has not been reported previously in bivalve mollusks.

(7)
Sodium and Magnesium Interactions in Cotton Nutrition

H. E. Joham and M. C. Parekh,
Texas A & M University

Cotton plants were grown in nutrient solutions in which sodium and magnesium levels were varied. Boll weight was inversely related to sodium concentration. Increasing substrate magnesium tended to offset the adverse effects of high substrate sodium.

A variety effect was noted in relation to sodium tolerance. With Stoneville 7A, an increase in substrate sodium to 50 ml/l caused a 33% reduction in yield. When magnesium was added (20 ml/l) to the high substrate sodium level, the yield reduction amounted to 26%. In Acala 1517D the same treatments accounted for 81 and 53% yield reduction respectively. These results indicate that added substrate magnesium may partially reduce the effects of toxic sodium levels.

(6)
Effect of Sodium Substitution for Calcium on the Translocation of Carbohydrates in Excised Cotton Roots

LAMAR JOHANSON AND H. E. JOHAM,
Texas A & M University

Studies were conducted to determine the role of sodium in maintaining carbohydrate translocation (as measured by C^{14}) in excised cotton roots. In two different six-day experiments the following trend was observed. A −Ca+Na medium led to significantly greater translocation of carbohydrate than a −Ca−Na medium, but was significantly less than in the +Ca+Na medium. Since the radioactive sucrose was supplied only to the distal portion of the excised roots, little carbohydrate was absorbed and growth was curtailed. The rate of respiration and RQ values of the roots were independent of nutrient treatment. Visual observations indicated that the roots were flaccid in the absence of sodium, but they were quite turgid when sodium was present. These studies support the conclusion that there is a direct sodium effect on translocation of carbohydrates.

(114)
Changes of Carotenoids and Lipoxidase Activity in Peanuts During Maturation and Curing

ELIZABETH B. JOHNS, H. E. PATTEE, AND A. E. PURCELL,
North Carolina State University and *ARS, USDA*

The effects of maturation and curing on the carotenoid concentration, color, and quantity of extracted oil, and on lipoxidase activity have been studied. The carotenoid level in the peanut kernel increased through the seventh week from pegging and then remained nearly constant. The percent oil showed a linear increase throughout maturation. The carotenoid concentration in the extracted oil, however, showed a very rapid reduction to the tenth week and a subdued rate of reduction from then to maturity at twelve weeks. A slow curing rate was also demonstrated to reduce significantly the carotenoid concentration of the oil. A lipoxidase system capable of decolorizing carotenoids was demonstrated and the activity was shown to increase rapidly with maturity. Comparison of activity from uncured and cured peanuts showed the cured peanuts to have a significantly higher level.

(86)
Comparative Physiology of Bovine and Porcine Spermatozoa

CLYDE EDGAR JOHNSON, JR., *Clark College*

This work describes the results of studies which determined the effects of anions on bull and boar sperm, under the influence of various cationic carriers, buffer systems, substrate levels, and temperatures. It was demonstrated that the nitrate ion enhanced motility, oxygen uptake, carbohydrate uptake and lactate production in bull sperm. The "NO_3 effect" was modified by the cationic carrier and abolished by lower temperatures and the absence of extracellular substrate. Nitrate and chloride ions not only influenced the magnitude of bull sperm metabolism, but the metabolic pattern of metabolism as well. Chloride ions appeared to favor respiration, the NO_3 ion effected a more equal utilization of the glycolytic and respiratory pathways. The "NO_3 effect" could not be demonstrated with boar sperm. The O_2 uptake of boar sperm in nitrate and chloride was the same. Glucose uptake and lactate production by boar sperm appeared to be increased in chloride.

(89)
Hemolysis as a Cause of Green Tissues Among Neotropical Frogs

DUVALL A. JONES, *Carnegie-Mellon University*

High concentrations of biliverdin have been found in tissues and body fluids of some species of Neotropical frogs and tadpoles. The cause of this green pigmentation is unknown, but evidence indicates that hemoglobin from hemolyzed red blood cells may be the source of biliverdin. Accumulation of the green pigment appears to be due to defective excretion by the liver. High environmental temperatures and hormonal effects are suggested as hemolytic factors; these agents may affect liver function also. (Supported in part by a Sigma-Xi - ReSA Grant-in-Aid and by Grant GB-3644 from the National Science Foundation.)

(13)
Tracer Studies with Three ^{14}C-labeled Herbicides, DMSO and Tween 80 in Black Valentine Bean

D. W. JONES AND C. L. FOY,
Virginia Polytechnic Institute, Blacksburg, Virginia

Primary leaves of 21-day old beans (*Phaseolus vulgaris* L.) were treated with ^{14}C-labeled dimethylsulfoxide (DMSO), 2-methoxy-3,6-dichlorobenzoic acid (dicamba), 1,1′-dimethyl-4,4′-bipyridinium salt) and 2-chloro-4-ethylamino-6-isopropylamino-*s*-triazine (atrazine). Each herbicide was tested alone and in combination with 0.5% Tween 80 (nonionic surfactant containing polyoxyethylene sorbitan monooleate), 30% DMSO or both. DMSO at concentrations of 25% or more caused varying degrees of acute toxicity. However, radioactive carbon was generally distributed throughout the plant 5 days after application of DMSO-^{14}C, as determined by autoradiography and counting. Tween 80 enhanced whereas DMSO apparently reduced the absorption and translocation of dicamba, a phloem-mobile herbicide. Neither Tween 80 nor DMSO markedly affected the movement of paraquat, which is usually regarded as a contact toxicant. Both Tween 80 and DMSO enhanced the foliar uptake and (apoplastic) movement of atrazine within the treated leaves.

(85)
The Conversion of Radioactive 17β-Estradiol to Urinary 2-Hydroxyestrone by Euthyroid, Hypo-, and Hyperthyroid Hamsters

WILLIAM B. KEITH AND KENNETH I. H. WILLIAMS,
The Worcester Foundation for Experimental Biology

The *in vivo* conversion of radioactive 17β-estradiol to 2-hydroxyestrone by the female Golden Hamster has been shown to be under thyroid control. Hypothyroid animals (thyroidectomized and thyroid inhibited) converted significantly less radioactive 17β-estradiol to Ketodase hydrolyzable urinary 2-hydroxyestrone than did control animals. Conversion percentages of 17β-estradiol in hyperthyroid females, and in three classes of thyroid conditioned male hamsters are also reported.

(49)
Flagellar Retraction in Posteriorly Uniflagellate Fungi

WILLIAM J. KOCH, *University of North Carolina, Chapel Hill*

Presented are observations of 17 species in the following 14 genera. BLASTOCLADIALES: *Allomyces* and *Blastocladiella.* CHYTRIDIALES: *Asterophlyctis, Catenochytridium, Chytridium, Chytriomyces, Cladochytrium, Entophlyctis, Phlyctochytrium, Rhizophlyctis, Rozella, Septochytrium,* and 2 undescribed cladochytriaceous genera. Recognized and described are four basic methods of flagellar retraction: *lash-around, body-twist, straight-in,* and *vesicular.* Variations in and combinations of the four basic methods are described. Observations with brightfield, darkfield, phase-contrast, and electron microscopy, along with what is known from the literature, are discussed and serve as the basis for generalized, summary diagrams or two dimensional models of patterns of flagellar retraction in posteriorly uniflagellate fungi. An endeavor is made to put the findings reported on in this paper in historical, morphogenetic, and phylogenetic perspective.

(149)
Studies on the Biology of *Proterometra albacauda,* Anderson and Anderson, 1967, an Azygiid Trematode

WAYNE A. KRISSINGER AND KRISHNA N. MEHRA, *Georgia Southern College*

Pleurocera laqueata (Say), a common river snail of Georgia, Kentucky, and Tennessee, was collected from Magnolia Springs, Millen, Georgia. They were found to shed cercariae of furcocystocercous type. The morphology of the cercaria was studied. The cercariae were forced fed to *Rana pipiens pipiens, Rana catesbeiana,* and *Bufo terrestris.* Adult parasites were recovered from the esophagus and stomach of these amphibians and were identified as *Proterometra albacauda.* The fishes *Lepomis macrochirus macrochirus* and *L. punctatus punctatus* were infected by dropping cercariae in their acquaria. The fish were observed to swallow the cercariae in a few minutes. Both species of fish were found to have this trematode in the esophagus and the stomach. *L. m. macrochirus* and *L. p. punctatus* were caught from the same site from which snails were collected. They were found to harbor adults of this trematode in the esophagus and stomach.

Pleurocera laqueata (Say) is reported as a new intermediate host and *Lepomis punctatus punctatus* is reported as a new host for this parasite.

(Supported by grant-in-aid from the Research Fund of Georgia Southern College.)

(87)
Ventromedial Hypothalamic Lesions and Their Effects on Fat Deposition and Other Physiological Phenomena in Migratory Birds

WAYNE J. KUENZEL, *University of Georgia*

There currently exists three methods by which birds can be induced to rapidly store up fat:

1) By manipulating the photoperiod (A. Wolfson, *J. Exp. Zool.* 125, 353-376, 1954; D. Farner *In* A. Wolfson (ed), Recent studies in avian biology, Univ. Illinois Press, Urbana, 1955);

2) By injecting hormones (D. Farner, *Gen. Comp. Endocrinol.* 4, 584-595, 1964; A. Meier and K. Davis, *Gen. Comp. Endocrinol.* 8, 110-114, 1967);

3) By lesioning the ventromedial hypothalamic area of the brain (W. Kuenzel and C. Helms, *BioSci.* 17, 395-396, 1967).

Employing the last method, we have observed that the fattening response in lesioned birds is quite similar to the naturally occurring response during the spring. It is our opinion that the control of fattening in migratory birds is effected by photic information eventually activating particular diencephalic regions, regulating feeding behavior, within the avian brain.

(5)
Dual Mechanisms of Phosphorus Uptake in *Euglena gracilis* Klebs

PHILIP A. LAHAYE AND JAMES G. GOSSELINK, *Louisiana State University*

The rate of absorption of phosphorus has been studied in *Euglena gracilis.* Two transport mechanisms for phosphorus have been suggested in the light of the kinetic data obtained. $Mechanism_1$ is active in a concentration range of 0.2-2.0 mg./100 ml. K_2HPO_4 and $mechanism_2$ at a concentration range 10-fold higher (2.0-20.0 mg./100 ml.). Higher concentration ranges tested gave results indicative of passive uptake.

(35)
The Moss Flora of Georgia: Interesting Species Which Have Been Found in the State

ROBERT K. LAMPTON, *West Georgia College*

Intensive collecting activities and researches into the Bryoflora of the State of Georgia have turned up species of mosses growing therein which are unusual in that the range of the species concerned has been extended considerably beyond the previously known geographical distribution. *Merceya ligulata* (Spruce) Schimp., one of the so-called "copper mosses" is abundant in Stewart County and *Cryphaea ravenellii* Aust. has been collected in at least three widely scattered counties. Other species thought to have a limited distribution in the southeastern states are expected to be found growing in Georgia. Information about habitats and distribution of these species is discussed as well as the status of Bryology in the State of Georgia.

(28)
Analysis of Polyethylene Glycol in Plant Material and its Absorption by Corn (*Zea mays* L. Gramineae), Bean (*Phaseolus vulgaris* L.; Papilionaceae) and Cotton (*Gossypium hirsutum* L.; Malvaceae)

DAVID W. LAWLOR, *Duke University*

The increasing use of Polyethylene glycols to reduce the water potential of the rooting medium of plants grown hydroponically, requires study on absorption of the polymer and possible adverse effects upon growth. Analysis was performed by a turbidimetric method (Hyden, S., 1956. Kungl. Lantbraks Hogskolans Annaler *22* 139-145), which was found to be sensitive and simple to perform. Complete recovery of Polyethylene glycol was not achieved by water extraction of cotton and yellow poplar leaves and attempts to extract it are described and reasons for incomplete recovery discussed. Intact plants absorbed little Polyethylene glycol when grown for up to two weeks in concentrated solutions. Cutting the root system led to increased absorption and the effects upon plant-water potential and transpiration are considered. It is suggested that Polyethylene glycol blocks the pathways of water movement in the leaf.

(27)
Oleoresin Exudation Pressure and Relative Water Content of Inner Bark as Indicators of Moisture Stress in Loblolly Pine

PETER L. LORIO, JR. AND JOHN D. HODGES,
Southern Forest Experiment Station

Diurnal patterns of oleoresin exudation pressure (OEP) of 40-year-old loblolly pine (*Pinus taeda* L.) were related to changes in soil and atmospheric moisture. Single, early-morning measurements were not closely related to soil moisture stress. Relative water content (RWC) of inner bark reflected soil moisture status and diameter growth response, and apparently was affected by atmospheric moisture deficit. Trees continuously flooded eventually showed the most severe reduction in OEP and RWC. Daily average OEP was related to microsite differences during a severe fall drought. Trees on flat, usually wet sites lost significantly more pressure than those on low (0.3 to 0.6 meter) mounds. This reponse was attributed to a deficient fine-root system on flat sites.

(113)
Studies on Respiration of Pine Pollen

KAREN B. LUQUIRE, LINDA B. EDWARDS, AND
RAYMOND W. HOLTON, *University of Tennessee*

Pollen can metabolize exogenously supplied sugars. We have examined the effects of sucrose, glucose, fructose, and mannose on the respiratory rate of pollen of *Pinus virginiana* Mill. Although sucrose, glucose and fructose stimulate the rate over a phosphate buffer control, mannose significantly inhibits respiration and pollen tube development. Experiments in which various concentrations of sugars and pairs of sugar have been used do not suggest that the mannose inhibition is by a simple competition mechanism. Essentially no differences in response to the sugars were noted for pollen collected in the spring of 1966 or spring of 1967 and stored at low temperature and humidity since collection. We have observed that a gas is evolved immediately after the pollen is wetted, either under anaerobic or aerobic conditions. The gas is not carbon dioxide and efforts are being made to identify it and to understand its significance, if any, in pollen respiration and germination.

(21)
Studies on Glutamic Acid Decarboxylase from *Cucurbita pepo* L. cv Summer Crookneck

BRENA LEE MACKEY AND AUBREY W. NAYLOR,
Duke University

Crude glutamic decarboxylase preparations derived from squash appear to be specific for glutamic acid and require pyridoxal phosphate as a coenzyme. The prosthetic group is held tenaciously against dialysis. The pH optimum for squash glutamic acid decarboxylase is narrow and activity is irreversibly lost if the pH deviates appreciably from 5.7. In the lyophilized condition the enzyme is quite stable, but much activity is lost after a few hours in solution regardless of efforts to preserve it. Our most highly purified glutamic acid decarboxylase preparation was obtained by employing a heat step, fractional ammonium sulfate precipitation and alumina gel and calcium phosphate gel adsorption. A 48-fold increase in specific activity over the starting homogenate with a 22 percent yield of the original activity was achieved. From its pH optimum, stability on dialysis, behavior on Sephadex columns and half-life in solution it is concluded that squash glutamic decarboxylase is distinctly different from that found in bacteria and animals.

(183)
Photoperiod Acclimation of High Temperature Tolerance in Tropical and Temperate Frogs

JOSEPH J. MAHONEY, JR., *University of Georgia*

Goldfish, Crucian carp, and painted turtles are known to have greater thermal tolerance when acclimated to long photoperiods. It has been suggested that such photoperiod acclimation may be adaptive in "preacclimating" temperate zone animals for the longer, hotter days of summer. This report presents a comparison of the effect of photoperiod acclimation on the thermal tolerance of a tropical frog and a temperate frog. *Rana pipiens,* the temperate frog, when acclimatized to LD 8:16 (photoperiod regimes of eight hours of light alternating with sixteen hours of darkness), LD 12:12, and LD 16:8 at both 15° C and 25° C, had greatest thermal tolerance at the longest photoperiod. However, *Hyla labialis,* the tropical species, had greatest thermal tolerance at 25° C when acclimated to its natural tropical photoperiod. At 15° C thermal tolerance was lowest at LD 12:12, which may reflect an increased tolerance to cold.

(70)
The Apparent Cultural Eutrophication of Mountain Lake, Virginia

FREDERICK C. MARLAND, *University of Georgia,* and
STUART E. NEFF, *Virginia Polytechnic Institute*

Phytoplankton records of the Mountain Lake Biological Station provide evidence that Mountain Lake has become slightly more eutrophic in a 30-year period. Phytoplankton quotients have doubled between 1930 and 1960. An increase of the $CaCO_3$ alkalinity has also occurred. These effects are thought to have been caused by the enrichment from 6 hotel cottages and distrubances in the drainage basin due to the construction of the present hotel in 1936.

(142)
Carbohydrates in Adult and Larval *Proteocephalus ambloplitis* (Cestoda: Proteocephala: Proteocephalidae) from the Small Mouth Bass, *Micropterus dolomieu*

MARIETTA MARRA AND GERALD WISLER ESCH,
Wake Forest University

Adult and larval *Proteocephalus ambloplitis* were collected during the summer of 1967 from netted small mouth bass, *Micropterus dolomieu.* Comparative histochemical distribution of glycogen between adult and larval cestodes was determined by the periodic acid-Schiff (PAS) reaction. In addition, chemical analyses for glycogen, free tissue carbohydrate, and free tissue glucose were conducted. Results will be discussed.

(42)
A Study of *Isoetes* Common to the Granite Outcrops of the Southeastern Piedmont

J. F. MATTHEWS, *University of North Carolina at Charlotte,* and W. H. MURDY, *Emory University*

Populations of *Isoetes* representing two species, *I. melanospora* and *I. piedmontana,* were collected from thirteen granite outcrop communities in Alabama, Georgia, and South Carolina. The populations were grown under uniform water and light conditions until the plants were matured. Morphological characters, traditionally used to separate the species occurring on the outcrops, were analyzed. When the population variability of the characters was determined, the populations could be ar-

ranged so that the characters formed a cline, from those associated with one species to those of the other species. This intergradation of morphological characters seemed to coincide with the occurrence of intermediate habitats, where in one case, the morphological characters of the population graded from one species to the other. It was not determined whether the primary control over these characters was genetic or environmental. Two-dimensional chromatographic studies of polyphenolic compounds and chromosome studies provided no further species specific data.

(175)
Stoneflies (Plecoptera) of Northwestern South Carolina

Von H. McCaskill and Rudolph Prins,
Clemson University

Qualitative collections for adult and nymphal stoneflies were made in a total of 116 streams over a one year period in Oconee, Pickens, Anderson, Greenville, and Abbeville counties. A total of 48 taxa was found. The distributions of 21 species of nymphs were ascertained; 13 species were generally distributed, six were found only above altitudes of 1000 feet, and two were found only below 1000 feet. The most abundant stoneflies within the study area were *Acroneuria abnormis, A. xanthenes,* and *Peltoperla* spp. Possible reasons for the decrease in density and diversity of stoneflies from higher to lower altitudes include changes in substrate types and water quality.

(185)
Upper Lethal Temperatures and the Distribution of Fresh Water Fish

Robert W. McCauley, *Waterloo Lutheran University*

A good correlation exists between upper lethal temperatures of fresh water fishes and the maximum summer temperatures of their habitat. For hardy species, however, temperature apparently plays a minor role in distribution since upper lethal temperatures often exceed maximum environmental temperatures by more than five centigrade degrees.

An explanation of this anomaly based on a study of the lethal temperature relations of the land-locked sea lamprey (*Petromyzon Marinus L*) throughout its life cycle, is suggested.

(139)
In Vitro Culture of *Drosophila* Wing Discs

Edward McCrady, III, *University of North Carolina at Greensboro*

In vitro culture experiments on dorsal mesothoracic ("wing") discs of *Drosophila* have been carried out using the medium of Schneider (J.E.Z. *156,* 1964) supplemented with fetal calf serum (Grand Island Biological) at a final concentration of 10%. After each culture period, disc tissue was transplanted into mature third instar larvae and allowed to differentiate during the metamorphosis of the host. By varying the period of *in vitro* culture from 0 to 14 days, it was determined that the thoracic and wing forming portions of the disc respond differently to the growth hormone of the larval host. The thoracic areas tended to lose their developmental capacities within one week, the average number of macrochaetae developed declining from 10 to 1.5. Such macrochaetae also decline in average length. The wing area of the disc, however, developed very poorly if transplanted without *in vitro* culture into a larva. After three or more days of *in vitro* culture, wing area development appears normal following transplantation. It thus appears that a relationship exists between the two areas which affects developmental capacity following *in vitro* culture.

(45)
Fruiting Myxobacteria from the North Carolina Seacoast

James C. McDonald, *Wake Forest University*

Tree bark and soil samples from the beaches and inland coastal areas of the 11 North Carolina counties bordering the Atlantic Ocean were collected during the summers of 1964 through 1967 and examined for fruiting myxobacteria. Existing methods of isolation were used. Sixty samples of bark from 15 tree species and 133 soil samples were studied. Myxobacteria found on tree bark included *Archangium gephyra, Archangium primigenium, Archangium* sp., *Chondromyces catenulatus, Chondromyces medius, Podangium gracilipes, Podangium lichenicolum, Stelangium muscorum,* and *Stelangium vitreum.* Myxobacteria found in soil from beach areas (low tide mark to 10 yds. beyond high tide) included *Archangium gephyra, Chondrococcus coralloides, Myxococcus fulvus, Myxococcus xanthus, Polyangium cellulosum* var. *ferrugineum, Polyangium fuscum, Polyangium minus,* and *Polyangium* sp. From inland areas myxobacteria found were *Archangium flavum, Archangium gephyra, Chondrococcus* sp., *Chondromyces apiculatus, Myxococcus fulvus, Myxococcus stipitatus, Myxococcus xanthus, Polyangium cellulosum* var. *ferrugineum, P. cellulosum* var. *fuscum, Polyangium fuscum,* and *Sorangium nigrum.* Measurement of soil pH and organic matter content was made for each soil sample. The pH of each tree bark sample was determined. Several correlations were noted. (This study was supported by NSF grant GB-1814.)

(12)
Anomalous Responses of Young Tomato (*Lycopersicon esculentum,* var. Marglobe) Leaves to Phytokinin Treatment

Janiece S. McHale and Lewis D. Dove,
Tulane University

Tomato plants were grown in a chamber under 2000 ft-candles illumination. Leaves were detached, treated, then placed in humid chambers under 50 ft-candles illumination. Ribonuclease (RNase) activity was assayed periodically during 8 days. Increased RNase activity was recently correlated with other indicators of senescence.

N^6-benzyladenine immediately suppressed RNase increases in older leaves. RNase activity of younger leaves continued to increase following a single N^6-benzyladenine treatment, but reached a plateau which the untreated controls finally exceeded. Kinetin-treated young leaves were initially induced to higher RNase activity than controls, but after several days controls surpassed the activity of treated tissue which failed to increase further. Response of detached leaves to phytokinins may be determined by age-related amounts of endogenous phytokinins. Water stress prior to detachment induced young leaves to respond like older leaves to phytokinin treatment. (Supported by P.H.S. Grant No. 5TI-GM-669.)

(26)
The Effect of Temperature and Moisture on Flowering and Boll Development in *Gossypium hirsutum* L. (Cotton)

BOBBIE L. MCMICHAEL AND ROBERT D. POWELL, *Texas A & M University*

Plants of *Gossypium hirsutum L.* var. Paymaster 101A, (cotton) at three growth stages were placed in three controlled environment chambers. Moisture stress was induced at four different levels by the addition of Carbowax 6,000 to the nutrient solution in which the plants were grown. The environment chambers were maintained at different temperatures for the duration of the experiment. The number of squares, number of flowers, boll retention, boll period, seeds per lock, and boll development were measured. These factors were related to the development and yield of the plants under the various conditions studied. Yields were greatly affected by both temperature and moisture and stage of growth of the plants at the time of treatment. The lowest temperature used was the detrimental to the plants under all conditions. The addition of Carbowax to the nutrient solutions reduced water uptake and caused a direct desiccation of the leaves.

(59)
Causes of Endemism in *Visuiera porteri*

A. CLAIR MELLINGER, *University of North Carolina*

Visuiera porteri is a fall flowering composite endemic to island and ecotone communities on granite rock outcrops of the piedmont in Georgia and eastern Alabama. Observations of natural field populations and additional populations transplanted to outcrops in North Carolina led to the hypothesis that endemism is strongly controlled by germination requirements. In order to test this hypothesis experiments were conducted to determine the effects of various microenvironmental factors upon seed germination. Optimal and limiting values for temperature, moisture, light, pH, and interactions of these factors were the main considerations of this study. Optimal conditions for germination were then compared with the microenvironmental conditions of the species niche on the outcrop to identify a cause-effect relationship.

(174)
The Species and the Distribution of Quohog Clams (*Mercenaria*)

R. W. MENZEL, *Florida State University*

Two species of quohog clams, the northern *Mercenaria mercenaria* and the southern *M. campechiensis,* along with several recognized subspecies occur along the Atlantic and Gulf Coast of the United States. The northern quohog extends northward to Canada and is represented in the Gulf by the subspecies *M. m. texana.* This species is confined to the inshore waters of bays, inlets and estuaries of the proper salinity. The southern species occurs only offshore in the more northern part of its range (up to New Jersey) but occurs inshore south of Cape Canaveral and in the Gulf of Mexico area as well as offshore. The subspecies *M. m. texana* has been found inshore south of Cape Canaveral along with the typical northern and southern forms. The two species hybridize readily in the laboratory and the F_2's have been reared. The morphology of the F_2's is very similar to the subspecies *M. m. texana* and it is surmised that this subspecies is a naturally occurring hybrid.

(68)
Seasonal Fluctuation of Phytoplankton Composition and Production in a Freshwater Lake

KENNETH A. MEYER, *University of North Carolina at Chapel Hill*

Construction of an eight acre lake in the North Carolina Botanical Garden in the summer of 1966 provided opportunities for research in freshwater ecology. Seasonal variation in phytoplankton composition, distribution and production has been compared with climatic and chemical variables in an attempt to describe the probable complex of controlling factors that govern algal succession. Results of this study provide base-lines for several autecological and ecosystem studies which have been recently initiated.

(141)
A Histogical Study of the Gastric Cardiac Gland in the Beaver (*Castor Canadensis*)

WILLIAM R. MILLARD AND IOLA T. MCCLURKIN, *University of Mississippi*

At the right of the esophagus of the beaver (*Castor canadensis*), at the lesser curvature of the stomach, is an unusual cardio-gastric gland composed of numerous branched follicles. The secreting units of the follicles are tubular glands arranged at right angles to the follicular lumen. There are three regional segments recognizable per gland unit. The neck region comprises the upper tenth of the gland unit and is composed of mucin secreting simple columnar cells. The medial duct region is composed of simple cuboidal duct cells and parietal cells. The basal secretory region contains enzyme secreting zymogenic cells, mucous cells, and parietal cells.

The gland as a whole is composed of several layers: an inner glandular layer, lamina propria, muscularis mucosa, submucosa, muscularis externa, and tunica adventitia.

The gland possesses an elaborate blood system, and the direction of the flow of the blood within the follicles is indicative of a heightened secretory activity.

(188)
The Influence of Season on the Radiation Sensitivity of an Old Field Community

GARY L. MILLER, *University of North Carolina*

Recent radiation experiments have raised the question of how a natural system would respond if it were exposed to ionizing radiation at different seasons in the year. In other words, would nature express a seasonal differential in radiosensitivity?

In order to answer this question, four segments of an old field were seasonally irradiated (April, July, October, January) for 29 days using a portable 9200 curie ^{137}Cs source. Field studies included estimations of changes in population densities, plant growth and changes in reproductive potentials. The results of this study indicate a seasonal differential in radiosensitivity, with the winter phase of the community being somewhat more tolerant.

(93)
Electrophoretic Analysis of the Molt-Inhibiting Hormone in Crawfish

WILLIAM C. MOBBERLY,
Northeast Louisiana State College

The object of this investigation was to determine the electrophoretic behavior of the molt-inhibiting hormone (MIH) from the eyestalks of the crawfish *Faxonella clypeata*. Extracts prepared from 20 eyestalks were applied to a three centimeter wide filter paper strip and subjected to electrophoresis for 18 hours at one of the following pH values: 4.2, 7.2, and 8.4. At the end of the 18 hours the filter paper strip was cut into six one-centimeter sections on both sides of the origin. The sections were washed in physiological saline which was injected into eyestalkless crayfish. If MIH had been on the particular section of filter paper, then the incidence of molting would have decreased when the saline wash of that section was injected. The results showed that at each pH used MIH migrated toward the cathode. MIH is electropositive in the pH range 4.2-8.4.

(112)
Biochemical Changes in Immature Peanuts in Response to Curing Temperature

S. C. MOHAPATRA AND H. E. PATTEE,
North Carolina State University and *ARS, USDA*

Photosynthetically labelled peanut kernels were used to study the time-temperature-moisture relationship of biochemical changes occurring during curing of immature peanuts. Radioactivity of the lipid fraction increased during the first six hours of curing at 50° C and during the first twelve hours at 20° C. During subsequent hours of curing, the radioactivity decreased from 7.5×10^5 dpm/gm dry wt. at 50° C and 5.5 dpm/gm dry wt. at 20° C until it reached a nearly constant level of one-half the maximum values: 48 hours was required to reach the constant level at 20° C while only 24 hours was required at 50° C. Radioactivity in the ethanol-soluble fraction decreased during the initial period of curing and then increased slightly until a constant level was reached. This effect was more evident at 20° C than at 50° C. Changes from anabolic to catabolic processes seem to be influenced by the moisture level of the peanut kernel.

(181)
Variation of Pelage Color in Species of Mice

CLIFTON H. MOORE, RONALD BLESSING AND
MICHAEL H. SMITH, *Savannah River Ecology Laboratory*

This paper introduces the use of a new technique for measuring the pelage color in mammals. Reflectivity of the pelages from six species of mice (*Ochrotomys nuttalli, Peromyscus gossypinus, Peromyscus polionotus, Sigmodon hispidus, Neotoma floridana* and *Mus musculus*) was measured by the Baush and Lomb Spectronic 505 Spectrophotometer. Two treatments were evaluated; (1) pelages pressed against glass showed an increased reflectivity at all wavelengths when compared to (2) pelages without glass pressed against the hair. Significant linear relationships were observed between wavelength (X) and per cent reflectance (Y) for each species and each individual within a species regardless of treatment. However, a non-linear model represented by $Y = a + b, \quad X + b_2X^2 + b_3X^3$ accounted for significantly more of the variability then a linear model for treatment 1.

(88)
Studies on the Metastasis of the Fortner Plasmacytoma to the Brain and Other Tissues of Hamsters

JACK H. MOORE, DANIEL P. GRISWOLD, JR.,
CHARLES A. KELLEY, AND DONALD J. DYKES,
Southern Research Institute

The Fortner hamster Plasmacytoma No. 1 has been shown to possess features characteristic of many human malignancies — features which should be of advantage in attempting to better understand neoplastic growth and response to chemical agents. This tumor has been shown: to metastasize to the axillary lymph nodes by one day following subcutaneous implant of a tumor fragment and to the brain, spleen, liver, lungs, kidneys, blood, and femoral marrow as early as six days following subcutaneous implant; to proliferate in the brain and eventually result in host death; and to cause host death, following cyclophosphamide (Cytoxan)-induced regression of subcutaneous tumors, by continued growth in sites (e.g. brain) which are relatively inaccessible to active Cytoxan metabolites.

(11)
Stimulation of Ethylene Production and Abscission

PAGE W. MORGAN, *Texas A & M University*

Discovery of auxin-induced ethylene synthesis led to the proposal that materials which stimulate ethylene production can be used to control plant growth (Morgan, Proc. 1967 Beltwide Cotton Research Conf. pp. 151-155). An experimental chemical of Amchem Products, Inc., which produces effects parallel to those of ethylene, had been tested for its ability to modify growth of the cotton plant. Amchem 66-329 induced abscission of leaves and fruiting forms of cotton plants in the greenhouse and field. The time course of abscission due to ethylene and Amchem 66-329 was similar. The product stimulated ethylene production to peak concentrations ranging from 4 to 70 ppm in the air around enclosed, flowering plants. Ethylene production by treated plants reached levels which induced abscission in non-treated plants and stimulation preceded abscission. The apparent stimulation of abscission by ethylene produced from or by the Amchem 66-329 indicates that it may be possible to modify the numerous plant processes affected by exogenous ethylene with timely applications of ethylene substrates.

(116)
A Model for the Regulation of Hyphal Branching in the Water Molds

J. THOMAS MULLINS, *University of Florida*

The plant body of *Achlya* and other water molds consists of coenocytic hyphae, whose walls are composed of about 15% microfibrillar cellulose and 85% of an amorphous non-cellulosic polysaccharide complex. Branch formation by such a structure involves the problem of expanding a localized portion of the wall. It has been found that the induction of branching is always accompanied by a rise in the enzyme cellulase. It is suggested that wall-softening enzymes such as cellulase regulate the production of hyphal branching by the production of "weak spots" in the cell wall which then allows the hyphal contents to be flow-oriented in the direction of maximum strain into finger-like laterals.

(83)
Some Attributes of an Amphioxus (*Branchiostoma caribaeum*) Population in Old Tampa Bay, Florida (Leptocardii, Amphioxi, Branchiostomidae)

GIDEON E. NELSON, *University of South Florida*

Branchiostoma caribaeum begins spawning in Old Tampa Bay during late August. Length frequency data are interpreted as showing three age classes: 1) Less than one year old: specimens under 25 mm in length, 2) Second year class: 25-45 mm, 3) Third year class: 45-60 mm. Sexual maturity begins at 30 mm in length.

(66)
Modern Carbonate Sediments: Algae and Marl Sediments in Coastal Marshes, Everglades National Park

STEVE A. NEUBERT, *University of Miami, Coral Gables*

The deposition of calcium carbonate by Cyanophyta (blue-green Algae) was studied with respect to changes in the bicarbonate, pH, and oxygen of the surface waters. The nature of these changes indicates that biogenic deposition of calcite is occurring by the active extraction of bicarbonate (HCO_3^-) ions in exchange for hydroxide (OH^-) ions. The physical precipitation of calcite by withdrawal of free carbon dioxide from solution would appear to account for an insignificant portion of the sediment. Estimation of the calcite formed was 19 lbs/acre/day. Comparison of water chemical data indicates a fundamental difference between this area and the main drainage system of the Everglades, and reflects the different type of marsh sediments accumulating in the two areas.

Future study of the area will include grain-size distribution of sediment and isotope fractionation of carbon and oxygen in the system.

(10)
The Reversal of Ethionine-Induced Inhibition of Elongation of *Avena* Coleoptiles by Various Compounds

W. E. NORRIS, JR., *Southwest Texas State College*

Ethionine-induced inhibition of elongation of *Avena* coleoptile segments has been measured in water and in indole-3-acetic acid. In the presence of 10 mM L-ethionine the inhibition amounts to about 70%. It has previously been shown that the addition of adenosine triphosphate effectively counteracts this inhibition; optimal ATP concentrations are between 0.25 and 0.5 mM. Adenine, adenine sulfate, adenosine, and guanine have now been shown to act similarly to ATP in reversing the ethionine-induced inhibition of elongation.

(147)
Nucleases of *Haematoloechus medioplexus*

D. A. NUNNALLY, B. J. BOGITSH, AND D. A. DAVIS, *Vanderbilt University*

Ribonuclease and deoxyribonuclease were measured in low speed (15,000 x g, 15 min) supernatants of homogenates of the frog lung fluke, *Haematoloechus medioplexus,* employing standard procedures. Optimum pH for ribonuclease, using 0.1 M acetate or vernonal-acetate buffers, is 7.2, although enzyme activity could be demonstrated over a wide range of pH values. For deoxyribonuclease, 0.2 M Tris-maleate buffers were used to determine optimum pH, which proved to be 5.1. For this enzyme, there were indications of a second peak in the vicinity of pH 8; tentative hypothesis that this peak represents a second enzyme is supported by the fact that activity in the alkaline range is mildly stimulated by the presence of Mg^{++} in the incubating medium, while Mg^{++} is inhibitory below neutrality.

Both deoxyribonuclease and ribonuclease were localized in unfixed cryostat sections by the use of a substrate film method. For both enzymes, activity was prominently displayed in the lumen of the digestive tract and in the eggs. These enzymes are therefore interpreted as constituting part of the digestive apparatus of *H. medioplexus* as well as playing unspecific roles in embryonic development. (Supported, in part, by National Science Foundation Grant GB-4742.)

(120)
Using Colchicine to Determine the Number of Cells Initially Forming a Lateral Root Primordium [1]

D. H. O'DELL,[2] D. E. FOARD, *Oak Ridge National Laboratory and East Tennessee State University*

Colchicine has been used to prevent nuclear and cell division in seedlings without preventing lateral root initiation. In the lateral root primordia of these seedlings, pericyclic cells that normally would have divided replicate their chromosomes without nuclear division. Such cells thus become "tagged" by their polyploid restitution nuclei. Therefore it is possible to count directly from serial sections the number of parent-root pericyclic cells involved in the initial formation of a lateral root primordium. Thus far such counts have been made for three cereals: wheat, *Triticum aestivum* L.; rye, *Secale cereale* L.; and barley, *Hordeum vulgare* L. In each case the number of cells initially forming a lateral root primordium is about 16. This study is currently being extended to species in other groups.

[1] Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.

[2] Research Participant

(75)
Testing Pesticides at the Ecosystem Level

EUGENE P. ODUM, GARY W. BARRETT, AND H. RONALD PULLIAM, *University of Georgia*

Problems sometimes arise when pesticides are tested at one level (i.e., individual or species) and then used without further study at another level (i.e., community and ecosystem). To determine the feasibility of field testing through the use of indices that measure effects on nontarget as well as target components two experimental one-acre grain crop enclosures were established, one of which received single application 2 lb. Sevin insecticide in mid-summer. In addition to the expected sharp reduction in density phytophagous insects the following community-level indices were reduced by the treatment: litter decomposition, mammalian reproduction and arthropod equitability for 1-2 weeks; herbivore diversity 2-3 weeks; predator diversity and density 3-4 weeks; herbivore density and biomass for 6 weeks. Plant standing crop, net primary production, seed production, and terminal density small mammals were not affected. The cost of the "ecosystem test" was estimated to be less than would be required for a laboratory testing procedure for any one of the components.

(119)
Chilling Effect and Related Changes in *Hibiscus Esculentum* L. Plants

R. G. Omran and Robert D. Powell,
Texas A & M University

The effect of chilling on *Hibiscus esculentum L.* (Okra) plants has been determined. Okra, var. Green Velvet, at two growth stages was subjected to three temperature regimes at two humidities, in controlled environment rooms, and returned to the greenhouse after treatment. The treated plants were graded for the severity of injury and compared to controls. All plants treated a 5° C were injured and the young plants died after 6 days. Injury to the mature plants was a terminal "die back" which became more apparent with subsequent growth. Regrowth originated from the lower part of the stems. At 10° C, less damage occurred in plants at both ages than was evident at 5° C. After treatments at both temperatures plants showed a decline in the number of flowers when compared to the control. Cold also induced changes in dry weight and nitrogenous constituents.

(55)
Unrecorded or Otherwise Unusual Vaucheria from N.C.

Donald William Ott, *University of North Carolina*

Recent collections of *Vaucheria* from the piedmont and coastal regions of North Carolina have yielded material of more than half of the fifteen species reported for the state. In addition, several previously unrecorded species have been collected in both marine and fresh water habitats including: *Vaucheria discoidea* Taft, *V. sessilis* f. *clavata* (Vaucher) Heering, *V. walzi* Rothert, *V. nicholsii* Brown, and *V. thuretii* Woronin. Critical stages in the development of antheridia and oogonia have been observed in material in the laboratory for most species collected. Unusual variation in the morphology of the reproductive structures was encountered in a number of species, both in the laboratory and in nature, which suggest that some characters presently used for distinguishing species of *Vaucheria,* especially those placed in the section Corniculatae, may not be reliable.

(36)
Hybridization in the Genus *Melanthera* Rohr (Compositae)

James C. Parks, *Vanderbilt University*

The natural variability found in the genus *Melanthera* and the wide distribution of some taxa has lead to a great proliferation of synonyms and a persistent source of confusion for taxonomists. Cytological studies have revealed a uniform haploid chromosome number ($n = 15$) in all U.S. taxa. This work, supplemented by field and greenhouse studies, suggests that hybridization may readily occur in nature. Evidence for the hybrid origin of some naturally occurring forms will be presented. The importance of considering hybridization as a factor in delimiting the taxa of *Melanthera* will be discussed.

(78)
A Limnological Reconaissance of the Eastern Prairies of the Okefenokee Swamp

Fred K. Parrish and Felicia H. Hollingsworth,
Georgia State College

A study was made to determine the aquatic macroinvertebrates in the Okefenokee Swamp, to ascertain the range of certain environmental conditions, and, initially, to select proper techniques for measuring and for collecting in this specific situation. Data and organisms were collected at approximately five week intervals for eighteen months in four eastern prairies. The animals collected were: Oligochaeta - 359, Hirudinea - 1, Arachnida - 239, Cladocera - 440, Copepoda - 280, Decapoda - 4, Amphipoda - 1, Coleoptera - about 40, Diptera - 441 larvae, Ephemeroptera - 23 larvae, Hemiptera - about 90, Lepidoptera - 2 larvae, Trichoptera - 15 larvae, Odonata - 68 nymphs. These organisms are in the process of being identified. Collection was most effective with a combination of straining the water with a 40 mesh sieve, taking Eckman dredge samples, examining aquatic plants, and picking up insects as they were seen. Hand sorting with the aid of a dissection microscope was the best method of separating the animals from the plant material.

The results of chemical analyses of the water were: pH - 4.2 to 4.6, Secchi disc readings - 4 to 32 inches, dissolved oxygen - .25 to 8.5 p.p.m. (depending on depth and time of day or night), dissolved carbon dioxide - 12.5 to 39 p.p.m. (depending on time of day or night), total alkalinity - trace, and total hardness - about 30 p.p.m. These data are similar to those for lower coastal plain rivers in this region.

Appreciation is expressed to the U. S. Fish and Wildlife service, which granted special permission for these studies, and to the Okefenokee Wildlife Refuge personnel for cooperation and aid in sampling and collecting.

(105)
The Uptake and Metabolism of Trifluralin by Goldfish, *Carassius auratus* (Linn.)

John H. Paxton, *Clemson University*

The uptake and metabolism of sublethel doses of topically and orally administered trifluralin (2,6-Dinitro-N, N-di-n-propyl-α,α,α-trifluoro-p-toluidine) by *Carassius auratus* was studied. The heart, liver, brain, kidneys, stomach and intestines, gonads, edible portion, and feces were analyzed using thin-layer and gas-liquid chromatography after 48 hours of exposure to the material. Trifluralin was detected in all tissues analyzed except the brain. One metabolite, 2,6-Dinitro-N-n-propyl-α,α,α-trifluoro-p-toluidine was found in the stomach and intestines, edible portion, and feces in both topically and orally dosed fish at a level 15% of the trifluralin present. A second metabolite, 2,6-Dinitro-4-trifluoro-methyl aniline was found in the edible portion of the orally dosed fish but not in those topically dosed. The two metabolites by a N-dealkylating mechanism, site undetermined.

(129)
Ultrastructural Changes in the Life Cycle of *Crithidia fasciculata* (Zoomastigophorea, Kinetoplastida, Trypanosomatidae)

Jerome J. Paulin and William B. Cosgrove,
University of Georgia

Heteroxenous trypanosomatid flagellates exhibit ultrastructural modifications of cellular organelles in their life cycle. Mitochondria, kinetoplasts, Golgi apparatus

and subpellicular microtubules are generally well-developed in the mid-gut or culture forms and poorly developed in blood-stream forms. We report here, in the monoxenous species *Crithidia fasciculata,* ultrastructural differences between individuals from young and old cultures.

Aliquots from axenically grown mass cultures of *C. fasciculata* were fixed every 6 hours over a 48-hour interval in buffered glutaraldehyde and/or osmium tetroxide. Examination of thin sections of log phase cells (i.e. 12-24 hours post inoculation) revealed well-developed mitochondria with numerous cristae. The kinetoplast, situated below the flagellar apparatus, was frequently observed to be an integral part of the mitochondrial complex. A well-developed Golgi apparatus and subpellicular microtubular system were present. Cells in the phase of declining growth rate (36-48 hours post-inoculation) were characterized by atypical mitochondria with irregular bulbous cristae and a general wrinkled appearance. The continuity between the kinetoplast and mitochondria was lacking or poorly differentiated. The cytoplasm contained conspicuous membranous fragments, suggesting the apparent breakdown of mitochondria or other cytoplasmic organelles, and electron-dense bodies which appear to be lipoidal in composition.

(198)
Remote Sensing for Plant Ecological Studies on a Watershed in Georgia

G. L. Plummer, *University of Georgia*

The Little River Watershed covers 150 sq mi of Coastal Plain land northwest of Tifton. Color-infrared photographs and thermal-infrared surveys were made to characterize distinguishable ecosystems at three different times of the year: winter, late-spring, mid-summer. Land-use patterns on the watershed at different times of the year shall be illustrated and described. "Normal" land-use characteristics shall be compared with typical deviations associated with different soil series from north to south. Various observations, measurements and interrelationships have been synthesized to establish a set of hypotheses whereby a model system may be programmed to analyze variations in environmental factors so that a basis may be established for predicting certain hydrological characteristics of crop-soil ecosystems elsewhere under similar conditions.

(148)
Incidence of Parasitism in Two Species of *Plethodon* (Amphibia: Plethodontidae) by *Brachycoelium* (Trematoda: Brachycoeliidae)

Vernon N. Powders, *Georgia Southwestern College*

During 1966 and 1967 the incidence of *Brachycoelium* infections in 392 *Plethodon glutinosus* and 988 *P. jordani* was studied. Both salamander species were collected in the Great Smoky Mountains National Park, while only *P. glutinosus* was collected from Knox County, Tennessee. For all areas and altitudes throughout the study, *P. glutinosus* was 17.85 per cent infected and *P. jordani* was 6.07 per cent infected. The per cent infection for *P. glutinosus* and *P. jordani* between the altitudes 2,700 and 4,600 feet (altitudinal levels where both species occur together) was respectively, 12.34 and 9.2. Above 4,600 feet, where only *P. jordani* was collected, some areas were found in which no *Brachycoelium* infections occurred. Comparisons of per cent infection between the two salamander species were made at various altitudinal levels and between seasons. It was concluded that *Brachycoelium* infection rates are equal in *P. glutinosus* and *P. jordani* and that infection rates appear to be independent of altitude. It was also concluded that *Brachycoelium* infection rates remain fairly constant throughout the year.

(115)
Physiology of Hypocotyl Hook Opening

Robert D. Powell and Page W. Morgan, *Texas A & M University*

The photomorphogenic control of hypocotyl hook opening in the *Phascolus vulgaris* (bean) and *Gossypium hirsutum* (cotton) seedling have been studied. Seedlings were grown in the dark, excised under safe green light and hook opening measured after 18 to 24 hours. With beans, opening is blocked in submerged hooks in the light, but begins as soon as they are removed from the water. The response of bean hooks is influenced by how they are positioned after they are cut. In the dark opening of standing hooks is greater than those lying horizontally and there is a geotropic component of the opening of horizontal hooks. The presence of cotyledons retards opening of bean hooks in both red light and dark. In contrast, under similar conditions, the cotton hypocotyl hook opens much more rapidly and completely when the cotyledons are present than when they are excised. Red light appears to have little effect on the opening of the excised cotton hook.

(155)
The Death of Classical Parasitology?

Charles E. Price, *Augusta College*

As a classical biologist, this author is alarmed at the ever-increasing tendency to relegate classical biology to the status of a minor or even unnecessary area of life science. While realizing the absolute necessity of the fields of experimental and/or molecular biology, the present author is one classical worker who is not yet prepared to "roll over and play dead".

This presentation consists of a reading (with comments) of a paper written by the author during 1967. The paper, entitled "Requiem for Classical Biologists?", was published in *Bios* (vol. 38, no. 2, pp. 85-88). The primary goal of "Requiem" was to have graduate students realize that the only enduring approach to the study of biology is the acquisition of a knowledge of both molecular and classical biology.

(40)
A Preliminary Report on the Vascular Flora of Mississippi

Thomas M. Pullen, *University of Mississippi,* Samuel B. Jones, Jr., *University of Georgia,* and J. Ray Watson, Jr., *Mississippi State University*

Approximately 40,000 collections were made between September, 1963 and November, 1967, in the 47,716 square mile area included in Mississippi. Distributional ranges have been extended beyond those previously published and over 200 new state records have been established. Although most species were typical of Coastal Plain and Piedmont vegetation, a number with more western or northern centers of distribution were uncovered. Plans call for a continuation of this study, leading ultimately to production of a manual of the Mississippi flora. (Supported, in part, by National Science Foundation Grant GB-4635.)

(138)
Hormones and PET Mouse Melanocytes

W. M. Reams, Jr., W. H. Dorman and
R. E. Shervette,[1] *University of Richmond*

In the frog, both epidermal and dermal melanophores are stimulated by MSH; however, only dermal melanophores show pigment granule aggregation in response to melatonin and other hormones. In mammals, epidermal melanocytes have been shown to respond to MSH but are refractory to hormones which usually evoke color lightening in amphibians. In a broad series of tests, we have found that dermal melanocytes of the PET mouse are also refractory to melatonin, acetylcholine, epinephrine and norepinephrine.

[1] Present address: *University of Virginia.*

(170)
Megaspore Tetrad Patterns in Leguminosae

David H. Rembert, Jr., *University of South Carolina*

A review of the literature and the work of this author reveals that at least 13 megaspore tetrad patterns may occur in Leguminosae. The majority of species investigated follow patterns which result in the development of a single functional megaspore. There are 6 species (*Lupinus luteus, L. polyphyllus, Lathyrus odoratus, Laburnum anagyroides, Wisteria sinensis,* and *Pueraria lobata*) that are reported to follow patterns which result in the development of 2 functional megaspores. All of these legume species have tetrad patterns that could have been derived from a generalized or hypothetical tetrad pattern. This ancestral pattern consists of 4 megaspores in linear arrangement with any one of the megaspores having an equal potential for development into a megagametophyte. The various megaspore patterns could have been derived by any one or a combination of the following conditions: loss of spore function, change in division plane, loss of cell wall, and loss of nuclear division. Based on these criteria a phylogeny for tetrad patterns may be suggested for Leguminosae.

(33)
Infrared Spectrophotometry: A Plant Taxonomic Tool Preliminary Investigation

John D. Reynolds, *Richmond Professional Institute*

Cold chloroform leaf extracts of several plant species were subjected to Infrared Spectrophotometric analysis. Spectrographs were made of Diapensiaceae (*Shortia galacifolia* T. & G., *Galax aphylla* L., *Pyxidanthera barbulata* Michx. and *P. brevifolia* Wells), Compositae (*Liatris secunda* Ell., *L. graminifolia* (Walt.) Willd., *Vernonia noveborancensis* (L.) Michx., *V. altissima* Nutt., *V. angustifolia* Michx., *V. acaule* (Walt.) Gleason, hybrid of *V. angustifolia* x *V. acaule* and hybrid of *V. angustifolia* x *V. noveboracensis*) and *Spinacia sp.* Since in all cases crude extracts containing chlorophyll were used, generalized patterns appear to be similar for all plant families examined. A critical analysis of resonating frequencies showed enough differences to distinguish between species of the same genus. It was also possible to distinguish hybrids with this analysis. In all cases the hybrids showed a closer similarity to the spectrographic pattern of the female parent. No attempt has been made to identify any of the resonating groups. Studies, to date, have been concerned simply with the possibility that Infrared Spectrophotometry may be used as a tool for "fingerprinting" species within a genus. The differences in the spectrographs of closely related species indicate the possibility of using this technique as an adjunct to morphological taxonomy.

(69)
A Comparison of Phytoplankton of Open Everglades and an Alligator Hole

Peter B. Rhoads and Robert Pope,
University of Miami

Periodic quantitative plankton samples were taken from April thru July of 1965 and during the same period of 1966 at an alligator hole in Everglades National Park. Additional samples were collected in November of 1967. The majority of algal forms found in the alligator hole samples were also found in the open everglades. This implies that a part or all of the phytoplankton assemblage found in the alligator hole is carried in by the slow water flow from the neighboring shallow glades. The sparcity of plankton in the quantitative samples is readily apparent. Of the 23 genera of algae that were found, 17 genera or 74% of the total were Chlorophyceae, but most of these forms were present in trace numbers. It appears that the greater part of the algal primary productivity in the alligator hole-everglades area is due to the heavy periphyton growth. An exception to this situation occurred in April, 1965, when a plankton bloom was observed in the alligator hole. At this time the water table was below the surface of the everglades, and it is possible that the alligator hole was acting like a small pond rather than the usual shallow marsh.

(118)
Growth of the Oxygen Tolerant Strain of *Chlorella sorokiniana* at Hyperbaric Oxygen Pressures

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USAF School of Aerospace Medicine,
Brooks Air Force Base, Texas

The growth rate of the oxygen tolerant strain (OTS) of *Chlorella sorokiniana* decreases in a linear fashion as the partial pressure of oxygen is increased from 711 to 1478 mm Hg. Under two atmospheres of oxygen growth ceases after 10 to 12 hours and is never resumed. This cessation of growth is not due to any permanent injury, and growth is resumed when oxygen partial pressure is reduced to one atmosphere or less. The inhibition occurs under both heterotrophic and autotrophic conditions and is not due to a stoppage of cell division alone. The results indicate that the tolerance of OTS cells to elevated oxygen pressures is not an absolute immunity, and that hyperbaric nitrogen partial pressures have a moderate inhibitory effect on the growth rate of *Chlorella.*

(161)
A Morphological and Cytochemical Study of *Hexamitus batrachorum* Swezy, 1915

Larry D. Risinger and Felix H. Lauter,
University of South Carolina

In this study five staining procedures were employed. They included: Best's carmine stain for glycogen, Feul-

gen's nucleal stain for DNA, Heidenhain's hematoxylin stain, Bodian's method of silver impregnation (protargol), and the methyl green-pyronin Y stain for DNA and RNA. The methyl green-pyronin Y stain, Best's stain, and the Feulgen stain were used for the first time on *H. batrachorum*. The hematoxylin and silver protein stains had been used previously in other studies on *H. batrachorum*.

The specificity of the Feulgen stain and the methyl green-pyronin stain was confirmed by the use of DNase and RNase. Salivary amylase was used to confirm the specificity of Best's carmine stain for glycogen. Glycogen is demonstrated in the cytoplasm, while DNA is demonstrated in the nuclei. In addition both DNA and RNA are demonstrated in the two posterior organelles. A hypothesis, dealing with the identification of the two posterior organelles, is stated.

(48)
Experimental Taxonomy of Some Members of the Saprolegniaceae

Bosilijka Ristanovic and Charles E. Miller,
Ohio University

From September, 1967, through January, 1968, approximately 100 strains of water molds (Saprolegniaceae) from several aquatic habitats from the environs of Athens, Ohio have been isolated, purified and studied taxonomically. Regular monthly collections, purifications and identifications have been made from Dow Lake, Southeastern Ohio, to determine seasonal influences on the number and kinds of water molds present. Sixty-six of these strains have been identified as various species of *Saprolegnia,* two as *Leptolegnia,* eight as *Achlya,* and one as *Aphanomyces.* Thirty-three strains of *Saprolegnia* did not produce oogonia and were not identified to the species level. Certain representatives of the identified strains have been grown on various kinds of media frequently used in classical bacteriological taxonomy. Initial results indicate that the growth responses by these fungi to some of the media may be useful as supplementary taxonomic characteristics in the identification of these taxa.

(72)
A Functional Classification of Forest Litter Arthropods Based Upon Response to Resource Enrichment

W. H. Rittenhouse, *University of North Carolina*

A study was made to separate the most common species of litter arthropods in the study area into functional groups based on response to enrichment of the habitat with presumed resources. Commercial sedge peat, partly decomposed leaves, and a mixture of partly decomposed leaves and peat were applied as resource treatments to study areas; and population parameters of seven species were followed for ten weeks by a sampling program. A summary of the results will be presented. This study was done as a search for possible competitive interactions, which will be discussed briefly.

(199)
Moisture Depletion Within Crop-Soil Sites

Robert H. Rivers and G. L. Plummer,
University of Georgia

Soil moisture conditions in early August 1967 were measured twice daily with a 241-Am-Be soil moisture probe to evaluate both depletion and recharge characteristics under two soil series (759-Fuquay loamy sand; 758-Tifton sandy loam) and three crops (corn, cotton, peanuts) in the Coastal Plain region. Observations, measurements, and interrelationships were tested statistically. Unique soil-crop interactions occur on each site in such a way that every field may be distinguished with independent characteristics. When certain soil-moisture-depletion characteristics were used to evaluate crop behavior, each crop apparently used soil-water differently from the other; more water was lost under corn than under peanuts; cotton apparently withdrew the least amount of water. Tifton sandy loams were generally "wetter" soils than Fuquay loamy sands. Implications for other plant ecological studies shall be presented from results obtained during this study.

(20)
Changes with Plant Age in the Activities of Two Invertases of Louisiana Sugarcane

Tawakol Y. Rizk and W. C. Normand,
Louisiana State University

The first stubble crop of three varieties of sugarcane C. P. 36-105, C. P. 42-10, and C. P. 48-103 grown under uniform agronomic practices was used for this study. Invertase activities were detected at pH 5.5 and pH 7.0 respectively from mature and immature internodes.

The activity of both invertases increased from the high-sucrose internodes (parts or varieties) to the low sucrose internodes. The increase of acid invertase activity was considerably larger than that of the neutral invertase among parts of the stalk as well as among varieties.

The activity of the two invertases tended to increase with plant age at different rates. The increase of acid invertase activity in partially mature cane was greater than that of the neutral invertase. When the cane became more mature and reached its highest sucrose content the neutral invertase activity increased faster than the acid invertase activity. These results showed a direct relationship between the two invertases in mature and immature internodes, and this relationship was influenced by the sucrose content.

(9)
Histological and Mitotic Changes in Excised Cotton Roots in Response to Trifluralin or Nitralin Treatments

Tawakol Y. Rizk and W. C. Normand,
Louisiana State University

Two comparable concentrations of the two herbicides were studied for their effects on mitosis and other histological changes in excised cotton root tips, which grown under sterile conditions on a modified White's medium (Machlis and Torrey 1956). The length of the roots were determined daily for three days. Segments of the roots were taken after 24 and 72 hours for sectioning (cross and longitudinal sections) and staining according to Johansen techniques.

Both herbicides inhibited root growth at different rates and the rate of inhibition increased with time as well as the herbicide concentration. This gross effect was correlated to an inhibition of mitosis or elongation depending on time and the herbicide concentration. Several other effects of xylem differentiation, diameter of the stele the shape and size of both cortex and pith cells were observed and were related to treatment by the herbicides.

(111)
Effect of Wounding on the Composition of Slash Pine Oleoresin: A Preliminary Report

DONALD R. ROBERTS, *Southeastern Forest Experiment Station,* Olustee, Florida

Gas chromatographic analysis of slash pine (*Pinus elliottii* Engelm. var. *elliottii*) oleoresin revealed that wounding of the trees, as in a naval stores operation, greatly changed the terpene hydrocarbon composition of the oleoresin from above, but not below, the wounded area (face). Generally the percentage of alpha-pinene in the turpentine portion of the oleoresin decreased whereas beta-pinene and beta-phellandrene percentages increased. The effect of wounding on oleoresin composition was evident as much as ten feet above the wounded area.

Experiments with small wounds (micro-chips), designed to determine the rate of composition change, failed to detect large differences, but minor effects of wounding were evident after one week. Experiments using fullface wounds (streaks) will be continued to investigate more fully the rate of composition change.

(201)
Conservation of Plant Species

HOLLIS J. ROGERS, *University of North Carolina at Greensboro*

The rapid increase in the human population with the resulting pressure on the natural resources is endangering the survival of numerous species of native plants. Urban expansion, atmospheric pollution, highway construction, water storage, strip mining, airport extension, modern farming and herbicide application is resulting in a serious reduction of the native habitat of many plant species. The college students of the present generation who were required to turn in 50 to 100 plant specimens for high school biology may now be expected to submit one, two or three collections of similar size in order to complete their program in the biological sciences. They may then be certified to teach biology and may thereby require their students to search through the ruins for an equal number of specimens. Records of the distribution of the former range of the species may soon replace the observation of the living plant.

(143)
Aspects of Respiration in *Schistosomatium douthitti*

STEFFEN H. ROGERS, *Vanderbilt University*

Respiratory enzyme activity in various stages of the life cycle of *Schistosomatium douthitti* was investigated. Histochemical, quantitative biochemical, and manometric techniques were employed and applied to three stages of the life cycle: the miracidia, the cercaria, and both sexes of the adult stage. Appropriate histochemical techniques were carried out on the cercaria in the snail hepatopancreas and on miracidia in the infected hamster intestine. All other experiments on cercaria and miracidia were carried out on the free swimming organisms. The adults were always studied after being removed from the venules of the hosts' intestine. The respiratory functions of the three stages will be compared. Included will be a comparison of the metabolic activity of the enzymes related to glycolysis, the Kreb's Cycle, and the cytochrome system of each stage. The effects of inhibitors, such as tartar emetic, fluoroacetic acid, nitrogen, and cyanide on the various stages of the life cycle will also be discussed.

(117)
Sequence of Ultrastructural Changes in Mesophyll Cells of Senescing Tomato (*Lycopersicon esculentum,* var. Marglobe) Leaves

STANLEY J. ROUX AND JOHN T. MCHALE, *Loyola University of the South*

Tomato leaf mesophyll cells were examined by electron microscopy during 0-20 days after leaf detachment. Leaves were stored under approximately 1000 ft-candles illumination with petioles in water. Ultrastructural changes became evident after 8 days. The tonoplast, endoplasmic reticulum, and plasma membrane were the first organelles to show abnormalities. Vesiculation of these membrane systems preceeded changes in chloroplasts and mitochondria. Coalescence of granal lamellae and vesiculation of stromal lamellae occurred in chloroplasts 11-20 days after leaf detachment. Mitochondria were particularly resistant to senescence. Degenerating organelles were similar in appearance to those observed in senescing wheat, green bean, and cucumber leaves, but the sequence of events differed. Patterns of senescence probably vary with taxa, although differences in methods could account for some variation. The orderly sequence of ultrastructural changes indicates that senescence is not random, but biochemically controlled. The sequence of ultrastructural changes has implications for the physiology of senescence.

(4)
On the Effects of DMSO in Cation Transport by Excised Barley Roots

WALTER E. SCHMID, *Southern Illinois University*

Dimethyl sulfoxide (DMSO), in concentrations of up to 10% by volume, stimulates the uptake of zinc by excised barley roots. In the same concentration it severely depresses uptake of sodium and of rubidium. It does not seem to affect the permeability of the membrane since roots treated with desorption solutions which were 10% in DMSO did not lose more of the preferred ion than did roots desorbed in solutions not containing DMSO. Oxygen utilization (measured in the Warburg Respirometer) was reduced when DMSO was present. It is suggested that DMSO is a poisoning agent which interferes with cation transport by attacking some aspect of metabolism and not by influencing the permeability of the membrane.

(24)
The Preliminary Characterization of Cholinesterase Activity from Etiolated Pea Seedlings (*Pisum sativum* var. Alaska)

OTTO J. SCHWARZ AND G. R. NOGGLE, *North Carolina State University*

The carboxyl ester hydrolase activity of etiolated pea seedlings was investigated. A radiometric assay was used to study the pea seedling's ability to hydrolyze acetylcholine. A spectrophotometric assay utilizing indophenyl acetate was used as a general indicator of carboxyl ester hydrolase activity. Studies concerning pH, metal activation, and inhibition were made. Both activities had a broad pH optimum between pH 7.0 and pH 9.0. Peak activity was approximately pH 8.5 for acetylcholine hydrolysis and approximately pH 7.2 for indophenyl acetate hydrolysis. The cholinesterase activity was found to be strongly inhibited by eserine at 10^{-2} M and completely inhibited by choline at 10^{-3} M. Both activities were inhibited by divalent metal ions. The patterns of eserine and metal inhibition suggested that the two assays were

measuring a complex mixture of enzyme activities. On the basis of these and other criteria the enzyme activity shown by the radiometric assay was tentatively defined as a cholinesterase.

(144)
Ultrastructure of the Caecum of *Schistosomatium douthitti*

W. Allen Shannon, *Vanderbilt University*

The ultrastructure of the lining and adjacent tissue of the caecum of *Schistosomatium douthii* is investigated with an Hitachi HS-8 electron microscope.

Plate-like cytoplasmic projections extend from the gastrodermal lining into the lumen of the caecum. Some form "superficial vacuoles" enclosing substances of various densities. Many vacuoles containing material of varying densities are seen within the gastrodermis. This tissue is bordered by a basal area and contains numerous mitochondria exhibiting prominent cristae. Extensive granular and agranular endoplasmic reticula are observed.

Similarities and differences between the gastrodermis of the male and female are compared.

(3)
Calcium Translocation in Bean Seedlings

G. M. Shear, *Virginia Polytechnic Institute*

Bean plants were supplied with ^{45}Ca during the period of seed development. The distribution of labeled calcium in the seed and in the seedlings both with and without additional unlabeled calcium was studied. Movement of ^{45}Ca in the seedlings was insignificant.

One cotyledon of bean seedlings was covered in various ways to minimize water loss. The roots were then supplied with ^{45}Ca for a period of six hours after which the cotyledons were removed and ^{45}Ca counted. Cotyledons protected from water loss accumulated calcium at a rate comparable to that of exposed cotyledons, thus showing accumulation of calcium by cotyledons independently from the transpiration stream. This would appear to indicate active uptake of calcium by cotyledons.

(34)
The Computer in the Flora North America Project

Stanwyn G. Shetler, *Smithsonian Institution*

The preparation of the Flora North America (FNA) will be an information problem and process, involving the coordination of a massive operation in searching, compiling, revising, and editing taxonomic data. This information once accumulated should be disseminated by the latest and most effective means of communication, and there should be an easy and rapid means of updating the record. Therefore, the computer will be used whenever possible as an integral part of the Flora program, and it is hoped that innovative applications for taxonomy and related sciences can result. Work is in progress toward the development of an automated bibliography, and programs have been written to enable the computer to construct and print dichotomous identification keys. A generic list of North American plants has been compiled by computer, and additional compilations are planned. Eventually, completed text is to be stored in a central data bank which in due course may be available to the individual scientist by means of remote teletype units. A report on progress to date will be given.

(135)
Teratogenic Effects of Direct X-irradiation on the Otic Vesicle of the Chick Embryo

Charles A. Singhas, *Wake Forest University*

A total of 125 chick embryos were irradiated at stages 9 and 20 (Hamburger and Hamilton) within two dose ranges (100 to 800 R and 1000 to 2000 R). Embryos exposed to the lower dose range were sacrificed at 7 and 10 days of incubation and those exposed to the higher dose range were sacrificed at 12, 18, and 24 hours post irradiation. Initial results indicate a radioresistance at dose levels below 700 R followed by suppressed development, necrosis, and degeneration within the higher dose range.

(205)
Territorial Behavior of the Dwarf Cichlid, *Apistogramma ramirezi*

Gary C. Smith, *University of Georgia*

Male and female individuals of *Apistogramma ramirezi* exhibit strong territorial behavior when properly established in laboratory aquaria. An intricate stimulus-response chain, with appreciable overlap, characterizes the interaction that results when this species is defending its territory. The primary sign-stimuli for the establishment of territories appear to be the rock caves in the aquarium which offer a maximum of protection for this small fish as well as a suitable spawning site. Displacement for this species consists of digging in the substrate and attack of inferior tank mates in the vicinity of a border dispute. This species exhibits three color patterns which are quite distinct and appear to be under hormonal control: the vertical-bar pattern of dominant males, the ocellated spot pattern of dominant females, and the broken horizontal-bar pattern of defeated fish of both sexes. Judging from this fish's response to colored models, the release of appeasement or aggression in this species requires a combination of color pattern, fin positions and syncronized movements.

(82)
Decapod Crustacean Burrows of Callianassids as Possible Paleoenvironmental Indicators

K. L. Smith, Jr., *University of Georgia*

The use of fossil callianassid burrows as paleo-environmental indicators was evaluated by comparatively studying recent burrow morphology and environments of three Atlantic coast callianassid crustaceans, *Callianassa major, Callianassa atlantica,* and *Upogebia affinis.* Data were collected at Sapelo Island, Georgia; Beaufort, North Carolina; and Indian River Bay, Delaware. Results indicated interspecific differences in burrow morphology and associated ecological parameters. Burrow morphological differences included interior diameter, wall thickness, and resting chamber dimensions. Environmental differences were reflected by infaunal associates. Infaunal associates of *C. major* suggested a high energy beach environment, while *C. atlantica* associates indicated a protected low energy beach area. *Upogebia affinis* associates suggested an estuarine environment. Interspecific differences in burrow morphology and associated environments suggest further use of fossilized callianassid burrows as paleoenvironmental indicators.

(81)
Application of X-ray Radiography to the Study of Burrowing Marine Organisms

K. L. Smith, Jr., *University of Georgia,*
James D. Howard, *Marine Institute, University of Georgia,* and Taylor Mayou, *University of Iowa*

The burrowing behavior of marine organisms is important in ecological and paleo-ecological studies, but is difficult to observe in the field or laboratory. X-ray radiography has proved to be a convenient way to study burrowing activity of small infaunal organisms. The technique permits observation "into" the sediment without destroying the organisms or the burrowing structures which they produce. Time lapse x-ray radiography permits examination of progressive changes in burrow formation and sediment reworking through time.

To date the burrowing activity of 30 intertidal invertebrate species from the Georgia coast have been examined. These studies were performed using artificially and naturally stratified sediments in aquaria supplied with continuously flowing sea water. Conditions of environmental erosion, deposition, and fluctuations of water level were simulated to determine their affect on the organism's burrowing behavior.

(56)
Growth and Energetics of *Chlorella pyrenoidosa* Chick

Jerry Smosky and G. T. Cowley,
University of South Carolina

Chlorella pyrenoidosa Chick was grown in Knopp's nutrient solution at a starting pH of 6.8 and under the following environmental conditions: 200-225 foot candles, 25° C., and ambient atmospheric CO_2.

The growth curve approached the typical sigmoidal pattern. The average dry weights ranged from 21.0 mg./liter at 2 days to 312.0 mg./liter at 16 days.

Ash accounted for 7.23% (day 16) to 12.59% (day 2) of the dry weights. Carbon content ranged from 45.85% of the ash-free dry weight (day 2) to 57.84% (day 14). Mineral analyses were as follows: magnesium, 0.82 to 1.32%; potassium, 1.81 to 3.18%; phosphorus, 0.09 to 1.32%; and iron, 0.10 to 0.24% of the dry weight. In general the content of magnesium, potassium, and phosphorus decreased as the cultures aged. No such relationship could be detected for iron.

Average energy values ranged from 3764 calories per gram dry weight at 2 days, to 4594 calories per gram dry weight at 16 days. On the basis of ash-free dry weight, values ranged from 4307 calories per gram at 2 days, to 5047 calories per gram at 20 days.

(132)
Reproductive Behavior of the Fork-Tailed Katydid, *Scudderia furcata*: Copulation

John D. Spooner, *Augusta College*

Sexual pairs in the fork-tailed katydid are formed by the male and female homing toward sounds produced by the opposite sex. First contact is with the antennae. The male turns around, and the female mounts the male from behind. The male cerci clasp the female near the base of the ovipositor, and the female is held loosely while the male produces a spermatophore. The spermatophore is forced into the vagina by the male's closing his subgenital and supra-anal plates. The female often bites the dorsum of the male while the spermatophore is being transferred. The female eats the spermatophore after copulation.

(133)
Reproductive Behavior of the Fork-Tailed Katydid, *Scudderia furcata*: Egg-laying

John D. Spooner, *Augusta College*

Scudderia furcata oviposits in leaves. Females select oviposition sites with the palpi. Once a spot is chosen, the female straddles the edge of the leaf, bites the edge of the leaf to open it, brings the ovipositor forward ventrally, grabs both ovipositor and edge of leaf with mandibles, and inserts the ovipositor into the leaf by sawing motions of the valvulae. One egg is layed at a time. After each egg is layed, the female grooms the entire ovipositor.

(193)
An Ecological Study of a Mature Stand of *Pinus taeda* of the Congaree Swamp

Richard Stalter, *University of South Carolina*

An ecological study of a mature stand of *Pinus taeda* in the Congaree swamp was conducted during the months of November and December, 1967. The stand was sampled by means of 20 quadrats, each of sufficient size to account for herbaceous, frutescent, and arborescent species. The paucity of pine reproduction and copious development of hardwoods suggests that the pine sere has almost reached its culmination, but in doing so has existed as such for a much longer period than similar seres elsewhere.

(152)
Parasitization of *Chortophaga viridifasciata* Eggs by Larvae of *Scelio bisulcus*

Ralph E. Stephens, Madison B. Cole, Jr.,
Ada A. Cole, and J. Gordon Carlson,
The University of Tennessee

Parasitization of adults and nymphs of the grasshopper *Chortophaga viridifasciata* (DeGeer) collected in the fields is not unusual, but parasitization of eggs laid and maintained in the laboratory has not been found until now. We have recently discovered one egg pod in which all of the eggs were parasitized by the Hymenopteran wasp *Scelio bisulcus* (Ashmead). The parasitized pod was collected from a cage housing adult grasshoppers which were caught in Knox County, Tennessee, in late July 1967. The eggs of the wasp must have been deposited in the eggs of the grasshopper either inside the body of the grasshopper or in the pod under sand. After fourteen days development at 26° C, the wasp larvae were observed to ingest and digest intact yolk granules. Scelionidae are known to parasitize eggs of Orthopterans, but heretofore no description of *S. bisulcus* larvae are known to exist. Adult *S. bisulcus* hatched after seven weeks of incubation as compared to the six weeks normally required for *C. viridifasciata.* (This study was supported in part by Atomic Energy Commission contract AT-(40-1)-2575.)

(77)
A Limnological Study of the Invertebrates of a Tennessee Cold Springbrook

Michele S. Stern, *Tulane University,* and
Daniel H. Stern, *Louisiana State University in New Orleans*

A one-year limnological investigation was conducted on an unnamed cold springbrook in Putnam County, Tennessee. The study was undertaken to analyze the

components of invertebrate biocoenoses, to record population fluxes, and to determine possible factors affecting abundance and interactions between members of the communities of a relatively uniform habitat. Fifty-five species of invertebrates were recorded. Relative abundance was greatest in February and lowest in July. The surrounding deciduous forest was determined to have the greatest effect on the composition and abundance of the fauna of the springbrook.

(200)
Correlations between Soil Moisture and Vegetational Types of an Island

SAMUEL M. STUBBLEFIELD, JR.,
Tennessee Technological University

The range of available soil moisture in its relation to vegetational types was investigated over a period of nine months. Random soil samples were taken at depths of 3″ and 12″ in the experimental area of 700 acres at weekly intervals. The moisture content and the permanent wilting percentages of the soil samples were determined. Quantitative vegetational analysis was made to ascertain the pattern of distribution in relation to the soil moisture content. Positive correlations were established between the amount of available soil moisture in each of the sampling areas, and the types of herbaceous and woody flora. Variations in the available soil moisture content at the 3″ and 12″ soil levels were also observed. The influence of available soil moisture at depths of 3″ and 12″ and the permanent wilting percentages of the soils involved were definite factors in the determination of vegetational types.

(2)
Influence of Diquat, Paraquat, and Several Surfactants on the Loss of Betanin From Beet Root Discs *In Vitro*

D. L. SUTTON AND C. L. FOY,
Virginia Polytechnic Institute

Betanin, a flavonoid pigment, is slowly released from fresh root discs of *Beta vulgaris* L. *in vitro,* and its rate of appearance as measured by spectrophotometry (max. 538 mu) may be used as a criterion in studying alterations in membrane permeability. Diquat (6,7-dihydrodipyrido [1,2-*a*:2′,1′-*c*] = pyrazidiinium salt) at 10^{-3} and 10^{-4}M inhibited the release of betanin; lower concentrations of diquat and 10^{-3}M paraquat (1,1′-dimethyl-4,4′-bipyridinium salt) gave readings comparable to the controls. The cationic surfactants Aerosol C-61 and Hyamine 1622, at concentrations from 0.001 to 1.0%, caused a rapid release of betanin. Nonionic surfactants Tween 20 and Tween 80 also enhanced the release of betanin but less dramatically. Six or 12 hour pretreatments with either diquat, paraquat, Tween 20, or Tween 80 did not nullify the drastic action of the cationic surfactants.

(1)
Absorption of 2-chloro-4,6-bis(ethylamino)-s-triazine (simazine) by Excised Roots of *Hordeum vulgare* L. (var. Wong)

DAVID L. SUTTON, D. W. JONES, C. W. LAUGHLIN AND M. G. HALE, *Virginia Polytechnic Institute*

The mechanisms whereby organic compounds are actively absorbed are probably very similar to absorption of inorganic ions. Information is available on the uptake of organic herbicides by intact plants, but few studies have been conducted with excised root systems. Simazine absorption by roots of intact plants is generally assumed to occur by a passive mechanism. Results with excised barley roots indicate absorption of simazine occurred by both a passive and active process. Within 30 minutes, approximately one-half of the simazine-C^{14} was absorbed with a reduced absorption rate for the next one and one-half hours. At the end of the two hour absorption period, roots were placed in distilled water or non-radioactive simazine and lost approximately 75 percent of the absorbed simazine within 15 minutes. Boiling or treatment with dinitrophenol reduced the active uptake of simazine.

(95)
Changes in the Carbohydrate Content During Metamorphosis of the Blowfly, *Phormia regina*

LAURENCE G. TATE AND LARRY T. WIMER,
University of South Carolina

Changes in the carbohydrate content of *Phormia regina* were determined at 24 hr intervals during metamorphosis. The non-glycogen carbohydrates were extracted from individual lyophilized animals with 70% ethanol. The remaining residue was treated with hot 4% NaOH to extract glycogen. Glycogen was isolated by precipitation in 70% ethanol and quantitated with anthrone. The non-glycogen carbohydrate fraction was purified on Dowex 1 and 50. The sugars were then separated by thin-layer chromatography and quantitated on a densitometer. The prepupa contained 848 μg of glycogen. Glycogen declined to 293 μg 24 hr later and to 243 μg by eclosion. Glucose and maltose showed similar values (18 μg) in the prepupa and increased to 155 μg and 96 μg, respectively, 24 hr later. In the newly emerged adult glucose had decreased to 77 μg and maltose to 14 μg. Trehalose remained constant (about 21 μg) during metamorphosis but increased strikingly (to 55 μg) at eclosion.

(167)
Tissue Anomalies in Tree Species Following Fast Neutron or Gamma Irradiation

FRED G. TAYLOR, JR., *Oak Ridge National Laboratory*

Gross morphological characters (such as puckering and wrinkling in leaves) are among parameters used to assess radiation effects in higher plants. While these descriptions are meaningful there is a greater need for anatomical clarification so as to convey knowledge of internal structures and possible alterations in functions of tissues. In contrast to gamma radiation, studies at ORNL have shown that exposures to fast neutrons yield qualitatively similar results in woody species. Radiation induced modifications in foliar tissues have been characterized for 9 genera of deciduous trees surrounding the Health Physics Research Reactor, while similar damages (gamma induced) have been observed in a conifer. Damage to shoot apical meristems are depicted in pines. Fusion of main and axillary stems has been recorded for 3 deciduous genera. These morphological features are defined anatomically to illustrate a type of radiation damage in representative genera. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(64)
Ecology of Red Mangrove Seedling Establishment

HOWARD J. TEAS, *University of Miami* AND
FLORENCE MONTGOMERY, *University of Georgia*

The red mangrove, *Rhizophora mangle,* ordinarily drops its seedlings into the water where typically they

float unrooted until the lower end comes to rest in contact with a suitable substrate. With view to understanding the ecological factors in mangrove establishment, several factors were tested. The effects of fresh versus salt water, light versus dark, mud versus sand, scraped radicle versus unscraped radicle, and geotropic posture were studied. Rooting occurred better in the dark than light, but very little rooting was found in salt water in the light; scratching of the radicle did not aid rooting; and seedlings in salt marsh mud with salt water grew best. A geotropic righting of horizontally placed seedlings was observed. The probable role of these findings in mangrove establishment and survival is discussed.

(172)
Effect of Bottom Substrates on the Bivalve, *Rangia cuneata*

KENNETH R. TENORE, *North Carolina State University*

The effect of bottom sediment composition on *Rangia cuneata* was investigated in the Pamlico River estuary, North Carolina. Mortality, meat-shell weight ratio, and shell growth were evaluated in relation to particle size, organic matter concentration, and phosphate concentration. *In situ* factorial experiments were carried out for 5 months using individually marked clams placed in boxes of predetermined sediment composition. Clay-silt sediments were an unfavorable environmental substrate. High levels of organic matter or phosphate intensified this effect, suggesting that the physical and chemical environment of fine sediments was responsible. However, in sand sediments, high levels of organic matter and phosphate were found favorable to *Rangia*.

To clarify these results, clams were placed in trays with sediment containing Zinc-65 labeled detrital matter and Phosphorus-32. The results indicated that *Rangia*, although a typical filter-feeding bivalve, can accumulate these materials from the sediment. Such mechanisms are suggested as a possible cause of the better growth observed in sand sediments with moderately high levels of organic matter and phosphate.

(94)
Metabolic Fate of ^{14}C-Isoleucine in Non-Egg-Laying Female *Aedes aegypti* (L.)

WILLIAM L. TIETJEN, *Georgia Southwestern College*, AND JAMES N. LILES, *The University of Tennessee*

The ^{14}C activities of lipid, protein, and soluble extract fractions were determined over 6 weeks following ingestion of L-isoleucine-u-^{14}C by non-egg-laying female *Aedes aegypti* (L.). 80 per cent of the initial activity was lost from the free isoleucine pool during the first day with only 1 per cent remaining in this pool after 10 days. 10 per cent of the ingested ^{14}C was lost through excrement, most being lost during the first two days. 15 per cent was lost to $^{14}CO_2$ over the 6 weeks. Lipid incorporation of the ^{14}C plateaued by 6 hours at 5 per cent of the ingested value. 50 per cent of the ^{14}C was incorporated into the protein fraction within 6 hours, with a high of 80 per cent being reached by 2 days. The decrease in total and protein ^{14}C were parallel, suggesting that the ^{14}C of the $^{14}CO_2$ came from the protein ^{14}C.

(73)
Bird Species Diversity and Ecological Succession

ELLIOT J. TRAMER, *University of Georgia*

Species diversity indices were calculated for 986 breeding bird populations from a wide variety of ecosystems. The index used was $H(s) = -\Sigma p_i \ln p_i$, where p_i is the proportion of individuals in the i-th species ($i = 1, 2, \ldots, s$). Within a given sere the diversity increased with the age of the community, leveling off as the system reached maturity. Although tropical savanna and wooded communities had higher diversities than their temperate counterparts, grasslands were found to have comparable diversities at all latitudes. Much of the existing bird census data were found to be inapplicable to the study of successional gradients, since many supposedly homogeneous tracts were, in fact, heterogeneous, and plot sizes were often too small or too large. It is suggested that a knowledge of the diversity changes in truly homogeneous seral stages enables one to estimate the degree of heterogeneity of a census area from its species diversity index.

(107)
Further Studies on Water-Soluble Cytochromes from Blue-Green Algae

LINDA S. TUCK AND RAYMOND W. HOLTON, *The University of Tennessee*

An improved method for the separation of water-soluble cytochromes from aqueous extracts of lyophilized algae has been devised. This procedure makes use of an initial separation on a Sephadex G-75 column. Despite an overlap in the elution of phycocyanin and the initial cytochrome fractions, the majority of phycocyanin is separated from the cytochromes. Partial separation of the individual cytochromes from *Anacystis nidulans* occurs on the Sephadex and complete separation can be carried out on a DEAE-cellulose column. When extracts from *Chlorogloea fritschii* are analyzed by this procedure, only a single cytochrome is observed. It is the f-type cytochrome with α-peak at 554 mμ and is apparently similar to those found in other photosynthetic organisms; however, the other c-type cytochrome with α-peak at 549 mμ found in *Anacystis* has not been detected in *Chlorogloea*. The results of further extractions and characterization of cytochromes from *Chlorogloea* grown heterotrophically and under conditions in which it fixes nitrogen will be described.

(80)
Biological Assimilation and Turnover of Three Radioisotopes by Crickets (*Acheta domesticus*)

ROBERT I. VAN HOOK, JR.[1] AND D. A. CROSSLEY, JR.,[1] *Oak Ridge National Laboratory*

The use of radioactive isotopes for measuring food consumption and energy flow in insect populations requires careful assessment of assimilation and turnover rates. In separate experiments, three radioisotopes (^{134}Cs, ^{51}Cr and ^{131}I) were fed to adult brown crickets for a 24-hr period. The insects were then transferred to nonradioactive food and their whole-body radioactivity measured at 1-hr intervals. The retention of each of the three radioisotopes can be described by a negative exponential equation consisting of two components, a shorter one related to loss of unassimilated radioisotope from the gut and a longer one describing excretion of assimilated radioisotope from tissues. The shorter components had similar rates (half-time = about 4 hrs) for all three radionuclides, indicating that it was indeed a measure of gut clearance. Chromium had the lowest assimilation (6%) and cesium the highest (65%). Assimilated ^{134}Cs and ^{51}Cr were eliminated at moderate rates (biological half-lives of 62 and 83 hrs, respectively), but assimilated ^{131}I was stored rather than excreted.

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(156)
Interaction Between Virus and Susceptibility Gene for Tumor Development in Mice

BASUDEO VARMA, *Georgia Southern College*

For the elucidation of viral relationship with genetic susceptibility in the development of spontaneous mammary tumors, two strains of mice — one designated as X, resistant to the development of mammary tumors, and a second strain designated as IBA/Ha, of which 95% breeding females develop spontaneous mammary tumors, were used as the experimental materials. Mice of the X strain are free from any viruses whereas the mice of the IBA/Ha strain contain two types of virus particles — A and B in their mammary glands and in their mammary tumor tissues. In mammary tumors, developed among F_1 breeding female mice of a cross between IBA/Ha female - X male, dough-nut shaped virus particles (A) varying in size from 110-120 mu in diameter were seen in the cytoplasm and nucleoid type (B) particles (135-160 mu) were observed budding in the intercellular space from the plasma membrane. Similar particles were also observed in the tumors developed among the second generation mice from the above cross, but intracytoplasmic particles (180-220 mu) were seen in addition to A type particles in these tumors.

Development of mammary tumors in these two strains of mice is genetically controlled by two complementary genes, gene *C* inherited by the IBA/Ha strain and gene *B* by the X strain of mice. Transmission of virus particles in F_2 albino mice from their maternal grandparents of IBA/Ha strain, probably render these mice susceptible to interaction between virus particles and the susceptibility gene for development of mammary tumors. Presence of virus in a strain of mice which is otherwise tumor resistant, could make it vulnerable for the development of spontaneous mammary tumors. Further work is needed to show which of these two types of virus particles — A or B interact with the susceptibility gene for the development of mammary tumors in these F_2 hybrid mice.

(180)
Environmental Control of Oxygen Consumption in Cotton Rats

C. KENYON WAGNER, *University of Georgia*

Oxygen consumption was studied in the cotton rat, *Sigmodon hispidus* using a Beckman G-2 Paramagnetic Oxygen Analyzer. Animals were placed in respirometers and held for eight hours at each of the following temperatures: 10°, 15°, 20°, 25°, 30°, and 35° Centigrade. There was a linear relationship between oxygen consumption (Y) and environmental temperature (X) from 10.0° to 22.5° C. as shown by the equation: $Y = 4.40 - .11X$ $cc.0_2/gm.hr.^{-1}$. The average oxygen consumption at 10° C. was 3.37 $cc.0_2/gm.hr.^{-1}$ and dropped to 1.96 $cc.0_2/gm.hr.^{-1}$ at 22.5° C. The zone of thermal neutrality extended from 22.5° to 30.0° C. with the average oxygen consumption 1.96 $cc.0_2/gm.hr.^{-1}$. At temperatures above the upper limit of thermal neutrality oxygen consumption rose to 2.36 $cc.0_2/gm.hr.^{-1}$.

(195)
Southern Mixed Hardwood Forest in the Virginia Coastal Plain

STEWART A. WARE, *College of William and Mary*

Analysis of the more mature portions of the College Woods at Williamsburg revealed a strong relationship to the Southern Mixed Hardwood Forest described by Quarterman and Keever. Ten of their twelve Group overstory species were present; those missing (magnoli and laurel oak) do not range so far north. The sample stand had a coefficient of similarity with the SMHF ab stract of 60%; Group I species contributed 61% of th total tree layer Importance Value. White oak, beech loblolly pine, tuliptree, and southern red oak were th dominants, and dogwood, red maple and American holl were the most important understory species. The sampled community differs from the SMHF in the high importance of tuliptree and red maple. Wells noted the importance of these species in North Carolina Coastal Plain climax forests; quantitative studies there are necessary to determine if these species generally become more important in the northeastern extension of the SMHF.

(110)
Lactic Acid Fermentation in *Achlya ambisexualis* (Order Saprolegniales)

CHARLES O. WARREN, NORA HARVIN, AND WILLIAM TURNER, *Southwestern at Memphis*

Although numerous reports have appeared concerning lactic acid fermentation in phycomycetous orders such as the Blastocladiales, Leptomitales and Mucorales, little attention has been given to the existence and significance of this metabolic pathway in the closely-related order, Saprolegniales. Lactic acid production in *Achlya ambisexualis* was demonstrated using a colorimetric assay for lactic acid accumulation in the medium. The fungus carried out lactic acid fermentation under highly aerobic (shake-culture) conditions, although the amount of lactic acid in the medium increased eight to ten-fold under stationary conditions. The rate of glucose assimilation was compared to the rate of lactic acid production under varying cultural conditions. Preliminary electrophoretic analyses of cell-free extracts demonstrated the presence of a lactic dehydrogenase appearing as a single anodic band. Studies of lactic acid fermentation in relation to assexual and sexual morphogenesis were conducted.

(25)
The Effects of Temperature on Water Potential and Water Movement in Plants

CHARLES P. WEATHERSPOON, *Duke University*

Spanner (Introduction to Thermodynamics, Academic Press, N. Y., 1964, p. 207) states that a change of "one degree centigrade is equivalent to over eighty atmospheres [change in water potential], in the sense that water will distill *from* an open solution of eighty atmospheres osmotic potential *to* pure water maintained at only one degree centigrade below it." This suggests that the temperature gradients commonly occurring within plants should have enormous effects on water movement through plants, largely overshadowing pressure, osmotic, and matric components of water potential. Experience shows that this is not the case, however. A consideration of the properties necessary for the functioning of a thermoosmosis apparatus shows that while liquid water movement is very sensitive to temperature gradients under certain special conditions, these conditions are practically absent in plants. Therefore, although temperature does indeed strongly influence water potential, the temperature "component" of water potential is largely ineffective in influencing water movement in plants.

(179)
The Effect of Temperature and Radiation on Litter Size in *Peromyscus polionotus*

J. R. Wells, J. L. Carmon, and M. H. Smith,
University of Georgia

The animals used for this study were trapped in the wild and have been maintained in the laboratory for seven generations. A factorial experiment with three levels of temperature and three levels of radiation was conducted. The male parents of generations 2 through 7 received either zero, 100r gamma, or 200r gamma radiation one week before they were mated to a single female. The animals were maintained at either 60°, 75°, or 90° F, in generations 5 through 7. The average number of young born alive in first litters of generations 2 through 7 was 3.02, 3.04, and 2.95 for the zero, 100r, and 200r, radiation levels respectively; no significant differences were noted. An analysis of all litters in generations 5 through 7 indicate a significant difference in litter size between the 100r and 200r radiation groups. Significant differences in litter size were found between all three temperature levels. Generation effect and temperature X radiation interaction has also been studied.

(150)
A Preliminary Report on Gametogenesis and Fertilization in the Heterogonic Life Cycle of *Rhabdias ranae* Walton, 1929

Martha H. Whicker and Felix H. Lauter,
University of South Carolina

The somatic, diploid, and haploid chromosome numbers were determined in the syngonic female (24, 12, eggs six, spermatozoa five or six), free-living female (24, 12, six), and free-living male (22, 11, five or six). In the parasitic hermaphrodite primary oocytes can be found in leptotene, zygotene, and pachytene stages. In the synapsis zone six tetrads in early diplotene can be observed. The chromosomes seem to disappear in the growth zone and reappear in the oocyte just prior to fertilization. After sperm penetration the egg nucleolus and nuclear membrane disintegrate. In the egg the six condensed tetrads move to the periphery and form two polocytes by rapid meiotic divisions. In the syngonic female, spermatogenesis occurs in the testis region. Primary spermatocytes in diplotene and diakinesis show five large tetrads and two small dyads. Meiotic divisions are pre-reductional. In anaphase I the two small dyads (heterochromosomes) are found lagging on the spindle. When division is completed, each secondary spermatocyte has one small and five large dyads. In the equational division one of the lagging heterochromosomes is lost when cytokinesis occurs forming two spermatids, one with five and one with six chromosomes. As the spermatozoa pass through the growth zone the chromosomes condense and spermiogenesis is completed.

The free-living male and female are presently being investigated.

(192)
Vegetational Patterns Along An Altitudinal Gradient — Community or Continuum?

Dennis Whigham, *University of North Carolina*

The vegetation of Bluff Mountain, Ashe County, N. C., is a mosaic of vegetation types which apparently intergrade into one another. This study of the vegetation of the North slope of the mountain indicates that three recognizable communities occur along the altitudinal gradient. These communities correspond to the low elevation cove forest, higher elevation sub-type of cove forest, and Oak-Chestnut forest as described for the vegetation of the Great Smoky Mountains. *Acer saccharum* is the dominant of the low elevation cove forest. *Betula lutea* is the dominant of the higher elevation sub-type and *Quercus rubra* var *borealis* is the dominant of the Oak-Chestnut forest of the ridges.

(50)
Taxonomic Studies on the Genus *Dinemasporium*

Joseph C. White[1] and Lafayette Frederick,
Atlanta University

The genus *Dinemasporium* has been subjected to critical review in order to clarify speciation, provide additional information on the manner of spore development, and elucidate the status and probable relationships of closely allied genera. These studies reveal that the generic diagnosis of *Dinemasporium* should be emended to include those morphologic variations now known to occur as additional typifying characters of the genus.

Thirty-four species and several varieties have been assigned to the genus. Results from our comparative studies of available type specimens suggest that only 11 species and 2 varieties be recognized as the taxa comprising *Dinemasporium*.

Spore formation appears to be murogenous in origin. The position and number of setulae on spores may vary with the species. Setulae may be present at each end of a spore or they may be laterally attached. The origin and structural nature of these setulae is still obscure. It does not appear as if they represent protrusive outgrowths from the spore wall.

[1] Present address: Department of Plant Pathology, *Washington State University*.

(177)
How Long Will Diapause Larvae of *Mormoniella* Live?

P. W. Whiting, *Oak Ridge National Laboratory*

Diapause larvae, larvae arrested in development at the fourth instar, have been reported to live at "room temperature" for two or even three years. If they are subjected to three months refrigeration, 4° C, the diapause is potentially broken, for upon removal from the refrigerator, they will pupate and eclose. If left in the refrigerator, they may safely be stored for well over a year. Larvae of several different stocks were refrigerated. Some were incubated after seven months and formed large, fertile adults. The remainder, examined after 22 months, were for the most part shriveled or completely dry but some were living although reduced in size. Incubation at 30° C induced pupation and the different stocks were recovered in active condition. (Research sponsored by the U. S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(63)
Compartmental Analysis of Production and Decay of *Juncus roemerianus*

Richard B. Williams, *Oak Ridge National Laboratory*,
and Marianne B. Murdoch,
U. S. Bur. Commercial Fisheries

The rates of annual net production and decay of *Juncus* (needle rush) in a salt marsh near Beaufort, N. C. were determined by fitting field data into a compartmental model in which individual culms moved through three successive compartments: live, dying and dead.

Average standing crops (dry wgt./m^2) for the compartments were respectively, 340 g, 500 g, and 1600 g; the number of turnovers per year were respectively, 2.5, 1.7 and 0.53. Annual production was 850 g (dry wgt.)/m^2. The rate of production was greatest in summer and least in midwinter.

(178)
Influence of Temperature Upon the Susceptibility to Acute Irradiation in *Peromyscus polionotus*

ROGER G. WILLIAMS, MICHAEL H. SMITH, AND JAMES L. CARMON, *University of Georgia*

The influence of temperature upon the susceptibility to acute whole irradiation has been studied in an attempt to find the effects upon the days until death and the $LD_{50/30}$. The test population was reared in a temperature controlled environment of 24° C. The mice were subjected to whole body irradiation from a Co^{60} source at either the 1000r, 1100r, 1200r, or 1300r, level. Following irradiation, the mice were placed in individual cages in either of three temperature control rooms; 15° C, 24° C, or 32° C. Each of the twelve radiation temperature subgroups consisted of 10 males and 10 females. The $LD_{50/30}$ ranged in the subgroups from 1102r for the males at 15° C to 1213r for the females at 32° C. The analysis of variance using the average number of days until death showed that a difference between the 1000r level and the other levels was significant (5% level) as well as a significant difference between the two temperature extremes.

(96)
The Non-Glycogen Carbohydrates of the Larval Hemolymph and Fat Body of *Phormia regina*

LARRY T. WIMER, *University of South Carolina*

Trehalose, frequently recognized as the predominant blood sugar of insects, is apparently absent from the hemolymph of larval Diptera. Since trehalose has been detected in whole dipterous larvae, an attempt was made to elucidate these seemingly conflicting reports. Non-glycogen carbohydrates were extracted from lyophilized fat bodies and fresh hemolymph using 70% ethanol, then purified with Dowex resins. Photodensitometry of thin-layer chromatograms permitted specific microdetermination of the sugars. Glucose, the predominant blood sugar, declined from 155 mg% in the early third instar larva to 61.5 mg% at puparium formation. Maltose was detected in trace amounts in the hemolymph during third instar development, while trehalose was not detected until puparium formation. The fat body contained trehalose and glucose throughout third instar development and at puparium formation showed values of 10.5 μg/fat body and 3.9 μg/fat body, respectively. An unidentified compound (probably carbohydrate) appeared at puparium formation and may have a developmental significance.

(140)
A Guide to the Formed Elements in Human Blood Stained with Wrights Stain

JOHN D. WITHERS, *Clark College*

Application of the principle of the Diagnostic key to the teaching of blood cell morphology has proven valuable in Histology, Elementary Biology and Hematology classes. Its use provides the teacher with an effective tool and the student with a means by which he can develop accuracy in examination of blood smears stained with Wrights stain.

(186)
Genetic Factors Relating to Radiosensitivity of *Populus deltoides*

J. P. WITHERSPOON, *Oak Ridge National Laboratory*

In studying biological effects of ionizing radiation on cells, tissues and organs, genetic factors relating to radiosensitivity are usually constant. However, when these effects are sought at a population level of organization, the differential responses of individuals (genotypes) lend much variance to experimental results. Radiobiological studies using clones (asexually propagated cuttings) of eastern cottonwood permitted replication of genotypes under controlled environmental conditions. Responses of clones to both gamma and fast neutron radiation indicated that genotypes may exhibit wide differences in radiosensitivity due to genetic control of growth rate, biological timing and tissue differentiation. Clonal variations in the relative biological effectiveness of fission fast neutrons compared to ^{60}Co gamma rays also were found as a result of growth rate differences. (Research sponsored by USAEC under contract with the Union Carbide Corporation.)

(37)
A Preliminary Biosystematic Study of *Erythronium americanum* Ker (Liliaceae) in the Southeastern United States

B. EUGENE WOFFORD, *University of South Alabama,* AND WILLIAM H. ELLIS, *Austin Peay State University*

Variations in the yellow flowering species of the genus *Erythronium* in the southeastern United States have recently been of considerable taxonomic importance. The existence of these variations between and within single populations of *Erythronium americanum* were suggested to the author and served as a basis for the study. Particular biosystematic emphasis was placed on the purple and yellow anther color forms of *Erythronium americanum*. Inferences were made from geographical, ecological, cytotaxonomical, anatomical, and morphological data compiled from both fresh material and herbarium specimens. Statistical analysis were employed where they seemed pertinent. The results of this preliminary investigation indicate that two distinct biotypes of *Erythronium americanum* exist and are best distinguished on the basis of anther coloration. Although it now appears that these two biotypes should be placed in the taxonomic category of forma, formal taxonomic recognition will not be presented until variations are sufficiently biosystematically studied throughout the entire range.

(67)
Non-petrified Fossil Spores in Sediments

FREDERICK A. WOLF, *Duke University*

Alluvial deposits and sediments of lakes and of other bodies of water contain the remains of animals and plants, especially pollen and fungal spores. This report is concerned with spores of fungi in sediments from lakes in Uganda, Kenya, Zambia, and Tanzania. The age of these sediments dates from the termination of the Ice Age.

The spores were sparse in some lakes and were abundant in others. Some kinds resembled contemporary genera, and therefore could be identified with a reasonable degree of assurance. Paucity of spores in certain of the lakes seems to be due to (1) year after year burning of the vegetation, (2) protracted periods of drought, (3) sporatic volcanic eruptions, and (4) grazing pressures from herds of wild and domestic animals.

It was anticipated that spores of certain widely prevalent genera would occur in the sediments and reasons for their non-occurrence were sought. It was learned that certain kinds are readily decomposed, if stored in sediment, and that some are destroyed by treatments employed in the preparation of materials for microscopic examination.

Apparently certain genera have not undergone change in morphology during the period that has elapsed since the termination of the Ice Age. The survival of the species must have depended upon evolutionary changes in their physiology, that resulted in their adjustment to the vicissitudes of climatic and other environment changes.

(19)
Enzymatic Activities in Leaves of Light-grown and Dark-grown Wheat Seedlings

FREDERICK T. WOLF, *Vanderbilt University*

Seedlings of wheat, var. Seneca, were grown either in continuous darkness or under a 14-16 hr. photoperiod for one week, at which time the relative activities of a number of enzymes were assayed in crude extracts obtained from the leaves. The enzymes studied were invertase, trehalase, raffinase, lipase, galactokinase, aldolase, glucose-6-phosphate dehydrogenase, acid phosphatase, urease, indole acetic acid oxidase, alcohol dehydrogenase, ascorbic acid oxidase, catalase, and peroxidase. Raffinase, ascorbic acid oxidase, and peroxidase levels were higher in dark-grown seedlings. Activities of all other enzymes studied were greater in light-grown seedlings, and ranged up to 3.5 times those in dark-grown plants. No significant differences in the degree of respiratory inhibition induced by cyanide or azide, or of respiratory stimulation by 2,4-dinitrophenol, were found.

(168)
Development of the Gametophyte of *Woodwardia areolata* in Sterile Culture: The Effects of Exogenous Sucrose

FRED T. YEATS, *University of Mississippi* AND *University of South Carolina*

Germinating spores of *W. areolata* (L.) Moore, sectioned at ten microns and stained, reveal a centrally located nucleus, which migrates to the spore wall and there divides. The subsequent, unequal, tangential cell division forms a small achlorophyllous rhizoidal cell. The larger cell then divides transversely, forming a large chlorophyllous prothallial cell.

Prothallia of *W. areolata* were cultured in Knudson's mineral medium supplemented with sucrose in concentrations varying from 0% to 4%. The effect of the varying sucrose concentrations was confined to a retardation of development at concentrations of 3% to 4%, and an enhancement at concentrations of 0% to 1.5%. This was the only effect noted. There was no significant difference in developmental patterns or in time of initiation of sex organs on the various sucrose concentrations. Branching prothallia occurred on all media except that containing 1% sucrose, and embedded antheridia were noted in prothallia grown on all media.

News of Biology in the Southeast

Joseph F. Fitzpatrick, Jr. — Editor

About People

Jean Givens, Instructor in Biology, Georgia State College, Atlanta, has been appointed a Director of the Newly-formed Azalea Chapter of the National Rhododendron Society. Persons interested in its activities may contact the Secretary, David E. Cook, 3288 Embry Drive, Chamblee, Georgia.

Richard Dennis Ewing has joined the Developmental Biochemistry Group of the Oak Ridge National Laboratory, Oak Ridge, Tennessee as a one-year USPHS Postdoctoral Fellow. Dr. Ewing received his Ph.D. from the University of Miami, Coral Gables, Florida.

Claudia Pellegrino completed a year's study with the Biochemical Radiation Group of the Oak Ridge National Laboratory on 3 November 1967. Dr. Pellegrino returned to his position at the Instituto di Patologia Generale, University di Sienna, Italy.

W. L. Mengebier has resigned as Head of the Department of Biology, Madison College, Harrisonburg, Virginia after a term of 14 years. Dr. Mengebier will return to full time teaching and research.

John Landry has been appointed Assistant Professor of Biology, Randolph-Macon Woman's College, Lynchburg, Virginia. Mr. Landry did graduate work at the University of Connecticut, specializing in vertebrate ecology, and comes to RMWC after a sojourn at the University of Utah.

Herbert P. Riley, Visiting Professor, Department of Population and Environmental Biology, University of California, Irvine, attended the West Coast Population Biologist's Conference at Stanford University in November.

New faculty members of the Department of Biological Science, Florida State University, Tallahassee, are: **Morton L. Burdick**, Assistant Professor, Ph.D., The Johns Hopkins University (Developmental Biology); **Pasquale Graziadei**, Associate Professor, M.D., University of Pavia, Italy (Electron Microscopy); **William F. Herrnkind**, Assistant Professor, Ph.D., University of Miami (Animal Behavior); **S. R. de Kloet**, Associate Professor, Ph.D., University of Utrecht, The Netherlands (Biosynthesis of Proteins and Nucleic acids); and **Charles R. Stasek**, Associate Professor, Ph.D., University of California, Berkeley (Mollusca).

New Staff of the Department of Biology, Roanoke College, Salem, Virginia are **Harold S. Adams**, Lecturer in Biology, B.S., Eastern Illinois University, M.S., University of Omaha, Ph.D. candidate, Virginia Polytechnic Institute; **Doris Jean Dealy**, Assistant Professor of Zoology, Ph.D., Texas Womans University (Bacteriology); **Gene Grubitz, III**, Assistant Professor of Biology, Ph.D., University of Arkansas (Animal Behavior); **Linna Ellen Hardin**, Research Assistant in Parasitology, B.A., Coker College, M.A., Vanderbilt University.

Tang Shih-chen Auyang, Professor of Biology, Taiwan Normal University, Taipei, Taiwan will be a Visiting Professor of Biology at Western Maryland College, Westminster, for the second semester, 1967-68 Session.

Howard M. Lenhoff, Director of the Laboratory for Quantitative Biology, University of Miami, Coral Gables, Florida, has been elected a Fellow of AAAS.

J. W. Longworth and **R. O.** Rahn, Biology Division, Oak Ridge National Laboratories, Oak Ridge, Tennessee, presented papers at the International Symposium on Basic Mechanisms in Photochemistry and Photobiology held in Caracas, Venezuela.

Alexander Hollaender, Biology Division, Oak Ridge National Laboratories, Oak Ridge, Tennessee, attended the December meeting of Organizing Committee of NAS which studied plans for the organization of a Health and Biological Planning Institute.

The chart series "Plants Poisonous to People" by **Julia Morton**, Director of the University of Miami (Florida) Collectanea, has been adopted by the Walter Reed Medical Center in Washington to train medical officers for service in Southeast Asia.

Some changes in the staff of the Radiobiological Laboratory of the U. S. Fish and Wildlife Service, Beaufort, North Carolina, include: **E. N. Pettaway, Jr.**, temporary Biological Aid, resigned; **J. C. White, Jr.**, returned from a year of graduate study at North Carolina State University, Raleigh; and **R. B. Williams** began a year of training at Oak Ridge National Laboratory.

J. P. Baptist, Radiobiological Laboratory, U. S. Fish and Wildlife Service, Beaufort, North Carolina participated in the Second Consolidated Departmental Manager Development Program held in Washington, D. C.

Charles Boehms, Associate Professor of Biology, and **David Synder**, Assistant Professor of Biology, Austin Peay State University, Clarksville, Tennessee, led a group of 19 students on a 7-day study at the Gulf Coast Research Laboratory, Ocean Springs, Mississippi.

D. A. Crossley, Jr., joined the staff of the University of Georgia, Athens, as Professor of Entomology. Dr. Crossley was formerly Insect Ecology Group Leader at Oak Ridge National Laboratory and Associate Professor of Zoology (Part-time) at the University of Tennessee.

David O. Tandle has been appointed Associate Professor of Forest Mathematics at Duke University, Durham, North Carolina. Dr. Yandle was formerly with the Southeastern Forest Experiment Station, Asheville, North Carolina. He will teach courses in forest statistics and operations research.

Fred M. Vukovich, Research Meteorologist, Engineering and Environmental Sciences Division, Research Triangle Institute, Durham, North Carolina, has been named Adjunct Professor of Forest Meteorology at Duke University. Dr. Vukovich will teach courses in atmospheric motion, turbulence and diffusion.

John Louis Gerin has joined the staff of the Molecular Anatomy Section, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Dr. Gerin was formerly with Abbott Laboratories, Chicago, Illinois.

Jimmy Barthel Jones has resigned from the staff of the Pathology and Physiology Section, Oak Ridge National Laboratory, Oak Ridge, Tennessee, to accept a position at the University of Tennessee Memorial Research Center, Knoxville.

Craig Allen has been appointed Assistant Professor of Biology, Shorter College, Rome, Georgia. Dr. Allen received his terminal degree in entomology from Clemson University.

Elton C. Cocke, Professor of Biology, Wake Forest University, Winston-Salem, North Carolina, has recently published a book on the Myxophyceae of North Carolina. The book is profusely illustrated and describes about 325 species of blue-green algae.

Ralph D. Amen, Associate Professor of Biology, Wake Forest University, Winston-Salem, North Carolina, assumed the duties of Chairman of the Department 1 July 1967. Dr. Amen succeeded Elton C. Cocke, who had been chairman since 1960.

Don G. Benson, Jr., has been appointed Assistant Professor of Zoology, Virginia Polytechnic Institute, Blacksburg. He was formerly at Louisiana State University, Baton Rouge.

William A. Calder, has been appointed Assistant Professor of Zoology, Virginia Polytechnic Institute, Blacksburg. He was formerly at Duke University, Durham, North Carolina.

Richard S. Mitchell, has been appointed Assistant Professor of Botany, Virginia Polytechnic Institute, Blacksburg. He received his Ph.D. from the University of California at Berkeley.

Robert A. Paterson, has been appointed Head of the Department of Biology, Virginia Polytechnic Institute, Blacksburg, Virginia. He was formerly at the University of Maryland, College Park.

Ernest R. Stout has been appointed Assistant Professor of Botany, Virginia Polytechnic Institute, Blacksburg. He was formerly a Public Health Service Postdoctoral Fellow at the University of Maryland, College Park.

About Institutions

The Department of Biology, **Southwestern at Memphis,** Tennessee, has received a NSF College Science Improvement Program grant of $32,000 for the purchase of a tow vehicle and trailer, the latter to be equipped as a mobile environmental laboratory. The first extended trip with this new facility is planned to be to the southwestern United States in Summer, 1968.

New Trustees and Officers were elected at the October meeting of the **BioSciences Information Service** (BIOSIS). Officers elected for a one-year term were **Arthur D. Hasler,** Director of the Laboratory of Limnology of the University of Wisconsin, Madison, President; **Norman E. Gibbons,** Assistant Director, Division of Biosciences, National Research Council, Ottawa, Canada, Vice President; **Karl H. Beyer, Jr.,** Senior Vice President, Research, Merck Sharpe & Dohme Research Labs, West Point, Pennsylvania, Treasurer; and **Allan H. Brown,** Chairman, Department of Biology, University of Pennsylvania, Philadelphia, Seeretary. New Trustees elected for a three-year term were **Herbert H. Ross,** Assistant Chief of the Illinois State Natural History Survey, Urbana; **William C. Steere,** Director of the New York Botanical Garden, New York City; and **Dael Wolfle,** Executive Officer, American Association for the Advancement of Science, Washington, D. C. Continuing Trustees are **Theodore L. Jahn,** Professor of Zoology, University of California at Los Angeles, Immediate Past President; **Paul J. Kramer, James B. Duke** Professor of Botany, Duke University, Durham, N. C.; **James H. Oliver,** Director of the American Museum of Natural History, New York; **Phyllis V. Parkins,** Director, BioSciences Information Service; **Kenneth B. Raper,** Professor of Bacteriology and Botany, University of Wisconsin, and **F. W. Went,** Professor of Botany, University of Nevada, Reno.

In conjunction with the 40th Anniversary of the **BioSciences Information Service** and the dedication of their new headquarters building, BIOSIS presented a two-day international eonference on world problems in Philadelphia in October. Speakers were Keynoter **Arthur Larson,** Director of the World Rule and Law School at Duke University, Durham, N. C.; **Sam Yorty,** Mayor of Los Angeles; **H. Bentley Glass,** Academic Vice President, State College of New York, Stony Brook; **Alan H. Nourse,** Author, Seattle, Washington; **Leon H. Sullivan,** Chairman of the Board, Opportunities Industralization Center, Philadelphia; and **Irwin B. Berch,** Director, Philadelphia District, Food & Drug Administration. The full proceedings of the conference are being prepared for distribution early next year, and will be available for those interested.

Louisiana State University in Shreveport opened for its first session during the 1967-68 school year. The staff of the Department of Biological Sciences includes **Richard K. Speairs,** Acting Chairman, formerly of Centenary College, Shreveport; **Bobby F. Dowden,** formerly of Mississippi State College for Women, Columbus; **Dorothy A. Hubble,** formerly of Byrd High School, Shreveport; and **Sylvia K. Goodman,** formerly of Bossier High School, Bossier City, Louisiana.

A two-day symposium on protein structure and function was held at the **University of Miami,** Coral Gables, Florida, 22-23 January 1968. Participants were **J. A. Rupley,** University of Arizona, Tucson; **G. M. Edelman,** Rockefeller University, New York City; **B. S. Hartley,** Laboratory of Molecular Biology, Cambridge University, England; **Feodor Lynen,** Nobel laureate of the Max Planck Institute, Munich, Germany; **R. Bruce Merrifield,** Rockefeller University; **H. A. Scheraga,** Cornell University, Ithaca, New York; and **William J. Whelan, Sidney W. Fox,** and **J. Frederick Woessner,** all of the University of Miami.

Eighteenth Annual Spring Wildflower Pilgrimage

April 25, 26, 27, 1968
Gatlinburg, Tennessee

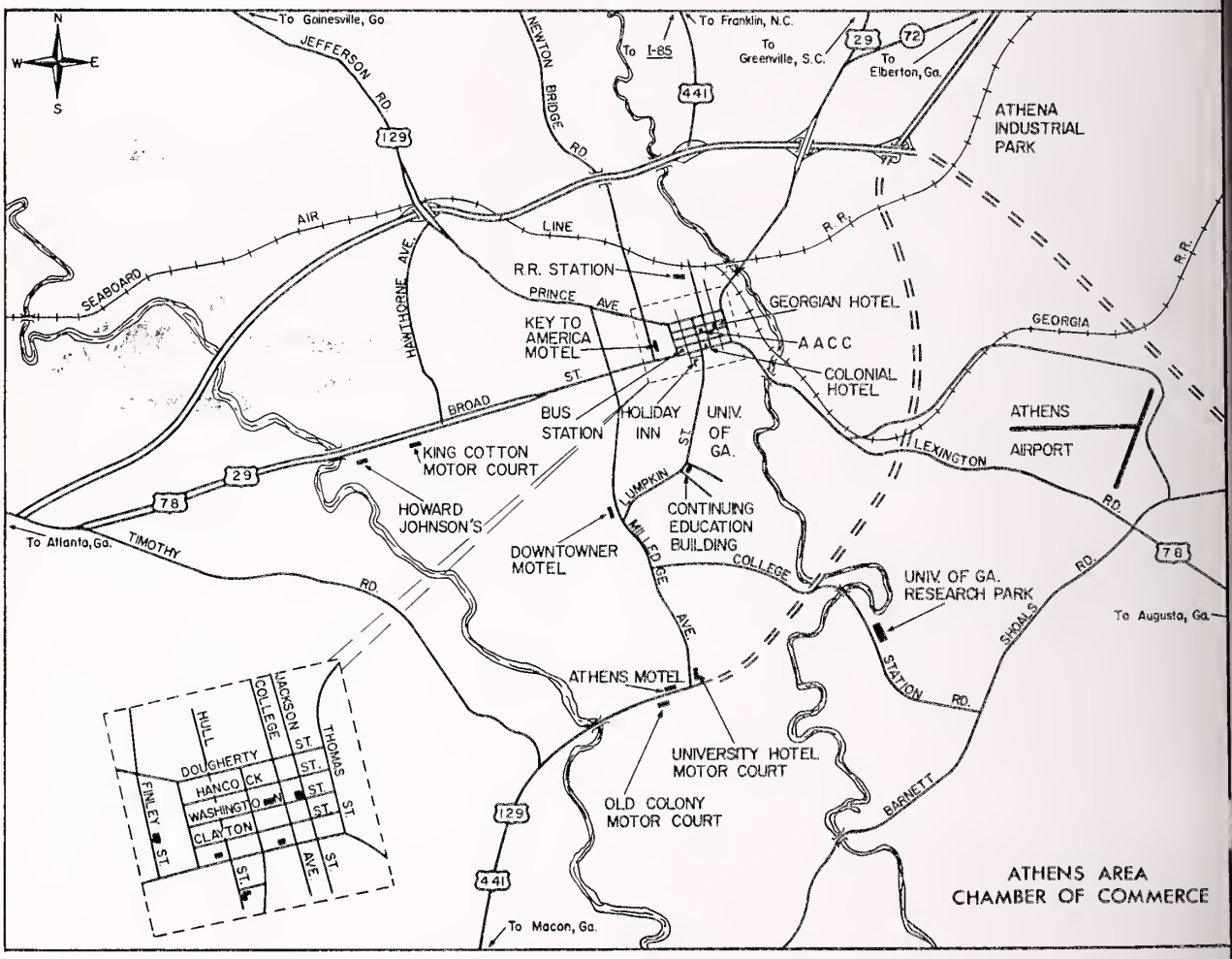
Plan now to enjoy this colorful and informative event in the Great Smoky Mountains at the peak of the spring wildflower season.

Each year this Wildflower Pilgrimage in the nation's most visited national park has grown in popularity. The Botany Department of The University of Tennessee, the Great Smoky Mountains National Park, and the Gatlinburg Garden Club join forces to prepare and conduct this program which is sponsored by The Gatlinburg Chamber of Commerce.

Motorcades and trail hikes under expert leadership take you to areas where spring wildflowers grow in quantity and variety. Morning bird walks are featured each day.

Photographic tours, under experienced photographers, are also scheduled events of the Wildflower Pilgrimage. Each evening there are illustrated talks, plant clinics and a "coffee" social period. Those wishing to participate in the Wildflower Pilgrimage are urged to register in order to make arrangements for various pilgrimage trips and tours. Registration opens 9 a.m. Thursday, April 25, 1968, in the Gatlinburg Civic Auditorium. Registration fee is $2. No advance registrations accepted. Detailed descriptions of each pilgrimage event are furnished each participant at the time of registration. Anyone who wishes to participate in the Nature Photographer's slide show on Saturday night should bring 10 of their best color slides.

If you wish a copy of the current Gatlinburg Accommodations Directory or other specific information, address Dept. W.P., Box 527.



Map of the Athens, Georgia, Area

The ASB BULLETIN

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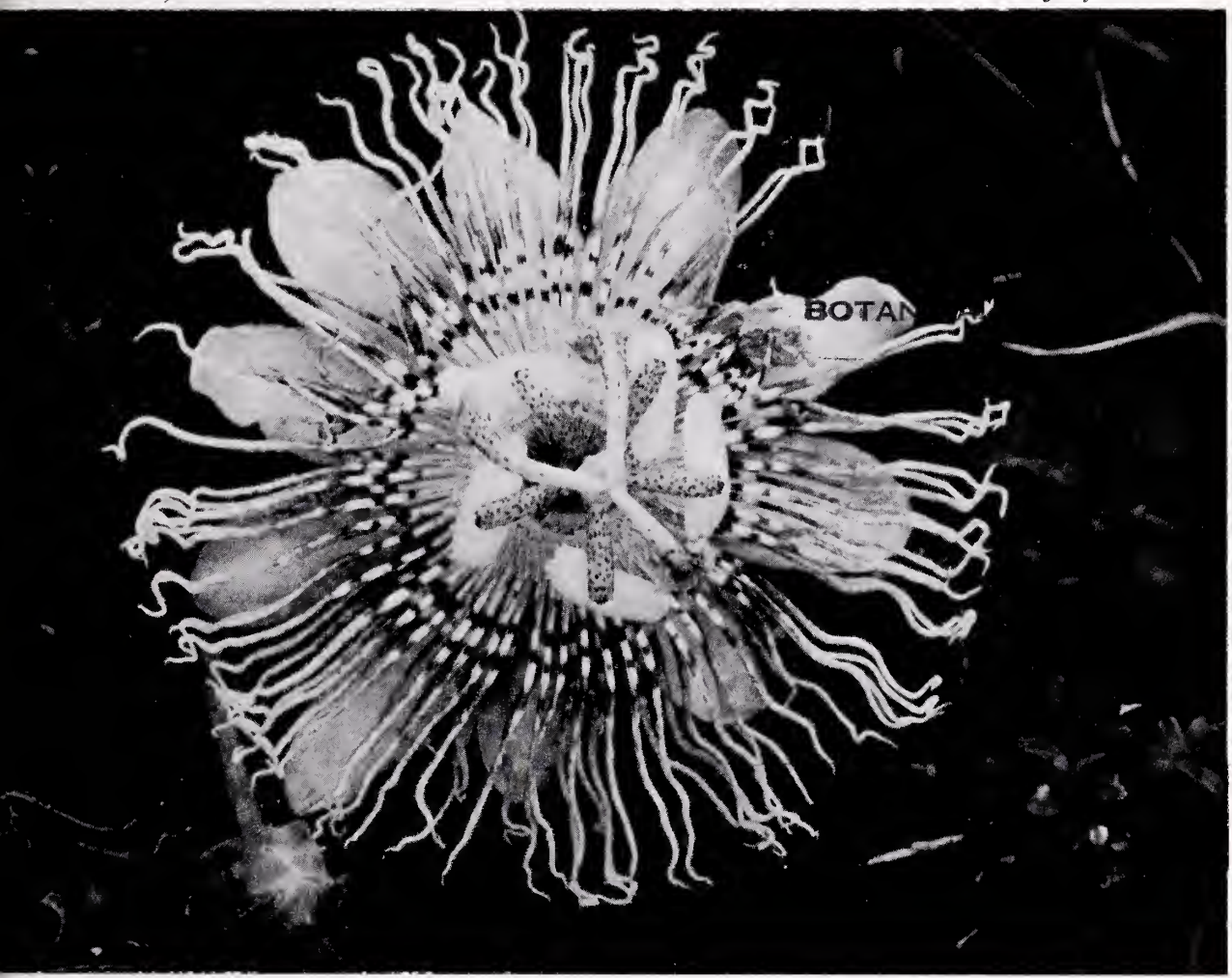

Passiflora quadriangularis — The Passion Flower or May Pop Clarence E. Styron

The Official Quarterly Publication of
The Association of Southeastern Biologists

ASB BULLETIN

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News Editor

JOHN CARPENTER, Business Manager

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Passiflora quadriangularis, passion flower or may pop. This woody vine is abundant on the bunkers of the Emory University Gamma Radiation Field in Atlanta, Georgia.

ASSOCIATION AFFAIRS

The largest annual meeting in the history of ASB, and perhaps the most successful ever, was held at the University of Georgia's Continuing Education Center at Athens April 18 to 20, 1968. Over 1000 biologists attended (more than the total membership of ASB), although the paid registration record was somewhat fewer than 1000. There were 213 papers on the program, about 50 percent greater than the previous record number presented at the 1967 annual meeting.

Much credit for the attendance at this meeting and the number of papers should go to the organizations that met with ASB this year; the Southern Section of the American Society of Plant Physiologists, the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Southeastern Division of the American Society of Ichthyologists and Herpitologists, and the Southeastern Region of Beta Beta Beta National Honorary Biological Society. For the first time at an ASB annual meeting, there were paper sessions all day Thursday (those by the plant physiologists).

(*Continued on page 74*)

Current Research on Vegetation in the Southeastern States

A symposium co-sponsored by the ASB, the Ecological Society of America, the Socicty for the Study of Evolution, and Section G, AAAS — December 29, 1966.

Washington, D. C., AAAS Meeting

Arranged by Elsie Quarterman, Vanderbilt University

Session I

Introduction: ELSIE QUARTERMAN, Vanderbilt University.

The topography of southeastern United States is varied, including such diverse environments as those of the Everglades of Florida, the delta of the Mississippi River, granite and limestone outcrops, sand hills, mountain peaks, and coastal marshes. All of these areas have distinctive and in many cases unique vegetation. The floristic affinities of this region with southeast Asia and the several centers of endemism occurring in the southeast add to its ecological as well as its floristic interest, but the main concern of this symposium lies with the ecological or broad aspects of vegetation. I shall concentrate my brief introduction, therefore, upon a representative portion of the well-known, in many cases classical, work that provides the context into which the papers to be presented today will fit.

Perhaps more botanical attention has been focused on the southern Appalachians than on any other southeastern area of similar extent. Whatever may be their history as an ancient refugium for plant species, the southern Appalachians are a modern refuge, so to speak, for plant communities in stable or near-stable condition, the counterparts of which have been destroyed in surrounding areas. The ruggedness of the terrain and the presence of the Great Smoky Mountain National Park each contributes to the preservation of these invaluable remnants of vegetation.

Several papers have dealt with the whole complex of mountain vegetation, beginning with Harshberger in 1903. Later on, Davis (1930) studied the vegetation of the Black Mountains and Whittaker (1956) that of the Smokies. Whittaker's work proposed a pattern based largely upon moisture gradient analysis. In addition, E. Lucy Braun (1950) included an over-all coverage of the southern Appalachians in her book on the Eastern Deciduous Forest.

The spruce-fir forest of high elevations, which Shanks (1954) described as occurring in a microthermal rain forest climate, were first studied quantitatively by Stanley Cain (1935), who was at that time very much involved with sampling methods, but whose more enduring contribution in this case, was the documented account of the spruce-fir forest itself. This forest is related to that of the northeastern states and southeastern Canada not only by its dominant species, but by many lesser floristic elements, as shown by Cain (1930) with reference to the higher plants and by A. J. Sharp (1939) for the bryophytes. In 1951, H. J. Oosting and W. D. Billings undertook an extensive comparison of virgin spruce-fir stands in the northern and southern Appalachians, and firmly established the ecological similarities of such forests in the two regions. Results of an extensive study of ground vegetation of the high elevation forest was published in 1958 by Dorothy Crandall, who designated 5 forest site types based upon variations in the undergrowth patterns.

Lower slopes of the mountains offer quite a different kind of ecological opportunity, in that one major dominant of the oak-chestnut forest that previously covered them (Braun, 1950) has been destroyed. The results of this catastrophic change have been studied in the Blue Ridge by Keever (1953) and in the Smokies by Woods and Shanks (1957). In both areas species of oak appear to be replacing chestnut, although insufficient time has elapsed for an equilibrium to have been attained.

According to E. Lucy Braun (1950), the cove-hardwood forests of the middle slopes are referable to the Mixed Mesophytic Association that is the key to the entire Eastern Deciduous Forest Formation.

Many questions concerning the origin and maintenance of the treeless grassy and heath balds of the Appalachians are still unanswered, although much information has been gathered about them by Camp (1931); Cain (1930; 1931); Davis (1931); Wells (1936; 1937); Brown (1953); Mark (1958); and Whittaker (1963). The local beech gaps, studied by Russell (1953), offer similar puzzles.

To review work on vegetation of the Piedmont region, one inevitably starts with the comprehen-

sive paper of Oosting (1942) on the plant communities of the Piedmont of North Carolina. This paper established the climax of the region as oak-hickory, and, together with Billings' study (1938) of old field shortleaf pine stands, described the now well-known pattern of old field succession. This work not only provided sound phytosociological data on the plant communities, but laid the foundation for many related studies dealing with the underlying causes of the patterns, such as those of Keever (1950) on causes of old-field succession, Borman (1953; 1956) and Woodwell (1958) on pine and sweetgum, and Bordeau (1954) on oak.

A special environmental complex occurring in the Piedmont is that of the granite rock outcrops. Oosting and Anderson (1939) described the plant successions on such outcrops in eastern North Carolina, and McVaugh (1943) indicated the unique floristic patterns and general vegetational characteristics of outcrops in the southeast as a whole. Present studies of granite outcrop vegetation center around those of R. B. Platt (Burbanck and Platt 1964), his colleagues, and graduate students, with emphasis on the outcrops occurring in Georgia and Alabama.

Limestone outcrops in the southeast also display unique vegetation. The greatest concentration of these occurs in middle Tennessee, where cedar glades support a vegetation that is strikingly different from that of the adjacent regions. Glade vegetation has been described by several authors, including Harper (1926) and Quarterman, who published results of quantitative studies of the cedar glade complex in 1950. Since that time, work in the glades has concentrated upon autecological studies of the cluster of endemics that occur there.

A review paper by Wells in 1942 was concerned with summarizing many papers on ecological problems of the coastal plain of the southeast, the physiographic region to which Wells, himself, devoted much attention, especially in the Carolinas. Other names associated with specific coastal plain segments must be mentioned: Roland Harper, in Georgia, Alabama, and northern Florida; John H. Davis, the chief authority on vegetation of all of peninsula Florida, and Pessin and Penfound in Louisiana and Alabama.

Interest in the vegetation of the Coastal Plain has revolved for some years around the ecological status of pine and hardwoods as regional dominants. The region has been given several vegetational designations, among them fire subclimax (Chapman, 1932; Garren, 1943), Southern Pine Forest (Shantz and Zon, 1924), Southeastern Evergreen Forest Region (Braun, 1950), Southern Mixed Hardwood Forest (Quarterman and Keever, 1962), and Southern Mixed Forest (Kuchler, 1964). For the Tallahassee Red Hills Section, Gano (1917) and Kurz (1944) had considered the climax to be Beech-Magnolia. Quarterman and Keever (1962) studied the upland forests throughout the whole extent of the coastal plain and determined that successional trends are toward a hardwood climax, co-dominated by some 14 to 24 species including beech and magnolia, but certainly not dominated by these species. They consider the potential climax of the mexic uplands, which they have called the Southern Mixed Hardwood Forest, to be an association of the Eastern Deciduous Forest.

Papers dealing with the maritime strand were reviewed in 1954 by Oosting, including those dealing with effects of salt spray and with treeless and forested strands and marsh vegetation. Since that time, Bordeau and Oosting (1959) have studied the live oak forests of North Carolina, and Clair Brown (1959) the vegetation of the Outer Banks of North Carolina.

Hall and Penfound (1939a, 1939b, 1943) reported the composition and structure of cypress and gum swamps of southeastern Louisiana and southern Alabama; Wright and Wright (1932) described the habitats and vegetation of the Okefenokee, one of the largest of the southern swamps; Wells (1942) and Buell and Cain (1943) reported on *Chamaecyparis* swamps near the North Carolina coast; John Davis (1943), Frank Egler (1952) and C. M. Loveless (1959) on the Everglades; and Davis (1940) on the mangrove swamps of south Florida. For other work dealing with southern swamps and marshes, reference may be made to a review paper on that topic by Penfound (1952).

Radiation effects on vegetation have been and are being studied in three centers, the Emory University study area at Douglasville, Georgia, the University of Georgia Ecology Institute at the Savannah River Project near Aiken, S. C., and the Ecology Division at Oak Ridge, at all of which basic information on vegetation is being accumulated.

The papers now to be presented represent a sampling of work in progress today.

As with the sampling of vegetation itself, not all possible variations of research on vegetation are represented here — and a certain degree of clumping in distribution has inevitably skewed the sample away from complete geographic coverage.

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ABSTRACTS OF PAPERS

1. *Distribution of Marine Algae Along the Coast of North America in Relation to Inshore Oceanographic Conditions.*

HAROLD J. HUMM, Queens College.

Inshore waters of continental North America in the western North Atlantic are populated by only two major geographical floral units. One of these originated and is centered in the tropics and its major inshore northern boundary appears to be in the vicinity of Cape Kennedy, Florida. The other originated and is centered in the cold-temperate waters of the North Atlantic and its major inshore southern boundary on the coast of North America is Cape Cod.

The long coastline between these two boundaries is a vast transition zone occupied either continually or seasonally by the more eurythermal elements of each major flora, for there are few, if any, species restricted to the transition zone. This zone of overlap of the two floras is readily divisible into several subzones bounded by temperature breaks related to coastal surface currents.

2. *Salt Marsh Vegetation of the South Atlantic Coast.*

ARTHUR W. COOPER, North Carolina State University.

Salt marshes of the South Atlantic Coast have been studied in sufficient depth so that the general aspects of their ecology are well understood. These marshes form behind barrier beaches or sea islands and are best developed in areas where major rivers deposit heavy silt burdens in estuaries. Characteristically, *Spartina alterniflora* Loisel., in three growth forms, dominates virtually all of the marsh below mean high water. Above this elevation, *Juncus roemerianus* Scheele and a group of "high marsh" species occur. Plant zonation in these marshes is closely correlated with variation in elevation, salinity, sediment texture, and drainage.

Studies of trophic structure of salt marshes in Georgia have shown the marsh and associated estuarine waters to be an inter-related system. Present studies are seeking to clarify details of marsh trophic structure and to determine the contribution of various estuarine producers to total estuarine productivity.

The history of sea level change is preserved in salt marsh sediments. The few data available are in agreement with other data and indicate a slowly rising sea level during at least the last 5000 years and suggests that present marsh vegetation and its successional relationships must be interpreted in this light.

Salt marshes are vital segments of the estuarine environment, providing food and shelter for many species of fish and shellfish at some time during their lives. The legal status of ownership of tidal marshes is vague in many states and in all states marshes are subject to increasing destruction. Efforts are underway in numerous quarters to develop effective means of marsh conservation. Knowledge of marsh ecology is forming the basis for these measures.

3. *Successional and Environmental Relationships of the Forest Vegetation of North Central Florida.*

CARL D. MONK, University of Georgia.

Seven major forest vegetation types exist in north central Florida: (1) southern mixed hardwoods, (2) mixed hardwood swamps, (3) bayheads, (4) sandhills, (5) sand pine scrub, (6) pine flatwoods, and (7) cypress swamps. The first three are climax communities on upland, wet fertile, and wet acid sites respectively. The latter four represent successional communities. With improvement of drainage or the elimination of fire, succession may proceed in a variety of directions.

The sandhills and sand pine scrub community types are fire maintained and are situated on sterile soils. Succession is always toward the Southern Mixed Hardwoods. The pine flatwoods are fire maintained and are located on poorly drained soils. With the release from fire succession may proceed toward either of the three climax communities. The direction of succession appears to be related to soil moisture and fertility. Cypress swamps are limited by flooding. With improved drainage they may be converted to mixed hardwood swamps or bayheads depending upon soil fertility.

4. *The Ecology of the Florida Pine Flatwoods.*

JOE ALLEN EDMISTEN, University of Georgia.

This study was designed to sample quantitatively the plants and soils of 32 stands of relatively undisturbed flatwoods in northcentral Florida. The objectives of the study included the following: (1) to establish successional trends with various periods of protection from fire; (2) to ascertain the associated edaphic changes and other ecological reasons for succession; (3) to obtain initial quantitative and qualitative differences in flatwoods types and the reasons for such differences; (4) to predict ultimate phytosociological compositions of flatwoods areas and rates of reaching this state of dynamic equilibrium.

In all stands sampled, pines were dominant by virtue of definition and selection. The sapling category was strongly invaded by hardwoods with years of protection. The disparity between the pine-dominated canopy and mixed hardwood understory is further exaggerated in the seedling class, where numbers of hardwood seedlings increased in logarithmic manner with years of protection.

The physical and chemical properties of the flatwoods soils changed also with years of protection. The average bulk density of the A_1 horizon was found to decrease with years of protection; the average moisture equivalent increased in the A_1 and A_2 horizons with years of protection due to incorporation of organic matter. Cation exchange capacity increased in a manner correlated with organic matter and moisture equivalent. The amounts of Ca and Mg, to a lesser extent, increased in the A_1 horizon in a manner correlated with the frequency of *Serenoa repens,* which suggests that saw palmetto acts as a nutrient "pump." As the importance value of *Myrica cerifera* increased, it was noted that in many cases there was a significant increase of NO_3 in the soil. It was noted also, that all pond pine stands occurred on soils having pH values from 3 to 4 and that root action on the organic hardpan located in most of the flatwoods soils resulted in a breaking up of the pan in many cases, and a more even profile of hydrolic conductivity was attributed to this.

In conclusion it may be said that when flatwoods are protected from fire, the vegetation shows a tendency to change from an open pine woodland to a closed hardwood forest composed of species from the more xeric sandhills and hammocks and the more hydric bayhead and swamp species.

5. *Multiresources Management of Coastal Plain Pinelands.*

J. B. HILMON, U. S. Forest Service.

An interdisciplinary team of six scientists is studying problems of integrating management of cattle forage and wildlife habitat with timber production in the slash-longleaf pine-wiregrass ecosystem. These researchers are determining effects of limited site treatments such as fire, mechanical disturbance, fertilization and cattle grazing intensities on multiresource productivity in the commercial pine stands of the northern part of the type and on cutover and understocked lands in southern Florida. On a more limited scale, the opportunities for achieving optimum production on completely renovated sites are being studied. Examples of recent research will be presented to illustrate management opportunities. Solutions to these problems require autecological studies of key plants in the ecosystem, and these have been started for *Aristida stricta, Serenoa repens, Ilex glabra* and *Cassia fasciculata.* Tracts have been set aside on Florida National Forests where results of multiresource research can be demonstrated in typical management situations.

Session II

6. *Radiation Sensitivity of Four Ecosystems.*

J. FRANK MCCORMICK, University of North Carolina.

One aspect of vegetation study which is more strongly developed in the Southeastern United States than elsewhere is radiation ecology. The pioneering efforts of Emory University, the University of Georgia, and Oak Ridge National Laboratory provided base lines and stimulation for extension of these studies to the University of Tennessee, the University of North Carolina, the College of William and Mary, and Alabama College.

Recognizing that rarely has the intensity of any environmental factor increased so much in so short a time, studies of the ecological effects of ionizing radiation were initiated in the early 1950's. These investigations consist of descriptions of the structure and function of a variety of plant communities, analysis of damage produced by varying rates and doses of ionizing radiation, and descriptions of the recovery mechanisms and patterns of these communities.

In addition to descriptions of the comparative radiation sensitivities of a variety of natural communities, these experiments have demonstrated the usefulness of ionizing radiation as a research tool.

This report will include a summary of current radiation ecology studies in the southeastern states and comparisons of the radiation sensitivities of a variety of communities.

7. *Granite Rock Outcrop Endemics from the Standpoint of Speciation.*

WILLIAM H. MURDY, Emory University.

Granite outcrop communities, scattered throughout the southeastern Piedmont from North Carolina, have long served as sites for plant speciation. A few of the many species endemic to outcrop communities may be remnants of once more widespread species, which had their origin elsewhere. However, many endemic taxa have originated in relation to outcrop habitats; some by a gradual, ecogeographic process and others by an abrupt, saltational process.

The Piedmont region marks the geographic limit of distribution for many Coastal Plain and Appalachian species and the granite outcrops, with their variety of extreme habitats, provide an environmental challenge to which semi-isolated and marginal populations may respond through adaptive change. The neo-endemic, *Phacelia dubia* var. *georgiana,* which is well suited to open outcrop habitats, has recently evolved from the Appalachian *P. dubia* in the form of an ecotypic phase at the southern-most boundary of its range. *P. maculata,* now a relict endemic, probably had a similar origin in the remote past. Other endemic species have likewise evolved gradually, but from Coastal Plain species. *Rhynchospora saxicola* and *Portulaca smallii,* for example, occur at the boundary of the ranges of their putative, Coastal Plain progenitors, *R. globosa* var. *typica* and *P. pilosa* respectively. The occurrence of species pairs within outcrop communities, strikingly similar in life-form and ecology, but radically different in other important respects, suggests that saltational speciation has been involved in their origin. The widely fluctuating outcrop environment would be a significant factor in such a process. Examples of species pairs include: *Cyperus granitophilus,* an endemic species, and the less-polyploid, widespread *C. aristatus*; *Sedum pusillum,* a rare endemic, and the cytologically-distinct *Diamorpha cymosa* (*Sedum smallii*); and *Talinum mengesii,* confined to Alabama and a few stations in Georgia, and the florally-distinct, widespread *T. teretifolium.*

8. *Recent Vegetation Studies in Eastern Tennessee.*

E. E. B. CLEBSCH, University of Tennessee.

Recent vegetation research in eastern Tennessee has been carried out at several educational institutions and at Oak Ridge National Laboratory. Studies of floristic plant geography have been made of the Oak Ridge Region, The University of Tennessee Agricultural Research Experiment Station Arboretum, and Chilhowee Mountain. Forest stand inventories and the documentation of current vegetation in changing stands or stands expected to change have been made in grass and heath balds, on Chilhowee Mountain, and in Fraser fir stands threatened by balsam wooly aphid invasion. Several studies have explored the predictive value of site variables for stand characteristics and individual tree characteristics. The effects of annual and periodic controlled burning on floristics, vegetational characteristics, and soil properties of scrub oak barrens on the Highland Rim and entering their fifth year.

The independent and interacting variables of spruce-fir and beech vegetation on properties of soils formed from sandstone and slate in higher elevations of the Great Smoky Mountains are being evaluated. The highly valuable grass balds of the Smokies are being studied intensively with an eye to possible management for preservation. Inventories of dry matter and major plant nutrients in forest stands and estimation of circulation rates of macronutrients are continuing and being refined.

9. *Vegetation of the Highlands, North Carolina, Gorges.*

ARTHUR W. COOPER, North Carolina State University, Raleigh.

In southeastern North Carolina, between Hendersonville and Highlands, the Blue Ridge escarpment and drainage divide separate and a south-facing embayment, with diffuse topography and pronounced river gorges, known as the southeastern escarpment gorge region, is formed. This area has long been known to be of biological importance, being the type locality of *Shortia galacifolia* T. & G. and the site of a number of disjunct bryophytes and ferns. Recognizing the research potential of the southeastern escarpment gorge region, the Highlands Biological Station in 1961 sought from the National Science Foundation, and was awarded, support for a broad research program dealing with the biota and environment of the gorges. Early projects were primarily inventories but later studies have sought explanations of observed phenomena in studies of organism-environment interactions.

Although there are few data, the general character of the climate is known. The most obvious

feature of the region's climate is high rainfall. Annual mean values over the area range from 70-85 inches and annual means up to 100 inches appear to characterize certain of the larger gorges proper. Although soils of the area are poorly understood, the data available suggest that sola, particularly on south-facing slopes, have features associated with high weathering, such as low base saturation and high gibbsite mineral content in the clay fraction. These features are unexpected in view of the youthful topography in the gorges.

Vegetation has been studied in three of the gorges and in several tributaries. A *Riverbank Shrub Thicket* community, dominated by *Alnus rugosa* (DuRoi) Spreng., occurs along the banks of all rivers and major creeks. In floodplain areas which have been the sites of human dwelling and cultivation, a *Disturbed Floodplain Forest,* successional to some type of Mixed Mesophytic Forest, is found. The coves and lower protected slopes, primarily below 2200 feet, are covered with some type of *Mixed Mesophytic Forest.* In the cove segregate, there is a concentration of mesic species whereas in the slope segregate, where cove species occur with those more common on drier uplands, there is a greater richness of species. *Chestnut Oak Forest* occupies east and north-facing slopes at lower elevations but becomes more continuous at higher elevations. South- and west-facing slopes, particularly below 2500 feet, are characterized by *Mixed Oak and Hickory Forest.* Dry, open ridges are dominated by *Pine* or *Pine-Oak Forest.*

Numerous vascular plant taxa present in the escarpment gorges illustrate taxonomic problems of varying degrees of complexity. *Symplocos, Calycanthus, Tilia,* and *Acer rubrum* L. have been studied. Several projects dealing with species ecology also have been carried out. Two studies of the ecology of *Shortia galacifolia* have been completed. Habitat conditions and data from seedling ecology lead to the conclusion that *Shortia* is a plant of disturbed conditions and that it was more widely distributed during the warm, moist conditions of the Tertiary when more frequent erosion would have produced the temporary moss-covered substrates where seedlings could survive.

Several rather clearly defined distribution patterns of vascular plants are evident in the escarpment gorges. Two groups of species, one characteristic of the Coastal Plain and the other of the Piedmont and Coastal Plain, reach upper elevational limits in the gorges. A smaller group of species reach lower elevational limits. A number of Southern Appalachian endemics and species characteristic of Mixed Mesophytic Forest are present but several are conspicuously absent. Several species show disjunct distribution patterns with evidences of low and high elevation populations. In addition, a concentration of bryophytes with remarkable disjunctions is also present.

Although much is known about the plant and animal life of the escarpment gorges, much remains to be discovered. Biologists with interests in the area are urged to undertake projects in the gorges.

10. *Some Studies of Forests of the Tertiary Hills of Western Louisiana.*

GEORGE WARE, Northwestern State College of Louisiana.

In progress are three projects involving ecological investigations of upland forests of western Louisiana. They treat: (1) composition of species-rich forests of pronounced slopes; (2) structural characteristics of ravine beech stands; and (3) the nature and distribution of blue-jack oak stands.

(1) In dissected areas of the Tertiary hills of western Louisiana, elevation differences between ravine bottoms and ridges approach 150 feet, and marked compositional differences among forests exist. Samples of woody vegetation in narrow horizontal bands have been utilized for indicating quantitatively the leading dominants and their closest associates. Ordered arrangements of importance values of species show compositional patterns from ravine to ridge-top.

(2) Occurrence of beech (*Fagus grandifolia* Ehrh.) on lower slopes of ravines is widespread in the Tertiary hills of Louisiana. With samples of beech stands near the margin of the beech range, it has been possible to show geographic variation in reproductive vigor.

(3) Natural restriction of blue-jack oak (*Quercus incana* Bartr.) to deep, coarse, upland sands may be observed in several areas of Louisiana. Studies show that woody-plant associates of blue-jack oak are few; however, longleaf pine (*Pinus australis* Michx.) commonly occurs with blue-jack, and ranges of the two species in western Louisiana coincide closely in sandy areas.

Concluding Remarks: ELSIE QUARTERMAN, Vanderbilt University.

As these papers have indicated, much research that is directed toward understanding and interpreting vegetation is under way in southeastern United States. Such information is important from the viewpoint of environmental management as well as of biological research. Some parts of our region are in wilderness condition, others are affected by 300 years of degrading utilization. If man is to progress toward making his environment more, not less, suitable for his own habitation, he needs to increase his knowledge of effects of various kinds of disturbance, of the capacity of vege-

tation for repair, and of the probable end-points of such repair.

There is a need to establish a frame of reference for studies of species origins, of species tolerances to all kinds of environmental stresses, of species productivity under different sets of conditions, and of species interrelationships that determine community composition and structure. Such a frame of reference comes from thorough phytosociological research. In the southeast there are large areas where vegetational description based upon quantitative studies is not currently available, and/or where more intensive work would supplement, expand, or perhaps replace the existing concept of local vegetation.

It is hoped that the presentation of this symposium may serve to encourage continued study, both descriptive and interpretive, and to focus the attention of interested investigators upon geographic and substantive areas in which vegetational studies could be profitably undertaken in southeastern United States.

The ASB is grateful to AAAS, and to the other co-sponsoring organizations for their assistance in presenting this symposium.

(Continued from page 66)

Credit for the smoothness of the meeting, for its success and enjoyableness, goes to the Committee on Local Arrangements headed by Drs. Wilbur Duncan and Donald Scott. About 90 people of the University of Georgia were involved with the local arrangements committee or with the Continuing Education Center in planning and management of the meeting. In addition to the biological faculty, a large number of graduate students contributed to the task and a number of secretaries and others. The traditional banquet on Friday evening was arranged by Dr. Carl Monk. This delightful affair was followed by an address in the center auditorium by Past-President Elsie Quarterman whose discussion of her plant physiological research in Tennessee fascinated every kind of biological scientist in her large audience.

It is to the faculty, students, and staff of the University of Georgia who participated in meeting arrangements to whom every ASB member in attendance and every member of the societies meeting with ASB are profoundly grateful.

The exhibits were probably the most numerous and attractive of any ever set up at an ASB meeting, and the attention they received gratifying to the personnel of the firms represented.

The many excellent facilities of the Continuing Education Center, as well as its efficient operation, drew countless compliments. These facilities permitted the meeting to be concentrated in one relatively small area, despite its over-1000 attendance.

NEW OFFICERS

Newly-elected officers at the Athens meeting were: Dr. John Carpenter, president-elect; Dr. James Hardin, vice-president; Dr. David Cotter, treasurer; Dr. A. E. Radford and Dr. John McCrone members of the executive committee.

Dr. Madeline Burbanck agreed to serve another three-year term as archivist, in which capacity she has rendered much valuable and time-saving assistance to ASB officers and has provided a much-needed depository for ASB records. Members having materials of historical interest to ASB should send them to Dr. Burbanck at the Department of Biology, Emory University, Atlanta, Georgia 30333, if they wish to have them kept in the archives. Which materials are kept is determined by Dr. Burbank.

PRESENT MEMBERSHIP

ASB probably has over 1000 members at this time, as Secretary Dorothy Crandall reported that there were 998 on April 18 (921 regular, 23 emeritus, 54 institutional). Many new memberships were received during the Athens meeting which have not yet been counted.

EMERTI

Nominated for emeritus membership were Dr. John Couch of the Department of Botany, University of North Carolina; Dr. Fred Emerson of the Department of Biology, Elon College; Dr. Clyde T. Reed of the Department of Biology of the University of Tampa. Election to emeritus status will be done at the October meeting of the executive committee at which time eligibility of those nominated will be determined. Members are urged to nominate ASB members who have retired from their regular duties and who have been members of ASB for at least the past ten years. Send your nominations to Secretary Dorothy Crandall, Randolph-Macon Woman's College, Box 278, Lynchburg, Virginia 24503.

DEATHS IN THE ASB FAMILY

The following members of ASB died between the 1967 and 1968 annual meetings: Dr. Robert E. Coker, Department of Zoology, University of North Carolina at Chapel Hill; Dr. Leonard Doerpinghaus, Department of Biology, Agnes Scott College; Dr. William C. Mobberly, Jr., Department of Biology, Northeast Louisiana State College; Dr. Gordon B. Woolcott, Southwestern College, Georgetown, Texas.

GOETHE TRAVEL AWARDS

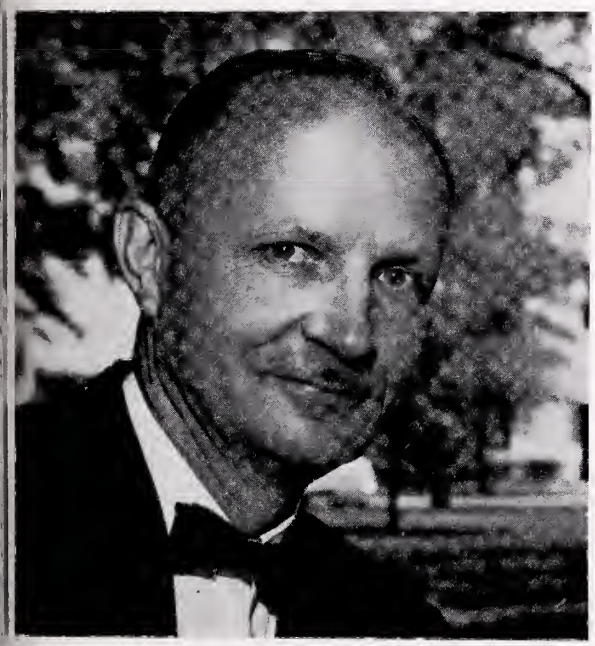
Goethe travel awards assisted 21 graduate students in attending this year's annual meeting, according to past-chairman of the committee, Dr. C. J. Umphlett of the University of North Carolina at Chapel Hill. The ASB executive committee has authorized the use of up to $500 from the treasury for continuation of these awards.

1969 ANNUAL MEETING

The 1969 annual meeting will be held at Memphis State University, Memphis, Tennessee. Dr. Carl D. Brown will serve as chairman of the local arrangements committee and will be assisted by Drs. Victor E. Feisal and Julian Darlington (of Southwestern at Memphis). Subsequent meetings will be held at the following institutions: 1970, Florida Southern College, Lakeland; 1971, University of Richmond, Virginia; 1972, Samford University, Birmingham, Alabama.

MERITORIOUS TEACHING AWARD

The winner of the Meritorious Teaching Award of ASB for 1968, Dr. Wade T. Batson, is a native of Marietta, South Carolina and a graduate of Furman University. He received the M.A. and Ph.D. degrees from Duke University. Since 1952 he has been on the faculty at the University of South Carolina, where he is now Professor of Biology. Dr. Batson's main scientific interests are botanical taxonomy and ecology. He is highly regarded for his abilities as a teacher, both in the classroom and in the field.



WADE T. BATSON

RESEARCH PRIZE

The winners of the research prize, awarded annually by the Carolina Biological Supply Company, were announced by Drs. Charles E. Jenner and Anne B. McCrary. Their paper had been judged best by a committee at a northern university to whom all entries were submitted. At the time this announcement was made, the Research Awards Committee and ASB officers were unaware that Drs. Jenner and McCrary had not been able to present their paper orally at the meeting as required by the competition rules.

Accordingly, the Executive Committee, the Research Awards Committee, and Drs. Jenner and McCrary have agreed that the prize should go to the runner-up, Dr. Henry C. Aldrich of the University of Florida for his paper, "Ultrastructure of mitosis in myxamoebae and plasmodia of Physarum flavicomum."

WE NEED YOUR HELP

We can well appreciate a persons concern when mail is sent to him or her at a wrong address, and it is returned to the sender as undeliverable. We can also understand indignation at some error in an address: a misspelled name, a college called by a name that has been recently changed, or a street mistakenly called an avenue.

However, speaking from the standpoint of the sender—in this case of the ASB Bulletin—we would greatly appreciate your forebearance of the small addressing *gaffe* that occurs all too frequently in our list. If, through the good graces of an overworked Post Office and the ministrations of a kind Providence, the Bulletin actually *reaches* you with some degree of regularity, please accept it and overlook small mistakes that offend only the vanity—and not the Postmaster. We ask this because every time an address change is made it costs the ASB twenty-five cents. A seemingly small amount in itself, but one which adds up quickly with the average number of changes running over 200 per year—and the money could well be used for more worthwhile purposes than enriching the Addressograph Company.

The short-term address is a related matter, which also adds to the problem. If you are a graduate student, please try to give us a fairly permanent address (home?) so that we won't be changing your address plate two or three times a year. (Second class mail is not forwarded, but is returned to us with postage due of ten cents on each item, thus making *those* changes cost thirty-

five cents each.) If you are teaching, please give careful consideration to where the Bulletin should be sent, and try to stick by the decision. Some people are apparently subject to a yo-yo syndrome, and, according to our records, change their addresses from home to school and back again fairly regularly. Remember, ASB dues are still among the lowest of any comparable society, and we need your help to keep them that way.

NSS Moves to Preserve Shelta Cave

The National Speleological Society, acting through the timely agency of the Nature Conservancy, has recently moved to preserve access to one of the world's truly unique underground ecosystems. A remarkable assemblage of animals lives in the groundwaters beneath the bustling streets of Huntsville, Alabama, and Shelta Cave, whose adjacent entrances lie on a lot between Link and Cave Streets just off the Pulaski Pike in this city, provides access to this unusual community. This lot recently came up for sale through an estate, and potential purchasers wanted to permanently seal the cave entrances to facilitate commercial development. In addition to cutting off access to this ecosystem for biologists, this action would have eliminated the colony of bats which inhabit the cave and probably drastically altered the ecological relationships to the detriment of the unique community. Thus, Shelta Cave became another in the unfortunately long list of examples of valuable natural areas threatened by urbanization. Preservation of this cave is of utmost importance, and has been undetraken.

Shelta Cave's major claims to distinction lie in the remarkable diversity of its troglobitic (cave-adapted) fauna and the fact that it is the type locality for nine species of cave animals, two of them apparent endemics. It will also be the type locality for other forms not yet described. It probably contains more kinds of major aquatic troglobites than any known cave in the world, and its terrestrial fauna is also quite rich. Thus, it offers for study an ecosystem in which the environmental parameters are reduced and yet where the maximum community complexity attainable in such a deprived environment may well be represented. In addition to its potential as a natural ecological "laboratory" and its value as a multiple type locality, the cave is also a marvelous nature preserve. It is one of but a few caves known to house three distinct species of troglobitic crayfishes, one of them an as-yet undescribed endemic, and is the type locality for one of the others. It also harbors a population of the endemic cave shrimp, *Palaemonias alabamae,* one of only two known troglobitic atyids. Other aquatic troglobites in Shelta include the fish *Typhlichthys subterraneus,* the salamander *Gyrinophilus pelleucus,* an undescribed flatworm. and an undescribed amphipod. In addition to its aquatic fauna, Shelta contains at least nine species of terrestrial troglobites—three cave beetles, a snail, a pseudoscorpion, a millipede, a spider, a dipluran, and an undescribed thysanuran. It is the type locality of six of these animals, as well as of the non-troglobitic isopod, *Miktoniscus alabamensis.* In all, counting non-troglobites but not miscroscopic forms or parasites, the cave houses populations of over forty species of animals.

In addition to research programs, educational tours involving the local community and various school groups are envisioned as part of the program for use of the cave. The Huntsville Chapter of the National Speleological Society will serve as custodian of the cave and administer it according to policies established by the Society's Research Advisory Committee and Nature Conservancy.

Further information on the Project may be obtained from John E. Cooper, Department of Zoology and Institute of Speleology, University of Kentucky, Lexington, Kentucky 40506.

The National Speleological Society needs the help of all biologists, conservationists and other concerned persons in its campaign to *Save Shelta Cave.* Its immediate goal is to raise $10,000. Tax-deductible contributions may be sent to: "The N. S. S. Shelta Cave Project," 2318 N. Kenmore Street, Arlington, Virginia 22201.

Books and Periodicals

COMPREHENSIVE BIOCHEMISTRY, Vol. 22: Bioenergetics. Vol. 27: Photobiology, Ionizing Radiations. Ed. by M. Florkin, and E. H. Stotz. American Elsevier Publishing Company, Inc., N. Y. vol. 22: 214 p., 1967, $12.75. vol. 27: 384 p., 1967, $20.00.

These two volumes are in Section V — Chemical Biology of the treatise. This section attempts to analyze the biochemical mechanisms of selected biologic processes. The notion that *all* biologic phenomena can be reduced to physicochemical principles appears to be promulgated in these volumes. A cursory examination of the nature of the topics and the way in which they are analyzed gives some crediance to this notion. This may be disturbing to many organismic biologists, however, some crucial biologic issues are not convincingly dealt with, to wit: molecular regulation. Such questions as: what factors determine the positioning of molecular complexes receive little, even speculative, attention.

The volume on Bioenergetics includes treatment of: Quantum Biochemistry: Mechanisms of Energy Transfer; Chemical Transfer in Biology (a. Donor-acceptor Complexes in Solution, b. Transfer of Charge in the Organic Solid State); and Active Transport and Ion Accumulation. Several of these papers present a rather quantitative analysis, however, the degree of correspondence between the theoretical calculations and in vivo observations is weak at best. Not only are biologic molecules complex in their quantum relations, but in vivo molecular complexes are unbelievingly elusive. Although the descriptive statement concerning the energy relations of molecular complexes are interesting, an examination of how such complexes originate and how their functions are regulated would be of greater interest to the biologist.

The volume on Photobiology covers the traditional areas of the subject: Phototropism; Biochemistry of Visual Processes; Bioluminescence; Photosensitization; The Effects of Ultraviolet Radiation and Photoreactivation; Phytochrome and Photoperiodism in Plants; Photosynthesis; and Effects of Ionizing Radiations in Biological Macromolecules. The last chapter, a topic not generally included in photobiology, is particularly welcome. Although the topics of photobiology naturally center on the photoresponses of plants, I feel the editors were remiss in not including a chapter on animal photoperiodism. The material presented in this volume is not particularly illuminating and is covered substantially in this form in a number of other volumes, but as the editors point out in their preface — there is some justification for having all this information "conveniently" placed in one series of books.

The volume on Bioenergetics appears to be more biophysical than biochemical in nature, and although of potential interest to biochemists it will probably not find wide audience among biologists per se. The other volume on Photobiology, however, should gain wide acceptance among biologists. The reason for this may be due, in part, to the fact that the papers on photobiology were authored mostly by biologists rather than by biophysicists or biochemists. For the biologist, sufficient bioenergetic detail is presented in the volume on Photobiology so as to make the volume on Bioenergetics unnecessary.

As with other volumes in this series, these are superbly bound, well printed, and overpriced. — RALPH D. AMEN, *Wake Forest University.*

THE SCIENCE OF MOVEMENT. R. A. R. Tricker and B. J. K. Tricker. American Elsevier Publishing Co., New York. 1967. 284 pp. $9.00.

A simple account of the physical basis of movement is extended to motion of organisms. The authors use an experimental rather than a mathematical approach to emphasize practical relevance of the science of movement, thereby avoiding excess mathematical abstractions.

Biological aspects of balance and the action of muscle are discussed in two early chapters. Eleven of 21 chapters mainly concern mechanics under such headings as Hydrodynamics, The Role of Friction in Movement, and Rotation. Principles are then extended to movement by organisms in chapters Movement on Land, Movement in Water, Bird Flight, and Rotational Coordination. Four concluding chapters use athletics as a common ground for uniting basic mechanics with biology. Six brief appendices offer mathematical details for selected topics such as arrangement of fibers in muscle and the period of swing of a pendulum.

Depth of treatment of biological topics varies. Muscle physiology is discussed in detail, while movement in water receives superficial attention. Serious students will be dismayed to find no literature cited nor suggestions for further reading.

Illustrations fill 40 percent of the book. The 141 photographs in 97 plates are of mediocre quality; careful editing could have eliminated many of them. There are 130 clear, instructive graphs and drawings. However, half of them are untitled, which demands careful reading of the text in order to grasp the significance of the figures.

Physical education teachers will especially appreciate this book. However, application of Newtonian mechanics to ordinary situations met in everyday life will interest a general reader. A biologist with little training in mathematics and physics, who desires to understand movement, will find this book unusually informative and enjoyable. — DALE HEIN, *Wake Forest University.*

RESEARCH IN PROTOZOOLOGY, Vol. 1, Edited by Tze-Tuan Chen. 1967. Pergamon Press. 429 pp. $17.00.

The objective of this four volume series is to review all major discoveries in protozoology made in the last 25 years and to relate these to earlier ones. In view of the diversity of publications in which researeh of interest to microbiologists may be found as well as the sheer volume of papers now appearing, this is a worth-while and long needed effort. As the interests of ever larger numbers of those in the life-sciences become increasingly interdisciplinary, we find ourselves ever more dependent on such volumes as this. One hopes that revisions will appear with regularity.

Volume 1 contains five review papers: "Cytoplasmic Organelles and Inclusions of Protozoa" by Everett Anderson; "Motile Behavior of Protozoa" by Theodore L. Jahn and Eugene C. Bovee; "Respiratory Metabolism" by William F. Danforth; "Contractile Vacuoles, Ionie Regulation, and Excretion" by J. A. Kitching; and "Nutrition and Growth of Protozoa" by R. P. Hall.

The largest of these articles is the 160 pages (total Vol. 1, pages 429) by Jahn and Bovee. It has 1005 references ineluding many recent citations from Japanese and other journals probably not easily available to every protozoologist. The authors have not merely summarized the literature cited but have digested, integrated, and related the information into a meaningful and informative whole.

All of the authors have accomplished wonders by providing the essence of research accomplishments in their respective fields as well as the necessary references for a study in greater depth. Review articles of this caliber undoubtedly contribute much to the advance of science and may, in fact, be essential to the development of meaningful interdisciplinary research programs.

Volume 1 of *Research in Protozoology* should be in all life science libraries. I also recommend it to anyone interested in biology. It provides the background needed to understand research advances not treated in depth in most texts. The price is a bit high but so is the information content per page. — JOHN CAIRNS, JR., *Department of Zoology, University of Kansas.*

DIRECTORY OF BIOSCIENCE DEPARTMENTS IN THE UNITED STATES AND CANADA. AIBS Office of Biologieal Edueation, J. David Loekard, Director. Reinhold Publ. Corp., New York. 1967 Paper. 672 + xvi pp. $8.50

This book is, as the name implies, a direetory of the staff, eourse offerings, and degree programs available at most degree granting institutions in the United States and Canada. Field stations and laboratories assoeiated with academie institutions and 300 non-degree granting institutions are also listed. Junior college offerings are, in general, not listed. Conspieuous by their absenee, however, are eertain field stations whieh offer eourse work and graduate training; for example, Woods Hole Biologieal Laboratories and Seripps Oeeanographic Institute. Although the Contents page lists three "Seetion", I eonsider that there are really four: (1) alphabetieal listing of institutions; (2) descriptions of departments, alphabetically by state; (3) lists of non-degree granting institutions; and (4) alphabetieal list of faeulty members. Information was eompiled from materials supplied by the respeetive departments and/or institutions. As one would expeet, the listings, particularly of junior staff, are already out of date, but this does not seriously impare use of the direetory if one is aware of this problem. The book will probably be of most use to advisors, including high school eounsellors, in assisting students to ehoose a proper place for undergraduate or graduate training. The direetory should be on the shelf of every bioseience department, advisor and library referenee room. Hopefully, it will be revised periodieally and with a potential sale of over 2,000 eopies, this eould be done and the priee retained at its eurrent reasonable level.—JFF.

THE DICTIONARY OF THE BIOLOGICAL SCIENCES. Peter Gray. Reinhold Publ. Co., New York. 1967. 602 + xx pp. $14.75

Peter Gray's effort is another in the reeent series of biologieal dictionaries whieh the different publishers are offering to the market. It eontains (by the publisher's eount) more than 40,000 entries and a four page list of the prineipal works eonsulted. Most of the definitions one would wish are ineluded, restricted highly technieal terms exeepted. There are numerous instances, however, where the author's rationale is not clear or the definition is in need of refinement. Likewise, one ean expeet some frustration in locating eertain terms unless one eonsults the Introduetion. For example, Grey aeepts the ordinal ending, "-iformes", for birds but does not for fishes although, to the best of my knowledge, most ichthyologists do. Likewise, he prefers the purist "foetus" over the more eommonly used "fetus." The word "fiber" has a number of meanings when applied to muscles whieh often eonfuse a student; the dictionary does not present the different meanings, the only speeialized definition given being "myofibril." A number of words are listed under the root stem; for example, a large number of entries are made under "-phyll-" and under "-therm". Under the latter, I find "poikilotherm" defined as "an animal whose body temperature varies aeeording to the environment"; I spend eonsiderable time trying to emphasize to my students that the differenees between these animals and homiotherms are in intrinsie physiological mechanisms and behavior, rather than in direet response to environmental factors. Another instanee of a shorteoming is the definition of "Peyer's patehes" whieh are "=lymph folliele". Do I look for these in the head or the foot, or where? Many

mutant genes are listed, especially of insects, but I wonder if those interested in these details should not know these without consulting the dictionary. The practice of listing chemical terms, especially enzymes, under their root word such as "esterase" strikes me as desirable. Here the student is impressed with the basic similarities of action, rather than the specific action. Ecological and genetic terms, in general, are well-defined, as is also the case for many vernacular names for organisms. Absent from Grey's list of consulted works are the commonly used laboratory manuals for elementary courses. I hope that in future additions Dr. Grey will search these for terms which may be unknown to a beginning student. In short, the dictionary is no better and no worse than recent similar efforts. It is, however, cheaper which gives it some attractiveness. —JFF.

News of Biology in the Southeast

Joseph F. Fitzpatrick, Jr. — Editor

About People

The News Editor regrets to report the death on 3 January 1968, after a lengthy illness, of **William C. Mobberly.** Dr. Mobberly was Associate Professor of Biology at Northeast Louisiana State College, Monroe. He received a bachelor's degree in pharmacy from Auburn University, a bachelor's degree in zoology from Huntingdon College, and a M.S. and Ph.D. in Zoology from Tulane University. He was a recognized authority in crawfish hormones.

Takashi Makinodan, Biology Division Oak Ridge National Laboratories, Tennessee, delivered two invited lectures to the Instituto Venezolano de Investigaciones Cientificas, Caracas, Venezuela on 18-20 January 1968.

Catherine Tchernigovtzeff of the Centre National de la Recherche Scientifique, Faculte des Sciences, Laboratorie de Zoologie, Paris, France, has joined the Biophysics Group of the Biology Division of Oak Ridge National Laboratory, Oak Ridge, Tennessee, for a three-month tour.

W. A. Arnold and **R. M. Pearlstein,** Biology Division Oak Ridge National Laboratories, Tennessee, attended the II International Conference on Photosensitization in Solids at Tucson, Arizona. Dr. Arnold acted as chairman of a session and Dr. Pearlstein presented an invited paper.

Alexander Hoellander, Biology Division, Oak Ridge National Laboratories, Tennessee, spent much of the month of February in travel. He attended the meeting of the Editorial Board of **Science** in Washington, presented a paper to the German Biophysical Society in Berlin, and attended the Cold Spring Harbor Directors' meeting in New York.

Vicenzo Covelli left the Biology Division, Oak Ridge National Laboratories, Tennessee, on 5 February to return to his position at the Comitato Nazionale per l'Energia Nucleare, Rome, Italy.

The editor regrets to report the death of **S. Leonard Doerpinghaus** in an automobile accident occurring on January 19, 1968. Dr. Doerpinghaus received his terminal degree at Louisiana State University, Baton Rouge, and taught at Texas Lutheran College and L. S. U. before joining the staff of Agnes Scott College, Decatur, Georgia. At the time of his death, he was Associate Professor of Biology.

Robert J. Hurley has been appointed first permanent Chairman of the Division of Graduate Studies in Marine Sciences, University of Miami, Florida. Dr. Hurley has been a senior member of the staff of the Institute of Marine Sciences since 1961, and he has just returned from a one-year leave of absence during which he served as Deputy Director of the UNESCO Office of Oceanography in Paris.

Karen E. Buckton has left the Mammalian Cytology and Genetics Section of the Biology Division of Oak Ridge National Laboratory, Tennessee, after a one-year visit. On February 21 she returned to her position at the Medical Research Council, Western General Hospital, Edinburg, Scotland.

Herbert S. Schwartz, formerly senior scientist with the Sloan Kettering Institute and Associate Professor in the Department of Pharmacology at Cornell University, has been appointed Professor and Head, Department of Biology, The University of Alabama, University.

John L. Mego, formerly Medical Research Chief at the Baltimore City Hospital and a member of the faculty at the Johns Hopkins University, has been appointed Associate Professor of Biology, University of Alabama, Univeristy. He is currently a National Academy of Science Fellow to Czechoslovakia and will join the staff September 1.

Helen Gill Sellin has joined the staff of the Enzymology Group of the Biology Division of Oak Ridge National Laboratories, Tennessee. She was awarded the Ph.D. by the University of Chicago.

A large expansion of the Biology Department staff of the College of William and Mary, Williamsburg, Virginia, has brought six new people to the campus during the past year: **Martin C. Mathes** (Ph.D., U. Maryland), a plant physiologist, came from the University of Vermont; **Jarid Simons** (Ph.D., Yale U.), an embryologist came following a post-doctoral fellowship at Yale; **Webster van Winkle** (Ph.D., Rutgers, the State U.) joined the faculty following completion of his degree in invertebrate physiological ecology; **Stewart A. Ware** (Ph.D., Vanderbilt U.) came following his degree which was awarded in Plant Ecology. Besides these who came in 1967, two others joined the staff in September, 1968: **Bradner Coursen** (Ph.D., U. Maryland), a student of fungal development and physiology, came from Lawrence University, Appleton, Wisconsin, and **Bruce Grant** (Ph.D., North Carolina State University, Raleigh) comes following his degree in population genetics and evolution.

Rudolph Prins, formerly at Clemson University, South Carolina, will teach this summer at the University of Oklahoma Biological Station at Lake Texoma. This fall he will join the staff of Western Kentucky University, Bowling Green, as Associate Professor of Biology.

Kai-Lin Lee, a recent graduate of Tulane University, New Orleans, Louisiana has joined the staff of the Biochemical Regulation Group, Biology Division, Oak Ridge National Laboratories, Tennessee.

James M. Collins has joined the Biochemistry of Cell Differentiation Group, Biology Division, Oak Ridge National Laboratories, Tennessee. He is a recent Ph.D. of the University of Tennessee, Knoxville.

Eugene P. Odum, Alumni Foundation Professor and Director of the Institute of Ecology, University of Georgia, Athens, has been named "Georgia's Scientist of the Year" for 1967 "in recognition of his contributions to the field of ecology" by the Georgia Science and Technology Commission.

Gary Dillard, formerly of Clemson University, South Carolina, will join the staff of the Department of Biology, Western Kentucky University, Bowling Green, in September.

New faculty members at East Carolina University, Greenville, North Carolina, are: **Wendell E. Allen,** Assistant Professor (Ph.D., Bacterial Genetics), University of Kentucky; **Takeru Ito,** Professor (Ph.D., Biochemistry), University of California, Berkeley; **Linda W. Little,** Assistant Professor (Ph.D., Environmental Microbiology), University of North Carolina, Chapel Hill; **James S. McDaniel,** Assistant Professor (Ph.D., Parasitology), University of Oklahoma; and **Susan G. McDaniel,** Assistant Professor (Ph.D., Ecology), University of Oklahoma.

R. A. Brown, Radiation Immunology Group, Oak Ridge National Laboratory, Tennessee, is on detached assignment to the Puerto Rico Nuclear Center, San Juan.

R. F. Kimball, Biology Division Oak Ridge National Laboratories, Tennessee, was in Europe 27 May through 11 June where he attended numerous conferences, meetings and seminars.

R. C. Fuller, Biology Division, Oak Ridge National Laboratories, Tennessee, presented a paper at the plenary session of the First International Congress of Photosynthesis, Freudenstadt, Germany, June 2-8. Following, he attended a conference at the University of Wales, Cardiff, and then presented a paper at the International Conference on Photosynthesis in Susan Cane in London. He returned to the laboratory on 17 June.

Ugo Del Monte, who has been with the Enzymology Group, Oak Ridge National Laboratory, Tennessee, recently returned to the University of Florence, Italy, in the capacity of Assistant Professor.

Dona C. Hooper left the Radiation Immunology Group, Oak Ridge National Laboratory, Tennessee, to continue her postdoctoral training in the laboratories of Frederick Becker, Associate Professor of Pathology, New York University Medical School.

About Institutions

An electron microscope laboratory has been established in the Department of Biology, **University of Alabama,** University. Temd R. Deason, Associate Professor of Biology, has been appointed director of the facility.

An Advanced Seminar in Tropical Botany was offered 17 June-26 July by the **University of Miami** (Florida). Seminar coordinator was **Taylor Alexander,** Professor of Botany. Other regular faculty were Richard A. Howard, Arnold Professor of Botany and Director of the Arnold Arboretum, Harvard; Howard J. Teas, Professor of Biology, Miami; and P. B. Tomlinson, Research Scientist at Fairchild Tropical Garden and Adjunct Assistant Professor of Botany, Miami. Several other specialists in related fields presented evening lectures.

Florida Technological University, Orlando, will accept its first students (freshmen and juniors) in September. Head of the Department of Biological Sciences will be Leslie L. Ellis, who formerly was Head of the Department of Zoology at Mississippi State University. Other staff are: **George E. Allen** (Ph.D., Mississippi State University), Associate Professor, insect pathology and virology; **Marshall J. Mann, Jr.** (Ph.D., Texas A & M University), Assistant Professor, cytology; **Richard E. Tandy** (Ph.D., Louisiana State University), Assistant Professor, invertebrate zoology; **Henry O. Whittier** (Ph.D., Columbia University), Assistant Professor, eryptogamic botany.

The ASB BULLETIN

Volume 15, Number 4 October, 1968

Geolycosa, wolf spider Clarence E. Styron

The Official Quarterly Publication of
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Associate Editor

JOSEPH F. FITZPATRICK, JR.,
News Editor

JOHN CARPENTER, Business Manager

CONTENTS

ASSOCIATION AFFAIRS

ASSOCIATION RESEARCH PRIZE

If you intend to present a paper at the annual meeting of the Association of Southeastern Biologists, we wish to call your attention to the Association Research Prize and invite you to submit your manuscript in competition. This prize of $100. is sponsored by the Carolina Biological Supply Company, Burlington, North Carolina. Rules and regulations are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented by the author(s) at the annual meeting.

2. Only members are eligible to submit papers in competition for the research prize. This applies to all names on the submitted paper.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Papers submitted in competition are judged by eminent scientists in the various fields of biology. These individuals are selected by the Research Committee and are from schools outside the Southeast. Every effort is made by the Re-

(*Continued on page* 86)

A HOME IN THE SUN

J. Albert Starkey [1]

Isolated occurrences of Allegheny Mound Ants have been able to remain unrecorded in such an unlikely area as Southern New Jersey. They are far from their typical homeland in the Allegheny mountains, and are known in New Jersey only in the northern part of the state. Dwellers of the forest, they remain undisturbed unless the forest is destroyed.

There are at least two separate colonies of the ants in the eastern end of Cumberland County, and I have observed one of them for a period of thirty years. This is the principal colony, and occupies an area of fifty acres.

The forest is deciduous, principally oaks, with a sprinkling of pitch pines. The oaks range up to 62 inches in circumference. Two oaks tested with an increment borer show a ring count of 60 ± 2 years. The type of growth of the trees indicates that the area was probably never cleared for farming, but represents a regrowth after having been cut over for the wood. Earlier cutting was done for both charcoal and lumber, and two sawmills operated within a mile of this site.

The soil is gravelly, part of the Bridgeton formation of the Quaternary period. The land is slightly rolling, the elevation varying from 70 to 90 feet above sea level, and the ant mounds are distributed over the entire 50 acres (except in the lower spots which are normally damp). Although all the forest appears to be of the same age, there are more old and abandoned mounds in the eastern section. There has been an apparent westward movement of the ant population.

Individual mounds are located in roughly circular areas free of trees for a 60 to 75 foot diameter. After a number of these locations are studied, a pattern becomes evident. If the forest canopy is open above the treeless area, there will be an active mound. If the canopy is closed, the mound, if present, will have been abandoned.

This combination of opening, sunlight, and ant activity is so typical that it is necessary only to travel through the forest looking for areas where there is a large patch of sunshine on the ground. In all probability, there will be an active mound near the center of the area. In a few instances there are two mounds; one in the sunshine, one in the shadow. As the canopy began to close over and shadows spread over the mound, the ants gradually shifted their activity and developed a new mound, a few feet away, in the remaining sunshine. In some instances where the canopy has closed over completely, the circular area is still obvious and investigation may show a long abandoned mound. Enough time may have elapsed so that the mound is now covered with the shrubs of the forest floor.

The area within the circle of trees, in all cases, is covered with low shrubs, mostly *Gaylussacia sp. and Vaccinium sp.* The ants apparently have had no effect on the growth of the shrubs except in the immediate area of the mound, which is never overgrown if it is in use by the ants. There are some places in which the shrubs have achieved better growth in the circles around the ants than in the nearby forest. Undoubtedly sunlight, the factor which favors the ants, also encourages the plant growth.

[1] Head, Science Dept., Vineland Senior High School, Vineland, New Jersey 08360.

Twenty years ago there were several mounds along the edge of the forest and along an open trail through the interior. The growth of the forest since that time has placed those same mounds in the shadows and they have been abandoned.

An interesting secondary use of two abandoned mounds is their development into fox burrows. One mound has two tunnels leading toward the central section from opposite sides, however, there is no evidence of current use.

There are mounds in all stages of development and abandonment. Some are so old that there has been considerable subsidence and only a few inches of elevation remains. Many are completely covered with the common shrubs of the forest. An apparent typical development is the growth of a patch of trailing arbutus, *Epigaea repens,* on abandoned mounds. Some are more or less completely covered with moss, identified as *Polytrichum ohioense*. This same moss also partly covers many of the active mounds.

The literature indicates that some myrmecologists believe that the spread of the mossy cover eventually forces the abandonment of the mound. However, it may be that the growth of the moss possibly follows, rather than precedes, the decreasing activity of the ants. It is known that the ants keep the immediate area of the mound more or less clear of vegetation. It may be assumed that they would clear away the mosses also. Without question, there is an inverse relationship between moss cover and ant activity.

Figure 1, (Top). — Large mound with partial cover of moss and grass. Ant activity is confined to the grassy area.

Figure 2, (Second from top). — Active mound with partial cover of moss at right.

Figure 3, (Next to bottom). — Shrubs closing over abandoned mound.

Figure 4, (Bottom). — Abandoned mound with fox burrow.

Some mounds are fully active, that is, they show a band of openings in use completely around the base. In some instances, their tops have scattered grass cover. This probably is not permanent cover and occurs only with chance distribution of seeds. Older mounds, with reduced population, frequently show activity near or on the top rather than around the base.

The mounds consist of soil particles and pebbles raised from below the surface as galleries are extended, mixed with pieces of chaff. Occasionally extraneous material such as charcoal, is mixed with the material of the mound surface. The charcoal is probably from fires of many years ago.

The largest active mound is nine feet in diameter and 18 inches high. Most of the mounds do not achieve these dimensions. An average diameter would be four to five feet and average height about ten inches.

One abandoned mound, 7.5 feet in diameter, was partially explored underground by digging a trench through one side. Soil was removed to a depth of 2.5 feet which marked the lowest level of abandoned galleries below ground surface, and at this depth water began to collect in the trench. Soil color indicated an admixture of topsoil and subsoil through a vertical extension of 1.6 feet, one foot above the ground surface and six-tenths foot below. From this depth to the bottom, the galleries were in yellow gravel.

The horizontal activity appeared to have been confined to about the same dimensions as the mound at the surface, approximately 7.5 feet. As the depth below the surface increased, the diameter of the area of use decreased. The galleries were still in good condition and the mound may have been in partial use the previous summer.

The question of why these ants are in this apparently isolated location does not have an easy answer. Is this an island left by geological processes? There are comparable occurrences in the flora of South Jersey. Most notable is probably the existence of isolated colonies of *Rhododendron maximum* and *Ilicoides mucronata* in the swamps of branches of the Great Egg Harbor River in Camden and Gloucester Counties. These species in such an atypical location are apparent relicts of earlier climatic upheavals.

Zoologists have found similar instances of isolation in which the age of the displaced species is greater than that of the other species of the area. Is *Formica exsectoides* a surviving species of the last glacial period? This apparent island location is in the Pine Barrens near their southernmost limits. It is believed by geologists that the Beacon Hill formation, which coincides with the boundaries of the Pine Barrens, has been continuously out of water since upper Miocene times but has been partly or completely surrounded by water several times.

Was *Formica exsectoides* pushed southward by the glaciation of North Jersey and then trapped on the Pine Barrens island? If so, there may be other locations presently unknown to entomologists. If this is the only South Jersey location, *Formica exsectoides* may disappear from the area. The most readily accessible locality is zoned as prime residential ground. The other station may be saved in its natural condition by county or city purchase and designation as a natural area. However, continued growth of the forest for another fifty years will probably result in such changes that there will no longer be any place in the sun for *Formica exsectoides*.

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STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION
(Act of October 23, 1962 Section 4369, Title 39, United States Code)

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POD Form 3526 May 1965

(*Continued from page 82*)

search Committee to keep the authors of submitted papers anonymous. Criteria for the award are left to the discretion of the judges' panel, who may withhold said award if no paper is considered to have sufficient merit.

5. Papers must be submitted *in triplicate* and in their entirety not later than *February 15, 1969,* to Donald Caplenor, Box 186A, Tennessee Technological University, Cookeville, Tennessee. 38501.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

7. The original copy of the prize-winning paper will be sent to the sponsor of the prize.

The rules and regulations governing the annual Association Research Prize of $100.00, sponsored by the Carolina Biological Supply Company, Burlington, North Carolina, are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. **Papers submitted in competition are judged by eminent scientists in the various fields of biology. These individuals are selected by the Research Committee and are from schools outside the Southeast. Every effort is made by the Research Committee to keep the authors of submitted papers anonymous. Criteria for the award are left to the discretion of the judges' panel, who may withhold said award if no paper is considered to have sufficient merit.**

5. Papers must be submitted *in triplicate* and in their entirety not later than *February 15, 1969, to Dr. Donald Caplenor, Box 186A, Tennessee Technological University, Cookeville, Tennessee 38501.* One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

IVEY F. LEWIS FELLOWSHIP AT MOUNTAIN LAKE BIOLOGICAL STATION

A Research Fellowship of $150.00 for summer course study or research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. This fellowship, formerly known as the *Phipps and Bird Research Fellowship,* was re-named at the request of the Phipps and Bird Company. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and especially in the case of younger workers, by references and educational data. Applications should be sent to *Dr. J. J. Murray, Dept. of Biology, Univ. of Virginia, Charlottesville, Virginia 22903* not later than 15 March 1969. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE
J. J. Murray, *ex officio*
James Riopel, *ex officio*
Thomas L. Quay
Arthur W. Jones
Donald Caplenor, *Chairman*

MERITORIOUS AWARD NOMINATIONS

As in previous years an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)

1961. Dr. Warren Deacon (Vanderbilt)
1962. Dr. Septima C. Smith (Univ. of Alabama)
1963. Father Patrick H. Yancey (Spring Hill College)
1964. Dr. Ruskin S. Freer (Lynchburg College)
1965. Dr. Harwell P. Sturdivant (Western Maryland College)
1966. Dr. Charles Ray, Jr. (Emory Univ.)
1967. Dr. H. J. Oosting (Duke University)
1968. Dr. Wade T. Batson (Univ. of South Carolina)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting material to *Dr. Lewis Berner, Dept. of Biological Sciences, Flint Hall, Univ. of Florida, Gainesville, Florida 32601.*

COMMITTEE
JACK H. FEHON
WADE T. BATSON
LEWIS BERNER, *Chairman*

SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

PRESIDENT-ELECT .....

VICE-PRESIDENT .....

EXECUTIVE COMMITTEE MEMBERS (2 for 3-year terms) .....

Deadline: January 1

Mail to: DR. HAROLD J. HUMM
Marine Science Center
Univ. of South Florida
Bayboro Harbor
St. Petersburg, Fla. 33701

Most of the following joined the ASB during the Athens Meeting, but their addresses were either not recorded or were recorded incorrectly. If any readers know of these missing persons, please notify Dr. Dorothy Crandall, Randolph-Macon Woman's College, Lynchburg, Virginia.

Julian Ballard
Richard G. Clements
Lillie Cobbs
J. Conry
T. D. Diamond
Bebe Dorris
Harold L. Eck, Jr.
Dana Griffin
Timothy M. Gwynette
George Hadden
Gay Jividen
Clifford Johnson
B. J. Kelly, Jr.
Philip A. LaHaye
David E. Lesley
Chet Michalski
F. Montaldi
Judy T. Morgan
Charles H. Owens
Theodore J. Passon, Jr.
Robert Pope
Ida Y. Williams
Byron H. Wise

West Virginia's best known oak tree, the third largest chinquapin (yellow) oak in the world and the largest in the state, is alive in West Virginia University's Arboretum and as healthy as can be expected for a 400-year-old tree. Its survival was inadvertently threatened last year by construction plans which inspired protests from throughout the state. When the architect's plans were revealed, WVU had them revised to spare the tree, which is about 80 feet high and 16 feet, five inches in circumference. Its top is missing, the main trunk is hollow and a scar from being struck by lightning runs down one side. But the chinquapin oak is still growing, according to Warren G. Tennant, grounds keeper at the Arboretum in Morgantown, who is standing beside the famous tree.

News of Biology in the Southeast

About People

Udo Horst Ehling left the Mammalian Genetics Group, Biology Division, Oak Ridge National Laboratories (ORNL), Tennessee, to accept a position as Head of the Department of Genetics, Radiation Research Association, Munich, Germany.

Hans G. Gasson, who has been associated with the Nucleic Aeid Chemistry Group, ORNL, as a Max Kade Foundation Postdoctoral Fellow, left the Biology Division to become associated with the Max-Planck Institut in Göttingen, Germany.

D. C. Vann of the Radiation Immunology Group, ORNL, left the Biology Division to accept a position in the Department of Experimental Pathology, Scripps Clinic and Research Foundation, La Jolla, California.

Chester B. Hager, associated with the Biochemical Regulation Group, ORNL, left the Biology Division to accept a position with Miles Laboratories, Elkhart, Indiana.

Vernon K. Jenkins, formerly with the Pathology and Physiology Section, ORNL, has accepted a postdoctoral fellowship in the Experimental Biology Department, Baylor University School of Medicine, Houston, Texas.

Beryl J. Ortwerth of the Enzymology Group, ORNL, has accepted a position with the Department of Surgery, University of Missouri Medical Center, Columbia.

E. H. Y. Chu, Biology Division, ORNL, spent much of the summer in China and Japan. Dr. Chu participated in the Summer Science Seminar, Academia Sinica, Chinese National Research Council, Taipei, Taiwan, China; he then presented papers at the International Congress of Genetics in Tokyo.

J. W. Angelovic, USDI, BCF, Radiobiological Laboratory, Beaufort, North Carolina, was elected president of the Atlantic Estuarine Research Society.

C. David Jennings has joined the staff of the USDI, BCF Radiobiological Laboratory, Beaufort, North Carolina. Dr. Jennings is an oceanographer.

E. F. Oakberg, J. R. Reel, W. D. Wicks, and **J. L. Wittliff,** Biology Division, ORNL, attended the International Congress of Oceanography in Mexico City.

W. E. Cohn, Biology Division, ORNL, attended meetings of the Combined Commission on Biochemical Nomenclature of the International Union of Pure and Applied Chemistry, and the International Union of Biochemistry in Bellagio, Italy.

Dale Howard Arner has been named Professor and Head of a newly-formed Department of Wildlife Management at Mississippi State University. Dr. Arner was formerly Associate Professor of Zoology at the institution.

Earl R. Rich, Associate Professor of Zoology, University of Miami, Coral Gables, Florida, has been named Associate Dean for academic programs, plans and developments in the College of Arts and Sciences.

Three new Assistant Professors have been appointed to the staff of the Department of Biology, University of Miami, Coral Gables, Florida: **Ronald H. Hofstetter,** Ph.D., University of Minnesota, ecology; **Howard G. Gratzner,** USPHS postdoctoral research fellow at California Institute of Technology, biochemical genetics; and **Barbara N. Burkett,** postdoctoral research scientist, Case Western Reserve University, insect physiology.

William S. Bradshaw has joined the staff of the Biochemistry of Cell Differentiation Group, ORNL. He was appointed an AEC Postdoctoral Fellow following receipt of his Ph.D. from the University of Illinois, Urbana in June, 1968.

The following members of the Biology Division, ORNL, attended the XII International Congress of Genetics, Tokyo, Japan: **M. A. Bender, E. H. Y. Chu,**

H. V. Malling, F. J. de Jerres, B. B. Webber, R. F. Kimball, and **R. C. von Borstel.**

Susumu Takeda, for the past year an Eleanor Roosevelt International Cancer Fellow of the American Cancer Society with the Biophysics and Human Cytogenetics Group, ORNL, has returned to his position as Head of the Department of Pathology, Mie Prefectural University, School of Medicine, Tsu-shi, Mie-ken, Japan.

Bonnie J. Roger, who received the Ph.D. degree in Plant Physiology from the University of Maryland, College Park, has joined the staff of the Microbial Photosynthesis Group, ORNL.

James A. Stewart, Postdoctoral Fellow, Biochemistry of Cell Differentiation Group, ORNL, became Assistant Professor of Biochemistry, University of New Hampshire in September.

David S. McDevitt, Postdoctoral Investigator, Cell Growth and Differentiation Group, ORNL, has accepted a position with the Department of Animal Biology, School of Veterinary Medicine, University of Pennsylvania.

Mahlon G. Kelly of Massachusetts Institute of Technology, has been appointed a NASA Visiting Professor of Biology at the University of Miami, Coral Gables, Florida. Dr. Kelly, while at Miami, will take part in the marine aspects of the Environmental Biology Program and will do research with aerial photographic techniques as applied to marine studies.

The News Editor regrets to report the recent deaths of two well-known southeastern herpetologists. **Doris M. Cochran,** deceased 20 May 1968, had retired as Curator of Reptiles and Amphibians, Smithsonian Institution, Washington, D. C. At the time of his death on 8 August 1968, **Fred Ray Cagle** was Vice-President in charge of development of Tulane University of Louisiana, New Orleans.

Ronald R. Cowden, formerly of the Louisiana State Univ. Medical Center, New Orleans, has become chairman of the Dept. of Biological Sciences, Univ. of Denver. He has been joined by the following: **Dr. John I. Payne,** Professor (formerly Associate Professor of Biology at Georgia State College in Atlanta), **Dr. William Brandom,** Associate Professor (formerly research scientist at the Delta Regional Primate Laboratory of Tulane University at Covington, Louisiana), **Dr. George B. David,** Professor (visiting Associate Professor, State University of New York at Albany) and **Dr. Sherill Curtis,** Research Associate (who received her Ph.D. in 1968, from Tulane University).

John A. Fincher, for twenty-two years a member of the faculty and administration at Samford University serving as former Head of the Department of Biology and for the past ten years as Academic Dean, resigned to accept the position of President of Carson Newman College, Jefferson City, Tennessee.

The Society of the Sigma Xi announced today through the chairman of its Grants-In-Aid of Research Committee, Dr. Harlow Shapley, an award to **Gwynn W. Ramsey** of Lynchburg College, Lynchburg, Virginia. This award has been made to Dr. Ramsey to assist him in his study of "An Ecological-Floristic Survey of Twelve Southern Virginia Piedmont Counties."

Eugene P. Odum, Alumni Foundation Distinguished Professor of Zoology at the University of Georgia and Georgia Scientist of the Year for 1967, has been named a Congressional Advisor.

Dr. Odum, who is also director of the University's Institute of Ecology, has accepted an invitation from Representative Richard L. Ottinger, D., N.Y., to advise a recently formed Ad Hoc Committee on Environmental Quality.

Representative Ottinger said the committee, made up of about 50 members of Congress both from the House and the Senate, will "be non-partisan and loosely structured in order to advance its real purpose: self education."

Dr. Odum, who has served as a United States delegate to numerous international scientific groups, was cited for his research by the State Science and Technology Commission when he was named Georgia Scientist of the Year last March. He is an internationally known expert in ecology and has headed the Institute of Ecology here since it was founded. He was also instrumental in the founding of the Savannah River Ecology Laboratory of the Atomic Energy Commission and in the formation of the University's Marine Institute at Sapelo Island.

L. H. Foster, president of Tuskegee Institute, recently appointed **James H. M. Henderson** director of the Carver Research Foundation. He succeeds the late Dr. Clarence T. Mason.

Dr. Henderson earned his Bachelor of Science degree at Howard University in 1939; M.Ph., University of Wisconsin in 1940; Ph.D., University of Wisconsin in 1943.

J. Richard Thomson is now Professional Associate, Advisory Center on Toxicology, National Research Council, National Academy of Sciences, Washington, D.C.

About Institutions

An Advanced Seminar in Tropical Botany was held at the University of Miami, Coral Gables, Florida, June 17 - July 26. Seminar coordinator was **Taylor Alexander,** Professor of Botany, University of Miami. Other faculty were **Richard A. Howard,** Arnold Professor of Botany and Director of the Arnold Arboretum, Harvard University; **Howard J. Teas,** Professor of Biology, University of Miami; and **P. B. Tomlinson,** Research Scientist, Fairchild Tropical Garden and Adjunct Assistant Professor of Botany, University of Miami. Twelve persons, ranging from college faculty to undergraduate student, were selected to participate.

The University of Miami, Coral Gables, Florida has inaugurated this September an intensive graduate level program in human-environmental biology in peninsular Florida. A full-year interdisciplinary course will involve a two-semester Advanced Ecology sequence at the doctoral level, and study areas in civil engineering, toxicology, pesticide biology, marine science, urban studies and radiation health. Subsequent years will provide for added experience in extant programs at the University and the Organization for Tropical Studies in Costa Rica. An initial-year award from the U. S. Public Health Service of $35,716 enabling establishment of the program will grow to total $250,000 in five years. Three current traineeships will be increased to five in 1969-70 and seven in 1970-71.

The Biology Department of The Catholic University has established an Electron Microscopy Laboratory, headed by **Dr. James A. McAlear** who was formerly with the University of California at Berkeley.

The **Federal Water Pollution Control Administration** is sponsoring a training program in the identification of pollution important organisms to be held at Georgia State College, Atlanta, Georgia, December 4th through the 21st 1968. Biologists, particularly those in the southeast, are invited to attend. Stipends are available to help defray expenses; there will be no charge for the course. The taxons to be covered include the algae, fungi, crustacea, mayflies, stoneflies, caddisflies, oligochaetes, fish, chironomids, and molluscs. Widely recognized authorities have agreed to teach each group. For applications or further information write: **Dr. Fred K. Parrish,** Program Director, Department of Biology, Georgia State College, 33 Gilmer Street, S.E., Atlanta, Georgia 30303.

Twenty-five systematic botanists from around the country were participants in the **Summer Institute in Systematics,** held at the Museum of Natural History, Smithsonian Institution, and jointly sponsored by the Smithsonian and the American Society of Plant Taxonomists, with support from NSF and the Air Force Office of Scientific Research. The southeastern U. S. was well represented: **W. C. Dickison,** Dept. of Biol., V. P. I.; **W. L. Ellison,** Erskine College; **J. W. Hardin,** Dept. of Botany, N. C. State Univ.; **E. L. Lipps,** Shorter College; **G. W. Ramsey,** Biology Dept., Lynchburg College; **J. L. Thomas,** Dept. of Biology, Univ. of Alabama; and **J. R. Watson, Jr.,** Dept. of Botany, Mississippi State University. The participants met for discussions and talks on problems dealing with systematic botany, and carried on their own research in the Herbarium during the 3-week Institute from June 23 to July 12.

The Rockefeller Foundation has recently allocated $165,000 for a three-year extension of a cooperative educational program in the medical sciences between several US medical schools, including the University of Tennessee, and the Universidad del Valle in Cali, Colombia. Dr. Richard R. Overman, Associate Dean of Medicine, serves as administrator of the University of Tennessee Medical Units' participation in the plan. The program has consisted of faculty members taking time out from duties in the US to spend time at Cali to assist Colombian educators in bringing more modern methods to the teaching of medical students. Present plans call for the establishment of the first true graduate school of medical scienees in South America.

The USPHS recently awarded a grant of $64,556 to the University of Tennessee medical units for the third and final year of a study aimed at more effective discovery and control of uterine cancer. The experiment is under the direction of Dr. Cyrus C. Erickson, Professor of Pathology, with Dr. Sidney Coleman and Mrs. Irma Rube of the Department of Pathology as coinvestigators. The survey is being conduеted in cooperation with City of Memphis Hospitals, The Shelby County Health Department, and the UT medical units' Obstetrics-Gyneeology. Under the mass-testing program initiated in 1952, the frequency of uterine cancer in Memphis has been reduced by 50 percent.

Chancellor Alexander Heard of Vanderbilt University has announced the construction of eight new buildings or additions in the areas of science and medieine. The construction of these faeilities costing in excess of $10 million will be financed through a NSF 'Center of Excellence' grant, the Health Scienees Advancement Award to Vanderbilt in 1967, loans, gifts from alumni, campaign funds, and other monies including the Ford Foundation grant. Included in the construetion plans are a new Science Library, buildings for Molecular Biology and Mathematics, five new floors for the Physics Building, completion of three shell floors in the Chemistry Building, and expansion of the off-campus Dyer Observatory. The buildings will feature flexible laboratory facilities, classrooms and faculty offices, a teaching observatory, and a greenhouse.

The Department of Biology has recently moved into a new building at Tennessee Technological University. The new building is completely air-conditioned and has some 60,000 square feet of laboratory, offiee, and classroom space. It houses programs in biology, agriculture, and fish and game management.

One of the largest private foundation grants in University of South Carolina history was recently announced as a vital step in establishing USC as a major center for coastal and oceanographic studies.

Announcement of a $131,450 award from the Belle W. Baruch Foundation was made by University of South Carolina President Thomas F. Jones and the Foundation's trustees.

The four-year grant will help "get the university into the ocean science business across the board" by establishing a new University of South Carolina Institute of Estuarine and Littoral Science, according to Dr. James A. Morris. He is vice president for advanced

studies and research and dean of the University of South Carolina graduate school.

The institute will spearhead research, sponsor high level seminars and colloquia, and encourage graduate instruction in coastal waterway and marine life studies.

Dr. Morris said a "scientist of unquestionable national renown" will be appointed to head the institute, which will focus on and expand the multiple marine studies already underway at the university.

The appointee will be officially designated as the Belle W. Baruch Distinguished Professor of Marine Ecology and will hold a faculty appointment in biology. He will be assisted by outstanding graduate students known as Belle W. Baruch Fellows. In addition, the institute will attract University of South Carolina faculty associates with special talents in related fields.

In this respect, its scope will be broad enough to include chemical engineers studying water conservation and pollution; geologists interested in mineral deposits, beach erosion and river sedimentation; biologists researching coastal plant and animal life; and law professors making headway in defining legal ownership and use of land off South Carolina's shoreline.

The institute will also encompass research into such areas of vital economic importance as sea farming and oyster and crab production, according to Dr. B. Theodore Cole, head of the biology department.

Estuaries, or inlets, and the littoral zone (from the high tide mark to a water depth at which light ceases) of South Carolina will be the primary research targets of the new USC Institute of Estuarine and Littoral Science.

The Belle W. Baruch Foundation plantation near Georgetown, S.C., which offers 17,000 acres of unspoiled forest land, ocean front, marshes, and other wild life preserves, is expected to be a center for much of the USC research.

Hobcaw House, the late Bernard M. Baruch's massive English manor where Winston Churchill, Franklin D. Roosevelt, and other international figures visited frequently, will be used as headquarters for colloquia and institutes. Adjacent laboratory facilities may also be developed there at the Foundation Research and Education Center.

Funding for the institute in marine studies brings the Belle W. Baruch Foundation's grants to the University of South Carolina to more than $300,000.00. The foundation was established in 1964 by the late Miss Baruch, daughter of Bernard M. Baruch, to promote "teaching and/or research in forestry, marine biology, and the care and propagation of wildlife and flora and fauna in South Carolina in connection with colleges and/or universities in the state of South Carolina."

To this end, the foundation earlier awarded a University of South Carolina research associate, Dr. George P. Spinner, a $100,000 grant to evaluate estuarine areas of the entire Atlantic coastline from Maine to Florida. The three-year project will determine what can be done to preserve these areas and increase their productivity.

Dr. Wade T. Batson of the University of South Carolina biology department is director of a $71,623 Baruch grant to develop a botanical inventory of the foundation's immense low-country plantation. The University of South Carolina is also cooperating with Albert H. H. Dorsey on a Belle W. Baruch Foundation grant to the S.C. State Department of Education. This grant, in the amount of $172,540 is for the development of a series of teachers' guides for the teaching of conservation in grades 1-12.

The latest Baruch Foundation grant and the new Institute of Estuarine and Littoral Science will also focus on the already strong marine orientation of the Department of Geology.

Dr. Donald J. Colquhoun is one of the leading authorities on the geology of the South Atlantic coastal plains and Dr. John R. Conolly has done major research into the marine geology of continental shelves, slopes, and abyssal plains. Dr. Conolly will join the University of South Carolina this fall. Dr. Bruce Nelson, former head of the department and now dean of the College of Arts and Science, is a specialist in estuarine sedimentation, clay minerology and geochemistry.

Two members of the University of South Carolina law school faculty, William A. Clineburg and John E. Krahmer, are studying the legal bases for ownership of tidal and submerged lands under the earlier foundation grant to Dr. Spinner.

Another law professor, C. H. Randall, is conducting an overall study of water laws in South Carolina for the State Water Resources Commission. Waters adjacent to the Belle W. Baruch Foundation plantation are also involved in a separate study of marine botany by Prof. William H. Queen of the biology department.

Practically the entire Department of Chemical Engineering is engaged in research on either water pollution or chemical properties of water. These include studies by department head B. L. Baker into removal of synthetic detergents from water and a study of purification of industrial waste by Dr. Milton W. Davis. Dr. J. H. Gibbons and Dr. F. Phillips Pike are directors of a research project on mixing of stratified layers as related to physical oceanography.

It is expected that the wide inter-disciplinary character of the Institute of Estuarine and Littoral Science will encompass all of these now separate projects.

Books and Periodicals

Your editors have considered the service which could be rendered by having a Book Review Section as a regular feature of the Bulletin. They cannot, however, perform such a service unaided. Persons who could provide prompt, succinct and critical reviews of new books in the biological scienees are invited to submit their names and areas of competence to the News Editor. Such response will be the basis of a final deeision on a Book Review Section.

New Botanical Publication

Botanical research articles of unusual length (50-150 ms. pages) will be considered for publication in Tulane Studies in Zoology and Botany (formerly Tulane Studies in Zoology). Shorter papers will also be considered. This journal is published by the Graduate School and has an average eireulation of 1000 copies. It is sent in exchange to university libraries and research centers throughout the world. Articles which are submitted will be promptly reviewed and edited. For further information write: Prof. G. E. Gunning (Editor) or Prof. A. L. Welden (Assoc. Editor), Dept. Biology, Tulane Univ., New Orleans, La., 70118.

THE MANUAL OF THE FLORA OF THE CAROLINAS. Albert E. Radford, Harry E. Ahles, and C. Ritchie Bell. The University of North Carolina Press, Chapel Hill, N.C. 27514. $15.95.

This is the first illustrated manual to cover the rich and varied flora of the Carolinas. Based on the recent collection of nearly 200,000 specimens, the book has been twelve years in the making and is expected to be a landmark in botanical publishing. It will be useful in each of the southeastern states, and was designed for botanists, students and teachers, foresters, wildlife and conservation researchers, county agents, libraries, and all those interested in the native and naturalized plants covered.

INSECTS AND PHYSIOLOGY. Edited by J. W. L. Beament and J. E. Treherne. American Elsevier Publishing Company. 378 pp. 1968. $25.00

This volume was prepared as a tribute to Sir Vincent Wigglesworth on his retirement from the Quick Chair of Biology and the Directorship of the Unit of Insect Physiology in the University of Cambridge.

The book consists of twenty-three chapters each by a different author and is divided into ten sections. The arrangement of subject matter is, generally speaking, the same as that used by Wigglesworth in his "Principles of Insect Physiology." The sections are: the integument; morphogenesis; neurosecretion; flight; the central nervous system; pharmacology; sensory physiology: behaviour; permeability; reproduction. These sections contain from five (morphogenesis) to one (flight, pharmacology and reproduction) chapters.

If the book were to be considered only as a tribute to VBW, there would be little more to be said. He is one of the most important biologists of this century and it is fitting and proper that he be honored. That twenty-three of his present and former associates were motivated to put this book together speaks eloquently of the regard in whieh they hold him. However, the reviewer must examine the work as a contribution to the literature of biology and in this regard, one can only conclude that, as with many compilations by different authors, it is a mixed blessing.

The publisher is to be commended on the high-quality printing and reproduction evident throughout. It is well printed and singularly free from minor errors. The quality of reproduction shows up particularly in the electron micrographs. In the articles by Smith and Slifer the elegant electron microscopy for which they are noted is well brought out in the plates.

Many of the artieles are likewise excellent. It is, perhaps, unfair to mention some of these in preference to others but one cannot pass by without noting that the style, which has become characteristic of Carroll M. Williams, adds much to the already interesting subject matter of his article on the brain hormone. Lawrence's diseussion of the epidermal cell as "a model of the embryo" is intriguing while Locke's article adds even more fuel for thought on these cells. Weis-Fogh gives a very succinct summary of the metabolic events occurring during flight. Various aspects of nervous and sensory physiology are treated well by Edwards, Treherne, Burtt and Miller.

The self-imposed restriction of having only insect physiologists associated with VBW write chapters, while entirely understandable, is probably the cause of the book's major faults. Many of the more biochemically oriented aspects of insect physiology which have been so fruitful in recent years are not included while in a number of cases the author for a particular topic is not the best available. In addition, the choice of subject by several of the authors who were selected appears unfortunate. This is particularly true in the case of "The physiology of the insect integument in the relation to the invasion of pathogens" by W. A. L. David and "Evolutionary aspects of metamorphosis" by A. N. Clements. Neither of these authors could contribute a single reference from his own work to the bibliography of his contribution.

When the high price of this book is considered along with some of its faults, this reviewer is almost forced to the conclusion that private tributes should be privately circulated. In spite of this, the book does contain much of value and anyone with a serious interest in the physiology of the insecta should at least delve into it.—Ernest Hodgson, North Carolina State University

The ASB Bulletin

Volumes 11-15
1964-1968

Published by
The Association of Southeastern Biologists, Inc.
C. W. Hart, Jr., Editor

Index to Volumes 11-15, 1964-1968

This is the third of a series of five-year indices planned for the *ASB Bulletin*. The author index includes authors of abstracts and articles, but the subject index does not include abstract titles. Those who plan to bind the *Bulletin* should note that this index and title page can be removed and bound with Volume 15 without disturbing the sequence of pages in this issue.

Subject Index

Departments

Directories

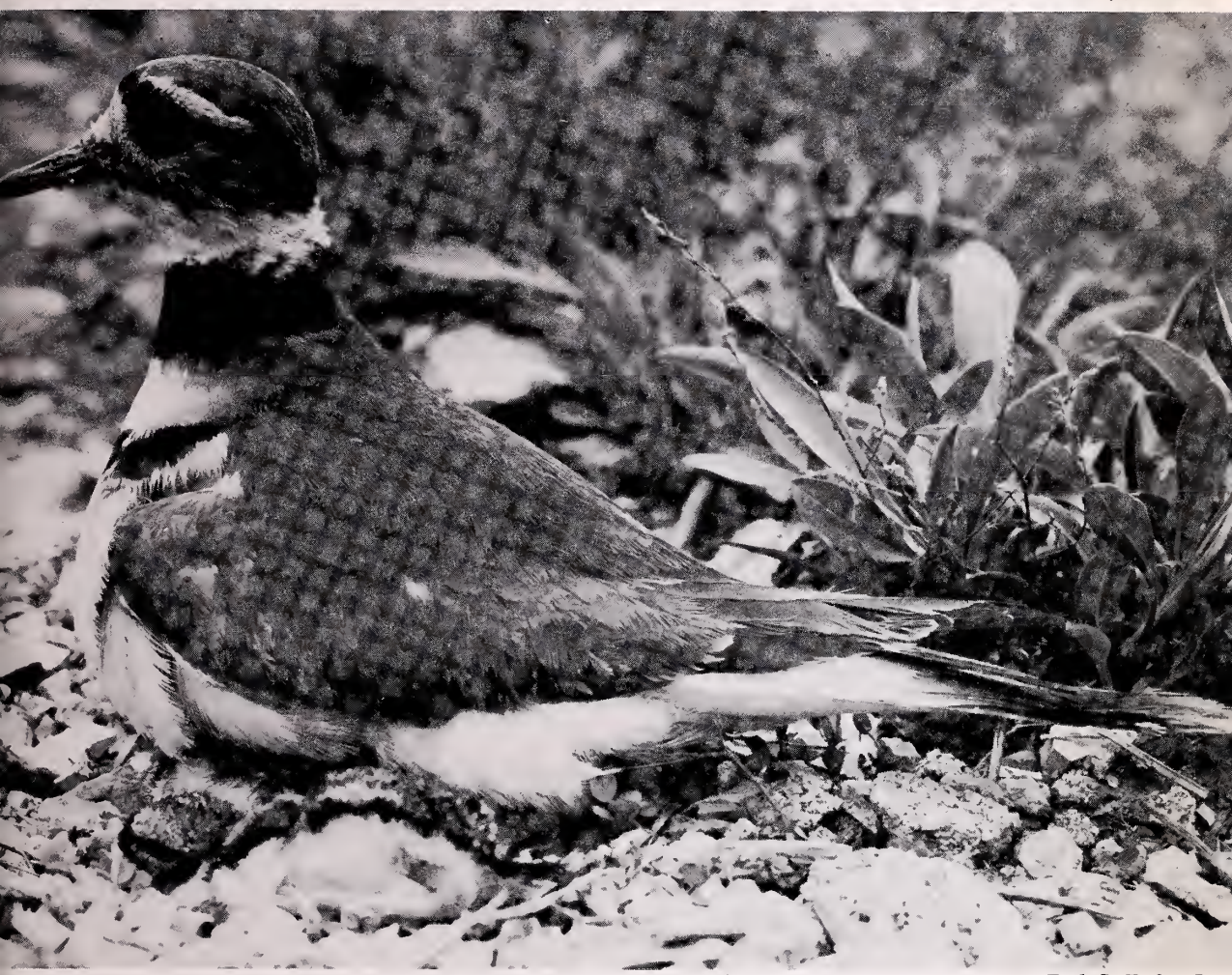
Meetings: ASB

Obituaries

Author Index

The ASB BULLETIN

Volume 16, Number 1 January, 1969



Killdeer, *Charadrius vociferus* Fred G. Taylor, Jr.

The Official Quarterly Publication of The Association of Southeastern Biologists

ASB BULLETIN

The ASB BULLETIN is the official quarterly publication of the Association of Southeastern Biologists, Inc., and is published at Philadelphia, Penna., in January, April, July and October. Letters, news items, other contributions, and all communications about editorial matters should be addressed to C. W. Hart, Jr., Editor, The Academy of Natural Sciences of Philadelphia, 19th and The Parkway, Philadelphia, Pa. 19103. Change of address should be sent promptly to the Secretary of the ASB, Dr. Dorothy L. Crandall, Randolph Macon Woman's College, Lynchburg, Virginia. Subscription orders from libraries and other institutions should be sent to the Business Manager, Dr. David J. Cotter, Georgia College, Milledgeville, Georgia 31061. Subscription rate for non-members of the ASB: $4.00 per year. Printing and typography by the Fulton Press, Inc., Lancaster, Pa.

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CONTENTS

About the Memphis Meeting

The Association of Southeastern Biologists will hold its 30th annual meeting April 17-19, 1969, at Memphis State University, Memphis, Tennessee. Registration and most of the other activities will be in the University Center. The program Thursday evening will begin at 7:30 in the Ballroom of the University Center. The General Session will be followed by a smoker in the main lounge and adjacent lounges in the Center. Exhibits will be on display on the 3rd floor lounge. Paper sessions and the annual business meeting will be held Friday. The Friday evening banquet and presentation of awards will be held in the Ballroom of the University Center. The retiring President's address will follow the banquet.

Registration

University Center, 3rd Floor
4:00 P.M. to 7:15 P.M., Thursday
8:00 A.M. to 11:00 P.M., Friday
Fee — $2.00

Exhibits

University Center, 3rd Floor Lounge
2:00 P.M. to 11:00 P.M., Thursday
8:00 A.M. to 5:00 P.M., Friday
8:00 A.M. to 11:00 A.M., Saturday

Paper Sessions

University Center, Ballroom and meeting rooms, Friday.

Other scheduled events

7:00 A.M. (Friday) Breakfast and Business Meetings: Southern Appalachian Botanical Club and Southeastern Section Botanical Society of America: Highland Towers.

GENERAL INFORMATION

Few cities are so advantageously located as Memphis. Beyond that, Memphis counts all four modes of transportation—river, rail, motor and air. These are the lifelines that link Memphis with big and growing markets throughout the Southeast and Southwest, and the Midwest. Memphis, the largest city in Tennessee, is located on the edge of the Mississippi River. Spring and fall are the most beautiful seasons, with mild weather and a great display of floral colors. Along with industry, education is called the biggest "business" in Memphis and Shelby County. Memphis State University is the second largest state university with an enrollment excess of 16,500. The university has over 40 buildings on its main 125-acre campus in residential East Memphis. Another 146-acres are being developed close to the main campus along with 623-acres which will serve as a conference center and a biological field station. Other educational and research facilities located in Memphis include Southwestern; Christian Brothers College; University of Tennessee Medical Units; St. Jude Research Hospital and many other commercial research laboratories. Memphis is the leading cultural center of a seven state Mid-South area. Points of interest are the Brooks Memorial Art Gallery, Memphis Museum, Front Street Theater, Memphis Opera Theater, Memphis Symphony Orchestra, Arts Center Inc., Memphis Art Academy and many others. Information concerning these and other attractions may be obtained at the Registration Desk.

Travel to Memphis

Suggested automobile routes to Memphis are as follows:

From the Northeast Interstate 40
From the Southeast Highway US 72 or US 78
From the South Interstate 55

Greyhound and Continental Trailways Bus lines serve Memphis. All the major airlines such as American, Delta, Allegheny, Braniff, Eastern, Piedmont, Southern, and others serve Memphis. The air terminal is within a few minutes drive of the campus. Limousine service is available to downtown Memphis only.

Parking

Parking facilities are available in the parking lot adjacent to the Highland Towers. This facility is two blocks from the main campus. Parking on the campus will be difficult if not impossible.

Dining Facilities

Breakfast and Lunch will be served in the Highland Towers. Members of the association and their guests will find it convenient to use the main cafeteria in the University Center. This facility, however, is usually crowded between 11:30 and 12:30. Several fine restaurants are located within 1½ miles of the campus. They are as follows:

Embers	Roaring Seventies
Villa	Knickerbocker
Pete and Sam's	Britling's Cafeteria
Lua	Morrison's Cafeteria

Field Trips

At the present, pending expression of interest, the following field trips are planned:

1. A Saturday morning field trip is being planned in Ornithology by Robert W. McGowan, Biology Department. This group will visit the Chickasaw Bluff areas and the alluvium of the Mississippi River, both areas in the Meeman-Shelby Forest State Park, located about 25 miles north of Memphis. Also, time permitting, the group may visit the Memphis State University Meeman Biological Field Station, which is being developed in an area adjacent to the state park.

Participants should indicate their interest in this field trip at the time of registration. Additional information will be made available during the meeting. If interested, bring binoculars and field clothes.

2. A botanical field trip is being planned to the Chickasaw Bluffs along the Mississippi River northwest of Memphis. This will include a short tour of the facilities and adjacent grounds of the recently-established Meeman Biological Field Station. Inasmuch as this 623-acre tract is a nature preserve, botanieal collecting will not be permitted, but following the tour of the Field Station, participants will be taken to the nearby 12,000-acre Meeman-Shelby Forest State Park, where by arrangement with the management, collecting may be done. A very rich vascular flora is to be found on the Chickasaw Bluffs including *Cladrastis lutea,* yellowwood, *Gymnocladus dioica,* Kentucky coffee-tree and *Magnolia acuminata,* cucumber magnolia, all quite restricted in range in west Tennessee. Participants should indicate their interest in this field trip at the time of registration.

It is anticipated that this trip will begin at 8 a.m., Saturday, April 19 at Memphis State University. Return will be not later than 4 p.m. Eating facilities are available for lunch in the state park.

3. Plans are being made for a Saturday morning field trip to Chucalissa Indian Village. This archaeological research and training site is operated by Memphis State University. Adjoining land is used as a biological field station. Exhibits at the Chucalissa Museum are open to the public. This prehistoric village is located in Southwest Shelby County about 13 miles from the main campus. Participants should indicate their interest at the Registration Desk.

Placement Service

A registry of employers and potential employees will be available. For those who wish, interview schedules will be arranged. The employment opportunity bulletin board service will also be established.

Accommodations

University Accommodations — Highland Towers, a modern, air-conditioned facility located two blocks from the main campus and minutes from fine shopping areas in Memphis. Brochures containing information on these accommodations were sent out in December. There are ample parking spaces adjacent to the Towers. Public ac-

commodations — Listed below are motels and hotels which are available and may be located on the cover map of the ASB Bulletin. (*) are motels which are only a few minutes drive from the campus.

1. Admiral Benbow Inn, Airport
   2201 Winchester Rd.
2. Admiral Benbow Inn, East *
   4720 Summer Ave.
3. Admiral Benbow Inn, Midtown
   1220 Union Ave.
4. Albert Pick Motor Inn
   300 North Second St.
5. Chisca Plaza Motor Hotel
   272 S. Main St.
6. Claridge Hotel
   109 N. Main St.
7. Downtowner Motor Inn
   160 Union Ave.
8. Holiday Inn, Brooks Rd.
   1441 E. Brooks Rd.
9. Holiday Inn, Central *
   1837 Union Ave.
10. Holiday Inn, Downtown
    22 N. Third St.
11. Holiday Inn, East *
    4941 Summer Ave.
12. Holiday Inn, Jr. *
    3020 Lamar Ave.
13. Holiday Inn, Medical Center
    969 Madison Ave.
14. Holiday Inn, Midtown
    1262 Union Ave.
15. Holiday Inn, North
    4022 Thomas St.
16. Holiday Inn, Poplar-East *
    5679 Poplar Ave.
17. Holiday Inn, Rivermont
    200 W. Georgia
18. Holiday Inn, Riverbluff
    340 W. Illinois Ave.
19. Holiday Inn, South
    2300 S. Bellevue Blvd.
20. Holiday Inn, Southeast *
    3728 Lamar Ave.
21. Holiday Inn, Southwest
    980 So. Third St.
22. Holiday Inn, West Memphis
    Interstate 210 Hwy. 40
23. Holiday Towers
    383 Madison Avenue
24. Howard Johnson's, Midtown *
    1318 Lamar Ave.
25. Howard Johnson's, South
    3280 Highway 51 S.
26. King Cotton Hotel
    69 Jefferson Ave.
27. Linden Lodge Motel
    176 Linden Ave.
28. Quality Courts Motel
    271 W. Alston
29. Ramada Inn, East *
    5225 Summer Ave.
30. Ramade Inn, South
    3265 Highway 51 S.
31. Ramada Inn, West Memphis
    1100 N. Ingram Blvd.
32. Sheraton Motor Inn
    889 Union Ave.
33. Sheraton-Peabody Hotel
    149 Union Ave.
34. Travelodge, Crump Blvd.
    180 E. H. Crump Blvd.
35. Travelodge, Downtown
    265 Union Ave.
36. William Len Hotel
    110 Monroe Ave.

To accommodate as many people as possible, private rooms and private baths are not available in Highland Towers. Inquiries should be made to: Central Towers — Highland Towers, 3599 Central Ave., Memphis, Tennessee 38111.

Local Arrangements Committee

Co-Chairmen	C. D. Brown V. E. Feisal
Housing and Family Activity	G. W. Tate, Jr.
Banquet, Food Service	G. W. Tate, Jr.
Smoker, Exhibits	P. R. Simonton H. R. Bancroft D. B. Folden
Field Trips	R. W. McGowan E. T. Browne B. A. Simco
Meeting Rooms, Audio-Visual	O. E. Smith
Finance	A. E. Perry
Registration	Priscilla S. Rushton Martha A. Powell Diane O. Fleming
Placement	M. H. Harvey
Program	J. T. Darlington E. T. Browne C. O. Warren
Transportation	A. E. Perry

Books and Periodicals

PROTIDES OF THE BIOLOGICAL FLUIDS — PROCEEDINGS OF THE FIFTEENTH COLLOQUIUM, BRUGES, 1967. Edited by H. Peeters. Elsevier Publishing Company, Amsterdam, London, New York. 626 pp. 1968. $34.50.

There are four major areas included of particular interest and use to the cellular biologist. The first is the *Academic Lecture,* "The Functions of Plasma Proteins" delivered by Dr. Tristram Freeman (London) in which he summarized present knowledge and postulated some interesting ideas. Some of the suggested research problems involve transferrin, haptoglobin, and fibrinogen. The proposal may have more intricacies than intended by the author in that the nature and cause of some illnesses will be understood when the function and metabolism of about two dozen plasma proteins are known.

The second part of the book concerns the cellular membranes. Most of this deals with various aspects of cytoplasmic membranes. A section on the molecular structure and function of protein in mitochondrial membranes is particularly outstanding.

The third area involves complement activity of components and inactivators. The primary contribution is the conclusion that more research is necessary before the actions of complement components involved with homograft and heterograft rejection, or membrane lesions, are understood. Much of the discussion concerns nomenclature and techniques for the separation of complement components.

The fourth area is devoted to separation methods. These methods deal with free electrophoresis, ion exchange celluloses and polyacrylamide gel electrophoresis and filtration.

This work includes discussions and papers concerning permeability, transport, membranes, and techniques associated with their study. The price may seem high until the binding, quality of the paper, and printing are examined. An appropriate adjective for this book is, *superb.* — JOHN F. DIMMICK, *Wake Forest University.*

AN ATLAS OF BIOLOGICAL ULTRASTRUCTURE. John D. Dodge. American Elsevier Publishing Co. New York. 80 pp. 1968. $10.50.

This book is a selection of beautifully made and printed electronmicrographs. They are aimed at providing the student with a good selection of micrographs for study to supplement the few usually found in current textbooks. The text is chiefly limited to a description of the subject of each photograph.

Arrangement of the book is in four sections: 1. The Cell and Its Organelles; 2. Animal Cells and Tissues; 3. Plant Cells and Tissues; and 4. Bacteria and Viruses. These sections are composed of 30, 63, 71 and 17 electronmicrographs, respectively. Each of the 181 photographs is excellent, clear, well-labeled, and furnished with an adequate but concise description.

A 3-page well-illustrated Appendix deals concisely but clearly with A. The Electron Microscope; B. Preparation of Material for Electron Microscopy; and C. Resolution and Magnification of the Electron Microscope. References are listed to key general works in the field, to electron microscope techniques, and to journals dealing with ultrastructure, in addition to specialized references in connection with the topics of each of the four main sections.

The work should be extremely helpful to the student, and perhaps especially the early student, of cell ultrastructure. — WALTER S. FLORY, *Wake Forest University.*

BARLEY VARIETIES — EBC. G. Aufhammer, P. Bergal, A. Hagberg, F. R. Horne and H. Van Veldhuizen. American Elsevier Publishing Co., New York. 156 pp. 1968. $16.50.

Barley varieties are frequently interchanged between countries. This book, prepared under auspices of the European Brewery Convention (EBC), provides authoritative information useful, and needed, when varieties are exchanged. This is based on wide experimental testing, involving 15 European countries. All text, including descriptions, is given in each of three languages, English, French and German.

Opening sections deal with grain characters used in identifying varieties, and with the reaction of barley varieties to DDT. Open and closed flowering is also discussed.

A list of some 230 barley varieties, with pedigrees, is alphabetically arranged. This is followed by pedigree charts for Dutch, British and Irish, French, Scandinavian and German barley varieties, respectively.

The greater part of the book is directed to the detailed descriptions of 38 varieties in use in the international or national trade. All are spring barley varieties except the winter variety Prima. Varieties of malting barley are included in the descriptions when they have successfully completed three years in the EBC Barley Committee trials or when acreage in one or more of the member countries of the EBC has risen to 5% or more.

Each varietal description is accompanied by a full page of photographs showing the entire ear, or head, together with enlarged views of the grain from two different angles. Descriptions furnish information for each variety regarding origin, ear and grain characters, vegetative and agronomic characters, susceptibility to each of five diseases (*Erysiphe graminis; Puccinia glumarum; Puccinia hordei; Rhynchosporium;* and *Ustilago nuda*) and grain quality.

This book will be essential for anyone dealing with the genetics, breeding, or brewing of barley. It will be useful as a general agronomic reference book on barley, and also will find a welcome place on the reference shelf of many economic botanists. — WALTER S. FLORY, *Wake Forest University.*

MARINE MOLLUSK JOURNAL REPRINTED

Volume 1 of *Johnsonia,* a monographic series on the mollusks of the Western Atlantic, published at Harvard University from 1941-45, has been out-of-print for ten years. It is now available in a facsimile reprint for $15.00, less than the cost for the original. The important families covered by Drs. Clench, Abbott, Turner and Bequaert include the Conidae, Muricidae, Strombidae, Littorinidae, etc. Obtainable from Dr. W. J. Clench, Museum of Comparative Zoology, Cambridge, Mass. 02138, or W. and R. McCauley, 1919 Sandy Hill Road, Apt. C-12, Norristown, Pa. 19401.

News of Biology in the Southeast

STATE CORRESPONDENTS

Alabama — Position Vacant
Florida — John D. McCrone, University of Florida
Georgia — Fred K. Parrish, Georgia State College
Louisiana — Harry J. Bennett, Louisiana State University
Mississippi — Joseph Fitzpatrick, Mississippi State University
North Carolina — C. J. Umphlett, University of North Carolina
South Carolina — J. M. Herr, Univ. of South Carolina; G. Thomas Riggin, Jr., Newberry College
Tennessee — Donald Caplenor, George Peabody College
Virginia — Harry L. Holloway, Jr., Roanoke College
West Virginia — Earl L. Core, West Virginia University

Joseph F. Fitzpatrick, Jr. — Editor
Dept. of Zoology
Mississippi State Univ.
State College, Mississippi 39762

NOTICE — The "News Section" of the **Bulletin** is only as good as you make it. Forward items of interest to the News Editor, or if you are too busy, inform your Public Relations Office of this Service; they probably would be happy to send items of information.

About People

Anthony J. F. Griffiths has joined the Fungal Genetics Group, Oak Ridge National Laboratories, Oak Ridge, Tennessee, as a USPHS Postdoctoral Fellow.

Ralph A. Zingaro has joined the Enzymology Group, ORNL, as a USPHS Postdoctoral Fellow.

Daniel H. Odell, a Research Participant with the Plant Physiology and Photosynthesis Group, ORNL, has returned to his position of Professor of Biology, East Tennessee State University, Johnson City.

Richard Cowan, Director, U. S. National Museum, Washington, D. C., received the Henry Allan Gleason Award of the New York Botanical Garden at the 1968 meeting of the Botanical Society of America in recognition of his work on the genus Swartzia.

Charles N. Boehms, formerly Associate Professor of Biology, Austin Peay University, Clarksville, Tennessee, has been named Dean of Students at that institution.

Staff members of the Department of Biology, Austin Peay State University, Clarksville, Tennessee, currently on leave are **David Snyder** (to University of Notre Dame) and **Ben Stone** (to University of Tennessee).

John M. Boyle, a graduate of the University of Sussex, Falmer, Brighton, England, has joined the staff of the Biophysics Group, ORNL, as an SRC/NATO Postdoctoral Fellow.

Richard P. Quinn has joined the staff of the Immunology Group, ORNL, as a USPHS Postdoctoral Fellow. Dr. Quinn is a graduate of Oregon State University.

Robert M. Smillie has joined the Microbial Photosynthesis Group, ORNL, as a Consultant. Dr. Smillie received his degree from Queens University, Kingston, Canada.

Frank P. Conte, a graduate of the University of California, Berkeley, has joined the Enzymology Group, ORNL, as a USPHS Senior Postdoctoral Fellow.

Gary L. Whitson resigned from the Cytology and Genetics Group, ORNL, to accept a position with the Department of Zoology, University of Tennessee, Knoxville.

Alexander Hollaender, Biology Division, ORNL, spent two weeks in Europe in late October to attend the International Atomic Energy Agency panel meeting in Vienna, Austria, and to confer with English and French Scientists.

Gerald J. Stine, a Postdoetoral Investigator with the Microbial Genetics Group, ORNL, has aecepted a position with the Department of Biology, University of Tennessee, Knoxville.

Yukinobu Nishimara, a graduate of Osaka University, Osaka, Japan, has joined the Molecular Biophysics Group, ORNL, as a Postdoctoral Fellow.

About Institutions

On December 18-20, 1968, an international conference on Physical Principles of Biological Membranes was held at the Center for Theoretical Studies of the University of Miami, Coral Gables, Florida. Among the participants were Maurice Wilkins, Nobel Laureate, London University, England; Britton Chance, University of Pennsylvania; George Eisenman, University of Chicago; Francis O. Schmitt, Massachusetts Institute of Technology; and R. Schlögl, Max-Planck-Institute for Biophysics.

The national headquarters for the Organization for Tropical Studies has been established at the University of Miami, Coral Gables, Florida. Executive director will be Jack T. Speneer, formerly program director of the Faeilities and Special Programs, Biological and Medical Sciences Division of NSF. Dr. Spencer will will hold an appointment as senior rescareh scientist at the University of Miami.

A new program of graduate training and research in ecology has recently been launehed at The University of Tennessee. Titled the Graduate Program in Ecology, it is an interdisciplinary organization involving staff from six departments in two colleges of the University and from the Oak Ridge National Laboratory. This will enable students to major in ecology and earn the degrees of Master of Science and Doctor of Philosophy in this field. Persons interested should write to the Director, Graduate Program in Ecology, 501 Hesler Biology Building, University of Tennessee, Knoxville, Tennessee 37916.

Conus geographus

DIRECTORY OF ASB MEMBERS

The following directory is, to the best of our knowledge, correct as of 1 December 1968. Because some mistakes invariably find their way into listings such as this, the Editor would greatly appreciate it if members who note omissions and mistakes would call them to his attention.

A

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The ASB BULLETIN

Volume 16, Number 2 April 1969

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ASB BULLETIN

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Volume 16, Number 2 - April, 1969

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ASSOCIATION AFFAIRS

The Nominating Committee has selected the following slate of nominees for the various ASB offices that will be vacated this year. Voting will take place at the Business Meeting of the ASB, which will be held at 11:45 A.M., Friday, April 18, in the ballroom of University Center. Short biographical sketches of the nominees are given on page 76.

President Elect

B. Theodore Cole — C. Willard Hart, Jr.

Vice-President

Burton J. Bogitsh — James N. Dent

Executive Committee

Perry C. Holt — J. H. Mullahy
W. J. Koch — Charles Ray, Jr.

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Program of the 30th Annual Meeting of the Association of Southeastern Biologists

Memphis State University, Memphis, Tennessee

A joint meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, Southeastern Division of the American Society of Ichthyologists and Herpetologists, and the Southeastern Region of Beta Beta Beta National Honorary Biological Society.

THURSDAY, APRIL 17

8:00- 5:00 **Department of Biology Open to Visitors:** Information and directions may be obtained at the registration desk or Room 103, Ellington Biological Sciences Building.

1:30 **Executive Committee Meeting, Association of Southeastern Biologists:** Room 303A, University Center.

2:00-11:00 P.M. **Exhibits:** Third Floor Lounge, University Center.

4:00- 7:15 and after Gen. Session **A.S.B. Registration.** Third Floor Lobby, University Center.

until 10:00 **Placement Service Registration:** 303K University Center.

7:30 **A.S.B. General Session:** Ballroom, University Center.
Address of Welcome: Dr. C. C. Humphreys, President, Memphis State University.
Response: Dr. Robert B. Short, President, The Association of Southeastern Biologists.
Smoker: Third Floor Lobby and Lounge.

FRIDAY, APRIL 18

7:00 **Joint Breakfast and Business Meeting for Southeastern Section, Botanical Society of America and Southern Appalachian Botanical Club:** University Center.

8:00- 5:00 **Department of Biology Open to Visitors.**

8:00-11:45 A.M. **A.S.B. Registration:** Third Floor Lobby, University Center.

8:00-10:00 **Placement Service Registration:** Room 303K, University Center.

8:00- 5:00 **Exhibits:** Third Floor Lounge, University Center.

8:00- 9:00 A.M. **Beta Beta Beta Registration:** Main Lobby, Ellington Biological Sciences Building.

9:00 A.M. **ASB Past Presidents Meeting:** Place to be announced.

9:00-11:45 A.M. **Beta Beta Beta Paper Sessions:**
Eastern Division — Room 105, Ellington Biological Sciences Building.
Western Division — Room 131, Ellington Biological Sciences Building.

8:30-11:30 **Paper Sessions:**
Plant Autecology — Room 303B, University Center.
Plant Ecology — Room 303C, University Center.
Plant Systematics, Floristics and Morphology — Room 303D, University Center.
Cryptogamic Botany — Room 303E, University Center.
Cytology — Room 303F, University Center.
Animal Physiology and Experimental Zoology — Room 303G, University Center.
Invertebrate Zoology — Room 303H, University Center.
Ichthyology & Herpetology — Ellington Biological Sc. Bldg., Auditorium.

11:15 **Business Meeting, Southeastern Association of Parasitologists:** Room 303J, University Center.

11:15 **Business Meeting, Southeastern Division of American Society of Ichthyologists & Herpetologists.** Auditorium, Ellington Biological Sciences Building.

11:45 **Business Meeting, Association of Southeastern Biologists:** Ballroom, University Center.

1:00- 2:00 **Beta Beta Beta General Meeting:** Room 131, Ellington Biological Sciences Building.

2:00- 5:30 **Paper Sessions:**
Ichthyology & Herpetology — Ellington Biological Sciences Building, Auditorium.
Animal Ecology — Room 303B, University Center.
Plant Ecology — Room 303C, University Center.
Plant Systematics, Floristics, and Morphology — Room 303D, University Center.
Experimental Botany — Room 303E, University Center.
Genetics — Room 303F, University Center.

Animal Physiology & Experimental Zoology — Room 303G, University Center.
Parasitology and Histology — Room 303H, University Center.

7:00 P.M. A.S.B. Banquet and Presentation of Awards: Ballroom, University Center.

Association Research Prize. Sponsored by Carolina Biological Supply Company.
Meritorius Teaching Award. Sponsored by Will, Scientific, Inc., Georgia.
Past President's Address: Harold J. Humm — *Marine Algae in Our Present and Future.*

SATURDAY, APRIL 19

8:00 A.M. **Field Trips:** Details at registration desk. Please sign up during registration.

1. Botany trip to Meeman Biological Field Station and Meeman-Shelby Forest. Led by Dr. Edward T. Browne, Jr.
2. Ornithology trip to Meeman Biological Field Station. Led by Mr. R. W. McGowan.

8:00-12:00 **Department of Biology Open to Visitors:** Information at registration desk.

8:00-11:00 **Exhibits:** Third Floor Lounge, University Center.

8:30 A.M. **Executive Committee Meeting, Association of Southeastern Biologists:** Room 303A University Center.

SCHEDULE OF PAPER SESSIONS

FRIDAY MORNING — APRIL 18

PLANT AUTECOLOGY

Room 303 B, University Center

Presiding: Dr. George S. Ramseur, University of the South

8:30 1. Sharpley, J. Miles and D. G. Kessel (Virginia Commonwealth University and Sharpley Laboratories, Inc.). Accumulation of Metals by Fungi II. Zinc, Iron and Yttrium Group.

8:43 2. Miller, Mercer D. and Joe A. Edmisten (University of Georgia). Nitrogen Fixing Ability of *Ceanothus americanus.*

8:56 3. Baskin, Jerry M. (University of Kentucky). Amino Acids and Amides in Diffusate of *Psoralea subacaulis* Seeds.

9:09 4. Baskin, Carol C. and Jerry M. Baskin (University of Kentucky). Germination Requirements of *Cyperus inflexus.*

9:22 5. Boulware, Margaret A. and Joe A. Edmisten (University of Georgia). Capability of Nitrogen Fixation by the Coralloid Roots of *Zamia floridana.*

9:35 6. Hunnicutt, Kermit and Joe A. Edmisten (University of Georgia). Nitrogen Fixation in *Elaeagnus umbellata.*

9:48 7. Herford, J. Robert and Joe A. Edmisten (University of Georgia). Preliminary Studies of Nitrogen Fixation on a Granite Outcrop.

10:01 8. Hess, Lloyd W. (Savannah River Ecology Laboratory) and David B. Dunn (University of Missouri). The Use of Neutron Activation Analysis in a Phylogenetic Study of Seed Mineral Content.

10:14 9. Burbanck, Madeline P. (Emory University). Loblolly Pine (*Pinus taeda* L.) as an Invader of Granite Outcrop Island Communities.

10:27 10. Cooper, Arthur W. (North Carolina State University). Net Primary Productivity of Young Big Tooth Aspen (*Populus grandidentata*) stands in Cheboygan County, Michigan.

10:40 11. Gibbon, Edward L. (North Carolina State University). The Ecological and Taxonomic Distinctness of *Carya carolinae-septentrionalis* and *Carya ovata* in the Southeast.

10:53. 12. McDonald, James C. (Wake Forest University). An Unusual Habitat for *Stemonitis splendens* (Myxomycetes).

PLANT ECOLOGY

Room 303 C, University Center

Presiding: Dr. William A. Thomas, Oak Ridge National Laboratory

8:30 13. KELLY, JEROME (University of Miami) AND MORRIS F. CRANMER (Pesticide Research Laboratory, USPHS, Perrine, Florida). Pesticide Flow Through a Model Freshwater Ecosystem.

8:43 14. KELLY, JEROME, PETER RHOADS, DOUGLAS SCHNEIDER, AND RICHARD SMITH (University of Miami). Pesticide Residues in a South Floridian Agricultural District Canal.

8:56 15. RHOADS, PETER B. (University of Miami). Aspects of Phytoplankton Primary Production in a Shallow, South Florida Lake.

9:09 16. RHOADS, PETER, PATRICK COLIN, JOHN BEERS, AND HOWARD TEAS (University of Miami), Aerial Photoecology of South Florida Patch Reefs.

9:22 17. DANIEL, CHARLES (Georgia College). Old Field Succession Six Years After Significant Gamma-Neutron Radiation Exposure.

9:35 18. NICHOLSON, STUART A., CARL D. MONK, AND GEORGE I. CHILD (University of Georgia). The Measurement of Vascular Plant Species Diversity in an Oak-hickory Community in the Piedmont of Georgia.

9:48 19. STROUD, LINDA M. AND ARTHUR W. COOPER (North Carolina State University). Net Primary Productivity of a Regularly-flooded North Carolina Salt Marsh.

10:01 20. PATTON, E. GIBBS (Wofford College). Location and Association of Shrubs in a Forest Community: a Statistical Analysis.

10:14 21. WRIGHT, V. K. (Emory University). Competition on Granite Outcrops between Two Species of *Talinum*.

10:27 22. SMITH, RICHARD C. (University of Miami). Effect of a Heated-Water Discharge on the Distribution of Benthos in a Portion of Biscayne Bay, Florida.

10:40 22a. FOSTER, W. A. (N.C. State Univ.) An Example of the Use of Color Infrared Aerial Photography for Salt Marsh Gradient Analysis.

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9:09 26. DICKISON, WILLIAM C. (Virginia Polytechnic Institute). Phylogenetic and Systematic Significance of Leaf Vascularization in Dilleniaceae (Angiospermae: Dictyledoneae).

9:22 27. WATSON, J. RAY (Mississippi State University). The Arborescent Flora of Mississippi.

9:35 28. REYNOLDS, JOHN D. (Virginia Commonwealth University) AND SAM B. JONES, JR., (University of Georgia). Microsporogenesis in *Vernonia angustifolia* Michx. (Compositae).

9:48 29. ELLIS, TIM T. AND VARLEY E. WEIDEMAN, (University of Louisville). Description and Breaking of Dormancy in Corms of Jack-in-the-Pulpit (*Arisaema* Spp.).

10:01 30. BELL, RITCHIE C. (University of North Carolina). Variation and Selection Pressure in *Aquilegia caerulea* James (Ranunculaceae).

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10:27 32. ROGERS, HOLLIS J. AND RALPH M. MORRISON (University of North Carolina at Greensboro). White Flowering Partridge Pea in North Carolina.

10:40 33. LELONG, MICHEL G. (University of South Alabama), A Floristic Study in Mobile, Alabama.

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8:43 35. HALE, MASON E. (Smithsonian Institution). Single Lobe Growth Patterns in *Parmelia caperata* (Lichens).

8:56 36. SIMS, ASA C. (Southern University in New Orleans). Toxins of Single Spore Isolates of *Pellicularia filamentosa*.

9:09 37. AKERS, STUART W. AND CHARLES E. ANDERSON (North Carolina State University). The Effect of Fluoride on *Chlamydomonas reinhardtii*.

9:22 38. THOMAS, DEMPSEY L. (Louisiana State University in New Orleans). Serological Relationship of *Protosiphon* to Selected Chlorophycean and Xanthophycean Algae.

9:35 39. HOUSTON, M. R., I. MCVEIGH, R. NEAL AND W. N. PEARSON (Vanderbilt University). Biosynthesis of Thiamine by *Phycomyces blakesleeanus*.

9:48 40. Drake, Bobby F. and Victor E. Feisal (Memphis State University). Threonine Deaminase Feedback Inhibition in A Pseudomonad Species.

10:01 41. Manigault, Walter Wm., Lafayette Frederick and Thomas W. Cole, Jr. (Atlanta University). A Study of Aflatoxin Production by Isolates of *Aspergillus flavus*.

10:14 42. Koch, William J. (University of North Carolina at Chapel Hill). Further Aspects of Flagellar Retraction in Fungi.

10:27 43. Wolf, E. T., and S. K. Hasija (Vanderbilt University). A New Species of *Cintractia* on *Fuirena* (Cyperaceae).

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9:09 48. Rao, R. D. (North Carolina State University). Ultrastructure of *Spirodela Polyrhiza* (L.) Schleiden. II. Chloroplast Development During Turion Germination.

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9:35 50. Dawes, Clinton J. (University of South Florida). An Ultrastructural Study of the Colorless Green Alga, *Saprochaete saccharophila* Coker and Shanor (Chlorophyceae, Chaetophorales, Saprochaetaceae).

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10:01 52. Floyd, Joseph C. and Felix H. Lauter (University of South Carolina). A Morphological and Cytochemical Study of *Tritrichomonas augusta* (Alexeieff) 1911.

10:14 53. Lundquist, Leonard E. and Felix H. Lauter (University of South Carolina) and William G. Dougerty and Mary M. Lee (Medical College of South Carolina). Ultrastructural Studies From a Free Living Juvenile Form of *Rhabdias ranae*, Walton 1929.

10:27 54. Palisano, John R. and Patricia L. Walne (University of Tennessee, Knoxville). Ultrastructural Aspects of Senescence in *Euglena granulata* with Special Reference to the Eyespot (Euglenophyceae, Euglenales).

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10:53 56. Walne, Patricia L. and Carole A. Lembi (University of Tennessee, Knoxville). Ultrastructural and Time-lapse Studies of *Trachelomonas, Lepocinclis*, and *Euglena* (Euglenophyceae, Euglenales) with Special Reference to Eyespots.

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Presiding: Dr. W. W. Gibson, LeMoyne College

8:30 57. Lumb, Roger H. (Western Carolina University). Glyceryl Ether Content of Five Species of Insects.

8:43 58. Samuels, Keith T., Jr. and R. W. Hull (Florida State University). The Role of Sterols in Photodynamic Response.

8:56 59. Willard, William K. (Clemson University). Radiosensitivity and Regulation of Population Density in the Yellow Fever Mosquito (*Aedes aegypti*).

9:09 60. Fleming, Diane Oakerson (Memphis State University). *In vitro* Experimental Effects of Radiocobalt 60 on Rabbit Polymorphonuclear Leucocytes.

9:22 61. Stokes, Bettye R. (Atlanta University) and Clyde E. Johnson, Jr. (Clark College). The Effects of Nitrate and Chloride Ions on Motility, Glucose and Oxygen Utilization in Rabbit Spermatozoa.

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10:14 65. Nelson, F. Kirk (Memphis State University). Changes in Rat Serum Protein Patterns under Combinations of Fasting and Electric Shock.

10:27 66. Sims, Michael H., Deason C. Dunagan, and George W. Tate, Jr. (Memphis State University). An Assay for FSH in the Golden Hamster.

10:40 67. Farmer, Mattie D. and George W. Tate, Jr. (Memphis State University). Preliminary Investigations of Protein-bound Iodine in the Mongolian Gerbil. (*Meriones unguiculatus*).

INVERTEBRATE ZOOLOGY

Room 303 H, University Center

Presiding: Dr. Clay M. Chandler, Bethel College

8:30 68. Ryan, Edward Parsons (East Carolina University). Morphology of the Male Reproductive System in the Hawaiian Kona Crab, *Ranina ranina* (L.) (Decapoda: Gymnopleura).

8:43 69. Hayes, John T. (Savannah River Ecology Laboratory). Growth Parameters and Notes on the Biology of *Bittacomorpha clavipes* (Fab.) (Insecta: Diptera: Ptychopteridae).

8:56 70. Gentry, John B. (University of Georgia). Notes on the Migratory Behavior of the Southern Harvester Ant (*Pogonomyrmex badius*).

9:09 71. McGhee, Charles R. (Virginia Polytechnic Institute). The Genus *Mesesoma* Weed (Phalangida, Arachnida) of North America.

9:22 72. Schmoller, Ronald R. (The University of Tennessee). Life Histories of Wolf Spiders (Lycosidae: Araneae: Arachnida) in the Alpine Tundra of Colorado.

9:35 73. Davis, John D. (Mississippi State College for Women). Courtship and Intermale Behavior of the Jumping Spider, *Zygoballus bettini* Peckham.

9:48 74. Applegate, Arthur L. (Western Kentucky University). Collection and Characterization of the Venom of *Loxosceles reclusus* (Arachnida).

10:01 75. Yokley, Paul, Jr. (Florence State University). Life History of *Pleurobema cordatum* (Rafinesque, 1820).

10:14 76. Hoover, Richard L. and Stephen M. Gittleson (University of Kentucky). The Protozoa of Mammoth and Great Onyx Caves, Kentucky.

10:27 77. Simpson, Tom and R. W. Hull (Florida State University). Suctoria in Culture.

10:40 78. Longest, William D. (The University of Mississippi). Additions to the Distribution of *Cura foremani* (Girard, 1852) in the Eastern United States.

10:53 79. Bell, Rondal E. (Millsaps College) and Julian C. Grubbs (University of Tennessee Medical Center). A Systematic Study of Planarian Species Utilizing Cellulose Polyacetate Electrophoresis.

11:06 80. Millican, Troy and Y. J. McGaha (The University of Mississippi). A Study of the Bottom Fauna of Sardis Reservoir in Relation to Biological Productivity.

11:19 81. Knight, Luther A. and Y. J. McGaha (The University of Mississippi). Rotifers (Rotifera) of Four Flood Control Reservoirs in Northern Mississippi.

ICHTHYOLOGY AND HERPETOLOGY

Auditorium, Ellington Biological Sciences Building

Presiding: Dr. Crawford G. Jackson, Jr., Mississippi State College for Women

8:30 82. Jackson, Marguerite M., MacDonald Fulton and Crawford G. Jackson, Jr. (Mississippi State College for Women). A Survey of the Enteric Bacteria (Enterobacteriaceae) of Chelonians: Preliminary Findings.

8:45 83. Ireland, Patrick H. (University of Arkansas). Reproduction and Growth of *Ambystoma annulatum* larvae.

9:00 84. Murphy, George G. (Mississippi State University). Sun-cued Orientation in Red-eared Turtles, *Pseudemys scripta elegans.*

9:15 85. Taylor, Douglas H. (Mississippi State University). Solar Cues in Orientation of the Cricket Frog, *Acris gryllus.*

9:30 86. Folkerts, George W. (Clemson University). Selection and the Identity of the *Desmognathus fuscus* Races in the Southeastern United States.

9:45 87. Schwaner, Terry D. and Robert H. Mount (Auburn University). Notes on Distribution and Ecology of *Phaeognathus hubrichti Highton.*

10:00 88. Powders, Vernon N. and William L. Tietjen (Georgia Southwestern College). Food Habits of *Plethodon jordoni* (Amphibia: Plethodontidae).

10:15 89. Outten, L. M. (Mars Hill College). Some Salamanders from Western North Carolina and Adjoining Areas (Amphibia: Urodela).

10:30 90. Gibbons, J. Whitfield (Savannah River Ecology Laboratory). Structure and Dynamics of the Yellow-bellied Turtle, *Pseudemys scripta* (Reptilia: Chelonia: Emydidae) in an Artificially Heated Reservoir.

10:45 91. Hardin, James W., Michael J. Harvey (Memphis State University), Roger W. Barbour, and James P. Schafer (University of Kentucky). Movements and Activity Patterns of the Dusky Salamander, *Desmognathus fuscus* (Amphibia: Caudata: Plethodontidae).

11:00 92. Dolbeer, Richard A. (University of Tennessee). Population Density and Home Range Size of the Eastern Box Turtle (*Terrapene c. carolina*) in Eastern Tennessee.

11:15 93. Stiles, Robert A. and David A. Etnier (University of Tennessee). Fishes of the Upper Conasauga River, Polk and Bradley Counties.

11:30 94. Comiskey, Charles (University of Tennessee). Fishes of the Big South Fork of the Cumberland River System.

FRIDAY AFTERNOON — APRIL 18

ICHTHYOLOGY AND HERPETOLOGY

Auditorium, Ellington Biological Sciences Building

Presiding: Dr. Carter R. Gilbert, University of Florida

2:00 95. Etnier, David A. (The University of Tennessee). Additional Notes on *Etheostoma trisella* Bailey and Richards.

2:15 96. Goodyear, C. Phillip (Mississippi State University). The Role of Learning in Y-axis Orientation of the Mosquitofish, *Gambusia affinis*.

2:30 97. Barclay, Lee and William Mike Howell (Samford University). Somatic Chromosomes of the Percid Fishes, *Percina nigrofaciata* and *Etheostoma artesiae*.

2:40 98. Amberg, Larry W. (Northeast Louisiana State College). The Geographic Distribution and Variation in the Cyprinid Fish, *Notropis volucellus*, in Louisiana.

2:50 99. Gray, James A. (Northeast Louisiana State College). Variation in the Cyprinid Fish, *Notropis lutrensis*, from the Drainages of Louisiana and Mississippi.

3:05 100. Douglas, Neil H. (Northeast Louisiana State College). The Geographical Distribution of Fishes Adjacent to the Areas East and West of the Mississippi River in Louisiana and Mississippi.

3:20 101. Gilbert, Carter R. (University of Florida). Comments on the Evolution of the Pharyngeal Teeth in Cyprinid Fishes.

3:35 102. Gilbert, Carter R. (University of Florida). Two New Genera and Species of Western Atlantic Gobiid Fishes with Vomerine Teeth.

3:50 103. Finley, Mack T., Denzel E. Ferguson, and J. Larry Ludke (Mississippi State University). Possible Selective Mechanisms in the Development of Insecticide-resistant Fishes.

4:05 104. Wall, Benjamin R., Jr. and James D. Williams (The University of Alabama). A New Percid Fish (*Etheostoma*) from the Tennessee River System in Alabama.

4:15 105. Rivas, Luis R. (United States Fish and Wildlife Service). Geographical and Ecological Distribution of Western Atlantic Snappers of the Genus *Lutjanus*.

4:30 106. Reed, James R. (Virginia Commonwealth University). Uptake and Elimination of Radiotungsten in Black Bullheads, (*Ictalurus melas*).

4:45 107. Medford, Dennis W. and Bill A. Simco (Memphis State University). An Investigation of the Fishes of the Wolf River in Tennessee and Mississippi.

ANIMAL ECOLOGY

Room 303 B, University Center

Presiding: Dr. C. D. Wilder, Virginia Polytechnic Institute

2:00 108. Harvey, Michael J. (Memphis State Unisity) and Roger W. Barbour (University of Kentucky). Home Range of the Eastern Mole, *Scalopus aquaticus*.

2:13 109. Gittleson, Stephen M. and Barbara Woodruff (University of Kentucky). Mass Accumulation of Microorganisms.

2:26 110. Johns, Fred L. (North Carolina State University). Winter Habitat Exploitation in Four Species of Sparrows in Ecotones.

2:39 111. McGowan, Robert W. (Memphis State University). Ornithological Education in Southeastern Colleges and Universities.

2:52 112. Bamforth, Stuart S. (Newcomb College of Tulane University). Influence of Vegetation on Soil Protozoa.

3:05 113. Waller, William T. and John Cairns, Jr. (Virginia Polytechnic Institute). Changes in Movement Patterns of Fish Exposed to Sublethal Concentrations of Zinc.

3:18 114. Sparks, Richard E., Alan G. Heath, and John Cairns, Jr. (Virginia Polytechnic Institute). Some Effects of Zinc on the EKG and Breathing Signal of Bluegills (*Lepomis macrochirus* Rafinesque).

3:31 115. Dickson, Kenneth L. and John Cairns, Jr. (Virginia Polytechnic Institute). The Use of the Sequential Comparison Index as a Biological Evaluation of Stream Pollution.

3:44 116. Burbanck, W. D., C. G. Goodchild, Elizabeth S. Dennis, C. E. Styron, and Madeline P. Burbanck (Emory University). Ecological Implications of Studies of α-amino Acids in Anthurid and Asellid Isopods.

3:57 117. Smith, Michael H. (University of Georgia). Absolute Densities of Small Mammals.

4:10 118. Angelovic, J. W., D. E. Hoss, and G. W. Thayer (Bureau of Commercial Fisheries Radiobiological Laboratory-Beaufort, North Carolina). Energy Requirements of Pinfish, *Lagodon rhomboides*, in the Newport River Estuary, North Carolina.

4:23 119. Simmons, George M., Jr. (Virginia Commonwealth University) and Stuart E. Neff (Virginia Polytechnic Institute). A Comparative Study of Thermal Stratification in a Mainstream and Pumped-Storage Impoundment.

4:36 120. Parrish, Fred K., Rorert M. Huie, Jr. and John J. Barnett (Georgia State College). A Preliminary Report of Animals Found on Granite Outcrops.

PLANT ECOLOGY

Room 303 C, University Center

Presiding: Dr. Arthur Cooper, North Carolina State University

2:00 121. Taylor, Fred G. Jr. and John P. Witherspoon (Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory). Fallout Studies on Native Vegetation. I. Effects of Beta-Radiation (^{90}Sr) on White Pine and Red Oak Trees.

2:13 122. Witherspoon, John P. and Fred G. Taylor (Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory). Fallout Studies on Native Vegetation. II. Field Retention of a Fallout Simulant by White Pine and Red Oak Trees.

2:26 123. Cowgill, Cythia and A. Randolph Shields (Maryville College). Productivity and Species Diversity of Plankton, Norris Lake, Summer, 1968.

2:39 124. Lipps, E. Lewis (Shorter College) and H. R. DeSelm (University of Tennessee). Pines in the Vegetation of the Marshall Forest.

2:52 125. McCormick, J. Frank, Fairman Cumming, Clair Mellinger and Rebecca Sharitz (University of North Carolina). Experimental Analysis of Community Structure.

3:05 126. Meijer, Willem (University of Kentucky). Phyto-Geographical and Ecological Studies in Malesia.

3:18 127. Magnoli, Michael A. (Marine Science Institute, University of Alabama) Concentrations of Zinc, Copper, Manganese, Molybdenum, and Boron in Plankton Samples from Selected Stations of Mobile Bay.

3:31 128. Williams, Louis G. (University of Alabama). Plankton, Detritus and Clay Turbidities in the Mobile Gulf of Mexico Interchange.

3:44 129. Way, Pamela J. and Joe A. Edmisten (University of Georgia). A Profile of Fernbank Forest.

3:57 130. Ellis, E. Ann and Joe A. Edmisten (University of Georgia). Macroscopic Temperate Zone Epiphyllae.

4:10 131. Bailey, John Kermit (Lincoln Memorial University). A Preliminary Study of the Ferns on the Limestone Bluffs of Norris Lake.

4:23 132. Stalter, Richard (High Point College) and Wade T. Batson (University of South Carolina). An Ecological Study of a South Carolina Salt Marsh.

4:36 132a. Amundsen, C. A. and E. E. C. Clebsch (University of Tennessee). Vegetation and Landscape Processes on Amchitka Is., Alaska.

PLANT SYSTEMATICS, FLORISTICS, AND MORPHOLOGY

Room 303 D, University Center

Presiding: Dr. A. J. Sharp, University of Tennessee

2:00 133. Jones, Samuel B., Jr. (University of Georgia). Biosystematic Studies in *Vernonia* (Compositae).

2:13 134. Coffey, Janice C. (Queens College). Chemotaxonomic Studies in the Southeastern Species of *Luzula*.

2:26 135. Lipscomb, Harriett (Georgia College at Milledgeville). A Consideration of the position of *Phryma*.

2:39 136. Hunter, Gordon E., Kim Freeman, Barbara Burch, and Guillermo Flores (Tennessee Technological University). Flavonoids and Systematics of American *Vernonia*: Compositae.

2:52 137. Drapalik, Donald J. (Georgia Southern College). Corona Variation in Southeastern United States *Matelea* (Asclepiadaceae).

3:05 138. Browne, E. T., Jr. (Memphis State University). Some Systematic Observations on *Hymenocallis* Salisb. (Amaryllidaceae) in the Southeastern United States.

3:18 139. Nesom, Guy L. (University of North Carolina — Chapel Hill). Apomictic Species and Species Complexes in Southwestern United States *Erigeron* section Olygotrichium (Asteraceae).

3:31 140. Shetler, Stanwyn G. (Smithsonian Institution). The Crisis of Herbaria.

3:44 141. Radford, Albert E. (University of North Carolina). Progress Report on Southeastern Flora.

EXPERIMENTAL BOTANY

Room 303 E, University Center

Presiding: Dr. J. T. Mullins, University of Florida

2:00 142. Culpepper, J. T. and Iola T. McClurkin (University of Mississippi). Demonstration of a Potassium-Sensitive, Calcium-Activated Adenosine Triphosphatase in the Meristematic Cells of Lost Pine.

2:13 143. Harris, W. F. (Oak Ridge National Laboratory). The Effect of Fast Neutron Radiation and Light Intensity on Root-Shoot Ratios of *Liriodendron tulipifera* L. Seedlings.

2:26 144. Raj, Baldev and J. M. Herr, Jr. (University of South Carolina). The Isolation of Protoplasts from the Placental Cells of *Solanum nigrum* L.

2:39 145. Sabharwal, P. S. (University of Kentucky). In Vitro Culture of Ovules, Nucelli and Embroyos of *Citrus*.

2:52 146. Yow, M. E., and B. H. Wise (Memphis State University). Pasteur Effect in the Corn Seedling (*Zea mays* L.).

3:05 147. Amen, Ralph D. (Wake Forest University) Seed Germination Responses of the Salt Marsh Grass *Distichlis spicata*: Mechanism of Seed Dormancy. (Angiospermae: Poales: Poaceae).

3:18 148. Parrish, David J. (Wake Forest University). Seed Germination Studies of Horse Nettle, *Solanum carolinense* L.

3:31 149. Sehgal, Prem P. and James A. Cook (East Carolina University). Regulation of Urease in Cotyledons.

3:44 150. Carter, Jr., George E. and Richard J. Kelly (Wake Forest University). Seed Germination Responses from the Salt Marsh Grass *Distichlis spicata* (L.) Green, (Angiospermae, Poales, Poaceae): Ecological Aspects.

3:57 151. Mansuri, A. D., D. B. Bibb, and D. J. Kelly (Bennett College). Radiation Effect on Starch Metabolism in Wheat Seedlings.

4:10 152. Allen, Mabel L. and Johnny Jackson (Savannah State College). Effects of the Iodide Ion on Abscission in Bean (*Phaseolus vulgaris* var Tendergreen) Leaf Explants.

4:23 153. Ballal, S. K. and H. K. Meredith, (Tennessee Technological University). Growth Response of Tomato Seedlings to a-Napthalenaecetic acid.

4:36 154. Stevenson, Enola L. (Atlanta University). Growth and Nitrogen Metabolism of Plants under Continuous Light of Different Qualities and Intensities.

GENETICS

Room 303 F, University Center

Presiding: Dr. W. Donald Fattig, University of Alabama

2:00 155. Jink, Willard L. (Marshall University), The Reproductive Potential of *Drosophila affinis*.

2:13 156. Murray, James (University of Virginia) and Bryan Clarke (University of Edinburgh). The Inheritance of Sinistrality in *Partula suturalis* (Gastropoda, Stylommatophora).

2:26 157. Ray, James H. and John M. Carpenter (University of Kentucky). The Effect of Zinc-65 on the Production of Lethal Genes in *Dropsophila melanogaster*.

2:39 158. Hess, Lloyd W. (Savannah River Ecology Laboratory) and David B. Dunn (University of Missouri). Isolating Mechanisms in the *Lupinus argenteus* Complex.

2:52 159. Stephens, Ralph E. and Gordon J. Carlson (The University of Tennessee). The Analysis of Tritiated Thymidine Incorporation in Grasshopper Neuroblasts.

3:05 160. Amand, W. St. (University of Mississippi). A Model System for Population Genetics Experiments.

3:18 161. Biggers, Charles J. (University of South Carolina), Serum Transferrin Polymorphism in *Peromyscus polionotus.*

3:31 162. Moisand, Robert E. and John M. Carpenter (State University College at Buffalo, University of Kentucky). Effect of Continuous Exposure to Two Insecticides on the Fitness of Two Third Chromosome Inversions of *Drosophila pseudoobscura.*

3:44 163. Harris, John W. (Tennessee Technological University), Isozymes of the E_4 Esterase in *Zea mays.*

3:57 164. Findley, David L. and Patricia L. Walne (University of Tennessee). Effects of Light and Temperature on the Ultrastructure of Stage IV Cells of *Chlorogloea fritschii* (Cyanophyceae, Chroococcales).

4:10 165. Deason, T. R., W. H. Darden Jr. and Sarah Ely (University of Alabama). Ultrastructure of Mitosis in *Volvox aureus.*

4:23 166. Fetner, Robert H. (Georgia Institute of Technology). Observations on Chinese Hamster (*Cricetulus griseus*) Metaphase Chromosomes with the Scanning Electron Microscope.

ANIMAL PHYSIOLOGY AND EXPERIMENTAL ZOOLOGY

Room 303 G, University Center

Presiding: Dr. W. W. Gibson, LeMoyne College

2:00 167. Edwards, Kiah, Jr. and Roy Hunter, Jr. (Atlanta University). The Chemical Characterization of the Notochordal Sheath in Bullfrog Larvae.

2:13 168. Burnham, Kenneth D. (The University of of Tennessee). Experiments with Embryos of *Ascaris lumbricoides* var. *suum* in vacuo.

2:26 169. McClurkin, Iola T. and Robert D. Riether (The University of Mississippi). Rapid Histological Preparation of Chitinous Specimens.

2:39 170. Bell, Rondal E. (Millsaps College), E. Leslie Knight (Wingate College), and Alfred E. Perry (Memphis State University). Electrophoretic Patterns of the Serum Proteins of Salamanders of the Genus *Gyrinophilus.*

2:52 171. Laslie, Wayne (Georgia State College). The Effects of Alkyl Benzene Sulfonate (ABS) and Linear Alkylate Sulfonate (LAS) at Three Concentrations on the Respiration Rate of *Notropis lutipinnis* Jordan and Brayton.

3:05 172. Forrester, Donald J. (Clemson University). Reproductive Performance of a Laboratory Colony of Deermice, *Peromyscus maniculatus.*

3:18 173 Cunningham, James R. (Clemson University). The Effects of X-radiation on the Blood Picture of Mice Infected with *Heligmosomum skrjabini* (Nematoda: Heligmosomidae).

3:31 174. Smoake, J. Alvin and Samuel R. Tipton (University of Tennessee). Hormonal Changes in Rats Cross-adapted to Cold Environments and Simulated High Altitude.

3:44 175. Cascio, Nicholas J. Lo (State University College at Buffalo). A Study of Multiple Molecular Forms of Enzymes in Species of Salmonidae and Esocidae: (Osteichthyes: Clupeiformes).

3:57 176. Stidham, James D. and Charles E. Lane (Presbyterian College and Institute of Marine Sciences, University of Miami). The Effects of Salinity on Blood Free Amino Acids in the Land Crab, *Cardisoma guanhumi* (Crustacea: Decapoda: Gecarcinidae).

4:10 177. Capone, J. J. and R. W. Hull (Florida State University). Thymidine Phosphorylase Activity in Chicken Erythrocytes Infected with Avian Malaria, *Plasmodiam lophurae.*

4:23 177a. Hubert, C. E. (Clark College). Dissociation, Inflamation, and Regeneration Phenomena in Livers of Chick Embryos Treated with Aminoguanidine Sulfate.

PARASITOLOGY AND HISTOLOGY

Room 303 H, University Center

Presiding: Dr. Elon E. Byrd, University of Georgia

2:00 178. Buckelew, Thomas P. and Felix H. Lauter (University of South Carolina). A Preliminary Study of the Miracidium of *Diplodiscus temperatus.* (Stafford, 1905).

2:13 179. Olexik, William A., A. E. Perry, and W. E. Wilhelm (Memphis State University). Parasites of the Tree Squirrels of Southwest Tennessee.

2:26 180. Forrester, Donald J. (Clemson University). Influence of Weather on the Intensity of Infection of Bighorn Sheep with Lungworms of the Genus *Protostrongylus* (Nematoda: Protostrongylidae).

2:39 181. Best, Stephen H. (Clemson University). A Comparison of the Helminth Faunas of Two Populations of Cotton Rats, *Sigmodon hispidus,* from South Carolina.

2:52 182. HAIR, JAY D. (Clemson University). Geographical Distribution and Seasonal Incidence in the Helminth Parasites of the Starling, *Sturnus vulgaris* L. (Aves; Passeriformes; Sturnidae).

3:05 183. GOODCHILD, C. G. (Emory University) and VIRGINIA L. MARTIN (Queens College). A Study of the Validity of Certain *Spirorchis* Species.

3:18 184. JOHNSON, CHARLES A. (North Carolina State University). *Myxidium chelonarum* n. sp. (Cnidosporidia: Myxosporida: Myxidiiae) from Various North American Turtles.

3:31 185. MILLER, GROVER C. AND REINARD HARKEMA (North Carolina State University). Helminths of the Opossum (*Didelphis virginiana*).

3:44 186. DOBBS, H. DONALD (Wofford College). Simple Method of Preparing Intestinal Tracts of Mice for the Purpose of Studying Adult *Trichinella spiralis* in situ.

3:57 187. CUNNINGHAM, FROST H. (North Carolina State University). A Survey of the Helminths of Aquatic Turtles in North Carolina.

4:10 188. ALLEN, W. R. III AND REINARD HARKEMA (North Carolina State University). Esterase Activity in *Pharyngostomoides* sp. (Trematoda: Strigeida: Diplostomatidae).

4:23 189. SHANNON, W. ALLEN AND B. J. BOGITSH (Vanderbilt University). Light and Electron Microscope Radioautographic Studies of Galactose-H^3 Utilization Related to Mucopolysaccharide Synthesis in *Megalodiscus temperatus*.

4:36 190. BOGITSH, BURTON J. (Vanderbilt University). Fine Structural Localization of Acid Phosphatase and Aryl Sulfatase Activities in the Intermediate Layer of *Hymenolepis diminuta* cysticercoids.

4:49 191. REID, WILLIS A., JR. AND REINARD HARKEMA (North Carolina State University). Esterases of *Procyotrema marsupiformis* Harkema and Miller, 1959 (Trematoda: Strigeida: Diplostomatidae).

5:02 192. PRESTWOOD, KATHERINE AND ELON E. BRYD (University of Georgia). *Psilostoma* sp. from the Wild Turkey.

UNIVERSITY CENTER — Memphis State University

University of Virginia Announces Mountain Lake Program

The University of Virginia has announced the program of graduate biology courses to be offered this summer at the Mountain Lake Biological Station in southwestern Virginia. They are as follows.

First Term — June 12 through July 15

Entomology: Dr. George W. Byers, University of Kansas

Ornithology: Dr. David W. Johnston, University of Florida

Plant Ecology: Dr. Frank McCormick, University of North Carolina

Vertebrate Endocrinology: Dr. B. E. Frye, University of Michigan

Second Term — July 17 through August 21

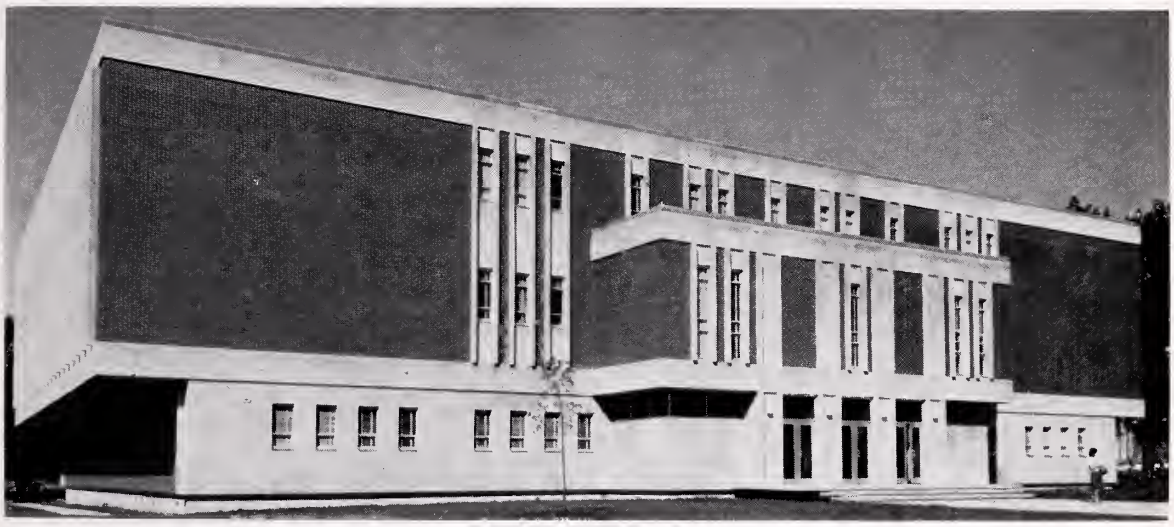
General Ecology: Dr. Maurice Brooks, West Virginia University

Invertebrate Zoology: Dr. Horton H. Hobbs, Jr., Smithsonian Institution

Mycology: Dr. Constantine J. Alexopoulos, University of Texas

Plant Biosystematics: Dr. C. Ritchie Bell, University of North Carolina

A limited number of National Science Foundation scholarships are available for research and study: (1) Post-doctorate for research, stipend $1300; (2) Pre-doctorate for supervised research, stipend $500; and (3) Post-graduate for training in field biology, stipend $400. Preference is given for studies concerned with the biota of the region. Application blanks for these awards may be secured from the Director, Mountain Lake Biological Station, Department of Biology, University of Virginia, Charlottesville, Virginia 22903 and must be submitted before May 1, 1969.



Ellington Biological Sciences Bldg. — Memphis State University

Abstracts of Papers Presented at the 30th Annual Meeting of the Association of Southeastern Biologists

The number in parenthesis at the top of each abstract refers to the number of that paper in the program.

(37)

The Effect of Fluoride on *Chlamydomonas reinhardtii*. (Chlorophyceae: Volvocales)

STUART W. AKERS AND CHARLES E. ANDERSON,
North Carolina State University

Fluoride concentrations, from 10^{-3}M to 10^{-2}M, were found to produce a limiting effect upon asexual reproduction in *Chlamydomonas reinhardtii* in short term experiments. Within this concentration range, fluoride induced morphological changes also. Test made on culture treatments at 10^{-2}M fluoride indicated an increased amount of mino acid assimilation after prolonged exposure of the cells to fluoride.

(152)

Effects of the Iodide Ion on Abscission in Bean (*Phaseolus Vulgaris* Var Tendergreen) Leaf Explants

MABEL L. ALLEN AND JOHNNY JACKSON
Savannah State College

The abscission region, which included 3 mm of pulvinus tissue and 10 mm of rachis tissue, was excised from the terminal leaflet of the first trifoliate leaf of 23 to 27 day old bean plants. The proximal and distal ends of separate explants were exposed to different levels of potassium iodide (1.0, 2.0, 3.0, 4.0, 5.0×10^{-1}M) incorporated into plain agar blocks, agar blocks containing a promotive level of IAA (200 mg/1), or agar blocks containing an inhilitory level of IAA (500 mg/1). The results showed that the iodide ion retarded substantially the formation of the abscission zone. This was more pronounced among explants treated with the higher concentration of potassium iodide. The two concentrations of IAA had little, if any, influence in altering the action of iodine ion. Explants treated with potassium iodide at different positions (proximal, distal, proximal and distal) did not vary significantly in the rate or percentage of abscission.

(188)

Esterase Activity in *Pharyngostomoides* sp. (Trematoda: Strigeida: Diplostomatidae)

W. R. ALLEN, III AND REINARD HARKAMA
North Carolina State University

Pharyngostomoides sp., a trematode found in the small intestine of the raccoon, was studied histochemically for esterase activity. Fresh frozen material or specimens prefixed in 10% buffered formalin were sectioned at 10μ in a Lab Tek cryostat. Substrates employed with appropriate inhibitors were: 5-bromoindoxyl acetate, naphthal AS-D acetate, acetylthiocholine iodine, butyrylthiocholine iodine, and alphanapthyl acetate. Localization of esterases was demonstrated in the oral sucker. acetabulum, pharynx, holdfast organ, pseudosuckers and underlying glandular area, anterior fore-body cuticle and the associated subcuticular tissue, nerve tissue, vas deferens, and bursa.

(147)

Seed Germination Responses of the Salt Marsh Grass *Distichlis spicata*: Mechanism of Seed Dormancy. (Angiospermae: Poales: Poaceae)

RALPH D. AMEN, *Wake Forest University*

At maturity, the seeds (caryopses) of *Distichlis spicata* (L). Green are dormant. This condition of dormancy appears to be due to an imbalance of growth hormones favoring inhibitors, and appears to be related to the condition of the "seed coat" (pericarp). Data are presented on the effects of various promotors (GA, NO_3, thiourea) and inhibitors (ABA, CCC, coumarin) on dormancy and germination as related to aqueous leaching and scarification of the seeds.

The postulated mechanism of seed dormancy is that endogenous growth inhibitors accumulate during seed maturation and restrict hydrolytic enzyme activity in the endosperm. The subsequent decay or removal of the inhibitor(s) facilitates the hormonal promotion of embryonic growth (germination). It is strongly suspected that there is a correlation between those habitat factors which lead to the induction of seed dormancy and those conditions which favor the natural breaking of dormancy.

(132a)*

(118)

Energy Requirements of Pinfish, *Lagodon rhomboides*, in the Newport River Estuary, N. C.

J. W. ANGELOVIC, D. E. HOSS, AND G. W. THAYER
Bureau of Commercial Fisheries
Radiobiological Laboratory
Beaufort, North Carolina 28516

Minimum energy requirements for pinfish in the Newport River (area 30 km^2) were calculated from estimates of population number and size composition plus measurements of respiration rates and caloric values. A mark-and-recapture study in the fall gave a length-frequency distribution and a population estimate of 1.6×10^6 pinfish. Measurements of respiration rates of pinfish ranging in weight from .01 to 240.00 grams were used to derive the regression equation.

$$\text{Standard Metabolic Rate} = .303 \text{ Weight}^{.752}$$

* *See page 73.*

Micro-bomb calorimetry was used to obtain a value of 4.665 cal/mg dry weight for pinfish. Based on these data, the pinfish population had an energy content of 47.6×10^9 cal and, in addition, respired a minimum of 461×10^6 cal/day. In the estuary, the net production of phytoplankton during the fall averaged 15.6×10^9 mg C/day. If the phytoplankton represented one-third of the total primary production and pinfish were secondary consumers in a food chain with transfer efficiencies of 10%, the pinfish population required 8.7% of the total primary production for basic maintenance.

(The Radiobiological Laboratory is supported jointly by the Bureau of Commercial Fisheries and the Atomic Energy Commission.)

(74)
Collection and Characterization of the Venom of *Loxosceles reclusus* (Arachnida)

Arthur L. Applegate

The freeze-dried venom from three spiders was serially diluted with distilled water to make up three concentrations of venom (1:20, 1:50 and 1:100). After 0.1 ml. of each dilution had been injected into the ear of a single rabbit, three hemorrhagic lesions, which corresponded in size to the concentrations of venom, were formed at the sites of the injection. To further characterize the venom by its pathogenicity, three *Loxosceles* females were induced to envenomate the shaved flanks of three New Zealand White rabbits. The resulting erythema, intravascular hemolysis, and hemorrhagic lesion formation in the area of external oblique muscle of the rabbits was comparable to the pathogenesis of the *Loxosceles* envenomations described by Denny, et.al., (1964).

The *Loxosceles* venom was also characterized by the electrophoretic mobility of the proteins contained in the venom. The freeze-dried venom from twenty spiders was pooled and electrophoresed on polyacrylamide gel (7%) buffered to a pH range of 8.2 - 8.4. Six separate trials were made at 21°C using a constant current of 5 ma on each of the six polyacrylamide gel columns used for each trial. At least one of the gel columns from each trial was loaded with either freeze-dried hemolymph or abdominal homogenate; these columns served as controls. The venom proteins separated into eight distinct bands. The hemolymph proteins formed thirteen bands; seven of the hemolymph bands were similar in their electrophoretic mobilities to seven of the venom bands. The nine bands of proteins formed from the abdomen homogenates were dissimilar to both venom and hemolymph proteins.

(131)
A Preliminary Study of the Ferns on the Limestone Bluffs of Norris Lake

John Kermit Bailey, *Lincoln Memorial University*

The shore lines of Norris Lake presents an abundance of unusual microclimates. This preliminary study of a limited area of this shore line reports fifteen species and/or varieties of ferns. Seven of these are reported for the first time in Campbell and Union counties in Tennessee. The adaptability of ferns to a variety of habitats (altitudes, temperatures, pH ranges, etc.) has led to some unusual traits, e.g., natural hybridizations between genera and species, with some of the hybrids producing viable spores, and an array of morphological variations within species. Two genera, *Asplenium* and *Camptosorus,* are abundant in the area and are outstanding in these traits. The xerophytic, mesophytic and hydrophytic nature of various fern species is well demonstrated in the area.

(153)
Growth Response of Tomato Seedlings to a-Napthaleneacetic acid.

S. K. Ballal and H. K. Meredith
Tennessee Technological University

Tomato seeds (Marglobe variety) soaked for six hours prior to planting in various concentrations of a-Napthaleneacetic acid (NAA) ranging from 500 ppm to 2800 ppm, and the growth response was studied for four weeks under 12-hr. photoperiods. The inhibition of growth rate increased proportionately from 25% at 500 ppm to 75% at 1600 ppm. However, at concentrations above 1600 ppm the inhibition was approximately 50%. Shoot tip applications containing 100 ppm and 500 ppm of NAA were made to plants at 12, 18 and 24 days of age. Although only 15% growth inhibition occurred at both the concentrations, there was evidence of resistance to exogenous NAA increasing with age of plants. Plants responded to NAA application in the form of absence of shoot apex, pronounced swellings on the axis, and thickening of the stem, and petioles. The extent of hypertrophy was in direct proportion to the concentration of NAA, and the response of plants was independent of age at the time of application.

(112)
Influence of Vegetation on Soil Protozoa

Stuart S. Bamforth
Newcomb College of Tulane University

Vegetation influences the numbers and proportions of ciliates and testacea. In coniferous forests, where organic materials accumulate in the litter, slow-growing testacea are 10 times more abundant than ciliates and number up to 36,000/g (wet weight) in litters and up to 6,000/g in soils. In deciduous forests and grasslands, where decomposition rate keeps pace with organic production, testacea decrease to 200-7000/g in both horizons, and bacteria-dependent ciliates increase to 500-5000/g in litters, while remaining about the same (less than 300/g) in soils.

(4)
Germination Requirements of *Cyperus Inflexus*

Carol C. Baskin and Jerry M. Baskin
University of Kentucky

Seeds of the annual sedge, *Cyperus inflexus* Muhl. (Cyperaceae), were dormant at maturity. Dormancy in this species was overcome by stratification (5°C), by scarification, and to a lesser extent by after-ripening in dry storage. Stratified seeds germinated better (1) at daily alternating temperatures (28° to 18°C) than at constant temperatures (28° or 18°C) and (2) in a 12-hour photoperiod than in constant darkness. Non-stratified seeds that were mechanically scarified at the radicle end or acid scarified germinated well at (1) a constant temperature of 28° or 18°C in 12-hour photoperiod and (2) an alternating temperature of 28° to 18°C in both light and dark. These germination requirements will be related to the ecology of this species.

(3)
Amino Acids and Amides in Diffusate of *Psoralea Subacaulis* Seeds

JERRY M. BASKIN, *University of Kentucky*

Scarified seeds of *Psoralea subacaulis* T. & G. (Leguminosae) were soaked in distilled water for 24 hours at 25°C. Water containing diffusate of the seeds was analyzed for amino acids and amides. Identification of amino acids and amides was made by comparison of R_f values, patterns and colors of known substances. Quantitative determinations were made by comparing their absorbance (570 millimicrons) with standard curves. Seventeen amino acids and two amides including alanine, arginine, asparagine, aspartic acid, one-half cystine, gamma-amino-n-butyric acid, glumatic acid, glutamine, glycine, histidine, isoleucine, leucine, lysine, phenylalanine, proline, serine, threonine, tyrosine, and valine were identified. One-half cystine, gamma-amino-n-butyric acid, alanine and glutamic acid were the most abundant.

The importance of seed diffusates in stimulating germination and growth of soil microorganisms, as described in the literature, is discussed.

(30)
Variation and Selection Pressure in *Aquilegia caerulea* James (Ranunculaceae)

C. RITCHIE BELL, *University of North Carolina*

Although the flowers of *Aquilegia* represent a relatively high degree of floral specialization for a member of the Ranunculaceae, most species are not morphologically stable; there is considerable floral and vegetative variability both within and between species. Some of the observed variability can be attributed to phenotypic response to varied environmental factors and some to hybridization and introgression. However, other aspects of the intraspecific variation pattern may be the result of retrogression because of relaxed pollinator selection pressure on the evolved floral characters.

(62)
Serum Protein Alterations in Hormonally Induced Polyarteritis Nodosa as Revealed by Electrophoresis

RONDAL E. BELL, *Millsaps College*

Polyarteritis nodosa was induced into adult, male, Sprague-Dawley rats by administering subcutaneous injections of estradiol propionate for thirty days followed by injections of follicle stimulating hormone for another thirty days. As early as four months and up to twelve months after cessation of treatment, sixty to eighty per cent of the animals develop the disease. The disease follows the pattern of a chain reaction involving hyperplasia of the pituitary, adenomatous adrenals, hyaline casts in the kidney tubules, changes in the concentrations of serum electrolytes, and finally the typical polyarteritic response in arterioles and arteries in many areas. Serum protein electrophoresis on cellulose polyacetate revealed an increase in the total serum protein during the development of the disease with accompanying decrease in serum albumin and increase in globulin fractions, especially the alphaone globulin fraction.

(79)
A Systematic Study of Planarian Species Utilizing Cellulose Polyacetate Electrophoresis

RONDAL E. BELL, *Millsaps College*
AND
C. JULIAN GRUBBS, *University of Tennessee Medical Center*

The electrophoretic separation of soluble proteins extracted from four species representing three genera of planarians revealed distinct species variations in electromobilities, number of components, relative amounts and resolution of fractions. Extracts of *Dugesia tigrina*, *D. dorotocephala*, *Cura foremanii* and *Phagocata gracilis gracilis* were prepared by a freeze-thaw method. The relative protein fractions were obtained with the Gelman deluxe electrophoresis chamber using cellulose polyacetate as the supporting medium. Veronal buffer of pH 8.8 (ionic strength 0.05) was used. Ten lambda aliquots of sample were electrophoresed for 60 minutes at 255 volts. The relative concentrations of the separated fractions were obtained from the stained electrophorograms with a recording densitometer. The electrophoretic patterns are characteristic and reproducible for each of the species investigated. Attempts were made to correlate morphological characters with the protein patterns. In general, similarities of the patterns tend to verify existing taxonomic relationships.

(170)
Electrophoretic Patterns of the Serum Proteins of Salamanders of the Genus *Gyrinophilus*

RONDAL E. BELL, *Millsaps College*
E. LESLIE KNIGHT, *Wingate College*
AND
ALFRED E. PERRY, *Memphis State University*

Two species presently are recognized within the genus *Gyrinophilus*. One species, *G. palleucus*, appears to be restricted to caves within its geographical distribution, while the other, *G. porphyriticus*, typically a stream or spring dweller, also is encountered in caves. *G. palleucus* is a neotenic form, while *G. porphyriticus* normally metamorphoses into the adult stage. Zone electrophoresis on cellulose polyacetate was used to characterize the serum proteins of the species of *Gyrinophilus*.

The total protein of both species separated into five electrophoretic fractions. Significant differences were observed between the two species with respect to electromobilities, relative amounts and resolution of fractions. Electrophorograms indicated a significant increase of serum protein occurring in the transformation from the larval to adult stage in *G. porphyriticus*. The electrophoretic distributions and relative concentrations of the protein fractions of the larval stage of *G. porphyriticus* resemble *G. palleucus* more closely than the adult stage of *G. porphyriticus*.

(181)
A Comparison of the Helminth Faunas of Two Populations of Cotton Rats, *Sigmodon hispidus*, from South Carolina

STEPHEN H. BEST, *Clemson University*

A survey of the helminth parasites of *Sigmodon hispidus* from the Piedmont and Coastal Plain regions of

South Carolina was conducted during 1968 and 1969. Nematodes and cestodes were the predominant helminths. Comparative data on the numbers of species and their incidence were obtained and related to the ecological differences that were observed between the two areas. New locality records for cotton rat helminths in South Carolina were noted.

The life cycle and host range of a strain of gastrointestinal nematode, *Longistriata adunca,* obtained from a cotton rat from the Coastal Plain region was studied experimentally.

(161)
Serum Transferrin Polymorphism in *Peromyscus polionotus*

CHARLES J. BIGGERS, *University of South Carolina*

Polymorphic serum transferrins of *Peromyscus polionotus* from South Carolina separated by polyacrylamide gel electrophoresis were shown to consist of three electrophoretic components. The three components were shown to have transferrin activity by the Ornstein procedure. A system of inheritance of three autosomal codominant alleles was proposed from analysis of data obtained from laboratory matings and from partial family data obtained from field collections. A comparison of three transferrin components of *P. polionotus* to that of *P. maniculatus* Trf-a, Trf-b, and Trf-c components indicated that the two species which interbreed in the laboratory share a common band (Trf-c). The three transferrin alleles of *P. polionotus* have been designated as Trf^c, Trf^d, and Trf^e. Disturbed segregation ratios of one of the alleles (Trf^d) was indicated to be due to transmission reduction.

(190)
Fine Structural Localization of Acid Phosphatase and Aryl Sulfatase Activities in the Intermediate Layer of *Hymenolepis diminuta* cysticercoids

BURTON J. BOGITSH, *Vanderbilt University*

The fine structure and the cytochemical distribution of acid phosphatase and aryl sulfatase in the intermediate cell layer of cysticercoids of *Hymenolepis diminuta* is reported. The cells comprising this layer are of two types in the developing cysticercoid and of a single type in the mature cysticercoid. In the former stage, one cell type is responsible for the elaboration of the peripheral layer with its radiating fibers. The second type is responsible for the formation of the circular fibers and, in part, the fibers of the intermediate layer. The latter type cell displays acid phosphatase and aryl sulfatase activity. Much of the activity is cytoplasmic in distribution and possibly is responsible for the ultimate degeneration of the cell. (Supported, in part, by N.I.H. grant No. AI-0858).

(5)
Capability of Nitrogen Fixation by the Coralloid Roots of *Zamia Floridana*

MARGARET A. BOULWARE AND JOE A. EDMISTEN
University of Georgia

The coralloid roots of certain Australian cycads have been reported to contain endophytic blue-green algae. Bergersen, Kennedy and Wittmann (1965) confirmed nitrogen fixation by blue-green algae in the coralloid roots of *Macrozamia communis* by the $^{15}N_2$ method. Coralloid roots of *Zamia floridana* were tested for the capability of nitrogen fixation by a modification of the acetylene reduction technique (Stewart, Fitzgerald, and Burris, 1967). Results indicated the capability of nitrogen fixation by the coralloid roots of *Z. floridana.* Slides of plant materials, technique, and results will be shown. The value of the acetylene reduction test for nitrogen fixing ability will be discussed.

(55)
Some Ultrastructural Aspects of Sperm-egg Interactions in the Horseshoe Crab, *Limulus polyphemus* (Merostomata: Xiphosura)

GEORGE GORDON BROWN, *Iowa State University and Virginia Institute of Marine Science*
AND
ROSS L. SHOGER, *Carleton College*

The *Limulus* sperm possesses four typical sperm components, acrosome, nucleus, mitochondria, and flagellum. The acrosome consist of two major parts, a hemispherical apical cap and a multifibrillar axial rod extending posterially from the cap caudal side through an intranuclear canal and coiling around the posterior portion of the nucleus. Andre (1963) has demonstrated the anterior projection of this rod (50μ) length during the acrosome reaction. The egg (1.5mm) is covered by two layers, an outer basement lamina (2μ thick) and an inner vitelline envelope (40-42μ thick). Examination of inseminated eggs revealed numerous spermatozoa attached to the basement lamina. Each sperm attaches by means of the acrosomal cap and its contents. The sperm axial rod projects through the two layers and presumably to the egg plasma membrane. A secondary stage involves the flagellar microtubules coiling around the nucleus and beneath the sperm plasma membrane. The mechanisms involved, mechanical or chemical, are speculative. Sperm nucleus penetration into egg has not been observed. (This work was initiated at the Marine Biological Laboratory, Woods Hole, NIH Grant TI HD - 26 - 06, and supported by NSF Grant GY4092, Virginia Institute of Marine Science, and by a small research grant fund, Iowa State University.)

(138)
Some Systematic Observations on *Hymenocallis* Salisb. (Amaryllidaceae) in the Southeastern United States

E. T. BROWNE, JR., *Memphis State University*

As envisaged by the late J. K. Small (*Manual of the Southeastern Flora*, 1933) *Hymenocallis* in the southeastern United States consists of eleven species, six of which he described himself. Subsequently, Traub and Hayward and others have proposed other binomials for taxa in the genus with the result that speciation in the genus is in a very confused state. From this study has come some clarification which may be of help to those trying to identify species in the group. As in the case of the Louisiana *Iris* species problem unraveled by H. P. Riley's brilliant work, Small and the others have apparently taken characters for species delimitation which are (1) inconstant or (2) are within the range of normal variation found within most species. Unlike the *Iris* sit-

uation, however, hybridization does not seem to have played too large a role. Considerable revision of the number of species in the genus would seem to be indicated.

(178)
A Preliminary Study of the Miracidium of *Diplodiscus temperatus* (Stafford, 1905)

THOMAS P. BUCKELEW AND FELIX H. LAUTER
University of South Carolina

The morphology of *Diplodiscus temperatus* was studied at the optical level. All facets of the morphology were reviewed including epidermal plates, subepithelium, apical gland, apical papilla, excretory system, nervous system, penetration glands, and germ ball. Stain techniques used were: Hematoxylin and Eosin, Heidenhain's Iron-Hematoxylin, and Protein Silver. Vital stains such as Neutral Red, Methylene Blue, and Nile Blue Sulfate revealed interesting detail. The miracidium was impregnated with silver nitrate in order to reveal the epidermal plate arrangement. The excretory system of the living miracidium was studied with the phase contrast microscope. This review of the morphology at the optical level presented the groundwork for a study of the ultrastructure of the miracidium.

(9)
Loblolly Pine (*Pinus taeda* L.) as an Invader of Granite Outcrop Island Communities

MADELINE P. BURBANCK, *Emory University*

After eleven years, eight .75-1.2m pine seedlings have become 6-7.5m trees in an island community at Mount Arabia. The 25 sq m area of the community has not changed since 1957 but the maximum soil depth increased from 30 to 41 cm. *Andropogon virginicus* which occupied 2/3 of the area of the community in 1957 has been replaced by pine trees with a ground cover of pine straw through which emerge a few stunted specimens of *Smilax, Parthenocissus, Quercus* seedlings, and small clumps of *Carex communis*. In 1957 there were pine seedlings (1 yr or older) in 5 out of 10 island communities with maximum measured soil depths of 30-50 cm. In 1968 there were pines in 7 of these 10 communities and in 3 additional communities where soil depth had increased during the 11 yr interval. Severe environmental conditions, particularly drought, prevent many pine seedlings from reaching maturity, but this 11-yr study suggests that *Pinus taeda* can invade island communities and become a dominant plant of the herb-shrub seral stage. (Supported in part by N.S.F. Grant GB-6881.)

(116)
Ecological Implications of Studies of χ-amino Acids in Anthurid and Asellid Isopods

W. D. BURBANK, C. G. GOODCHILD, ELIZABETH S. DENNIS, C. E. STYRON[1] AND MADELINE P. BURBANCK, *Emory University*

Determination of percentages of χ-amino acids by the use of ion exchange chromatography in four populations of *Cyathura polita,* two additional species of *Cyathura,* and *Lirceus fontinalis* and comparisons of the percentages were made to discover if there was any correlation between the number of significant differences and the closeness of the taxonomic relationship. On the generic level, total percentage of amino acids and ammonia of the asellid, *Lirceus,* was significantly different from the totals for *C. polita, C. carinata,* and *C. burbancki.* The specific differences were not as pronounced. *C. polita* differed markedly from *C. burbancki*; *C. polita* and *C. carinata* were not very different; and *C. carinata* and *C. burbancki* differed only in percentages of alanine and ammonia. Interpopulation comparisons showed positive correlation with certain ecological differences; an ecologically isolated population differed markedly from other Florida populations, and two populations with similar habitats differed only in the percentage of methionine. The evidence suggests that percentages of χ-amino acids could be used as an aid in determining ecotypes. (Work supported by N.S.F. Grant GB-3122 and research grant (PHS-E795) from the Institute of Allergy and Infectious Diseases of the National Institutes of Health, Public Health Service.)

[1] Present address Oak Ridge National Laboratory

(168)
Experiments with embryos of *Ascaris lumbricoides* var. *suum* in vacuo

KENNETH D. BURNHAM
The University of Tennessee

Ascaris lumbricoides var. *suum* embryos, at several stages of development, were subjected to a vacuum of three to six mm Hg for thirty minutes duration. The experimental conditions utilized were designed to simulate commercial practices employed in the vacuum cooling of produce, a process widely used in Arizona and California. In comparison with controls, no adverse effects in development of embryos were noted during three weeks of observations.

(177)
Thymidine phosphorylase activity in chicken erythrocytes infected with avian malaria, *Plasmodium lophurae*

J. J. CAPONE AND R. W. HULL
Florida State University

Thymidine phosphorylase activity has been found in the *Plasmodium lophurae* and chicken erythrocyte complex. Preliminary investigations have shown that the enzyme is membrane-bound and sensitive to inactivation by lipid solvents and free oxygen or oxidizing agents. It has been differentiated from the hydrolases by its dependency on phosphate. The enzyme is specific for thymidine. It was also found that the early stage chicken reticulocyte possessed a high specific activity of thymidine phosphorylase but the activity decreased logarithmically as the cell matured into a functional erythrocyte. The mature erythrocyte does not demonstrate thymidine phosphorylase activity. There is a linear relationship of enzyme activity to parasitemia in the early stages of infection, i.e., before the chicken responds to the hemolysis caused by the segmented parasites rupturing the cell, with a strong and sudden reticulocytosis, generally being initiated 72 hours after the infection began.

The origin of the enzyme, i.e., host or parasite, is unknown since it cannot be separated from the membrane of lysed infected erythrocytes. At present it can-

not be separated from the membranes without inactivation, thus suggesting the possibility of reactivation of host originated enzyme by the parasite. Possible mechanisms are discussed.

(150)
Seed Germination Responses from the Salt Marsh Grass *Distichlis spicata* (L.) Green, (Angiospermae, Poales Poaceae): Ecological Aspects

GEORGE E. CARTER, JR. AND RICHARD J. KELLY
Wake Forest University

On the assumption that the flowering plants occurring in the mean-high-tide area of the esturine salt marshes are obligate halophytes, the seed germination requirements of *Distichlis spicata* were investigated. It was determined that *D. spicata,* a faculatative rather than obligate halophyte, sets dormant, viable seeds which appear to be non-photoblastic. Several treatments were found to give high germination percentages. Among these were after-ripening (stratification), leaching-scarification, and osmotic shock. These pre-germination requirements will be related to the general esturine ecology.

(134)
Chemotaxonomic Studies in the Southeastern Species of *Luzula*

JANICE C. COFFEY, *Queens College*

The genus *Luzula* is represented in the southeastern United States by four species: *Luzula acuminata* Raf. var. *acuminata* and var. *carolinae* (S. Wats.) Fern., *L. bulbosa* (Wood) Rydb., *L. echinata* (Small) Hermann, and *L. multiflora* (Retz.) Lej. No published data is available concerning the secondary pigments occurring in this genus. This investigation proposes to establish flavonoid patterns in these species and to use these patterns as a basis for further investigations into the nature of variation in this genus. Identification of the consistently occurring flavones and flavonols is offered.

(10)
Net Primary Productivity of Young Big Tooth Aspen (*Populus grandidentata*) stands in Cheboygan County, Michigan

ARTHUR W. COOPER
North Carolina State University

Following destruction of original forests of red and white pine on sandy soils in northern lower Michigan by timbering and fire, sprout stands of Big tooth aspen (*Populus grandidentata*) have developed. Permanent sample plots established on property owned by the University of Michigan Biological Station provide data on rates of species change and permit quantitative reconstruction of the general pattern of succession. In addition, relationships between diameter and weight of trees, determined from destructive sampling, permit estimates of standing crop of trees at given times during the succession. Data on changes in species composition and size from the permanent sample plots have been combined with estimates of the standing crop of above ground biomass of plants to provide generalizations on changes in rates of net primary productivity during the first 50 years of the succession.

(123)
Productivity and Species Diversity of Plankton, Norris Lake, Summer, 1968

CYNTHIA COWGILL AND A. RANDOLPH SHIELDS

Plankton samples from four embayments of Norris Lake were used to relate productivity and species diversity. In general, the two parameters are inversely related. The most significant observation was the increase in diversity values without any increase in total productivity adjacent to marinas where several houseboats are moored. In one instance this was associated with oxygen depletion. Plankton production in Norris Lake is relatively low.

(142)
Demonstration of a Potassium-Sensitive, Calcium-Activated Adenosine Triphosphatase in the Meristematic Cells of Lost Pine.

T. J. CULPEPPER[1] AND IOLA T. MCCLURKIN
University of Mississippi

Calcium ions activated adenosine triphosphatase (ATPase) activity in the nuclei of the meristematic cells in root tips from lost pine seedlings, a race of *Pinus taeda* L. Sodium, in conjunction with equivalent concentrations of calcium and ATP, inhibited ATPase activity, whereas potassium ions under the same circumstances further increased the activity of calcium. This specific cation-stimulated ATPase requires equivalent concentrations of calcium and ATP, and magnesium ions cannot substitute for calcium. It has an optimum pH of 5.5 and is located only in the nuclear component of the cell.

The determination of the amounts of phosphate liberated by the experimental cations from tissue homogenates of the seedling root tips complemented and paralleled the histochemical results of this study.

[1] Now at University of Southern Mississippi

(187)
A Survey of the Helminths of Aquatic Turtles in North Carolina

FROST H. CUNNINGHAM
North Carolina State University

During July 1967 to October 1968, one hundred and one specimens of the following species of aquatic turtles were collected in six counties in North Carolina: 29 *Pseudemys scripta scripta*, 28 *Chrysemys picta picta*, 18 *Sternotherus odoratus*, 14 *Chelydra serpentina serpentina*, 6 *Kinosternon subrubrum subrubrum*, 5 *Pseudemys floridana floridana*, and one *Clemmys guttata*. Twenty three species of helminths were obtained as follows: fifteen species of trematodes; three species of acanthocephalans; four species of nematodes; and one species of leech. *Pseudemys scripta scripta*, the yellow bellied turtle, harbored the widest variety of helminths. *Spironoura chelydrae*, a nematode, was the most abundant parasite both in distribution and number per host. Nine new host records and ten new locality records are reported from North Carolina.

(173)
The Effects of X-radiation on the Blood Picture of Mice Infected with *Heligmosomum skrjabini* (Nematoda: Heligmosomidae)

JAMES R. CUNNINGHAM, *Clemson University*

The effects of concurrent X-radiation and parasitism by an intestinal nematode, *Heligmosomum skrjabini* (= *Nematospiroides dubius*), on the blood picture of F_1 hybrids of C3H/Anf and C57BL laboratory mice has been studied. Mice were inoculated orally with 200 infective larvae and irradiated with one of four different dosages of total body irradiation so that the leucopenia resulting from the irradition coincided with the leucocytosis caused by the parasite. Hematological data included total and differential leucocyte counts, and packed cell volumes (hematocrits). Total egg production was also investigated using a modified McMaster technique. Significant results of the experiment will be discussed.

(17)
Oil-Field Succession Six Years After Significant Gamma-Neutron Radiation Exposure

CHARLES DANIEL, *Georgia College*

Old-field succession on a flood plain in North Georgia received total exposure of 44,600 rads in two significant burst during initial stages of development. Third year succession reverted to first year dominant *Diodia teres*, where perennial invasion did not occur. Where previously established in third year dominancy, perennial *Monarda punctata* maintained dominancy by vegetative budding until fifth year despite irradiation. Six years later with no further significant irradiation to affect grasses and forbes, *Lespedeza cuneata* and Monarda shared dominance, however tree invasion was insignificant. Non-irradiated control succession was dominated by Monarda in the third and by Monarda-Smilax bonanox in fifth year succession. Six years later both control areas had an open pine canopy above a grass-forbe Monarda-Smilax-Andropogon virginicus dominance.

(49)
Ultrastructure Studies of Several Marine Dinoflagellates (Division: Pyrrophyta)

JOANNE T. DAVIS AND CLINTON J. DAWES
University of South Florida

Dinoflagellate species, *Gonyaulax polyhedra, G. Monilata, Protoceratium reticulatum, Pyrodinium bahamense, Prorocentrum gracile*, and *Gymnodinium splendens*, isolated from the Gulf of Mexico and cultured by the Florida Board of Conservation, were examined with the electron microscope. The general ultrastructure of the dinoflagellate is described with the primary studies based on *Gonyaulax polyhedra* and *G. monilata*. The other species were used as comparative organisms. Typical eukaryotic organelles were found, and in addition, several unusual features were noted. Trichocysts were similar in all the species examined except *Prorocentrum gracile*. The chloroplast membrane for *G. polyhedra* consisted of a triple membrane. An unusual concentration of concentric mitochondria was encountered in *Pyrodinium bahamense*. Thecal plates were apparently surrounded by two unit membranes, the thecal membranes, one which encircled each plate and another membrane which covered the whole cell. Directly beneath the plasmalemma was a layer of small tubules. The nucleus contained numerous condensed fibrillar chromosomes.

(73)
Courtship and Intermale Behavior of the Jumping Spider, *Zygoballus bettini* Peckham

JOHN D. DAVIS
Mississippi State College for Women

A study of courtship and intermale displays of the jumping spider *Zygoballus bettini* Peckham indicates behavioral differences correlated with male polymorphism. Three forms of males were distinguishable by overall size and proportions of fang and first leg, both of which are releasers in displays. Using stimuli of known intensity, fifty courtship display sequences were filmed for each size group. Motor elements of display were found to be highly constant, but were patterned into units in which the male approached the female rapidly or more slowly. Typically, the rate of approach accelerated as the male neared the female, but the total number of rapid units versus slower units differed for the smallest males and other groups. Seventy per cent of the total movement units of the smallest males involved slow approach versus fifty per cent for the other groups. The largest males tended to hold their first legs farther from the vertical than the other groups: this difference was also seen in intention movements. Intermale pairings resulted in a different set of motor patterns and grappling without injury, except when small males were paired with the largest males, in which case the small males were attacked without releasing the agonistic ritual movements of the large males.

It is suggested that the small males may represent the initial male size, and that selective pressure for supernormal releasers has produced the larger forms.

(50)
An ultrastructural study of the colorless green alga, *Saprochaete saccharophila* Coker and Shanor (Chlorophyceae, Chaetophorales, Saprochaetaceae)

CLINTON J. DAWES
University of South Florida

The cytology of a colorless green alga *Saprochaete saccharophila* Coker and Shanor (Chaetophorales) has been studied utilizing light and electron microscopes. The eukaryotic cell structure is very similar to fungal cells, containing Golgi bodies, mitochondria, nuclei and glycogen-like bodies. The cell wall contains microfibrils arranged parallel to the filament axis and an abundance of amorphous material. The possible chemical constitution of these microfibrils is discussed. Small protrusions from the cell wall project into the cell lumen and are reminiscent of trabeculae found in *Caulerpa*. The fungal and algal features of this organism are compared and discussed.

(165)
Ultrastructure of Mitosis in *Volvox aureus*

T. R. Deason, W. H. Darden, Jr., and Sarah Ely, *University of Alabama*

Male colonies of the M5 strain of Volvox aureus can be induced at will, and the developing sperm packets provide a source of rapidly and synchronously dividing cells. Colonies with dividing male initials were selected using disposable glass pipettes, fixed in gluteraldehyde and osmium, and embedded in an Epon-Araldite mixture. Previous reports of intranuclear division are confirmed, and the role of microtubules and basal bodies in mitosis is discussed.

(26)
Phylogenetic and Systematic Significance of Leaf Vascularization in Dilleniaceae (Angiospermae-Dicotyledoneae)

William C. Dickison
Virginia Polytechnic Institute

The mature foliar nodes of Dilleniaceae (*sensu stricto*) are unilacunar one-trace, trilacunar, and multilacunar. The unilacunar and multilacunar patterns are both derived from the trilacunar condition. Cotyledonary nodes are unilacunar two-trace or unilacunar one-trace. Nodal anatomy discredits a close relationship between the Dilleniaceae and Theaceae. Descriptions of petiole venation patterns reveal that vascular cylinders composed of widely dissected bundles are more primitive than those with fused bundles and more complex medullary traces. The vascularization of the lamina displays fundamental phylogenetic trends of specialization in both major and minor venation. Bundle sheath cells are either parenchymatous or sclerenchymatous and may enclose the terminal tracheids. Slender venation patterns lacking bundle sheathing are less specialized than coarser-veined leaves with massive bundle sheathing. When considered together, nodal anatomy and foliar vasculature are frequently of excellent diagnostic and taxonomic value.

(115)
The Use of the Sequential Comparison Index as a Biological Evaluation of Stream Pollution

Kenneth L. Dickson and John Cairns, Jr.
Virginia Polytechnic Institute

Six sampling stations were located on a twelve-mile stretch of the New River in Giles County, Virginia, which received three different potential sources of pollution. Representative and comparable samples of macroinvertebrates were obtained at each station using a bottom net and a Peterson dredge. Evaluation of data was made using the Sequential Comparison Index (S.C.I.)[1] and taxonomic techniques, such as species diversity, the Biotic Index, and the breakdown into intolerant, facultative, and tolerant categories.

Interpretation of the data shows similarities between all techniques of evaluation. When unit effort and degree of professional specialization required are compared for the various techniques, the S.C.I. proves to be a simple, rapid, and reliable technique for the evaluation of the biological effects of pollution. Although taxonomic specialization is not required for the use of the S.C.I., a basic understanding of aquatic ecology is essential for its interpretation. (Research supported by Manufacturing Chemists Association.)

[1] Cairns, John, Jr., et al., J. Water Pollution Control Federation, 40, 9, 1607 (1968).

(186)
Simple Method of Preparing Intestinal Tracts of Mice for the Purpose of Studying Adult *Trichinella spiralis* in situ

H. Donald Dobbs, *Wofford College*

A method has been devised for mounting and staining in toto intestinal tracts of mice so that entire populations of adult *Trichinella spiralis* can be studied in situ. Small and large intestines are mounted on strips of heavy absorptive paper, slit longitudinally, and fixed with Bouin's for 20-30 minutes. The intestinal strips are hydrated, stained with Delafield's hematoxylin for 5-10 minutes, and then transferred to 35% alcohol. The strips are "read" under a magnification of 20X. The position and sex of each worm and the locations of Peyer's patches are recorded on a plotting chart in scale with the intestinal tract. These preparations permit investigation of spatial relationships among individual worms, and between worms and intestinal structures (villi and Peyer's patches), and the linear frequency distribution of adult trichinella in the same host. This method is being used in conjunction with mass recovery techniques for the purpose of studying the effects of immunity on distributional patterns of adult trichinella in the small intestine.

(92)
Population Density and Home Range Size of the Eastern Box Turtle (*Terrapene c. carolina*) in Eastern Tennessee

Richard A. Dolbeer, *University of Tennessee*

By systematic searching of a 22 acre woodland near Knoxville, Tennessee, 270 box turtles were captured, marked, and released during 1968, with many being recaptured a number of times. The location of each turtle captured was recorded by reference to trees marked at 250 foot intervals. From the data on locations of recaptured turtles, the average home range diameter for adults was estimated to be 250 feet. A population estimate of seven to nine turtles per acre was obtained by the use of capture-recapture data. These results are somewhat different than the estimates given for the same species by investigators in Maryland and Indiana in which the home range diameter was estimated to be 325 to 375 feet and the population density four to five turtles per acre. This indicates that the habitat used in this study is somewhat more suitable for the box turtle in that it supports a higher population with a smaller home range for individual turtles.

(40)
Threonine Deaminase Feedback Inhibition in a Pseudomonad Species

Bobby F. Drake and Victor E. Feisal
Memphis State University

Feedback inhibition of threonine deaminase was studied in a Pseudomonad species. Investigations with crude cell-free extracts revealed (I) concentrations of isoleucine

necessary to inhibit the threonine deaminase reaction from 0 to 100% at substrate concentrations of 0.4M, 0.2M, and 0.1M threonine, (II) enzymatic activity at different pH, in which pH 9 was determined as optimum, (III) enzymatic activity at different temperatures, at which 40 C was determined as optimum, and (IV) the enzyme to be specific for the L forms of threonine and isoleucine.

It, also, was noted that as substrate concentration was doubled the amount of isoleucine to inhibit the reaction by 50% was doubled. Higher concentrations of isoleucine were required to completely inhibit the reaction at pH higher than 8. Enzymatic activity was greater under alkaline conditions, as activity ceases at a pH below 7.

(137)
Corona Variation in Southeastern U.S. *Matelea* (Asclepiadaceae)

DONALD J. DRAPALIK, *Georgia Southern College*

I recognize nine species of *Matelea* in the Southeastern United States. Six species display a considerable amount of corona variation as compared to the other three. These six species include all those cited under *Odontostephana,* Alexander in Small, *Manual Southeast Flora.* Garden studies have shown that most of the variation is due to genetic rather than environmental factors, and that artificial interspecific F_1 hybrids generally have coronas that are intermediate between the two parents. Corona variation appears to be random in respect to all other characters studied. All variants of a single species are frequently found within single natural populations. In spite of the tremendous amount of corona variation, each species usually has a "typical" corona pattern which can be used as a diagnostic tool.

(167)
The Chemical Characterization of the Notochordal Sheath in Bullfrog Larvae

KIAH EDWARDS, JR. AND ROY HUNTER, JR.
Atlanta University

The notochordal sheath of larval amphibians (*Rana catesbeiana,* Class Amphibia, Order Anura), which is found directly around the peripheral and vacuolated notochordal cells, consists of two components: an inner fibrous and an outer elastic lamella. In an effort to clarify data on the chemical nature of the sheath, the method of enzymic hydrolysis was employed. Sections of tissue from the tails and isolated notochordal sheaths were observed before and after treatment with hyaluronidase, collagenase, gelatinase, elastase, lipase, steapsin, and proteinase. The sheath was unaffected by hyaluronidase treatment. The inner fibrous lamella and the basement lamella of the epidermis (a well defined collagenous structure) were completely hydrolyzed by collagenase and gelatinase. Proteinase treatment resulted in a disruption of the compactness of the fibrous lamella. The outer elastic lamella of the sheath was not affected by elastase and the other enzymes, either singly or in combinations. Neither component of the sheath was altered by lipase and steapsin, although these enzymes did cause a disruption of the vacuolated notochordal cells. These data confirm the collagenous nature of the fibrous lamella; however, the precise nature of the elastic lamella remains unknown.

(130)
Macroscopic Temperate Zone Epiphyllae

E. ANN ELLIS AND JOE A. EDMISTEN
University of Georgia

Ruinen (1961) described the environment for epiphytes on the external surfaces of perennial, tropical leaves (the phyllosphere). In the tropics, well-developed phyllosphere populations (epiphyllae) are of general occurrence. Ruinen also recognized a successional sequence of epiphyllae establishment. Fungi, algae, lichens, and liverworts have been observed growing on leaves of *Magnolia grandiflora, Ilex opaca,* and *Serenoa repens* in southwest Georgia. Prominent epiphyllous species from these leaves have been identified. The successional sequence of these epiphyllous species is being studied. Comparisons of the temperate zone epiphyllae and tropical epiphyllae will be made. Ektachrome slides of epiphyllae will be shown.

(29)
Description and Breaking of Dormancy in Corms of Jack-in-the-Pulpit (*Arisaema* Spp.)

TIM T. ELLIS AND VARLEY E. WIEDEMAN
University of Louisville

As one of the spring herbaceous perennials Jack-in-the-Pulpit develops from a corm. Corms from a natural population were divided into four categories. Three of the categories, based on corm size, are suggested to correspond to different age groups. Plants of the fourth category, bud corms, were tenuously attached to parent corms and lacked the root system characteristic of the other groups. Only plants of the largest category developed flowers on their vegetative shoots. Breaking of dormancy was accomplished by chilling corms collected in July for at least two months at a temperature of 4 C. Development of plants seemed to follow the sequence found in nature.

(67)
Preliminary Investigations of Protein-Bound Iodine in the Mongolian Gerbil (*Meriones unguiculatus*)

MATTIE D. FARMER AND GEORGE W. TATE, JR.
Memphis State University

The Mongolian gerbil (*Meriones unguiculatus*) has been investigated for possible use as a clinical research animal for studying thyroid physiology. Using a modification of the technique of Grossman and Grossman, PBI (protein-bound iodine) values and total iodine volume were determined for the gerbil. The average PBI value was $2.38 \pm .25$ ug/100 ml, and the average value for total iodine volume was $6.1 \pm .39$ ug/100 ml. The action of sodium salicylate as a possible factor in the deiodination of thyroxine was also investigated.

(166)
Observations on Chinese Hamster (*Cricetulus griseus*) Metaphase Chromosomes with the Scanning Electron Microscope

ROBERT H. FETNER, *Georgia Institute of Technology*

This report describes our preliminary investigation on metaphase chromosomes in Chinese hamster (*Cricetulus*

griseus) cells using the scanning electron microscope. The material used was a fibroblast cell culture in the first transfer from minced embryos.

(164)
Effects of Light and Temperature on the Ultrastructure of Stage IV Cells of Chlorogloea *fritschii* (Cyanophyceae, Chroococcales)

Davis L. Findley and Patricia L. Walne
University of Tennessee, Knoxville

Experiments have shown the effects of varying conditions of light and temperature on the morphology of the blue-green alga, *Chlorogloea fritschii*. Manipulation of the light intensity from 25 to 700 ft-candles of light and temperature from 25 to 45 C results in conditions under which predictable morphological stages predominate. At the extreme temperature of 45 C, low light intensity (60 ft-c) results in 100% Stage IV cells (unicellular, endospore forming), and high light intensity (600 ft-c) results in only 25% Stage IV cells and 75% Stage I cells (short filaments). The present study provides comparative data on the ultrastructure of cells grown under these conditions of temperature and light intensity. The possible effects of various light qualities on the morphology and ultrastructure of the organisms will also be considered.

(60)
In Vitro Experimental Effects of Radiocobalt 60 on Rabbit Polymorphonuclear leucocytes

Diane Oakerson Fleming, *Memphis State University*

The eosin dye exclusion test is the only significantly sensitive method found in the present study to measure the radiation response of rabbit polymorphonuclear leucocytes in the first three hours following radiation doses of 50,000-150,000 rads. These radioresistant cells show sensitivity to radiation at 100,000 rads. Addition of bacteria to the cells for a phagocytic test lowers the dose of radiation necessary for this loss of cell viability to 50,000 rads. The phagocytic index, percent phagocytosis, and bactericidal capacity of these cells are not significantly changed by these levels of radiation; a few studies indicate sensitivity in the 250,000-350,000 range. Intracellular (lysosomal) enzymes such as lysozyme and alkaline phosphatase (AP) do not vary in activity at the 50,000-150,000 rad levels. The post-radiation interval of measurement is important since cell viability and AP activity decrease significantly as a function of time. A three-way analysis of variance is used to determine the statistical significance of the variations due to radiation, the time interval, and the randomly bred rabbits. A model is described for testing the "enzyme release" hypothesis of radiation damage to the cell.

(52)
A Morphological and Cytochemical Study of *Tritrichomonas augusta* (Alexeieff) 1911

Joseph C. Floyd and Felix H. Lauter
University of South Carolina

New information on the cytochemistry of *Tritrichomonas augusta* is presented in this study. Also, the morphology of the organism is redescribed.

DNA was found to be located in the nucleus, being demonstrated there by the Feulgen nucleal reaction and the methyl green-pyronin Y staining procedure. The DNA is of the double-stranded type. RNA is located in the cytoplasm and the nucleoplasm. The specificity of the Feulgen nucleal reaction and the methyl green-pyronin Y staining reaction was verified by the use of the enzymes DNase and RNase.

Glycogen was demonstrated by Best's carmine stain, the periodic acid-Schiff reaction, and the Bauer Feulgen reaction. The axostyle stained positive for glycogen, the walls giving a positive reaction and the central region remaining unstained. The perinuclear cloud is composed of glycogen granules. Glycogen particles were found in the cytoplasm. Salivary amylase and diastase were used to substantiate the results of the stains for glycogen.

(180)
Influence of Weather on the Intensity of Infection of Bighorn Sheep with Lungworms of the Genus *Protostrongylus* (Nematoda: Protostrongylidae)

Donald J. Forrester, *Clemson University*

During a ten year period (1959-68) lungs from Rocky Mountain bighorn sheep (*Ovis c. canadensis*) were examined for infections by the lung nematodes, *Protostrongylus stilesi* and *P. rushi*. All lungs were collected from rams over three years of age which had been shot during October, November, and December of each year by special-permit hunters in the Sun River game area of western Montana.

Year to year changes in intensity of infection were studied by measuring the surface areas of lesions caused by *P. stilesi* and by counting the numbers of adult *P. rushi* for each lung. The variations were correlated with precipitation and temperatures during the preceding spring months, especially April and May. These observations will be discussed in relation to the activities of the land snails which serve as intermediate hosts of these lungworms. (Supported. in part, by National Science Foundation grant G-19422.)

(172)
Reproductive Performance of a Laboratory Colony of deermice, *Peromyscus maniculatus*

Donald J. Forrester, *Clemson University*

Certain aspects of the breeding activities of a laboratory colony of wild and first-generation *Peromyscus maniculatus* were studied over a 23 month period.

Data on more than 600 litters and 2500 offspring were obtained. Average litter size was 4.3 for all litters and 4.1 and 4.7 for litters born to wild-trapped and first-generation females respectively. The range for numbers of young per litter varied from 1 to 7 for wild females and 1 to 9 for litters of first-generation females. More males than females were born to both types of females. Litters born to wild and first-generation females showed an increase in size up to the seventh pregnancy. The incidence of pregnancy was highest in first-generation females. Reasons for the better reproductive performance of first-generation females will be suggested. (Supported in part by Graduate Training Grant 5Tl-762 from the U.S. Public Health Service.)

(22a)
An Example of the Use of Color Infrared Aerial Photography for Salt Marsh Gradient Analysis

WILLIAM A. FOSTER, *North Carolina State University*

The relative importance of 7 types of marsh vegetation on the Lockwood Folly River, North Carolina, was estimated through the use of color infrared aerial photographs. Vegetational changes inland from the inlet along this tidal river are a function of environmental gradients such as salinity, elevation, and substrate. The pattern of vegetational change along this composite gradient indicates likely areas for future studies on factors limiting the distribution of certain plant species.

(70)
Notes on the Migratory of the Southern Harvester Ant (*Pogonomyrmex badius*)

JOHN B. GENTRY, *University of Georgia*

Life history studies of the southern harvester ant, *Pogonomyrmex badius,* are in progress at the Savannah River Plant near Aiken, South Carolina. One interesting part of the studies has been observations on the migratory behavior of this seed-eating ant species. The migrations, which take place between May and October, occur across the surface of the ground in the form of a line of ants carrying brood and food stores from the old to a new colony site. In some areas, up to 97% of the colonies migrate one time during the summer. As many as 40% of these colonies may undergo a second migration.

The stimulus, or stimuli, which results in the migration of *P. badius* colonies is not known. Normally, only a small part of the worker force is active above ground at any one time. However, during migration, the entire colony is exposed. Apparently, this risk is necessary to insure survival of the colony.

(11)
The Ecological and Taxonomic Distinctness of *Carya carolinae-septentrionalis* and *Carya ovata* in the Southeast

EDWARD L. GIBBON, *North Carolina State University*

Carolina shagbark hickory (*Carya carolinae-septentrionalis*) and shagbark hickory (*Carya ovata*) have been considered as separate species or combined as a single species by various authors. In certain areas of their range of sympatric occurrence they occupy what appear to be distinctly different sites while in some locations they occur on the same site.

Soil samples were collected from beneath representatives of both taxa. These samples were analyzed for selected properties including available phosphorous; exchangeable calcium, magnesium, potassium, and aluminum; and particle size distribution. A taxonomic analysis of the two taxa, using vegetative criteria, has been made. The result of these ecological and taxonomic investigations will be reported.

(90)
Structure and Dynamics of the Yellow-bellied turtle, *Pseudemys scripta* (Reptilia: Chelonia: Emydidae) in an Artificially Heated Reservoir)

J. WHITFIELD GIBBONS,
Savannah River Ecology Laboratory

Individuals of the yellow-bellied turtle, *Pseudemys scripta,* in a heated reservoir on the Savannah River Plant reach exceedingly large body sizes and maintain extraordinary juvenile growth rates when compared with turtles of this species from other populations on the Savannah River Plant. Increased aquatic temperatures may be responsible in some way for these observed growth differences. The increased growth rates result in certain changes in population structure and dynamics which have interesting consequences on the population ecology of this species.

(109)
Mass Accumulation of Protozoan Microorganisms

STEPHEN M. GITTLESON AND BARBARA WOODRUFF,
University of Kentucky

During an investigation of vertical aggregations of protozoa (Gittleson and Jahn, 1968) it was observed that by reducing the surface area of cultures, the aggregating organisms would sediment in massive numbers. The highest relative concentration factors (ratio of cells/ml in concentrate to cells/ml in culture) are about 260 for *Polytomella agilis,* 240 for *Polytomella caeca,* 80 for *Astasia longa,* 70 for *Chlamydomonas reinhardi* (−), 50 for *Chlamydomonas reinhardi* (+), 50 for *Euglena gracilis,* and 40 for *Tetrahymena pyriformis* where cells/ml in culture are about 100,000, 700,000, 300,000, 1,000,000, 2,600,000, 400,000 and 100,000, respectively. All organisms were grown axenically in a medium of 0.1 g sodium acetate, 0.2 g yeast extract and 0.1 g tryptone/100 ml distilled water in 1,000 ml batches and transferred to 250 ml burettes for mass accumulation (23 to 26 degrees C). Direct cell counts were made using the Sedgewick-Rafter method.

(Research supported by the University of Kentucky Research Foundation).

(183)
A Study of the Validity of Certain *Spirorchis* Species. (Trematoda: Digenea)

C. G. GOODCHILD AND VIRGINIA L. MARTIN
Emory University and Queens College

Eggs from the tissues of wild *Chrysemys picta* captured in Georgia were used to establish the life cycle of *Spirorchis scripta* in the laboratory. Two lines of parasites were begun from monomiracidial infections in the snail, *Menetus dilatatus.* Hatchling *C. picta* obtained from commercial suppliers and exposed to cercariae of these parasites were grown under a varying range of conditions until sacrificed to permit recovery of adult worms. Worms were prepared as whole mounts and subjected to a series of measurements set up by other authors to characterize different species of *Spirorchis.* This work strongly suggested the synonymy of *S. picta* and *S. elegans* with *S. scripta.*

Geographical Distribution and Seasonal Incidence in the Helminth Parasites of the Starling, *Sturnus vulgaris* L. (Aves: Passeriformes: Sturnidae)

JAY D. HAIR, *Clemson University*

Seventy-five species of helminths, representing 49 genera, have been reported from starlings by numerous authors in different parts of the world. They comprise 26 species of Trematoda, 13 of Cestoda, 27 Nematoda, and nine Acanthocephala. In all instances except one, more genera and species of helminths have been reported from starlings from the eastern than from the western hemisphere. Several possible factors which may contribute to the differences between the helminth faunas of starlings from the two hemispheres are suggested.

The incidence of parasitism is high in starlings in western South Carolina during the spring and summer months. The prevalence and seasonal variations of the helminth parasites appear to be dependent on numerous factors which will be suggested.

(35)
Single Lobe Growth Patterns in *Parmelia caperata* (Lichens)

MASON E. HALE, *Smithsonian Institution*

The growth of a single lobe has been followed with closeup photography for one year. The dominant pattern is dichotomous branching with about one complete dichotomy each year. Lateral and intercalary growth is minor; most is strictly apical. During winter months growth rates are extremely low (of the order of 0.05 mm per week), but by April there is a rapid increase. The chief manifestation of growth is enlargement of the opaque white patches below the cortex which represent fungal tissue without associated algae. During rapid growth the fungal component grows faster than the algae, carrying along and enlarging the white patches. The patches decrease in size or close up during fall and winter as growth slows down.

(91)
Movements and Activity Patterns of the Dusky Salamander, *Desmognathus fuscus*

JAMES W. HARDIN[1], ROGER W. BARBOUR, JAMES P. SCHAFER, AND MICHAEL J. HARVEY[1], *University of Kentucky*

Movements and activity patterns of 14 *Desmognathus fuscus* were studied using radioisotope tagging and tracking techniques. The average home range size of 5 salamanders with 40 or more points of detection was 48.4 m^2 range, 25.2 m^2 to 114.5 m^2). The maximum movement in a 24 hr period was 17.1 m (in 10 hr 25 min). Most recorded movements were of distances less than 2 m. Most movements began between 0600 and 0900 and between 2100 and 2400. The salamanders had peaks of activity at 0800 and 2300. The least activity was observed at 0300 and at 1600, average temperatures being 17.0°C and 29.0°C respectively. During and after rainfall the animals were often found out of the stream channel. In daylight wet periods the peaks of movement were exaggerated whereas in nighttime wet periods the movements were similar to nighttime dry periods. No sexual differences in activity were noted. The two most active animals were a male and a female; the most quiescent were gravid females.

[1] Present address: Memphis State University.

(163)
Isozymes of the E_4 Esterase in *Zea mays*

JOHN W. HARRIS, *Tennessee Tech*

Five alleles of the E_4 esterase gene in maize have been found. Alleles E_4^c, E_4^d, E_4^e, and E_4^f each specify a series of isozymes with differing rates of anodal migration in starch gel electrophoresis at pH 8.5. The slowest band of each series is the most intense, with each faster band being progressively lower in intensity. The fifth allele, E_4^n, is a null or silent gene. The multiple bands specified by different E_4 alleles are distinguishable by the position to which the slowest band migrates in electrophoresis. However a number of the isozymes belonging to different series were found to correspond in migration rate. All of the bands in a particular E_4 series are specified by a single gene and the genes responsible for the production of different series are allelic. Several lines of evidence indicate that the various E_4 isozymes differ in charge.

(143)
The Effect of Fast Neutron Radiation and Light Intensity on Root-Shoot Ratios of *Liriodendron tulipifera* L. Seedings

W. F. HARRIS
Radiation Ecology Section, Health Physics Division
Oak Ridge National Laboratory, Oak Ridge, Tennessee

Shoots of 2-year old yellow poplar were given acute sublethal fast neutron radiation doses of 200, 300 and 400 rads as dormancy was breaking. Plants were then grown in 100%, 50%, and 25% full sunlight. Three replicates of each treatment combination were harvested at 45, 75, 115 and 195 days post-irradiation. Root-shoot ratios (R/S) ranged from 0.85 (full sun-controls) to 0.23 (25% full sun-400 rads). At 45 and 75 days post-irradiation R/S values of irradiated seedlings were significantly lower ($P<0.05$) than those of controls. Time (45 to 75 days) intensified the radiation effect. Reduced light intensity had little effect to this point. At 115 days radiation and reduced light both significantly lowered ($P<0.05$) R/S values compared to radiation-treatment controls and full sun-grown plants. Reduced light resulted in R/S values similar to those of full sun-grown plants receiving 400 rads. Recovery (increased R/S value) of irradiated plants was more complete for 50% full sun-grown plants. Recovery was accelerated by a combination of increased lateral growth and reduced light intensity, increasing leaf area and photosynthate. Therefore, interactions of light intensities and ionizing radiation can play a significant role in determining R/S balances and subsequent growth and survival of plants.

(Research sponsored by the U.S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(108)
Home Range of the Eastern Mole, *Scalopus aquaticus*

MICHAEL J. HARVEY, *Memphis State University*
AND ROGER W. BARBOUR, *University of Kentucky*

Radioisotope tagging and tracing techniques were used in determining home ranges of seven eastern moles, four males and three females. Moles were tagged subcutaneously, using a hypodermic needle and plunger apparatus, with 50 microcurie Co^{60} alloy wire tags. Detection apparatus consisted of a model 489 Thyac II survey meter equipped with earphones, shoulder strap, and a scintillation probe mounted at one end of a 3 m tubular aluminum pole. Each mole was located on at least 40 different days during periods ranging from 11 months to 3 years. The modified minimum area method was used for calculating home range areas. Average home range area was 7,433 m^2; males averaged 10,898 m^2 (range, 3,616 - 18,041 m^2), and females averaged 2,812 m^2 (range, 1,512 - 3,430 m^2).

(69)
Growth Parameters and Notes on the Biology of *Bittacomorpha clavipes* (Fab.) (Insecta: Diptera: Ptychopteridae)

JOHN T. HAYES, *Savannah River Ecology Laboratory*

The phantom crane fly, *Bittacomorpha clavipes* (Fab.) is a widely distributed species occurring in marshy areas adjacent to streams and ponds from Ontario to Manitoba south to Florida and Texas. In January, 1969, over 100 larvae of this species were collected from a small stream flowing from an artesian well on the Savannah River Plant, Aiken, South Carolina. A comparison of head capsule width with dry weight biomass of the individual larvae suggests four or perhaps five larval instars. Overwintering occurs in the larval stage which feeds on detritus and possibly *Spirogyra*. Adults are present from early spring until late fall, with peaks of abundance in June and October, at the Savannah River Plant.

(7)
Preliminary Studies of Nitrogen Fixation on a Granite Outcrop

J. ROBERT HERFORD AND JOE A. EDMISTEN
University of Georgia

The nitrogen budget of a granite outcrop is being studied by using a acetylene reduction test (Stewart et al, Proc. N.A.S. 58: 2071-2078, 1967) in modified form to test various outcrop components for nitrogen fixation ability. Plants and soils were collected, flushed of nitrogen, and exposed to acetylene in the field with sterile technique. The production of ethylene as a measure of nitrogen fixation ability was detected with gas chromatography. Outcrop plants shown to have the ability to reduce acetylene to ethylene include: *Andropogon virginicus, Vigueira Porteri, Tradescantia sp., Opuntia compressa, Smilax bona-nox, Rhus sp., Cheilanthes sp., Polytrichum sp., Grimmia sp., Cladonia spp., Parmelia spp., Peltigera sp.*

Color slides of the site and gas chromatographic results will be shown. Attempts are being made to quantitate the results in terms of potential nitrogen fixation per unit dry weight of plant tissue.

(8)
Isolating Mechanisms in the *Lupinus argenteus* Complex

LLOYD W. HESS, *Savannah River Ecology Laboratory*
AND
DAVID B. DUNN, *University of Missouri*

Extensive breeding studies, involving over 1,000 crosses, have indicated genetic compatability within this group of morphologically very similar taxa. Flowering season, pollenator selection, altitudinal stratification, geographic range, and habitat were considered along with the genetic isolation indicated by the breeding data. On the basis of this information and careful morphological comparisons over 75 named entities ranging from Canada to New Mexico were grouped into 12 named taxa which are believed to more truly represent the population biology of the group. A greatly reduced genetic plasticity of the higher elevation species was noted.

(158)
The Use of Neutron Activation Analysis in a Phylogenetic Study of Seed Mineral Content

LLOYD W. HESS, *Savannah River Ecology Laboratory*
AND
DAVID B. DUNN, *University of Missouri*

Neutron activation analysis is demonstrated to have numerous advantages over other techniques of mineral analysis; especially increased sensitivity, the non-destructive process, and reduced contamination potential. These traits are especially desirable for analysis of plant material such as seeds since the quantity is often very limited and the seeds themselves may be very small. Seeds representative of different species and subspecies of Lupines from various geographic locations were compared as to Mn, Na and K content. To give some idea of the variations of these three minerals in taxonomic units more distantly related than the individual species of a genus, seed material of nine families was also studied. In some cases the mineral content is indicated to be more related to site fertility than genetic difference while in certain families the ratio of minerals accumulated seems significant related within the taxonomic unit.

(76)
The Protozoa of Mammoth and Great Onyx Caves, Kentucky

RICHARD L. HOOVER AND STEPHEN M. GITTLESON
University of Kentucky

Thirty-one protozoan species were identified. Flagellates (15 species) are most common followed by amoebas (10) and ciliates (6). Great Onyx Cave contained *Atraktomonas laevis, Bodo variabilis, B. caudatus,* and *Heterophrys glabrescens*; Mammoth Cave: Historic Entrance — *Rhynchomonas nasuta, Sphaenochloris urceolata, Amoeba guttula, A. radiosa, Ciliophrys marina*; Richardson Spring — *Cyathomonas truncata, Polytoma minus, Bodo minimus, Atraktomonas laevis, Actinophrys sol, Raphidocystis infestans, Amoeba guttula, Vorticella microstoma, Colpoda* sp.; Fish tank (near Richardson Spring) — *Bodo globosus, Cercobodo crassicauda, Amoeba guttula, Colpoda steini*; River Styx — *Amoeba guttula, A. radiosa, Arcella vulgaris, Monas guttula, Codonoeca inclinata, Balladyna elongata, Astrodiculus radi-*

ans, Peranema trichophorum, Polytoma minus, Phyllomitus amylophagus, Raphidiophrys pallida, Bodo minimus, Oxnerella maritima, Stichotricha intermedia, Euplotes charon, Colpoda steini, Heterophrys glabrescens; Echo and Roaring Rivers — *Monas obliqua, Bodo caudatus.* Cave protozoa are troglophiles — surface forms that accidentally penetrate into the cave environment primarily via surface drainage where they live and reproduce.

(Research supported by the University of Kentucky Research Foundation.)

(39)
Biosynthesis of Thiamine by *Phycomyces blakesleeanus*

Houston, M. R., I. McVeigh, R. Neal and W. N. Pearson
Vanderbilt University

The biosynthesis of thiamine from hydroxymethylpyrimidine and C^{14}-thiazole or C^{14}-hydroxymethylpyrimidine and thiazole by *Phycomyces blakesleeanus* is described. Radioactive intermediate compounds and metabolites synthesized during growth in shake culture have been isolated and identified by one or more of the following techniques: thin layer chromatography, column chromatography, autoradiography, and bioautography. Data are presented which indicate that the pathway of synthesis of thiamine by this fungus is similar, if not identical, to that reported for baker's yeast and some species of bacteria.

(177a)*

(6)
Nitgrogen Fixation in *Elaeagnus Umbellata*

Kermit Hunnicutt II and Joe A. Edmisten
University of Georgia

Elaeagnus umbellata, a flowering, root-nodulated plant belonging to the family *Elaeagnaceae* was tested for its capability of fixing nitrogen. Root nodules of this woody shrub were tested for nitrogen fixing ability by the acetylene reduction test modified from Stewart, *et al.*, 1967. The production of ethylene from acetylene was detected by use of gas chromatographic technique. Results of these tests and data describing the distribution of *Elaeagnus* will be presented. *Elaeagnus umbellata* was found capable of fixing nitrogen and practical applications of this knowledge were considered.

(136)
Flavonoids and Systematics of American *Vernonia*: Compositae

Gordon E. Hunter, Kim Freeman, Barbara Burch, and Guillermo Flores
Tennessee Technological University

Flavonoid compounds isolated from methanol extracts of leaves of *Vernonia* species by paper chromatography are proving useful in the classification of the American species. Chromatographically the species are usually distinct. Further study of the compounds by means of spectrophotometry and acid hydrolysis can be used to characterize the flavonoid compounds. The latter information is providing documentation to support relationships suggested by morphological investigations of some of the populations.

* *See page 73.*

The six species included in this investigation are *Vernonia altissima* Nutt., *V. corymbosa* Schiv., *V. marginata* (Torr.) Raf., *V. lettermannii* Englem, *V. augustifolia* Michx., and *V. crinita* Raf.

(82)
A Survey of the Enteric Bacteria (Enterobacteriaceae) of Chelonians: Preliminary Findings

Marguerite M. Jackson, Macdonald Fulton, and Crawford G. Jackson, Jr.
Mississippi State College for Women

A long-term investigation of the enteric bacterial flora of wild and captive turtles was initiated in early 1968. Individuals of 16 species, representing 2 families and 10 genera have so far been examined. Among wild individuals: *Salmonella miami* was found in *Sternotherus minor*; *S. infantis* in *Chelydra serpentina*; *Edwardsiella tarda* in *Chrysemys picta* and *Pseudemys s. scripta*; *Citrobacter* (Bethesda-Ballerup Group) in *Kinosternon subrubrum* and *Pseudemys floridana.* Among individuals which have been captive for one month to three years: *S. thompson* was found in *Pseudemys s. ornata, Geoemyda annulata, Pseudemys nelsoni* and *Terrapene carolina bauri*; *E. tarda* in *P. s. ornata, G. annulata, P. nelsoni* and *Pseudemys concinna*; *Citrobacter* (Bethesda-Ballerup Group) in *T. c. bauri, C. picta, Kinosternon leucostomum* and *Gopherus polyphemus.* This report apparently constitutes the first finding of *Edwardsiella tarda* in turtles. Several strains of *Escherichia* and *Aerobacter* which may represent new species are concurrently being investigated. The widely distributed *Aeromonas hydrophila,* though not classified as a strict gut-inhabitant, was of frequent occurrence in both wild and captive individuals of most species examined.

Routine procedures and culture techniques are used to determine biochemical profiles prior to serotypic analysis. It is anticipated that the accumulating data will shed light on questions regarding incidence of infection, degree of pathogenicity and geographic distribution. (Supported in part by an MSCW Faculty Research Grant.)

(155)
The Reproductive Potential of *Drosophila Affinis*

Willard L. Jinks, *Marshall University*

Pertinent literature concerning the ecology and nutrition of *Drosophila,* and specifically *D. affinis,* has been briefly reviewed. Terminology relevant to the study of reproductive potential is redefined and clarified, with the term reproductive potential meaning any factor or the sum of all factors contributing to maximum population size, such as: sex ratio, longevity, fecundity, viability, and generation time. The methods of obtaining this information are outlined in detail.

The yeasts, *K. apiculata, S. cerevisiae,* and *P. fermentans* were used as food for the flies. Egg counts were made to obtain data on fecundity. The ratio of the imagoes to eggs gave information on viability. The time that it took for the egg to develop to the adult stage was considered to be the generation time. The female fly was permitted to live out its life cycle in a food vial and its expiration date was noted.

Longevity was notably different between the three yeasts; the life span was shortened considerably when flies ate *K. apiculata,* being only 14-22 days with an average of 14 days. *Pichia* and *Saccharomyces* averaged 34 and 22 days, respectively.

(110)
Winter Habitat Exploitation in Four Species of Sparrows in Ecotones

FRED L. JOHNS, *North Carolina State University*

An analysis of the habitat exploitation of four species of sparrows (Song, Field, White-throated Sparrow and Slate-colored Junco) in ecotones between "old fields" and woods was conducted in the Raleigh, N.C. region during the winters of 1966 and 1967. Data were collected as point observations of feeding birds in years, plots, vegetation zones, at heights from the ground, and in specific plants. Analyses of variation indicated that, even though all four species exploited similar volumes of space and time, there are demonstrable patterns for each species which negate the idea of mutual niche occupation in winter. Significant differences were found for species in vegetation zones, in heights from the ground, and in associated plant species but no differences were found for species in years or plots.

(184)
Myxidium chelonarum n. sp. (Cnidosporidia: Myxosporida: Myxidiidae) from Various North American Turtles

CHARLES A. JOHNSON, *North Carolina State University*

Myxidium chelonarum n. sp. is described from the gall bladder of *Pseudemys scripta scripta* (Schoepff) (Yellow-bellied Turtle) from Edenton, North Carolina. Trophozoite: green; round, flat; slightly ameboid; 16-180 microns in diameter; hyaline ectoplasm, granular endoplasm; polysporous. Spore: 14.2 × 4.1 × 3.7 microns; boat shaped; suture lines indistinct; 4-6 striae arranged obliquely across spore; 2 polar capsules; polar filament 5-7 coils, averages 32 microns long. *Myxidium chelonarum* n. sp. was also found in the gall bladders of the following species of turtles: *Chelydra serpentina, Kinosternon sonoriense, Sternotherus odoratus, Graptemys pseudographica, G. pulchra, Pseudemys floridana, P. concinna, Chrysemys picta* and *Deirochelys reticularia.* Susceptibility studies involving eight species of vertebrates produced negative results.

(133)
Biosystematic Studies in *Vernonia* (Compositae)

SAMUEL B. JONES, JR., *University of Georgia*

The perennial species of *Vernonia* indigenous to eastern North America are especially promising materials for biosystematic studies; however, they have been the subject of relatively few biosystematic investigations. Our work has indicated the existence of hybridization, introgression, and clinal variation; species based by early taxonomists on one or two specimens, often with little or no ecological data; and the frequent naming of hybrids. The greatest problem is that of hybridization followed by introgression. This is sometimes confounded by the hybridization of more than two species. Partially sympatric species are often isolated by the relatively weak barriers of seasonal or ecological isolating mechanisms. Man has frequently helped to break down this isolation by creating disturbed ecological sites which are now occupied by hybrid populations. Our approaches to clarification of some of the problems include a hybridization program, a cytological study, an analysis of population samples, and observations of some of the ecological parameters of the populations.

(13)
Pesticide Flow Through a Model Freshwater Ecosystem

JEROME KELLY AND MORRIS F. CRANMER
Environmental Biology Program, University of Miami, and Pesticide Research Laboratory, USPHS, Perrine, Florida

Chlorinated hydrocarbon pesticides have been found to be concentrated upward in food chains in estuarine environments. Since pesticides are often washed from fields on which they were applied into bodies of freshwater, they are found in freshwater organisms, sometimes causing serious damage to the environment. In this study a 110 gallon tank, simulating natural conditions, was stocked with carnivorous fish, herbivorous fish, a plankton population, higher plants, and detritus feeders. A concentration of DDT of 1 ppb was maintained in the tank water. At selected times organisms from the various trophic levels, the water and substrate materials were analyzed for DDT and its breakdown products by gas chromatography. Results are discussed in terms of DDT uptake and its ecological consequences.

(14)
Pesticide Residues in a South Floridian Agricultural District Canal

JEROME KELLY, PETER RHOADS, DOUGLAS SCHNEIDER, AND RICHARD SMITH
Environmental Biology Program, University of Miami

South Dade County, Florida, contains farm lands to which large amounts of pesticides are applied. Unknown amounts of these pesticides find their way into the nearby drainage canals. A study of the pesticide levels in one of these canals was made during the winter growing season (1968-69), the season of heaviest use of the fields, particularly for truck farming. The canal, C-102, and nearby fields were surveyed for drainage runoff and land use by ground observations and aerial photography. The Central and Southern Florida Flood Control District office supplied information concerning drainage flow. Surveys of crop distribution and pesticide sales provided information on types of materials applied to the agricultural crops. Water samples, collected along the length of the canal, were analyzed by gas chromatography. Seven pesticides, identified as persisting throughout the length of the canal, were estimated quantitatively. Sampling will continue through March, 1969. Data will be reported on aquatic pesticide levels and correlated with pesticide application, type of crop, rainfall, and canal flow.

(Supported by U.S. Public Health Service Training grant No. ES-00126.)

(34)
Antennopsis gallica Heim and Buchli, (Hyphomycetes: Gloeohaustoriales), An Entomogenous Fungus on Subterranean Termites in Florida

J. W. KIMBROUGH, *University of Florida*

Antennopsis gallica Heim and Buchli, an entomogenous Hyphomycete, is reported for the first time in North America on the subterranean termites *Reticulitermes vir-*

ginicus Banks and *Reticulitermes flavipes* (Kollar) in north Florida. This also constitutes the first report of this fungus on species of *Reticulitermes*. Although the fungus has been reported on various termites in certain European countries, many aspects of its life cycle were heretofore unknown. Details of the life cycle of *A. gallica* are described and illustrated and methods of distribution are discussed. These studies have shown that although infection is widespread in this area, the degree of infection of individual insects is less than reported in other parts of the world.

(63)
Age Difference as a Factor in the Assay of the Effect of 5-HT on Gut Motility in the Rat

T. Daniel Kimbrough
Virginia Commonwealth University

Work during the past six years has shown that the rat duodenum when perfused *in vitro,* is a sensitive tissue indicator of 5-hydroxytryptamine. Drug treatment and fluorometry were used to show that peristalsis increases in response to elevated levels of 5-HT. These studies, however, have failed to consider possible variations owing to age. An assay of this factor would seem essential to a long-term study of 5-HT metabolism since certain brain tissues *e.g.* pineal, or tissues which contain the highest levels of 5-HT, also show marked changes with age.

Recently, gut strips from male Wistar rats were perfused, and their contractions were recorded with a GME polygraph. Mean results indicated that 5-HT-induced gut motility is up to 300% greater in 5 months old rats than in 1½ month old rats.

(81)
Rotifers (Rotifera) of Four Flood Control Reservoirs in Northern Mississippi

Luther A. Knight, Jr., and Y. J. McGaha
University of Mississippi

The rotifer fauna of four flood control reservoirs in northern Mississippi was investigated from June, 1965 through April, 1968. Data from 34 stations on Arkabutla, Sardis, Enid and Grenada Reservoirs and some of their tributaries include 85 species of rotifers. Emphasis was placed upon those forms occurring in streams and limnetic zones of the reservoirs. Although rotifers are a major component of zooplankton, only a few species occurred with adequate frequency and in sufficient numbers to be considered common. However, members of *Polyarthra dissimulans* Nipkow and *Keratella cochlearis* (Gosse) often constituted a majority of the zooplankton crops. Percentages of zooplankton represented by rotifers ranged from 16.3% in some streams to 85.1% in bays. Populations of rotifers were sparse in streams, but development reached maxima in bays where stream and reservoir waters mixed and then decreased in the main bodies of the reservoirs. Poor quality of water in these reservoirs may limit populations of many rotifers.

(42)
Further Aspects of Flagellar Retraction in Fungi

William J. Koch
University of North Carolina at Chapel Hill

Of the four basic patterns of flagellar retraction recently demonstrated, one of these, *body-twist* retraction, is analyzed further. Observing zoospores of *Blastocladiella* with phase contrast microscopy, demonstrated are the movements of the zoospore's body and flagellum prior to encystment. A three-dimensional concept of *body-twist* flagellar retraction is presented. Also shown is the fate of the nuclear cap during encystment.

(171)
The Effects of Alkyl Benzene Sulfonate (ABS) and Linear Alkylate Sulfonate (LAS) at Three Concentrations on the Respiration Rate of *Notropsis Lutipinnis* Jordan and Brayton

Wayne Laslie, *Georgia State College*

The effects of alkyl benzene sulfonate (ABS) and linear alkylate sulfonate (LAS) at 10, 20, and 30 ppm on the respiration rate (in gill movements per minute) of *Notropis lutipinnis,* a teleost fish of the Order Cypriniformes, were tested. A concentration of 10 ppm of LAS produced no significant differences in the respiration rate of the test fish from that of the control, while 10 ppm of ABS produced a significant difference at the .05 level. In 20 ppm the respiration rate was increased. The differences in the respiration rate of the experimental fish and that of the controls were significant at the .01 level. At 30 ppm the respiration rate was decreased and the differences were significant at the .01 level.

ABS appeared more toxic than LAS with 10% (2 out of 20) of those exposed to 20 ppm of this solution dying, while 15% (3 out of 20) died in 30 ppm of ABS. None died in the LAS solution. There was no significant difference in the respiration rates of the fish in LAS and those in ABS at a given concentration. The effects of the solutions appeared to be cumulative as the respiration rates of the controls steadily increased throughout the experiment.

(33)
A Floristic Study in Mobile, Alabama

Michel G. Lelong, *University of South Alabama*

The need for a recent and reasonably complete list of vascular plants in the Mobile region has been felt in the teaching of some of our biology courses. Consequently a vegetational study of the area surrounding the University of South Alabama campus was conducted during the last two years. This area covers approximately three sections of land and consists primarily of rolling, sandy Longleaf pine woods typical of this region. It is traversed by Three Mile Creek and its swampy and marshy floodplain.

Approximately 2600 specimens were collected and identified. They represent 684 species and varieties of vascular plants. The grass family is best represented in this location with 111 species, followed by the composite family with 86 species, the legume family with 59 species, and the sedge family with 42 species.

(46)
Interconnections Between Cytoplasmic Microtubules and Basal Bodies of Tetrasporalean Pseudocilia (Chlorophyta, Chlorophyceae, Tetrasporales)

CAROLE A. LEMBI AND PATRICIA L. WALNE
University of Tennessee

Ultrastructural investigations of the development and structure of pseudocilia in *Tetraspora lubrica* and *Schizochlamys* sp. have disclosed interconnections between cytoplasmic microtubules and pseudocilial basal bodies heretofore unreported. Connections between elements of the basal bodies and the proximal connecting fibers will also be described. The possible significance of the interconnections in correlating structure and function of these organelles will be discussed.

(Research supported in part by an NDEA Title IV Predoctoral Fellowship to the senior author and by a University of Tennessee Faculty Research Grant to the junior author.)

(124)
Pines in the Vegetation of the Marshall Forest

E. LEWIS LIPPS, *Shorter College*
H. R. DESELM, *University of Tennessee*

The plot method was used to examine the forest vegetation of Georgia's first National Natural Landmark — the 100-acre Marshall Forest. Pine was important in each of the three plant communities: Pine-Oak on the gentle, south-facing slope, Chestnut-Oak on the upper north-facing slope, and the Mixed Forest of the ravine. The relation of pine density and size to soil impedance to roots and periodic storms is discussed.

(135)
A Consideration of the Systematic Position of *Phryma*

HARRIETT LIPSCOMB, *Georgia College at Milledgeville*

Phryma, a monotypic genus with uncertain taxonomic affinities, was investigated anatomically and morphologically in an effort to determine its systematic position. A general survey was made of the families in Scrophulariales and Lamiales with which *Phryma* has been associated. Of the groups examined *Phryma* exhibits the most structural similarities with the racemose Verbenaceae in general vegetative form, inflorescence type, and in floral and fruit anatomy. Detailed observations of the floral and fruit anatomy reveal that *Phryma* has its closest affinities with the tribe Lantaneae in the subfamily Verbenoideae. Even though similar in fruit and floral characteristics, *Phryma* has diagnostic and distinct features separating it from the tribe Lantaneae. Because of the compatible features of *Phryma* with the members of the subfamily Verbenoideae, it is suggested that *Phryma* be accorded tribal status in the subfamily Verbenoideae of the family Verbenaceae.

(175)
A Study of Multiple Molecular Forms of Enzymes in Species of Salmonidae and Esocidae (Osteicthyes: Clupeiformes)

NICHOLAS J. LO CASCIO
State University College at Buffalo

A starch gel electrophoretic study of the enzyme glucose-6-phosphate dehydrogenase (G-6-PD) in the Salmonidae and the enzyme 6-phospho-gluconate dehydrogenase (6-PGD) in the Salmonidae and Esocidae was undertaken in order to deduce the molecular structure and genetic variability found within and between species of these families for these two enzymes. An examination of the banding patterns of G-6-PD and 6-PGD from *Salmo gairdneri* (RT), *Salmo trutta* (BT), *Salvelinus fontinalis* (ST) and *Salvelinus namaycush* (LT) liver samples did not demonstrate intraspecific variation. Difference between species was clearly evident. Only when an electrophoretic examination was made of two groups of Brown Trout during spawning season was a sex difference noted in the G-6-PD and 6-PGD banding patterns. This was interpreted as the effect of hormonal influence. The 6-PGD enzyme found within the species of Esocidae and Salmonidae examined was found to be polymorphic and dimeric in structure. This polymorphism is controlled genetically by a single locus.

(78)
Additions to the Distribution of *Cura foremani* (Girard, 1852) in the Eastern United States

WILLIAM D. LONGEST, *The University of Mississippi*

Cura foremani (Girard, 1852), the common brown planarian, formerly reported from Rhode Island westward to Michigan and south into Tennessee and Virginia, occurs in Maine, Mississippi and Louisiana. The worms prefer clear streams and springs that seem to be free of pollution. In some streams and springs *Cura foremani* is the only triclad inhabitant, however, it does exist in some streams with *Dugesia tigrina*.

(57)
Glyceryl Ether Content of Five Species of Insects

ROGER H. LUMB, *Western Carolina University*

Since their discovery in tumors, glyceryl ethers have become the subject of rather intensive investigation. Success in discovering the precursors of these compounds in mammalian tissue has been limited; this laboratory is attempting to use insects as a simple model system for studying glyceryl ether metabolism. A brief survey of several insects as to glyceryl ether content has been done as preliminary work to such studies.

Sarcophaga bullata (larvae, pupae, and adults), *Apis mellifera* (larvae and adults), *Gallaria* (larvae), *Photinus pyralis* (adults), *Phormia regina* (larvae, pupae, and adults) were used for this study. Only *Photinus* was found to contain a substantial amount of alkyl glyceryl ether, and none of the insects studied contained significant amounts of alk-1-enyl glyceryl ether. Relative percentages of neutral and phospholipid fractions and chainlengths of the alkyl glyceryl ether in *Photinus* are reported. This work done in the Lipid Research Laboratories, Medical Division, Oak Ridge Associated Universities, Oak Ridge, Tennessee. Supported in part by USAEC.

(53)
Ultrastructural Studies From a Free Living Juvenile Form of *Rhabdias ranae,* Walton 1929

LEONARD E. LUNDQUIST AND FELIX H. LAUTER
University of South Carolina
WILLIAM G. DOUGERTY AND MARY M. LEE
Medical College of South Carolina

The Ultrastructure of the intestinal cells from *Rhabdias ranae* was studied. Major interest was centered on the luminal border of the cells since there have been reports of cilia lining the gut of some nematodes. Electron micrographs showed microvilli to be present on the luminal surface of the cells. The microvilli are covered by a homogenous extracellular coating. In contrast to the rest of the cells, the three most anterior cells of the intestine are devoid of microvilli. Their luminal border is smooth and covered by a cuticle. This complex of cells make up the esophago-intestinal valve. The cell organelles were studied. In addition, inclusions were observed and their location in relation to organelles considered. Special emphasis was placed on multilaminated bodies which were found in the mitochondria.

(127)
Concentrations of Zinc, Copper, Manganese, Molybdenum, and Boron in Plankton Samples from Selected Stations of Mobile Bay

MICHAEL A. MAGNOLI, *Marine Science Institute, University of Alabama, Bayou La Batre, Alabama 36509*

Water, plankton, and periphyton samples collected at weekly intervals from May, 1968 to January, 1969, from five representative stations of Mobile Bay displayed wide fluctuations in trace metal content from analyses using the atomic absorption technique. Maximum concentrations were correlated with high concentrations of suspended organic matter, being in highest concentration during periods of plankton blooms.

(41)
A Study of Aflatoxin Production by Isolates of *Aspergillus flavus* from West Pakistanian Soils

WALTER WM. MANIGAULT, LAFAYETTE FREDERICK AND THOMAS W. COLE, JR.
Atlanta University

Seven isolates of *Aspergillus flavus*, isolated from West Pakistanian soil, were analyzed to determine their aflatoxin producing capacities. The isolates were cultured on rice, shredded wheat chex, and a semi-synthetic liquid medium. Fermented cultures were extracted and the partially purified chloroform extracts were analyzed by thin-layer chromatography for aflatoxins B_1, B_2, G_1, or G_2. Determinations were made by comparing the chromatograms of each isolate with that of a known standard. Aflatoxins levels were first determined by comparing fluorescence intensity of any aflatoxin resolved with that of a standard. Quantitative determinations of B_1 concentrations in the purified rice extracts were made by ultra-violet absorption spectrophotometry.

Thin-layer chromatographic analyses indicated that B_1 was produced by all seven isolates, although levels of B_1 varied sharply. Aflatoxin B_2 was produced by the five isolates that were high B_1 producers, but was not detected in extracts from the two low producers. No clear evidence of the presence of G_1 or G_2 in extracts of the isolates was provided. Aflatoxin G_1 was suspected, however, in one of the high level B_1 producing isolates. These studies provide further evidence of the widespread occurrence of aflatoxin producing fungi in soils throughout the world.

(Research supported by Agricultural Research Service Cooperative Research Contract No. 12-14-100-8390 (34), U.S. Department of Agriculture.)

(151
Radiation Effect on Starch Metabolism in Wheat Seedlings

MANSURI, A. D., BIBB, D. B. AND KELLY, D. J.
Bennett College

The effect of ionizing radiation on starch metabolism in endosperm has been compared with that in control plants. Irradiated (20,000 r dosage) as well as control seeds were grown on a thin layer of sterilized sand in Petri dishes and starch content was determined spectrophotometrically at well marked germination stages.

Rate of starch hydrolysis is slower in irradiated seedlings as compared to the rate in control seedlings. This slower rate of hydrolysis in irradiated seedlings continues for 120 hours of germination and increases 6-fold at 144 hours of germination and suddenly declines at 168 hours of germination; whereas in control seedlings a steady rate of hydrolysis is maintained. The disturbed rate of starch utilization due to ionizing radiation may be one of the factors in abnormal and stunted growth of the seedlings.

(169)
Rapid Histological Preparation of Chitinous Specimens

IOLA T. MCCLURKIN AND ROBERT D. RIETHER
University of Mississippi

At temperatures between 46 and 60 C., chitinous specimens are fixed and softened within twenty-four hours in the following solution: saturated picric acid in 90% isopropyl alcohol — 75 parts, formalin — 15 parts, and concentrated nitric acid — 8 parts.

Dehydration, clearing and embedding are all done at 55 C. Following four hours dehydration in 100% isopropyl alcohol, specimens are cleared overnight in terpeniol and embedded in Paraplast. Continuous paraffin ribbons may be obtained as thin as five microns.

(125)
Experimental Analysis of Community Structure

J. FRANK MCCORMICK, FAIRMAN CUMMING, CLAIR MELLINGER AND REBECCA SHARITZ
University of North Carolina

The structure of any system is largely determined by the distribution, abundance, variety, and morphology of its components. Ecological studies of natural communities routinely include descriptions of these parameters and usually conclude with hypotheses concerning the mechanisms and factors responsible for structural qualities. These hypotheses are rarely tested experimentally. Seldom do community ecologists verify cause and effect relationships prior to accepting hypotheses as fact. Island communities of Southeastern granite outcrops, because of their structural simplicity, provided an opportunity to experimentally test a hypothesis based upon field observations of dominant species. The hypothesis

that soil depth and soil moisture are the chief variables influencing the structure of outcrop communities was verified experimentally by randomizing the influence of other variables in tests for cause and effect relationships between community structure and these two environmental factors.

(12)
An Unusual Habitat for *Stemonitis splendens* (Myxomycetes)

JAMES C. McDONALD, *Wake Forest University*

Several myxomycetes and their interesting habitats are discussed.

(71)
The Genus *Mesosma* Weed (Phalangida, Arachnida) of North America

CHARLES R. McGHEE, *Virginia Polytechnic Institute*

The genus *Mesosoma* Weed has attracted little attention. Species appear to be confined to the southeastern and midwestern sections of the United States. The four species which can be recognized as belonging to the genus are *Mesosoma nigrum* (Say) Weed, *M. coxatum* Davis, *M. roeweri* Goodnight, and *M. texana* Goodnight. These species are based on rather incomplete descriptions which for the most part would not permit their identification with any degree of certainty. An attempt has been made to redefine the known species of the genus. This will perhaps clear the way for a more comprehensive systematic study of the group and will contribute to future research into their distribution and natural history.

(111)
Ornithological Education in Southeastern Colleges and Universities

ROBERT W. McGOWAN, *Memphis State University*

There are 266 four-year colleges and universities in 14 southeastern states (including Texas). Questionnaires were sent to the 60 schools where Ornithology is taught. Forty-three were returned. These questionnaires determined the average number of students studying ornithology each year, the texts, laboratory manuals, and field guides most frequently used, the extent of field experiences in undergraduate courses, the experiences by students in preparing bird skins, and the number of advanced degrees offered annually in ornithology. Also, from the questionnaires, a directory of teachers of Ornithology in the southeast was prepared.

(107)
An Investigation of the Fishes of the Wolf River in Tennessee and Mississippi

DENNIS W. MEDFORD AND BILL A. SIMCO
Memphis State University

The Wolf River in Tennessee and Mississippi was studied between July 18, 1967, and July 13, 1968. The species of fish present and the habitat in which they were collected were recorded for 73 collections from 48 stations. Fifty-three species of fish were obtained in this study.

(126)
Phyto-Geographical and Ecological Studies in Malesia

WILLEM MEIJER, *University of Kentucky*

A cursory summary is given of plant explorations, geography, and ecology in Malesia during the past 20 years. The great potential for further field work is emphasized. Monographic studies for the Flora Malesiana are revealing new genera, range extensions of unexpected species, and enormous richness of species in some genera. The need for study of plants in the field instead of just herbarium specimens is becoming obvious. Palynological research of deposits from the Cretaceous onwards and recent mapping work of plant areas have given new insights into the possible role of Malesia in the evolution of flowering plants and their dispersal over the earth.

The role that plant exploration can play in forest exploitation and management, land-area planning, and improvement of crops is mentioned. Intensive ecological research in forestry and agriculture in Malesia is urgently needed and should play an important role in any technical assistance for the economic development of this area. Various aspects of the author's studies and travels in Sumatra and Borneo will be illustrated with a series of colored slides and black and white transparencies.

(185)
Helminths of the Opossum (*Didelphis virginiana*) in North Carolina

GROVER C. MILLER AND REINARD HARKEMA
North Carolina State University

Studies were conducted on the incidence and distribution of helminths in 54 opossums from 13 counties in eastern North Carolina. Most of the hosts were collected in the vicinity of Raleigh, N. C., but some were taken from coastal counties. Thirteen species of helminths were recovered as follows: TREMATODA: 4 species; CESTODA: 1 species; ACANTHOCEPHALA: 1 species; NEMATODA: 7 species. All hosts evidenced some degree of infection and the parasites recovered were those which seem to be fairly specific for the opossum throughout its range.

(2)
Nitrogen Fixing Ability of *Caenothus americanus*

MERCER D. MILLER AND JOE A. EDMISTEN
University of Georgia

Delwiche, Zinke, and Johnson (1965) confirmed the ability of various West Coast species of *Ceanothus,* a flowering, root-nodulated, non-legume, to fix nitrogen by the $^{15}N_2$ technique. *Ceanothus americanus,* a small flowering shrub found in drywoods and on hillsides of the Eastern United States, was tested for the capability of nitrogen fixation by the acetylene reduction technique (Stewart, Fitzgerald, and Burris, 1967). Results indicated the capability of root nodules of *C. americanus* to fix nitrogen. Attempts are being made to quantitate the data from the acetylene reduction tests. The ecological significance of *C. americanus* in relation to its nitrogen fixing ability and the practical value of the acetylene reduction technique will be discussed.

(80)
A Study of the Bottom Fauna of Sardis Reservoir in Relation to Biological Productivity

TROY MILLICAN AND Y. J. MCGAHA
University of Mississippi

Sampling of benthic organisms was made on a bimonthly to monthly basis from July 3, 1967, to May 27, 1968, on Sardis Reservoir. Samples were taken with Ekman dredges and represented nine regular sampling stations and five transects consisting of four stations each. Each sample comprised approximately five square feet.

Representatives of three Metazoan phyla, totaling 13 genera, of which five appeared most prevalent, were collected. The numerical distribution of organisms was: Chironomids, 42% collected at all stations; *Chaoborus,* 24% collected at all stations; Tubificids, 23% collected at 13 stations; Sphaeridae, 5.9% collected at 11 stations; *Hexagenia* nymphs, 3.1% collected at 8 stations. Chironomids were the dominant organisms in terms of mass. Bay areas appeared to be the most productive in contrast to the open water areas. Sampling sites with mud type bottoms supported the largest number and kinds of benthic organisms. Water level fluctuation, bottom type, erosion material, and predators are factors influencing the benthic productivity in Sardis Reservoir.

(162)
Effect of Continuous Exposure to Two Insecticides on the Fitness of Two Third Chromosome Inversions of *Drosophila pseudoobscura* (Insecta: Diptera)

ROBERT E. MOISAND AND JOHN M. CARPENTER
State University College at Buffalo and University of Kentucky

The effect of continuous exposure to various concentrations of DDT and Guthion on the relative fitness of two third chromosome inversions of *Drosophila pseudoobscura* were studied. Relative fitness, as indicated by the frequency of the two inversion chromosomes in the control and insecticide stressed populations, was compared to the frequencies predicted by the Hardy-Weinberg formula.

(24)
The Influence of Different Mounting Techniques on the Size and Shape of Pollen Grains of *Solidago boottii* (Asteraceae, Asterales, Angiospermae)

GARY H. MORTON, *University of Tennessee*

Studies of elliptical pollen grains in *S. boottii* were made to evaluate current methods of pollen examination and measurement. Fresh and dried pollen grains were measured without treatment or mounting medium. The dried pollen was considered as the standard for shape and size. Measurements of pollen mounted by different current techniques were compared to the standard. Depending on the technique used, the pollen remained the same size and shape as the standard, changed in size, or changed in shape and size. A summary of the results and their application to taxonomy will be discussed.

(156)
The Inheritance of Sinistrality in *Partula suturalis* (Gastropoda, Stylommatophora)

JAMES MURRAY, *University of Virginia*
AND
BRYAN CLARKE, *University of Edinburgh*

Partula suturalis Pfeiffer, a land snail from Moorea in the Society Islands, is unusual in that dextral and sinistral individuals are found within a single species. Local populations may consist of either left or right-handed forms or of both. Laboratory breeding has produced lineages which encompass four generations. Since *P. suturalis* is hermaphroditic and normally reproduces by cross-fertilization, separate progenies may be obtained for each animal in a pair. Usually each individual produces offspring with only one type of coiling, which may be the same as or different from its own. The lineages indicate that the direction of coil of the offspring is controlled by the genotype of the maternal parent. Thus Mendelian segregation occurs, but its expression is delayed for one generation. In this respect it resembles *Limnaea peregra* (Boycott and Diver 1923), although in *P. suturalis* sinistrality is dominant. Exceptions to these rules will be discussed.

(65)
Changes in Rat Protein Patterns Under Combinations of Fasting and Electric Shock

F. KIRK NELSON, *Memphis State University*

Rats were subjected to experimental conditions of fasting, electric shock, and combinations of these stimuli. Determinations by acetate membrane electrophoresis indicated that albumin levels were decreased in all cases tested, and the globulins were slightly increased. The gamma-globulin fraction was found to have the greatest increase under fasting conditions. A slightly higher deviation from the normal condition was observed in females under stressful situations.

(139)
Apomictic Species and Species Complexes in s.w. U.S. *Erigeron* Section of Olygotrichium (Asteraceae)

GUY L. NESOM
University of North Carolina at Chapel Hill

This project was initiated to determine the relationship between *Erigeron flagellaris* Gray, a small, stoloniferous and aggressive species widespread in the s.w. U.S. (plus a small disjunct area in British Columbia), and a complex of three very narrowly and closely related species of southwestern Utah. One of these was recognized by Cronquist as a variety of *E. flagellaris* and suggested as perhaps the parental form of *E. sionis,* another of the three endemics. However, this varietal status has proved not to be the case, the so-called variety actually being a highly variable diploid and occurring with a pentaploid form of the true *E. flagellaris.* Hexaploid, tetraploid, and triploid populations of *E. flagellaris* also occur in this area and are all apomictic; the diploids are restricted to a small area in central Colorado. Preliminary evidence suggests that these levels are formed primarily intra-populationally rather than through segmental alloploidy. The Utah endemics and *E. divergens,* another closely related species, also possess diploids plus several apomictic levels of ploidy.

(44)
Observations on the Distribution of Certain Aquatic Phycomycetes in Granite Outcrop Soil

MARGARET GREEN NESOM, *University of North Carolina*

In April and June, 1968, the distribution of selected members of Phlyctidiaceae, Blastocladiaceae, and Saprolegniaceae in the upper 2.5 cm of soil was studied in an island community on a granite outcrop near Atlanta, Georgia. A selective baiting technique was used to eliminate competition for substrate by non-zoosporic forms. Of the numerous taxa of Phlyctidiaceae observed, four easily recognized species were studied: *Rhizophydium echinocystoides, Septosperma rhizophidii, Phlyctochytrium aureliae* and "Blyttiomyces", an undescribed fungus possibly allied to the genus *Blyttiomyces.* Filamentous fungi studied include *Allomyces neo-moniliformis* (Blastocladiaceae), *Achlya klebsiana,* and *Leptolegnia* sp. (Saprolegniaceae). Soil moisture, temperature, organic content and presence of other plants were recorded for each of 169 soil samples. General edaphic characteristics of the community, pH and soil texture, were determined for the upper soil at locations of increasing soil depth. A partial description was presented of the immediate environmental complex surrounding viable structures of the aquatic phycomycetes listed.

(18)
The Measurement of Vascular Plant Species Diversity in an Oak-hickory Community in the Piedmont of Georgia

STUART A. NICHOLSON, CARL D. MONK, AND GEORGE L. CHILD, *University of Georgia*

Most species diversity studies have centered on groups of organisms of similar size (i.e. insects, trees, birds) and have been based on data collected using the same census method and uniform plot size. In communities such as forests several different plot sizes and sample methods are often used to census the various strata. Two questions arise: (1) how sample plot size and method effects diversity within a stratum, and (2) how data from different strata can be pooled to estimate the diversity of the community. Strata of an oak-hickory forest were arbitrarily defined as follows: (1) ground flora, woody stems < 1 ft. tall and all herbaceous stems; (2) shrubs, woody stems > 1 ft. tall but < 1 inch D.B.H.; (3) understory, stems $> 1 < 4$ inches D.B.H.; and (4) canopy, stems $>$ inches D.B.H. The forest was divided into two halves which were sampled in the following manner: ground flora by forty by 1 sq. m. quadrats; shrubs, twenty 16 sq. m. quadrats; understory and canopy by five 2000 sq. m. quadrats, twenty 100 sq. m. quadrats, and 40 quarter points. The three sampling techniques used for canopy and understory yielded similar estimates of diversity expressed by the function $\overline{\overline{H}} = -\Sigma\, p_i \ln p_i$, suggesting that diversity is independent of sampling method and plot size, providing an adequate sample is obtained. The community diversity was determined by pooling the data that was required to estimate the diversity of each stratum. The estimated diversity values for the strata and community determined from the two independent sets of data were comparable.

(64)
The Effect of Light Jogging on Cardiovascular Fitness

DONALD A. OLEWINE AND FRANK H. RAMSEY
Georgia Southern College

Recently jogging programs have been recommended for improving the physical fitness of the general population. The following experiment was undertaken to determine the effects of light jogging on cardiovascular fitness, as indicated by the Harvard Step Test, in 38 male freshmen students who participated in the program as part of their physical education requirement. During 3 training sessions/week the participants alternately walked and jogged at 110 yard intervals around an irregularly shaped ½ mile course. At the first training session a distance of 1½ miles was completed by each participant. Each week the distance increased by ½ mile until 3 miles were completed at each session during weeks 5 through 9. The results of step tests (mean $\pm$ S.E.) administered in the first, fifth, and 10th weeks were not significantly different (72.6 ± 0.2, 71.3 ± 2.6, and 73.3 ± 2.4 respectively). However, the mean resting heart rate (beats/30 seconds) was significantly lower at the 10th week than it was at the beginning of the training period (39.8 ± 1.3 v.s. 43.0 ± 0.08, mean $\pm$ S.E.). Supported by grant-in-aid from the Georgia Southern College Faculty Research Fund.)

(179)
Parasites of the Tree Squirrels of Southwest Tennessee

WILLIAM A. OLEXIK, A. E. PERRY, AND W. E. WILHELM
Memphis State Univ.

Ten species of parasites were recovered from 50 tree squirrels of southwestern Tennessee, and several of these are new parasite records for the host genus *Sciurus* (Mammalia, Rodentia). *Orchopeas howardii* (Insecta, Siphonaptera), a squirrel flea, was the only ectoparasite collected. *Hymenolepis nana* and an unidentifiable species of Diphyllobothriidae are new cestode records from tree squirrels (Cyclophyllidea and Pseudophyllidea). *Hymenolepis nana* was an erratic infection as the adult was encysted on the ventral lobe of the host liver. *Nudacotyle* sp. (Trematoda, Digenea) is a new record from *Sciurus* and appears to be the first trematode reported from squirrels. *Heligmosomum* sp., *Citellinema sleggsi,* (both Strongylidea) *Strongyloides* sp. (Rhabdiasidea), *Capillaria* sp. (Trichuridea), *Rictularia* sp. (Spiruridea), and a species of the subfamily Trichostrongylinae (Strongylidea) were nematode parasites. *Heligmosomum* sp. is a new report. Sites of infection, numbers of parasites recovered, and sex ratios of nematode parasites are reported.

(89)
Some Salamanders from Western North Carolina and Adjoining Areas (AMPHIBIA, Urodela)

L. M. OUTTEN, *Mars Hill College*

During the period from the early part of 1967 through 1968, more than one hundred field studies and collections of salamanders were made in areas from the Cades Cove and Clingmans Dome sections of Great Smoky Mountains National Park to the regions of Craggy Gardens, Mount Mitchell, Grandfather Mountain, Roan Mountain, and Mount Jefferson. Field observations were followed by further study in the laboratory.

(54)
Ultrastructural Aspects of Senescence in *Euglena granulata* with Special Reference to the Eyespot (Euglenophyceae, Euglenales)

JOHN R. PALISANO AND PATRICIA L. WALNE
University of Tennessee

Cells of *Euglena granulata* were grown in an enriched liquid medium of soil-water supernatant and Bold's Basal Medium with vitamins and were allowed to age over a period of weeks. During the course of senescence, cells change progressively from green, actively motile and highly metabolic naked organisms to chlorotic, less active to non-motile, encapsulated cells. Morphological and positional changes, possibly associated with senescence, in cellular organelles will be described. The structure, integrity, and position of eyespot components will be compared with those of other pigment-containing bodies which accumulate in the cell as it senesces.

(Research supported in part by a University of Tennessee Biomedical Sciences Support Grant, 1101R-01, to the junior author.)

(148)
Seed Germination Studies of Horse Nettle, *Solanum carolinense* L.

DAVID J. PARRISH, *Wake Forest University*

Laboratory investigations of the requirements for seed germination of *Solanum carolinense* are revealing several regulatory parameters. There is a demonstrable dormancy exhibited by mature seeds. Seeds which are 80% to 90% viable are non-germinable on moist filter paper. Aqueous extracts of the fruit contain an unidentified inhibitor or inhibitors. Inhibition of lettuce seedling growth is apparent at dilutions of 100 ppm. Exogenously applied auxin, gibberellin, and kinetin do not overcome the extract's inhibition. Chromatography of extracts has revealed inhibitory fractions. A phytochrome system is evident in the seeds of *S. carolinense*. Red light promotes germination, while far-red light inhibits. The effect of either wave length is reversible by the other. Far-red inhibition is overcome by exogenous applications of gibberellic acid. Certain nutrient salts promote germination. Additional drying increases germinability as has been observed with tomato seeds, a member of the same family.

(120)
A Preliminary Report of Animals Found on Granite Outcrops

FRED K. PARRISH, ROBERT M. HUIE, JR., AND JOHN J. BARNETT
Georgia State College

Although there is a sizeable literature concerning plant ecology and communities of granite outcrops, there are few reports concerning animals which occur in such situations. The primary area under study is a seven acre outcrop in north Rockdale County, Georgia, although collecting trips have been made to other outcrops nearby. The animals found during this study (1966-1969) were divisible into two groups — those characteristic of rock outcroppings (exclusively invertebrates such as the grasshopper *Trimerotropic saxatilis* (McNeill)) and those that were transient or ubiquitous (typified by the Eastern Cottontail, *Sylvilagus floridanus.*) Mammals building nests under rocks or in broom sedge "islands" include the mice *Peromyscus* and the Eastern chipmunk, *Tamias striatus.* Other transient mammals include squirrels, *Sciurus carolinensis* and deer, *Odocoileus virginianus.* The fence swift, *Sceloperus unduntalis*, occurs in large numbers; the only other reptile observed was the black racer, *Coluber constrictor.* A variety of invertebrates were found, the number and species varying with the time of year and the specific ecosystem. Sporadic blooms of collembolans have occurred which were sufficient to change the appearance of an acre of outcrop.

(20)
Location and Association of Shrubs in a Forest Community: A Statistical Analysis

E. GIBBES PATTON, *Wofford College*

In a study of the ecology of native shrubs, an electronic computer has indicated some association between species-pairs and between species and physical-environmental factors. By the method of Greig-Smith (second edition, 1964), presence-or-absence data from systematic point-quarter sampling were put into 2×2 contingency tables and the hypothesis of independent distribution was tested by use of chi-square. This method indicated some associations not apparent from non-quantitative analysis. Results are offered from study of ten shrub species in the North Saluda River drainage, Greenville County, South Carolina. Discussion is invited in terms of (1) validity of the sampling and (2) usefulness of the technique for studies in autecology, chorology, and community structure.

(Assistance from the Belle W. Baruch Foundation is acknowledged.)

(51)
Fine Structure of Centriole Formation in *Labyrinthula* sp. (Rhizopodea, Labyrinthulida)

FRANK O. PERKINS
Virginia Institute of Marine Science

The fine structure of de novo centriole formation was observed in meiotic zoosporulation in *Labyrinthula* sp. Vegetative spindle cells, which contained no centrioles, procentrioles, or centriolar plaques, formed presporangia by changing into approximately round or oval cells within sori. Two granular aggregates or protocentrioles approximately spherical and about 240 mμ diameter were formed in the cytoplasm a few hundred mμ from each nucleus. Microtubules, oriented in astral ray patterns, were attached directly to each of the protocentrioles. Following migration to opposite sides of the nucleus each of the protocentrioles differentiated into double centrioles attached at the cartwheel or proximal ends. Binary fission of the centrioles and reorientation yielded a diplosome or orthogonal orientation of the organelles. Each mature centriole consisted of the usual cylinder of 9 triplet microtubular blades with a cartwheel complex at the proximal end consisting of 5 or 6 tiers of cartwheels. Further centriole replication appeared to occur by orthogonal budding from mature centrioles.

(88)
Food Habits of *Plethodon jordani* (Amphibia: Plethodontidae)

VERNON N. POWDERS AND WILLIAM L. TIETJEN
Georgia Southwestern College

Plethodon jordani stomachs from the Great Smoky Mountains National Park were analysed for food content. These stomachs were from various different altitudes throughout *P. jordani's* range in the park. Food items include: Collembola, mites, millipedes, snails, and various other Arthropoda. Very few empty stomachs were found during the study. An altitudinal and seasonal comparison of food items will be presented. Stomach analysis of *Plethodon glutinosus* will also be presented as a comparison of food habits between these closely related salamander species.

(144)
The Isolation of Protoplasts from the Placental Cells of *Solanum nigrum* L.

BALDEV RAJ AND J. M. HERR, JR.
University of South Carolina

Living protoplasts were isolated from the interplacental regions of *Solanum nigrum* berries by the removal of the walls from cells in tissue slices treated for 1-2 hours with 12% pectinase in 0.35 M sucrose solution. Protoplasts thus isolated, then washed and transferred to microculture chambers for observation, invariably tended to be spherical. Comparative measurements of cell and protoplast volumes revealed that 10% of the isolated structures were subunits of protoplasts. From volume changes in protoplasts studied in different osmotica, the maximum expansion of the cell membrane was determined. Hypertonic solutions promote stability, and protoplasts were maintained in 0.35 M sucrose solution for several days. The effects of various inorganic and organic compounds were also investigated to determine the optimal conditions for *in vitro* culture of isolated protoplasts.

(47)
Ultrastructure of Spirodela Polyrhiza (L.) Schleiden. I. Raphides and the Idioblast

R. D. RAO, *North Carolina State University*

Spirodela polyrhiza is a cosmopolitan aquatic belonging to the family Lemnaceae, commonly called the duckweeds. In the course of ultrastructural characterization of *S. polyrhiza*, the fine structure of the raphides and the idioblast was also investigated. Raphides are needle-like optically visible crystals, presumably of calcium oxalate, which occur in a wide variety of plants. The crystal chambers are elongate in form and when cut transversely they exhibit rectangular profiles. The crystal chambers appear to be compartmentalized by a single membrane. The individual chambers show an electron dense boundary.

The raphide cell is represented by a typical nucleus, sparse ER, Golgi and mitochondria. Concentric membrane profiles were also observed. The raphide cell lacks the so-called modified plastids. The non-accumulation of starch by the plastids appear to be species specific rather than a general phenomenon, for starch was seen to be present in the plastids of *S. polyrhiza* raphide cell.

(48)
Ultrastructure of Spirodela Polyrhiza (L.) Schleiden. II. Chloroplast Development During Turion Germination

R. D. RAO, *North Carolina State University*

The turion is a modified frond and a means of vegetative reproduction in *S. polyrhiza*. The plastids of turion are amyloplasts — starch storing plastids. The development of chloroplasts to maturity from amyloplasts accompanied by turion germination is completed by 48 hours. The main feature of the differentiation of amyloplasts is the development of an elaborate grana-fretwork system, which is preceded by reconstitution of the envelope. Once this is completed the subsequent development to maturity appears to follow the normal developmental pattern, that is, invagination of inner membrane to produce a grana-fretwork system.

(157)
The Effect of Zinc-65 on the Production of Lethal Genes in *Drosophila melanogaster*

JAMES H. RAY AND JOHN M. CARPENTER
University of Kentucky

Drosophila melanogaster adults were placed in population cages with food containing Zinc-65 in a concentration of 97.2 μc/ml. Per cent hatchability of daily egg samples was used as an index for dominant lethal genes produced by the radioactive environment. To test for recessive sex-linked lethal gene production, adult males were removed from the cages at intervals during the experimental period and mated to non-radioactive Muller-5 virgin females using the Muller-5 technique. Daily percentages of dominant lethal genes ranged from 0 to 43%, and the peaks of egg mortality appeared to follow a cyclic pattern. Small percentages of recessive sex-linked lethal genes were found in the P_1, F_1, and F_2 control and experimental samples. Although greater percentages of recessive sex-linked lethal genes were produced with increasing radiation exposure, experimental results did not appear to differ significantly from control results. Experiments are currently underway using higher concentrations of Zinc-65.

(45)
An EM Study of the Dendritic Keratinocytes of the PET Mouse

WILLIE M. REAMS, JR. AND STANLEY P. TOMPKINS
University of Richmond and The Medical College of Virginia

An EM examination of the epidermis of PET mice reveals a mixed population of cells. Most prevalent are the polyhedral keratinocytes with oval nuclei, many desmosomes and tonofilaments. In addition, three types of dendritic cells have been described previously, all of which have lobated nuclei, and lack desmosomes and tonofilaments. Some of these dendritic cells are pigment cells with melanosomes or premelanosomes; others are Langerhans cells with their typical organelles; while the third type lacks characteristic organelles and are known to be a mixture of both melanoblasts of neural crest origin and pre-Langerhans cells. In a developmental study of the Langerhans cell, cells have been found in both embryo and older epidermis which differ from both the above dendritic cells and the surrounding keratinocytes. These cells have lobated nuclei and show few desmo-

somes and tonofilaments. As such semikeratinocytes, like Langerhans cells, are found in neural crest-free as well as normal epidermis, it is tempting to speculate that they might be precursors of the Langerhans cells.

(Supported by NIH Grant AM-11864-02. The work was done in part at the Virginia Institute for Scientific Research.)

(106)
Uptake and Elimination of Radiotungsten In Black Bullheads (*Ictalurus melas*)

James R. Reed, *Virginia Commonwealth University*

Black bullheads (*Ictalurus melas*) were found to accumulate radiotungsten from food and from water. Whole-body activity reached a plateau after the fish had been in isotope solution four days. Whole-body elimination of radiotungsten varied somewhat with the method of uptake. Fish that had accumulated radiotungsten from water had a single linear component of elimination with a biological half-life of 2.75 days. Fish that received radioisotope in a single feeding lost activity at two rates, one component had a biological half-life of 14 hours and the second of six days. The bone, skin, flesh, blood and gills contained the greatest percentages of whole-body activity after one day of uptake from water. After eight days of uptake the flesh, gills and gut together contained 43.4 percent of the total activity. The bone had the longest biological half-life (8.0 days) of the tissues examined and contained 80 percent of the whole-body activity after 16 days of elimination.

(191)
Esterases of *Procyotrema marsupiformis* Harkema and Miller, 1959 (Trematoda: Strigeida: Diplostomatidae)

Willis A. Reid, Jr. and Reinard Harkema
North Carolina State University

This strigeoid trematode, parasitic in the pancreatic duct of the raccoon, was studied for the histochemical localization of esterase activity. The worms were prefixed in 10% buffered formalin, cryostat-sectioned and treated with the following substrates: α-naphthyl acetate, 5-bromoindoxyl acetate, acetylthiocholine iodide, and butyrylthiocholine iodide. Inhibitors used were sodium fluoride, eserine, iso-OMPA, and 62-C-47. In all tests the pharynx demonstrated the most intense reaction, apparently due to a mixture of simple esterases and acetylcholinesterase. A strong reaction indicating acetylcholinesterase activity was obtained in the oral sucker, acetabulum, pseudosuckers and its glandular cells, the cuticle and subcuticular cells in the oral sucker region, nerve tissue, and the bursa. Non-specific esterases were indicated by a weaker reaction in the subcuticular cells of the holdfast, the outer tunic of the testis, the vas deferens, and the prostatic cells. Pseudocholinesterase was not demonstrable in the worm.

(28)
Microsporogenesis In *Vernonia angustifolia* Michx. (Compositae)

John D. Reynolds, *Virginia Commonwealth University*
and
Sam B. Jones, Jr., *University of Georgia*

The anther first consists of meristematic tissue. In each angle, hypodermal cells, aligned vertically, enlarge and divide periclinally. The conductive tissue differentiates at this time. During enlargement of the microsporocyte the anther wall consists of epidermis, a hypodermal layer and uninucleate tapetal cells. The hypodermal layer divides to form the endothecium and the middle layer which is flattened and crushed by the time the meiotic process begins in the microsporocytes. These are arranged in a single vertical row in each of the four loculi. Two meiotic deviations result in four nuclei in a tetrahedral, isobilateral or decussate arrangement. Wall formation is simultaneous. The pollen mother cell wall still encloses the microspores at exine formation. Each microspore is surrounded by a homogeneous substance until the echinae form. Pollen grains are three celled when released. Tapetum is glandular and persists until dehiscence. Tapetal cells are uninucleate, binucleate, and later contain fusion nuclei.

(15)
Aspects of Phytoplankton Primary Production in a Shallow, South Florida Lake

Peter B. Rhoads
Environmental Biology Program, University of Miami

Short term light and dark bottle experiments were used to estimate phytoplankton primary production in a shallow, limestone rockpit lake, during 1968. These results are examined in terms of plankton data and physico-chemical variables, with particular attention to incident radiation, rainfall and grazing. With the exception of a spring *Dinobryon* bloom, a low phytoplankton standing crop was observed, dominated by nannoplankton. Primary production estimates indicate a low mean phytoplankton production level (about 200mg $C/m^3/day$), despite the influence of the surrounding residential area. Indirect evidence is presented indicating that the benthic flora dominates organic production. Low phytoplankton levels are analyzed in terms of a benthic flora competition hypothesis.

(16)
Aerial Photoecology of South Florida Patch Reefs

Peter Rhoads, Patrick Colin,
John Beers and Howard Teas
Environmental Biology Program, University of Miami

South Florida patch reefs typically exhibit a "halo" of bare sand caused by grazing of herbivourous reef fishes. Aerial photographs revealed that in a few cases patch reefs off southern Dade County had a second bare sand halo or band. The second band is approximately ten meters wide and concentric with the reef at a distance of 50-75 meters. A mixture of the sea grasses *Syringodium filiforme* and *Thalassia testidinum* grow in the area on a calcareous sand and coarse particulate substrate. The grasses have been transplanted to various locations in the inner and outer halo band areas and examined for feeding by herbivorous fishes. Heavy grazing was found in the inner region but not in the outer halo. The results of transplant experiments and geological observations in the double halo reef area will be illustrated with slides.

(Supported by U.S. Public Health Service training grant No. ES-00126.)

(32)
White Flowering Partridge Pea in North Carolina

HOLLIS J. ROGERS AND RALPH M. MORRISON
University of North Carolina at Greensboro

The partridge pea (*Cassia fasciculata*) is a native annual plant about 15 cm to 45 cm high. It is generally found along road sides, sandy fields and open creek banks from Florida to Texas, and north to Massachusetts and New York. Its leaves are evenly pinnate with twelve to thirty linear-oblong leaflets. The bright yellow flowers make the plant conspicuous during the months of August and September. The flowers have five petals, two or three of which are larger than the others with a purple spot at their bases. In 1931, L. C. Jensen reported plants with a distinct creamy white color in Franklin County, Missouri. These plants have subsequently been placed in forma *Jenseni* (1935). Jensen collected seeds from the white flowered plants and of the forty plants produced, all but two showed the new flower color.

One of us (H. J. R.) found the *Jenseni* form along an open creek bank in the city of Greensboro. As far as we can determine, this is the first reported find of this form outside the original location in Missouri and definitely the first report for North Carolina. Seeds were collected from both the yellow and white flowered populations. Germination studies have shown that scarification effectively breaks seed dormancy. At present we are maintaining both populations in the greenhouse. Our report will include the results of these growth studies in terms of the genetics and cytology of the white form of *Cassia*.

(68)
Morphology of the Male Reproductive System in the Hawaiian Kona Crab, *Ranina Ranina* (L) (Decapoda: Gymnopleura)

EDWARD PARSONS RYAN, *East Carolina University*

A study of the morphology of the male reproductive system and details of ultrastructure in spermatogenesis was undertaken on the Hawaiian Kona crab, *Ranina ranina* (L), whose family includes members that are of the oldest brachyuran fossils and whose recent members display both lobsterlike and crablike characters. The morphology of the reproductive systems in both sexes is more macruran (lobsterlike). Cytological studies of spermatogenesis reveal aflagellate spermatozoa that are unlike other Brachyura in ultrastructure and in probable function. The spermatozoa are transferred to the female sternal spermatheca without spermatophoric elements.

(This research was supported by National Science Foundation Grant GB 5710.)

(145)
In Vitro Culture of Ovules, Nucelli, and Embryos of Citrus

P. S. SABHARWAL

Investigations were carried out on the in vitro growth and development of ovules, nucelli and embryos of six polyembryonate species of *Citrus*: *C. aurantifolia*, *C. limettioides*, *C. microcarpa*, *C. paradisi*, *C. reticulata* and *C. sinensis*, and one monoembryonate species, *C. grandis*. A modified White's medium served as control. Adenine, casein hydrolysate, coconut milk, 2, 4 - D, IAA, kinetin and yeast extract were added as supplements.

Ovules of the polyembryonic species of *Citrus* were cultured at the globular stage of nucellar proembryos. The embryos either developed normally or callused or formed buds on a medium containing CH (400 ppm). Embryo-like structures differentiated from the callus and some of them even gave rise to seedlings.

Micropylar halves and segments of nucelli (from which the zygotic embryo or the extreme tip portion was removed) of several polyembryonate species were cultured. Only the proembryos responded while the cells of the nucellus *per se* remained quiescent. On CH medium, the behaviour of embryos was similar to that observed in the cultured ovules. When subcultured, the callus differentiated into embryo-like structures which later developed seedlings. Cultures of nucelli of *C. grandis* failed to thrive on Wb and CH media. However, on a CM medium, nearly 25 per cent of the embryos matured and germinated in situ.

Micropylar halves, from which macroscopic nucellar proembryos had been excised, and the chalazal halves of nucelli showed no response.

When globular nucellar embryos were cultured individually on CH medium they merely enlarged or gave rise to a callus of limited growth. Groups of adventive embryos of *C. reticulata* elicited a response almost similar to that of the embryos in the micropylar halves of nucelli, but embryonal callusing was less pronounced.

(160)
A Model System for Population Genetics Experiments

W. ST. AMAND, *University of Mississippi*

A model system (using ordinary snaps) is described which allows population genetics experiments to be performed during a single laboratory session. The design involves large population simulation and allows the collection of data to illustrate the Hardy-Weinberg equillibirum, and the effects of partial or of complete selection. With slight modifications such phenomena as forward and reverse mutation, hybrid vigor, reduced reproductive potential, etc., can also be studied. The materials employed are simple, inexpensive, and everywhere available.

(58)
The Role of Sterols in Photodynamic Response

KEITH T. SAMUELS, JR. AND R. W. HULL
Florida State University

When the ciliate *Paramecium caudatum* is exposed to an aqueous suspension of 3,4-benzpyrene and irradiated with long-wave ultraviolet light, the cells become immobile and eventually lyse in a length of time that is a function of concentration of the hydrocarbon and the intensity of irradiation. This process is termed photoactivation and appears to involve photo-oxidation and free radical formation. *Tetrahymena pyriformis*, strain w, is less sensitive in this system. It is postulated that the lack of sensitivity may be due to a sterol, tetrahymenol, (identified by Conner, 1963), found as a component of the cell membrane of *T. pyriformis*, which sterol is not found in *Paramecium*. This sterol is methylated ergosterol. To test this postulate, *T. pyriformis* was grown under conditions devised to replace the tetrahymenol with ergosterol. The treated cells were then subjected to the photoactivation circumstance, using cells with tetrahymenol unreplaced as controls. The membranes of normal and treated cells were analysed by thin-layer and gas-liquid chromatography.

(72)
Life Histories of Wolf Spiders (Lycosidae: Araneae: Arachnida) in the Alpine Tundra of Colorado

RONALD R. SCHMOLLER, *The University of Tennessee*

About 2,000 specimens of *Pardosa* wolf spiders were collected in the alpine tundra of Colorado during 1966 and 1967. Pitfall jars were placed in a variety of habitats, ranging from tree-line (11,400 ft.) to rocky summits (14,000 ft.). The jars were sampled twice a month during June - October, 1967. The five most numerous species of *Pardosa* collected occur in different plant communities. The life-cycle length, overwintering stage(s), mating periods, and time of hatching were determined for these spiders. Three of the species have annual (one year) life cycles and overwinter in the penultimate stage (the instar preceding adulthood). The other two species have biennial (two year) life cycles, overwintering in various stages. Biennial life cycles may be correlated with lower prey densities in the habitats of the biennial species, as suggested by the low net (plant) productivity of their habitats. Temperature, moisture, and wind may also be important.

(149)
Regulation of Urease in Cotyledons

PREM P. SEHGAL AND JAMES A. COOK
East Carolina University

The factors controlling urease levels in cotyledons of jack beans were studied under sterile conditions. In culture, the urease content declined as rapidly as in cotyledons harvested from seedlings of different ages. High temperatures (85°) or low pH (4.5) caused a faster decrease in urease activity as compared to the controls (75°F, pH 5.8). The addition of dithiothreitol — a sulfhydryl compound, urea or thiourea lead to increased urease activity on fresh weight and protein basis. In experiments with urea, a continuous flow of sterile medium was maintained to avoid excessive accumulation of ammonium ions in cotyledons. Higher urease activity in urea is attributed to substrate protection. Thiourea, a competitive inhibitor of the enzyme gave best preservation of urease in contrast to urea-treated and untreated cotyledons. Thiourea and other substituted ureas are used as herbicides. Possible mechanism of action of thiourea will be discussed.

(189)
Light and Electron Microscope Radioautographic Studies of Galactose-H^3 Utilization Related to Mucopolysaccharide Synthesis in *Megalodiscus temperatus*

W. ALLEN SHANNON AND B. J. BOGITSH
Vanderbilt University

Mucopolysaccharide synthesis is investigated by incubating slices of *Megalodiscus temperatus* in a medium containing galactose-H^3. The tissue is subsequently fixed and radioautographed for light and electron microscopy. Labelling appears to be mostly cytoplasmic. The initial uptake of the label is confined to the subtegumental cells with a progression toward the external surface with time. Electron microscopy shows labelling specifically over the Golgi areas and related vesicles, vesicles in the tegument, and to a lesser extent over glycogen. (Supported, in part, by N.I.H. grant No. AI-0858.)

(1)
Accumulation of Metals by Fungi II. Zinc, Iron and Yttrium Group

J. MILES SHARPLEY AND D. G. KESSEL
Virginia Commonwealth University AND
Sharpley Laboratories, Inc.

The limits of iron and zinc accumulation by the mycelia of a *Hormodendrum sp.*, *Pullularia pullulans*, and *Aspergillus niger* have been defined. *Pullularia* was found to tolerate up to 3 percent zinc (30,000 ppm) in the culture medium and able to concentrate 20,000 ppm of zinc in the mycelial mass. *Hormodendrum* and *A. niger* were less tolerant of the metals but appreciable amounts were accumulated. The relationship of the tolerance for zinc by *Pullularia* is discussed as correlated to the growth of this organism on zinc containing paint films.

The preliminary data concerning the concentration by fungi of certain rare earth metals from sea water and salt brines are presented. These data indicate up to a 10-fold concentration of members of the yttrium group, based on emission spectroscopy of the ashed fungal mycelia.

(140)
The Crisis of Herbaria

STANWYN G. SHETLER, *Smithsonian Institution*

Notwithstanding optimistic predictions, the future of the herbarium as a research institution and facility seems to be endangered. Quantitative gains have been mistaken for progress and good health, while in fact the physical facilities, operational procedures, collection strategy, and intellectual undergirding of the herbarium have not kept pace with the times. The future has been measured against the past and the present, yielding predictions of no lasting value. In this paper, an attempt is made to present a constructive analysis of what is needed to insure the continuing vitality of the herbarium. A brief survey of the world's herbarium resources is given, and the problems of managing and utilizing these resources are discussed. The changing role of the herbarium is traced, and several proposals for copying realistically with the changes are offered.

(119)
A Comparative Study of Thermal Stratification in a Mainstream and Pumped-Storage Impoundment

GEORGE M. SIMMONS, JR.
Virginia Commonwealth University
STUART E. NEFF, *Virginia Polytechnic Institute*

Claytor Lake Reservoir is a mainstream impoundment on the New River near Radford, Virginia, and power is generated by conventional draw down. Smith Mountain Reservoir is the upper storage impoundment of a pumped-storage hydroelectric plant on the Roanoke River near Roanoke, Virginia. In pumped-storage operation, water is recycled from a lower to an upper storage impoundment during periods of low power use and is drawn down during generation at peak demand periods. Thermal stratification in the two reservoirs is quite different. The metalimnion at the height of summer thermal stratification is 5-7 meters deep in Smith Mountain Reservoir and 23-26 meters deep in Claytor Lake Reservoir. Location of the metalimnion and the hypolimnetic volume seems to depend upon penstock location and the retention period of water in each reservoir. The re-

cycling process in Smith Mountain Reservoir has a minimal effect on thermal stratification. The beneficial effects of recycling are localized due to basin morphometry.

(77)
Suctoria in Culture

Tom Simpson and R. W. Hull, *Florida State University*

The paucity of published reports on the biology of Suctorian protozoa can be attributed to difficulties in achieving laboratory cultures of these interesting forms. Suctorians typically "bloom" in nature, as well as in laboratory culture, but the causes of these blooms are as yet not well established. Between blooms, it is common for laboratory cultures to fail due to a generalized autolysis of the cells coupled with a greatly reduced reproductive rate. Several workers (Rudzinska, 1951-1953; Lilly, 1953; Sterbenz, *et. al.*, 1955) have dealt with this and related problems in Suctorian biology, but none have yet developed techniques that yield assured culure of Suctorians collected from the field. This investigation discusses methods used for culturing three species, *Solenophrya micraster*, *Tokophrya quadripartita*, and *Heliophrya sp.* The culture parameters for these as well as their reproductive cycle will be discussed. Optimal rates of feeding, important in keeping cultures from decline, will be presented and characteristics of their reproductive rates will be summarized. In addition, investigations into the delay of morphogenesis by chelating agents will be presented as a method of altering cultures for experimental studies on the ciliated bud. The nonmetamorphosing cells may be viable for up to 96 hours with little or no change in morphology. The achievement of axenic cultures of Suctoria and the unique characteristics of these cultures will also be discussed.

(66)
An Assay for FSH in the Golden Hamster

Michael H. Sims, Deason C. Dunagan, and George W. Tate, Jr., *Memphis State University*

A modification by Benson (Endocrinology 84: in press) of the Steelman and Pohley assay for FSH has been adapted for use in the golden hamster. Benson's modifications provide for more sensitive measurements of serum FSH than previously used bioassay methods. Employing immature female hamsters (22 days old) as assay animals, series of dilutions of FSH preparations of known potencies were run to standardize the ovarian response. Ovarian weight in the immature animals was the parameter measured. The ovarian response to serum from adult animals during the estrous cycle and pseudopregnancy will be compared with the ovarian response to standardized FSH amounts. Details of the assay procedure as well as preliminary data on comparisons between standardized injections and serum FSH will be presented.

(This work was supported by a grant from the Memphis State University Faculty Research Fund.)

(36)
Toxins of Single Spore Isolates of *Pellicularia filamentosa*

Asa C. Sims, Jr., *Southern University in New Orleans*

Pellicularia filamentosa is an important plant pathogen. In order to find the nature of parasitism of this pathogen toxic metabolic products from culture fluids of single spore isolates were separated and characterized. It was found that at least 4 different toxic metabolities were isolated according to their soluability in water, ether, ethel alcohol and acetone. Each toxin in contact, with germinating seeds of flax and alfalfa did not cause typical symptoms of the damping off disease, where as when the toxins were combined together in known strengths, fairly representative typical symptoms were obtained.

(174)
Hormonal Changes in Rats Cross-Adapted to Cold Environments and Simulated High Altitude

J. Alvin Smeake and Samuel R. Tipton
The University of Tennessee

Rats acclimated to 7°C. were exposed to 10,000 feet simulated altitude until acclimated. The acclimation to cold interfered with the acclimation to altitude. The possibility that this negative cross-adaptation was being mediated by some metabolic response induced by thyroxine was investigated. By treating hypothyroid rats with thyroxine, a response similar to that of cold-acclimated rats could be induced. Hypothyroid rats treated with 2,4-dinitrephenol showed an increase in tolerance to extreme altitude, but thyroxine reduced this tolerance. If protein synthesis were blocked with actimemycin-D before or at the same time of thyroxine treatment, but not after, the inhibitory effect of thyroxine could be abated. Treatment with epinephrine or pargyline produced the same response on tolerance as that of thyroxine.

(Aided in part by funds from Public Health Service Research Grant AMO7365 and NASA Grant NGL-43-001-021.)

(117)
Absolute Densities of Small Mammals

Michael H. Smith, *University of Georgia*

The number of mammals (N) at risk of capture is easily estimated from the data derived from removal trapping. However, N is of little value in certain studies where density is of prime interest. Two different techniques may be useful in estimating the area being sampled: (1) The spatial distribution of captures for animals moving onto a grid is different from that of resident animals. The number of shifting animals caught in successive rows of traps from the outer edge to the middle of the grid is a curvilinear function. Subtraction of shifting animals from total catch equals the number of animals residing on the area occupied by the grid plus a border zone equal to the radius of the average home range. (2) Assessment lines going outward from the grid for a relatively long distance can be used to measure the area affected by the grid. The use of these techniques will be illustrated with data from a mixed hardwood small mammal community.

(22)
Effect of a Heated-Water Discharge on the Distribution of Benthos in a Portion of Biscayne Bay, Florida

Richard C. Smith, *Environmental Biology Program, University of Miami*

The annual and long-term changes in distribution of benthic invertebrates, grasses, and macro-algae, due to

a heated-water discharge from a small electricity generating station (430 megawatts), have been evaluated. Quantitative benthic samples at ten stations, beginning in the fall of 1968, have been examined to evaluate monthly changes in abundance and diversity of the benthos. In addition to benthic sampling, data were collected on salinity, particles size and organic content of sediment, and temperature of sediment and water. Aerial photographs, taken prior to construction of the generating station, indicated a "benthic pattern" in the area of study which is presently found at other locations in Biscayne Bay. These patterns are being investigated to evaluate the long-term changes in the area of the generating station discharge.

(Supported by U.S. Public Health Service training grant No. ES-00126.)

(114)
Some Effects of Zinc on the EKG and Breathing Signal of Bluegills (*Lepomis macrochirus* Rafinesque)

Richard E. Sparks, Alan G. Heath, and John Cairns, Jr.
Virginia Polytechnic Institute

Polygraph recordings were made of the heart and breathing activities of twelve 5 - 7 inch bluegills (*Lepomis macrochirus* Rafinesque). Experimental fish were exposed to zinc concentrations of 56 mg/l and 10 mg/l in continuous flow test chambers. Two of four fish exposed to 56 mg/l zinc showed a marked decrease in amplitude of the breathing signal immediately upon addition of zinc. In 10 to 31 minutes, the amplitude of the breathing signal began to increase slightly. The heart rate of all experimental fish gradually decreased over a period of 2 to 6 hours, while the breathing rate increased. One to four hours after addition of zinc, the breathing rate of experimental fish was faster than the heart rate. In contrast, the heart rate of control fish was always faster than the breathing rate and both rates remained relatively constant. Thus indicators of functional damage to bluegills appear before the actual death of the fish due to zinc toxicity.

(This research was supported by a grant from the Manufacturing Chemists Association.)

(132)
An Ecological Study of a South Carolina Salt Marsh

Richard Stalter and Wade T. Batson
University of South Carolina and High Point College

The vegetation of a South Carolina salt marsh was sampled by means of line transects and $1m^2$ quadrats. Soil samples were taken from specific points on the transects and analyzed for conductivity, chlorinity, salinity, pH, texture, and organic content. A surveyor's transit and stadia pole were employed to determine zonation limits of vegetation, and a recording tide gauge was used in conjunction with the aforementioned to determine the duration and depth of flooding of each vegetation zone. The limits of the vegetation zones, arbitrarily determined, will be discussed in conjunction with the above factors. The pH is unimportant in restricting the vegetation to certain zones. Soil texture is of doubtful importance. Organic content may be important in restricting certain species, although the direct effect of organic content was not determined. The soil solute concentration and depth and duration of flooding may be important as these factors correspond well with the range and development of the vegetation. Likewise, the soil solute concentration corresponds well with species distribution. Flooding may be important in restricting the seaward range of all plants except *Spartina alterniflora*. The evidence presented in this study suggests that flooding and the action of the tides in general may produce conditions that are unfavorable for the establishment and subsequent early development of all species except *S. alterniflora*. These factors and conditions were considered important in defining the zones of vegetation on this salt marsh.

(159)
The Analysis of Tritiated Thymidine Incorporation in Grasshopper Neuroblasts

Ralph E. Stephens and J. Gordon Carlson
The University of Tennessee

Embryos of the grasshopper, *Chortophaga viridifasciata* (De Geer), equivalent to 14 days development at 26°C were incubated at 38°C in H^3-thymidine ($10\mu c$/ml; $1.48 \times 10^{-3}M$) for ½, 1, 2, 4, 6, or 8 hours. At the end of each exposure 3 embryos were made into squash preparations and autoradiographed. The number of grains was determined in an area of 113 square microns chosen at random over each of 50 neuroblasts per embryo. Selected cells were in the stage of DNA replication. The average counts rise steadily through 4 hours, level off from 4 through 6 hours, and fall gradually from 6 to 8 hours. A frequency distribution analysis of counts in individual cells is interpreted to mean that the leveling-off and fall in counts from 4 to 8 hours may be due to some combination of the following factors: (1) a possible saturation effect, (2) anaphase division, in which the incorporated thymidine per cell is halved, (3) a possible slowing-down of the mitotic rate after several hours in culture medium, and (4) a possible inhibitory effect of thymidine on mitosis.

(This study was supported in part by Atomic Energy Commission Contract AT-(40-1)-2575.)

(176)
The Effects of Salinity on Blood Free Amino Acids in the Land Crab, *Cardisoma guanhumi* (Crustacea: Decapoda: Gecarcinidae).

James D. Stidham and Charles E. Lane
Presbyterian College and Institute of Marine Sciences, University of Miami

The land crab, *Cardisoma guanhumi*, a semi-terrestrial crab of South Florida, the Caribbean Islands and South America is found in a wide range of environmental salinity. We here report the findings of one area of our studies of osmoregulation in this crab. Adults of uniform size were maintained in distilled water, tap water, and sea water of varying salinities. Qualitative and quantitative changes in blood free amino acids were determined using automatic ion-exchange chromatography. Twenty free amino acids were identified with glycine, taurine, arginine, proline and alanine predominating in crabs from all experimental environments. These five amino acids were seen to increase with increasing salinity with alanine exhibiting the greatest increase over the entire range from distilled water through 175% sea water. The significance of extracellular and intracellular free amino acid pools in this organism will be included.

(61)
The Effects of Nitrate and Chloride Ions on Motility, Glucose and Oxygen Utilization in Rabbit Spermatozoa

BETTYE R. STOKES, *Atlanta University* AND CLYDE E. JOHNSON, JR., *Clark College*

This work describes the effects of Norman-Johnson II (Cl) and III (NO_3) diluents on the metabolism of New Zealand White rabbit spermatozoa. The oxygen uptake of cells in the N-J-III diluent containing nitrate anions was 57% greater than that of sperm in the N-J-II diluent, which contained chloride anions. Sperm in N-J-III exhibited a 37% greater utilization of glucose than sperm in N-J-II. Motility of cells was also greater in the nitrate medium. In addition to the effects of nitrate and chloride anions on oxygen uptake and glucose utilization, the effects of these ions on the lactate production exhibited by these cells will be discussed.

(19)
New Primary Productivity of a Regularly-flooded North Carolina Salt Marsh

LINDA M. STROUD AND ARTHUR W. COOPER
North Carolina State University

Estimates of net primary productivity of major vegetation types in the regularly-flooded marsh at Oak Island in Brunswick County, North Carolina were made. A harvest method was used to obtain standing crop estimates of vegetative types. The average behavior of the crop through a growing season was obtained by fitting the observed data to a fourth degree polynominal in time. The R^2 values obtained using this equation were generally good for all vegetation types. Net production was then determined by two methods: 1) using only living standing crop estimates and 2) using changes in living and dead standing crop estimates. Productivity estimates obtained in this study were not as high as values obtained in previous salt marsh studies at Sapelo Island, Georgia but were similar to other data for North Carolina and greater than data from farther north along the Atlantic coast. Reasons for these differences will be discussed.

(121)
Fallout Studies on Native Vegetation. I. Effects of Beta-Radiation (^{90}Sr) on White Pine and Red Oak Trees

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Oak Ridge National Laboratory, Oak Ridge

The major radiological hazards from fallout deposited on natural or agricultural ecosystems are external gamma and beta radiation and internal beta radiation from assimilation of radionuclides. With reference to plants, the hazard of surface contact with beta emitting fallout particles and the hazard of beta-field radiation where plant habitats are covered with fallout particles, has not been fully determined.

During the past year beta radiation sources and techniques of botanical application have been developed. Current radiobotanical studies are directed toward determining beta radiosensitivities of important native plant species.

Utilizing a strontium-90 fallout simulant, contact and beta bath exposure experiments have been conducted with white pine and red oak trees. Biological effects of contact doses (0.2 to 300 rads/hr) varied from 47% growth reduction to 100% lethality of apical meristems in pines. A beta bath dose of 600 rads proved lethal by 30 days. In red oak trees total bath doses exceeding 1500 rads in 1 to 3 days were sufficient to kill apical buds, while doses ranging from 500 to 750 rads reduced shoot growth by 50%.

(Research jointly sponsored by the Office of Civil Defense, Department of Defense, and the U.S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(38)
Serological Relationship of *Protosiphon* to Selected Chlorophycean and Xanthophycean Algae

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Louisiana State University in New Orleans

Serological data indicate that the green alga *Protosiphon* (14 isolates tested) is related to four other chlorophycean genera: *Spongiochloris* (6 species), *Spongiococcum* (3 species), *Neochloris* (3 species), and *Bracteococcus* (9 species). *Protosiphon* shows no sereological affinity to the xanthophycean genera *Botrydium* (3 species) or *Botrydiopsis* (3 species). Antigens of the seven genera were reacted with antisera produced against *Protosiphon, Spongiochloris, Bracteococcus, Botrydium,* and *Botrydiopsis.* None of the chlorophycean algae reacted with *Botrydium* or *Botrydiopsis* antisera. Conversely, no *Botrydium* or *Botrydiopsis* species reacted with any antisera against the green algae. This strongly suggests a very weak relationship, if any, between chlorophycean and xanthophycean algae. All chlorophycean genera exhibited intergeneric affinity and the two xanthophycean genera also showed a similar relationship. These serological data support current taxonomic classification.

(113)
Changes in Movement Patterns of Fish Exposed to Sublethal Concentrations of Zinc

WILLIAM T. WALLER AND JOHN CAIRNS, JR.
Virginia Polytechnic Institute

Recent literature contains numerous references which indicate that waste disposal concentrations which merely permit survival of aquatic organisms may not permit them to function properly. This research was undertaken to develop a rapid feed-back monitoring system using fish movement patterns as an indicator of normal function.

Movement patterns of *Carassius auratus,* Linnaeus, exposed to lethal and sublethal concentrations of $ZnSO_4 \cdot 7H_2O$ were monitored using a series of light beams and photo-resistors. Six, five-gallon aquaria each equipped with three light beams transversing the aquaria at the bottom, middle, and top constituted the monitoring apparatus. Electronic counters were advanced each time a fish passed through a light beam. Results of $ZnSO_4 \cdot 7H_2O$ exposure obtained using static test conditions, a twelve-hour photoperiod, synthetic dilution water, and a single fish per tank showed a high degree of variability in the movement patterns; however, increases or decreases in activity and changes such as photoperiod reversal were apparent.

(Supported by Manufacturing Chemists Association.)

(56)

Ultrastructural and Time-lapse Studies of *Trachelomonas, Lepocinclis,* and *Euglena* (Euglenophyceae, Euglenales) with Special Reference to Eyespots

PATRICIA L. WALNE AND CAROLE A. LEMBI
University of Tennessee

Phase-contrast and electron microscopy and microcinematography were used to study cellular details in 3 genera of euglenoid flagellates. These organisms afford interesting comparisons — *Trachelomonas,* which displays "metaboly" (euglenoid movement) within a protective lorica; *Lepocinclis,* which is naked like *Euglena* but "nonmetabolic"; and *Euglena,* which is naked and undergoes metaboly. Special emphasis will be given to the comparative ultrastructure of the extrachloroplastic eyespots in these genera and to the positional relationships of the eyespots with other organelles.

(Research supported in part by a University of Tennessee Biomedical Sciences Support Grant, 1101R-01, and a Faculty Research Grant to the senior author.)

(23)

The Vascular Plants of Tipton County, Tennessee

SARAH WARRINGTON AND E. T. BROWNE, JR.
Memphis State University

Tipton County is one of the five westernmost counties of Tennessee. Within its boundaries are parts of two floristic provinces: the Eastern Deciduous Forest Province and the Coastal Plain Province. The former extends eastward from the loess bluffs that rise abruptly from the Mississippi Alluvial Plain, and the latter is associated with the lowlands and bottomlands of the Mississippi and Hatchie Rivers.

The soils of the Eastern Deciduous Forest have developed from loess deposited in the Pleistocene Epoch, while the soil of the Coastal Plain Province is alluvium of Recent origin and is continually being deposited, transported, and redeposited. The several soil types support a wide variety of species.

(27)

The Arborescent Flora of Mississippi

J. RAY WATSON, *Mississippi State University*

The known arborescent flora of Mississippi consists of 200 native and naturalized species distributed in 76 genera and 43 families. In addition 16 cultivated species are known to occasionally escape. Genera with the largest number of arborescent species in the state are *Quercus* (32 species), *Crataegus* (22 species), *Carya* (13 species), *Ilex* (9 species), *Prunus* (9 species) and *Magnolia* (7 species). Certain species in the flora are known from one or a few locations. Among these are *Cladrastis lutea* (Michx. f.) K. Koch, *Gymnocladus dioica* (L.) K. Koch, *Magnolia tripetala* L., *Prunus hortulana* Bailey, *Prunus munsoniana* Wight & Hedr., *Quercus austrina* Small, *Quercus macrocarpa* Michx., and *Quercus mississippiensis* Ashe.

(129)

A Profile of Fernbank Forest

PAMELA J. WAY AND JOE A. EDMISTEN
University of Georgia

Fernbank Forest, located in Atlanta, Georgia, was sampled in various locations during the months of June to October, 1968. A profile was constructed from averages of the species present. This profile represents the structure of a typical southern mixed hardwood forest. Accompanying photographs were taken in October to show the trees in a winter condition. The profile method of representing a forest is superior to photographs because it gives a concise picture of what is to be found in the forest. This method could be a valuable educational tool in botany and related disciplines where a knowledge of taxonomy is not essential.

(31)

Quantitative Differences Between Gametophytes of Ferns with Sexual and Apogamous Reproduction

DEAN P. WHITTIER, *Vanderbilt University*

Gametophytes of ten apogamous and twenty-one sexual species of ferns in seven genera were studied in axenic culture. Besides the fact that only thirty-two spores are formed in the sporangia of apogamous species, their spores are larger than those of the diploid fern species. But spore size along with antheridium size is related to the level of ploidy and not to the type of reproduction. The gametophytic growth of the apogamous species in general was faster than that for the sexual species. Apogamous sporophytes were formed on smaller gametophytes in a shorter period of time than archegonia on the gametophytes of the sexual species. Thus the maturation of gametophytes producing apogamous sporophytes was more rapid than the gametophytes of the sexual species.

(59)

Radiosensitivity and Regulation of Population Density in the Yellow Fever Mosquito (*Aedes aegypti*)

WILLIAM K. WILLARD, *Clemson University*

Populations of the yellow fever mosquito, *Aedes aegypti* (L.), were exposed to a series of selected levels of X-rays (O R, 1600 R, 3200 R, and 6400 R). Females mated with irradiated males produced a normal complement of eggs regardless of the dose administered to the males; however, the viability of the eggs decreased with increasing dose to the males. Nontreated females mated with irradiated males (6400 R) produced eggs which were only 0.0005% viable. Females treated with 3200 R and mated with nontreated males failed to produce eggs. Sterile individuals of either or both sexes were introduced into nontreated populations having a sex ratio of 1:1. The introduction of sterile males was more effective as a population control method when the percentagewise variation in egg viability was considered; however, the number of individuals produced was 11% less when sterile females were introduced than was found with the comparable introduction of sterile males. The more practical means of population control of *Aedes aegypti* was concluded to be the introduction of

sterile males. Contrary to observations in many species, the females were twice as sensitive to radiation as were the males when compared on the basis of the dose required to sterilize and with regard to the production of viable eggs.

(128)
Plankton, Detritus, and Clay Turbidities in the Mobile Bay-Gulf of Mexico Interchange

Louis G. Williams, *University of Alabama*

Based on the microscopic analysis of sediments from suspended materials in water samples turbidities varied directly with tidal turbulence and river runoff, with the highest plankton standing crops developing during periods of lowest inorganic turbidity. During peak plankton blooms the ulta plankton dominated, consisting of very tiny green and blue-green algae, while the gulf plankton was dominated by diatoms. Photosynthetic bacteria were an important component of the Mobile Bay estuary.

(122)
Fallout Studies on Native Vegetation. II. Field Retention of a Fallout Simulant by White Pine and Red Oak Trees

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Oak Ridge National Laboratory, Oak Ridge

Small white pine (*Pinus strobus*) and red oak (*Quercus rubra*) trees were contaminated in the field with a quartz fallout simulant containing ^{134}Cs. The initial fraction of the simulant retained by foliage was higher in the oaks (0.35) than in the pines (0.24). However, after 1 hour, the broad leaved oaks had lost 90.5% of the initial ^{134}Cs concentration while the pines had lost only about 10%. These early retention differences are related to the effects of wind on the two distinct foliage types. Effective half-lives were calculated for fallout on both species at intervals of 0 to 1 day, 1 to 7 days and 7 to 33 days. For pine trees these values were 0.25, 4.53 and 20.66 days, respectively. For oaks they were 0.12, 1.41 and 24.86 days. Loss of particles (^{134}Cs) was due, primarily, to the weathering action of wind and rain during the study.

(Research jointly sponsored by the Office of Civil Defense, Department of Defense, and the U.S. Atomic Energy Commission under contract with the Union Carbide Corporation.)

(43)
A New Species of *Cintractia* on *Fuirena* (Cyperaceae)

F. T. Wolf and S. K. Hasija, *Vanderbilt University*

The genus *Cintractia* (Ustilaginales) includes some 68 species of smut fungi parasitizing hosts belonging to the Cyperaceae and Juncaceae. A literature search failed to reveal any previous record of a smut parasitizing *Fuirena simplex* Vahl. The present description is based on material collected 17 August 1967, in Dawson County, Nebraska by Dr. Robert Kral. After comparison of characters of the sorus, spores, and epispore markings with those of *C. calderi, C. leucoderma, C. subinclusa* and *C. Taubertiana*, it has been decided to describe the smut on *Fuirena* as a new species.

(21)
Competition on Granite Outcrops between Two Species of *Talinum*

V. K. Wright, *Emory University*

Talinum teretifolium (2n = 48) appears to be replacing *T. mengesii* (2n = 24) on granite outcrops in central Georgia where their distribution ranges overlap and where their niche requirement appears to be very similar. Field observations and laboratory experiments indicate that the seedlings of both species have a similar tolerance to desiccation. A significant difference in reproductive behavior does exist which would permit a unidirectional replacement where the species occur together.

(25)
The Ovule and Megagametophyte of *Smilax walteri* Pursh. (Angiospermae: Monocotyledoneae: Liliales: Liliaceae)

Fred T. Yeats and J. M. Herr, Jr.
University of South Carolina

The ovaries of *Smilax walteri* Pursh. usually contain three ovules, each one arranged in a position best described as curved 90 degrees from atropous. These ovules are bitegmic, and the inmost layer of the inner integument contains a resinous material. The composition of this material is discussed. The ovules are crassinucellate with several layers of parietal cells. The megaspore mother cell divides to form either a linear or T-shaped tetrad of megaspores, and the chalazal megaspore is functional. The defunct megaspores and the adjacent nucellus degenerate and form a persistent layer of cell fragments around the developing megagametophyte. Megagametogenesis follows a development essentially similar to the *Polygonum* type. Enlargement, concomitant with development, extends the megagametophyte and destroys the parietal tissue. The orientation of cells in the megagametophyte is variable and is discussed.

(75)
Life History of *Pleurobema cordatum* (Rafinesque, 1820)

Paul Yokley, Jr., *Florence State University*

The Ohio Pigtoe Mussel, a commercially valuable species, inhabits the largest rivers of the Ohio River drainage system, and occurs in concentrations or "mussel beds" in the Tennessee River. Oogenesis and spermatogenesis occur at cyclic intervals throughout the year with spawning and fertilization in April and May. Glochidia are formed in four to six weeks after fertilization in the marsupial outer gills. The parasitic glochidia, released mainly in June, attach to the gill filaments of the Rosefin Shiner, *Notropis ardens* (Cope), encyst, and transform into independent mussels in fourteen to eighteen days. A motile foot is developed during encystment but no increase in overall size results. Within three weeks after dropping from the host fish, the free-living naiads double in size. Sexual maturity is reached within four years and gonads remain functional throughout the remainder of the life of the individual which may be twenty-five to thirty years.

(146)
Pasteur Effect in the Corn Seedling

M. E. Yow and B. H. Wise, *Memphis State University*

The intracellular control mechanism which produces the Pasteur effect is of functional value to the cell in decreasing the consumption of glucose under the aerobic conditions that cause the production of large amounts of ATP by the mitochondria. Several mechanisms have been proposed to account for this effect. Most investigations to date have been performed using animal tissues. For our investigations the active meristematic distal portion of the primary root of the corn seedling was selected. There were several possible approaches to the problem. Our initial studies focused on the elucidation of control sites by detection of "crossover points" of relative depletion and accumulation of the glycolytic intermediates. These phosphate esters were measured by enzymatic methods before and after transfer of the seedlings from air to nitrogen.

Papers Received Too Late to be Included Alphabetically

(132a)
Vegetation and Landscape Processes on Amchitka Island, Alaska

C. A. Amundsen and E. E. C. Clebsch
The University of Tennessee

The grass-subshrub sub-arctic tundra of the Aleutian Islands is the result of a poor flora which has developed into a monotonous vegetation under fairly uniform and rigorous weather conditions. The few distinctive plant communities on Amchitka Island are most closely controlled by moisture gradients and are highly correlated with distinctive soil features.

(177a)
Dissociation, Inflammation and Reaggregation Phenomena In Livers of Chick Embryos Treated With Aminoguanidine Sulfate

Charles E. Hubert, *Clark College*

Aminoguanidine sulfate injected at four days severely damages most hepatic cords of chick embryos. A few hepatic cords appear resistant to AGS and retain glycogen. Damaged livers are restored to normal quantitatively and histologically by 20 days.

The initial reaction involves inhibition of cord development, swelling of parenchymal cells and edema which separates endothelium from parenchyma. Dissociation and inflammatory phenomena then occur. The number of mononuclear cells indicates the degree of inflammation and the amount of destruction of the parenchymal tissue. Resistant cylinders accumulate excessive amounts of glycogen.

Spaces between resistant cylinders are progressively occupied by weakly PAS-positive ground substance containing small numbers of highly modified sub-lethally damaged surviving dissociated cells. Mononuclear cells remain present. Cells in this matrix gradually assume characteristics of parenchymal cells and collectively form hepatic cords. Formation of cyst-like parenchymal structures containing mitotic figures occur; these anastomose and collapse, forming typical hepatic cylinders.

University of South Florida Marine Science Institute Plans Ten Summer Courses

Ten marine science courses spanning the areas of biological, chemical, geological, and physical oceanography will be offered during the summer quarter of 1969 by the Marine Science Institute of the University of South Florida at the newly developed Bay Campus facilities near downtown St. Petersburg on Tampa Bay.

These courses are open to upperclass undergraduate and graduate students except for Plankton Systematics, designed for graduate students only. The deadline for application is May 27; registration for the two sessions will be held on June 8 and July 16.

June 9 to July 16: Phycology — Drs. Harold J. Humm and Clinton J. Dawes; Physical Oceanography — Dr. Robert W. Flynn; Marine Geology — Dr. George M. Griffin; Marine Invertebrate Zoology I (Lower Invertebrates) — Drs. J. L. Simon and Frank E. Friedl; Physiology of Marine Animals — Dr. John M. Lawrence.

July 17 to August 22: Chemical Oceanography — Dr. Dean F. Martin; Ichthyology — Dr. Hugh H. DeWitt; Marine Invertebrate Zoology II — Drs. Frank E. Friedl and J. L. Simon; Physiology of Fishes — Dr. J. R. Linton; Plankton Systematics — Dr. Thomas L. Hopkins.

For detailed information write to *Dr. Harold J. Humm, Director, Marine Science Institute, University of South Florida, St. Petersburg 33701.*

News of Biology in the Southeast

STATE CORRESPONDENTS

Alabama — Position Vacant
Florida — John D. McCrone, University of Florida
Georgia — Fred K. Parrish, Georgia State College
Louisiana — Harry J. Bennett, Louisiana State University
Mississippi — Joseph Fitzpatrick, Mississippi State University
North Carolina — C. J. Umphlett, University of North Carolina
South Carolina — J. M. Herr, Univ. of South Carolina; G. Thomas Riggin, Jr., Newberry College
Tennessee — Donald Caplenor, George Peabody College
Virginia — Harry L. Holloway, Jr., Roanoke College
West Virginia — Earl L. Core, West Virginia University

Joseph F. Fitzpatrick, Jr. — Editor
Dept. of Zoology
Mississippi State Univ.
State College, Mississippi 39762

Notice. — Some limited response has been received from persons interested in a book review section for the *Bulletin*. Adequate coverage of the several disciplines, however, is not present among the volunteer reviewers. Again we ask that any other persons who are able and willing to provide book review services for ASB please contact one of your editors.

About People

Clinton L. Baker, Southwestern [College] at Memphis, Tennessee, has resigned as Director of the Reelfoot Biological Station, Tennessee. He will be succeded by **William Nelson**, Assistant Professor of Biology, University of Tennessee at Martin. Dr. Baker, a thirty-five year veteran with the Tennessee Academy of Science will now devote his time to writing a history of the Academy.

Alma L. Luzzati has joined the Radiation Immunology Group, Oak Ridge National Laboratories, Oak Ridge, Tennessee. Dr. Luzzati received the Ph.D. degree from the University of Pavia, Pavia, Italy.

M. L. Simmons, formerly Advisor to the Experimental Animal Facilities and the Animal Testing Laboratories of ORNL has left the facility to join the staff of Smith, Kline, and French Laboratories in Philadelphia, Pennsylvania.

W. D. Wicks, Biology Division, ORNL, was in Recife, Brazil, to participate in an advanced biochemistry course at the University of Pernambuco. Afterwards, he visited laboratories and gave lectures in Sao Paulo and Rio de Janeiro.

Elliot Volkin and **R. C. von Borstel**, ORNL, were in Belo Horizonte, Brazil, in December, 1968, to present papers at the International Symposium on Nuclear Physiology and Differentiation.

James G. Farrelly has joined the Enzymology Group, ORNL, as a Biology Division Postdoctoral Fellow. He was granted his degree by the Universty of Tennessee, Knoxville.

About Institutions

As part of a continuing lecture series at the **University of Miami's Research Station at Pigeon Key, Florida,** Warren J. Wisby, Director of the National Fisheries Center and Aquarium, Washington, D.C., presented a public lecture. This series is a part of the Environmental Biology Program at Miami, which is under the direction of Howard J. Teas.

The Department of Botany at the University of North Carolina, Chapel Hill, has been awarded a grant of $16,300 by NSF for conducting a research participation program for college teachers during the summer of 1969. The grant provides stipends of $1,000 each for six postdoctoral participants and $750 each for two predoctoral participants. In addition, each participant will receive an allowance of $150 per dependent and a travel allowance. The program will begin June 16 and end August 23. Any teacher of biological sciences in a U. S. college or junior college is eligible to apply. Application forms and a brochure describing the program may be secured by writing the Director of the program, Dr. Victor A. Greulach, Department of Botany, University of North Carolina, Chapel Hill, N. C. 27514. The program is unique among others of the same kind elsewhere as regards the large number of professors and varied botanical disciplines provided for choice by the participants, enabling them to do research in a field that is in line with their interests and backgrounds. The professors available for directing the research of the participants are John N. Couch, Lindsay S. Olive, William J. Koch, and Clyde J. Umphlett in mycology; Max H. Hommersand in phycology and algal physiology; A. J. Domnas in plant biochemistry; Edward G. Barry, Clifford Parks, and Paul Mangelsdorf in genetics; J. Frank McCormick and Howard T. Odum in Ecology; and A. E. Radford, C. Ritchie Bell, and Clifford Parks in plant taxonomy and systematics. The goal of the program is to provide an opportunity of resumption of research activity by college teachers who have been unable to continue active investigation because of lack of time, space, or facilities.

Continued from page 30

B. Theodore Cole, Professor and Head of Department of Biology, University of South Carolina. Absorption, metabolism, and *in vitro* autoxidation of unsaturated fatty acids; effects of sodium flouroacetate on cold blooded animal carbohydrate metabolism. AAAS; Society for Experimental Biology; Physiological Society; ASB (Executive Committee, 1960-63; Vice-President, 1965-66).

C. Willard Hart, Jr., Invertebrate Zoologist and Administrator of Consultant Programs, Dept. of Limnology, Academy of Natural Sciences of Philadelphia. Functional morphology, systematics, and biogeography of entocytherid ostracods; fresh water chemistry of Caribbean islands. AAAS (fellow); Council of Biology Editors (treasurer); American Society of Zoologists; ASB (Editor of *Bulletin* 1961-69).

Burton J. Bogitsh, Associate Professor of Biology, Vanderbilt University. Histochemistry of host-parasite relationships; systematics of flatworm parasites. Society of Parasitologists; American Society of Zoologists; ASB (Executive Committee, 1967-69).

James N. Dent, Professor of Zoology, University of Virginia. Amphibian taxonomy, development, and endocrinology; embryonic development of *Plethodon cinereus*; developmental physiology and comparative embryology. AAAS; American Society of Zoologists; Association of Anatomists; ASB.

Perry C. Holt, Professor of Zoology, Virginia Polytechnic Institute. Morphology, taxonomy, and ecology of the Branchiobdellida; anatomy and taxonomy of arachnids. AAAS (fellow); Society of Systematic Zoologists; American Society of Zoologists; ASB.

William J. Koch, Associate Professor of Botany, University of North Carolina. Culture, comparative morphology, sexuality, and taxonomy of aquatic fungi; fungi parasitic on algae. AAAS; Botanical Society; Mycological Society; Association of Plant Taxonomists; ASB (agent for incorporation, 1961-).

John H. Mullahy, S.J., Professor and Chairman of Biology Dept., Loyola University (Louisiana). Cytology of Rhodophyceae. AAAS (fellow); American Phycological Society; Botanical Society; Torrey Botanical Club; Association of Jesuit Scientists; ASB.

Charles Ray, Jr., Professor of Biology, Emory University. Cytology and genetics of *Linum* species; interspecific hybridization; cytogenetics of *Tetrahymena*. AAAS; Genetics Society; Society of Protozoologists; Genetics Association; ASB.

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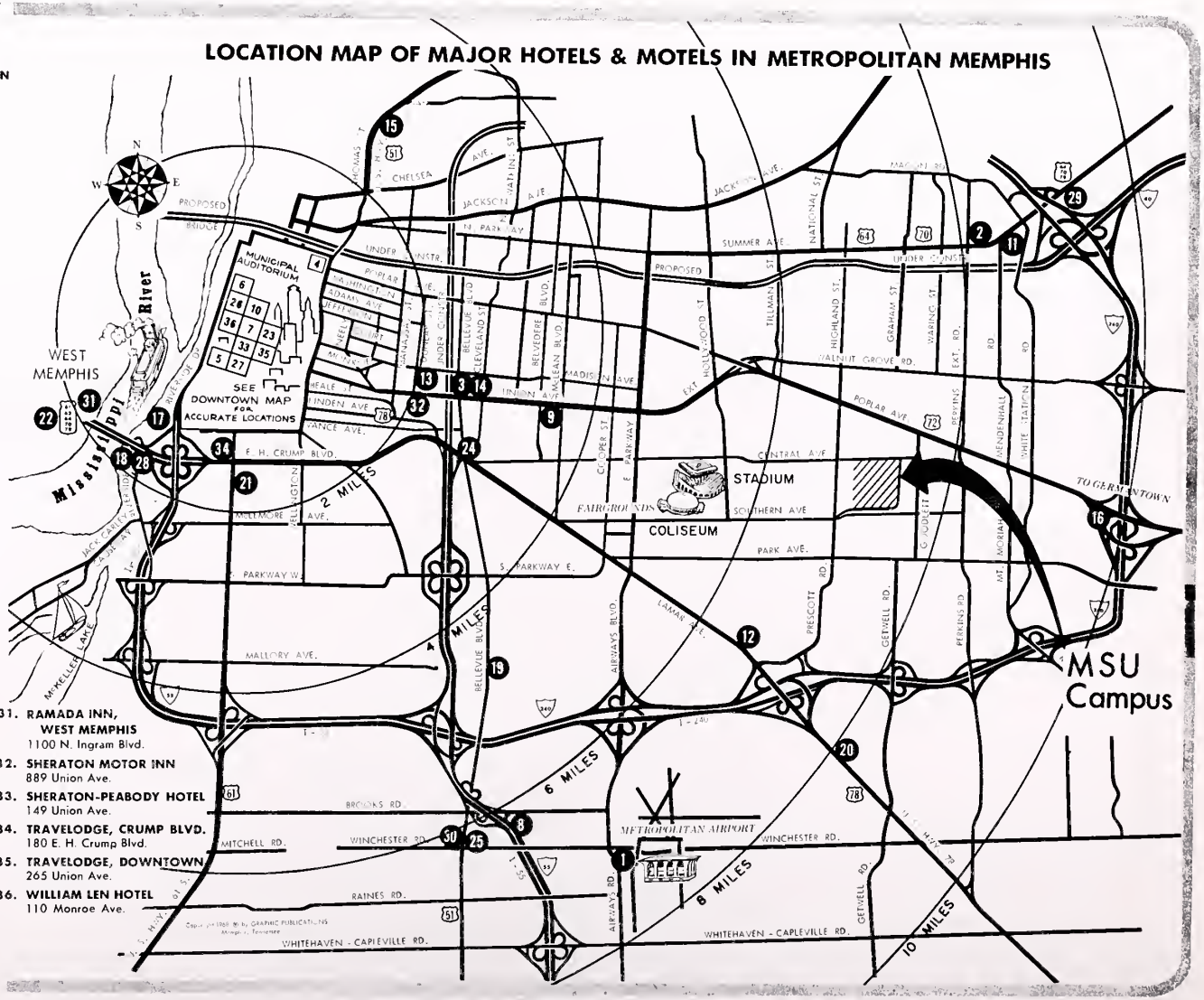
LOCATION MAP OF MAJOR HOTELS & MOTELS IN METROPOLITAN MEMPHIS



31. **RAMADA INN, WEST MEMPHIS**
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33. **SHERATON-PEABODY HOTEL**
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34. **TRAVELODGE, CRUMP BLVD.**
180 E. H. Crump Blvd.
35. **TRAVELODGE, DOWNTOWN**
265 Union Ave.
36. **WILLIAM LEN HOTEL**
110 Monroe Ave.

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The ASB BULLETIN

Volume 16, Number 3 July 1969

PRIMATE FACILITY — Duke University Field Station for Animal Behavior Studies (See Page 98)

The Official Quarterly Publication of The Association of Southeastern Biologists

ASB BULLETIN

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Associate Editor

JOSEPH F. FITZPATRICK, JR.,
News Editor

DAVID J. COTTER, Business Manager

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ASSOCIATION AFFAIRS

Notice of Positions Available for Undergraduate or Graduate Students

Employers are urged to submit notices regarding job opportunities for undergraduate or graduate students in biology to The ASB Bulletin. Notices of summer employment are particularly requested. Send information to the Editor as soon as available. Include information on where, when, description of work, salary, length of time, type of training required, etc.

The Alcovy River - A Unique Natural Heritage

CHARLES H. WHARTON
Georgia State College

Prologue

Foremost among the things which can destroy this nation is the failure to recognize and teach the true relationship of man to the natural world. The most shocking manifestation of this is the abuse and destruction of our natural environments of air, water, and land. Lately it has become manifest through the ecologist Eugene Odum and his associates that a combination of water and land, the coastal marsh, is of critical importance. Another combination of water and land, the inland swamplands, perhaps lacking so significant a champion, and with far less data in their behalf, have nevertheless come to their time in history.

This report is written in behalf of the larger river swamps of the Southeast, those mysterious assemblages of water and forest, the wet and the unwet, that have intrigued naturalists and explorers from 1791 to 1969. From the days of William Bartram, who found and lost the gorgeous *Franklinia* in the great Altamaha swamps, we have hardly known how to treat this quite conspicuous and little understood feature of our natural environment. To the average man the word "drain" was the major verb to apply to this watery realm that was neither fish nor fowl. Forlorn ditches and abandoned canals over the state attest the lack of appreciation and understanding of these wetlands. The mighty Okeefenokee but narrowly escaped the fate of drainage brought by ditch, canal, or channel; the vast Everglades has come close to death by the same means.

Today, a deepening and widening of swamp streams by bulldozer and dragline, called "channelization" threatens the remaining fresh water river swamps of Georgia. Channelization is a part of nearly every flood control project of the Soil Conservation Service under Public Law 566. Because P.L. 566 projects have been largely confined to small watersheds, the channelization of larger Georgia streams has not been attempted. Proposed channelization of the large Alcovy River in Newton and lower Walton Counties has abruptly brought this facet of flood control in conflict with ecologists, conservationists and resource management agencies. Not only would channelization destroy the Alcovy's position as a state scenic river, but it would jeopardize one of the state's few remaining natural areas, the potential of which is of value to every citizen in Georgia.

Small bottomlands, on streams small enough to have been manageable by the beaver, the Indian and the Caucasian settlers, are not the issue. We here are concerned with the large swamp ecosystem, too large to be mastered by man or animal, that has existed in a relatively stable state for centuries. These great river swamps were likely the last refuge of the vanished mastodons, mammoths and ground sloths who, incredibly, appear to have survived here until as late as 2000 years ago. Today these swamps are the last refuge for a dwindling host of native fauna, including the cougar, red wolf and Ivory-billed Woodpecker.

I thus offer constructive criticism of only one phase of Soil Conservation Service activity, the

interpretation of P.L. 566 as regards channelization of the larger swamps along the larger streams. No opposition is intended against flood control reservoirs, protection of land being farmed or having been farmed, or other sound aspects of the Alcovy Project.

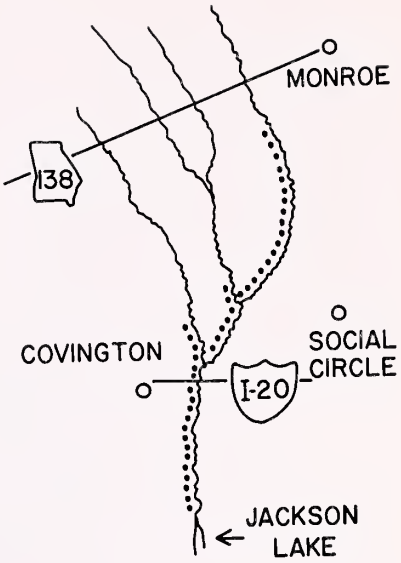
Introduction

The Alcovy River is a branch of the Ocmulgee, and the easternmost of three large rivers draining into Jackson Lake. Above Jackson Lake are impressive shoals and the fall is most rapid. From about four miles below Covington north to Monroe the river is bordered by some of the finest bottomland swamps in the Piedmont. Where standing or flowing water is abundant, there are numerous stands of tupelo gum (*Nyssa aquatica*), a coastal plain species. Infrequently flooded portions of the swamp bear a floodplain assemblage of water oak, swamp chestnut oak, sweet gum, hackberry and poplar. Occasional high bluffs border the river with beeches and mountain laurel. Among the larger vertebrates, water fowl, deer, raccoon, otter, beaver, mink, swamp rabbit and squirrel are often abundant. The forest floor supports a rich assemblage of smaller vertebrate life. Among the amphibia are Ambystomid salamanders (spotted and marbled), two species of *Eurycea, Hemidactylium, Pseudotriton,* the golden mouse (*Ochrotomys nuttali*) and in the high swamps and ecotones, the rare southeastern shrew, *Sorex longirostris,* and the jumping mouse, *Zapus hudsonicus*. The southernmost locality for the northern meadow mouse, *Microtus pennsylvanicus,* was discovered adjacent to the swamp by Homer Sharp on Sam Hay's property south of Covington. The swamp pools swarm with invertebrate life even in winter. Current studies are underway on food chains in the Alcovy swamp but relatively little is known of this prominent ecosystem. The Alcovy itself is clean and unpolluted compared to other Piedmont streams. It is perhaps unique among Piedmont rivers in the vastness of its swamps, the nature of the swamps, and in having an accessible and central location. We at Georgia State use the Alcovy for field trips and have found it very convenient to an institution in urban Atlanta. Further, its cleanliness offers us a research control in comparative studies of the swamp ecosystem of the South River, now virtually an open sewer. River basin studies are an important phase of the current International Biological Program. Between Monroe and Jackson Lake the Alcovy provides unexcelled wilderness experience in hiking, boating, hunting, fishing and general natural history. The quality of its water and its environment of plant and animal life makes the river a valuable candidate for the state scenic rivers system.

The area of the swamp lying south of the Alcovy Station railroad trestle has been calculated by planimeter from U.S.G.S. quadrangles to be 1825 acres, and is of the most crucial importance. Complete U.S.G.S. coverage is not available in Walton County but the area from the railroad bridge north to Monroe has an estimated 1500 acres of river swamp.

The Alcovy Project

The Soil Conservation Service, under Public Law 566, has very recently completed plans for a project which is intended to eliminate 80% of the swamp forest along the Alcovy and two principal tributaries, Cornish and Flat Creeks. This project is sponsored by the Upper Ocmulgee Soil and Water Conservation District and city officials of Monroe, Covington and other communities. About 15 reservoirs are to be constructed. Two are large, the largest having a normal pool of 560 acres, a flood pool of 1235 acres. The present Alcovy channel is to be dredged from five to six feet deep (published plans for Cornish Creek, Flat Creek and the lower Alcovy call for a cut below grade of from 4.0 to 8.5 feet); the spoil may be spread or not spread at the landowner's wishes. Cornish Creek will be dredged from its junction with the Alcovy (5.5 foot depth to top of bank) to Highway 138 (4 foot depth here). All trees will be cut on one or both sides of the river and tributaries in a strip from 30 to 100 feet wide to make it easier to deposit the dredging spoil and to prevent trees from falling into the river. The present channel of the Alcovy is to be followed in dredging. In certain areas the channel will be widened as well as deepened. On Cornish and Flat Creeks old dredge lines will be followed. From the terminus of the present large swamps about a mile above the highway 213



The Georgia map (left) indicates the extent of Small Watershed Projects of the Soil Conservation Service as of Dec. 31, 1968. Solid black area is the coverage of the Alcovy River - Cornish Creek Projects. Stippled areas are other S.C.S. flood control projects classified as follows (some are Pilot Watersheds, most are under P.L. 566): Completed, 22; approved, 41; submitted for approval, 103. On the right is an enlargement of only a part of the Alcovy River - Cornish Creek Projects; the proposed Alcovy Scenic River is shown as a heavy dotted line.

bridge to about six miles downstream, snagging and clearing of the river will be done. The costs of the project on the Alcovy proper will be $6,003,032 of which $3,909,874 are public funds. The costs of Cornish Creek are $4,860,-009 of which $3,196,910 are public funds. The stopping of erosion, the reduction of flood-frequency on existing croplands, and the impoundment of water for late summer use by cities downstream are all worthwhile objectives of the Alcovy Project. *Disagreement comes only with channelization of the lower Alcovy below Monroe and in certain parts of lower Cornish and Big Flat Creeks.*

The evidence is strong that channelization of the Alcovy will destroy a very valuable resource, not only for the owners of the river, but for the people of the entire state. Serious confrontations between conservation, game and timber resource people and the advocates of P.L. 566 have occurred, chiefly over the disastrous effects of channelization. Weaknesses of P.L. 566 programs have been summarized by Poole [1] of the Wildlife Management Institute indicating that, in many states, "engineers, economists and physical scientists are making irrevocable biological decisions affecting irreplaceable resources". Stuart [2] has presented an analysis of P.L. 566 recommending elimination and reduction of channelization. Russell [3] of Kentucky Fish and Wildlife Resources has discussed the catastrophic effects of 566 projects indicating that ". . . lowland wood-

[1] Poole, Daniel A., Weaknesses in the Public Law 566 Watershed Program, presented at the 15th National Watershed Congress, Louisiana, May 27, 1968.

[2] Stuart, Russ, An Analysis of Public Law 566, presented at the N.W.F. meeting, Las Vegas, Nevada, March, 1964.

[3] Russell, Dan M., Wildlife and P.L. 566 Watersheds, presented to State Soil Conservation Staff Conference, February 25, 1963.

land habitat comes the nearest to a multiple use concept of any wildlife environment. Its utilization by important furbearers, waterfowl and for its timber resources make it doubly valuable from the monetary and recreational standpoints." "We in Kentucky have found that wildlife habitat destruction far outweighs any possible benefits under the P.L. 566 programs."

Barick [4] reported to the Southeastern Directors of Wildlife Commissions that his study group examined nine streams channelized by P.L. 566 projects and detailed the impact on swamp hardwood tree production. "Participants observed clear cut evidence of tupelo gum damage and destruction through excessive water removal and right of way clearing. Expert opinion expressed indicated that excessive lowering of water tables would result in tupelo die-back and that this valuable species would be replaced by other less valuable species. In the course of our tour we gained additional information supporting our belief that desired agricultural drainage could be secured without destroying the valuable wetlands, since the present drainage design is based upon the erroneous assumption that these areas have no significant value." Barick's group consulted with drainage engineers and found that modification of former procedures was indeed practical. Forest Durand,[5] while director of the Tennessee Game and Fish Commission, expressed the growing concern held by many state agencies dealing with conservation of natural resources (including Georgia officials), that P.L. 566 projects are very questionable where the resources being lost are in short supply and increasing demand while those gained are already in oversupply. Durand points out that channelization and stream alteration appear an easy way to arrive at satisfactory cost benefit figures as required by law. Director Durand challenged the current idea of getting water that can not be put behind dams off the watershed as soon as possible, reversing the past philosophy of holding it there, a philosophy which had originally helped enact P.L. 566.

Bayless and Smith,[6] in a study of habitat alteration associated with stream channelization in eastern North Carolina, compared the fish populations of 23 channeled and 36 unchanneled streams and found 90% reduction in weight and number of game fish per acre in streams channeled by P.L. 566 projects. For a 40-year period following channelization fish and wildlife populations did not recover. Allen's [7] report on channelization's impact on fish and wildlife revealed that all 13 southeastern states felt that channelization posed a serious threat. In addition, Kentucky reported erosion and slumping in 60% of P.L. 566 channels inspected. Leonard Foote and I found serious slumping in the Little River channel emptying into Lake Allatoona. Unfortunately, owing to the uniform and faster current created by channelization, this material is not redeposited locally but swept far downstream into the lakes. In naturally meandering streams, soil that may erode on the outside of bends is redeposited on the inside of other bends. Departments of some states, such as Florida, have urged repeal of P.L. 566. South Carolina suggested that important ecological types and areas be placed in a "hands off" category. Ecologists and agency specialists of the Georgia Natural Areas Council have the responsibility of establishing a classification of Georgia environments and of declaring their public value as soon as possible.

Ecologists and wildlife specialists were criticized at a public hearing on the Alcovy because they had supposedly waited 10 years to make themselves heard. A letter from the Georgia Game and Fish Commission dated March 4, 1968, states that the Commission is not made aware of a project until it is already approved and that recommendations for modification of stream channelization are entirely ignored. While a preliminary work plan map on the Alcovy was prepared as early as 1960, feasibility studies by

[4] Barick, Frank, Tour of Small Watersheds (P.L. 566) Projects in North Carolina by Special Study Committee of Appalachian Section of S.A.F., June 17, 1964.

[5] Durand, Forest, presented to North American Wildlife and Natural Resources Conference, Detroit.

[6] Bayless, Jack, and William Smith, The Effects of Channelization upon the Fish Populations of Lotic Waters in Eastern North Carolina, North Carolina Wildlife Resources Commission, Raleigh.

[7] Allen, Ralph H., A Summary Report on Channelization and its Impact on Fish and Wildlife Resources to the Southeastern Association of Game and Fish Commissioners, Alabama Department of Conservation, Montgomery, 1968.

Service engineers were begun in 1963, stopped in 1964 due to reservoir limitation figures, and not resumed until 1967 when P.L. 566 was amended to raise the size of reservoirs from 5000 to 12,500 acre feet. According to the S.C.S. itself complete finalized plans for the Alcovy Project have been made available only in the past few months. It has therefore been difficult even for agencies on the inside of these projects to have known what was intended prior to 1967.

Alabama's chief of Game and Fish, Kelly,[8] indicates that channel construction alone usually costs several times more than the market price of the land alleged to be benefited, and that "a closer look reveals that in almost all instances the amount of money to construct the channel, if placed in savings at the current interest rate, would more than pay for annual losses of each landowner, incurred as a result of floods."

According to the work plans it would appear that 4,327 acres of swampland could be drained for creating additional farmland. This is directly against administrative policy set forth in para. 101.101 - 101.103, Chap. 1, Part 1, *Watershed Protection Handbook,* S.C.S., U.S.D.A. which states "No P.L. 566 financial or technical assistance will be provided for projects in which monetary benefits accrue primarily from bringing additional land into agricultural production." Charles Elliott, writing for The Atlanta Journal (Outdoors and Recreation, March 9, 1969), says that he fails to understand how we can pay landowners to put their agricultural land in the federal soil bank and then expend federal funds to give them more agricultural land.

Even if the acreage cited above could bring private monetary gain the cost to the public is prohibitive. According to a statement issued by the Georgia Game and Fish Commission February 27, 1969, "These plans say the annual benefits of this will be worth $105,000 a year. Channelization costs . . . to accomplish this would cost almost three million dollars, which could mean that it would take almost 30 years for the benefits of drainage to match the cost. By that time, the future recreational and educational uses of the swamp lands might exceed their value to the public as drained land . . . ."

Something is fundamentally wrong when any organization can, without basis in sound ecological study, destroy a large life system (ecosystem) of great potential value to its owners and to the people of the entire state. It is fundamentally wrong to expend public funds to help private citizens, while the pleas of public agencies and professionals are ignored. The implications of the Alcovy go far beyond this river. Projects under P.L. 566 nearly blanket Georgia's Piedmont. Unless true cooperation on channelization soon occurs between the S.C.S. and other state and Federal agencies, there will be no scenic rivers left in Georgia and the esthetic, educational, scientific and recreational benefits of many streams will be lost for generations to come. The children of the present landowners have to live in the environment which we leave them. At the heart of the matter is the fact that many landowners have derived no monetary yield from their swampland and are being taxed as highly on it as they are for high ground which can be developed or cultivated. We must acknowledge this problem. We must indicate ways to get tax relief for swampland and point out how it may be profitable to keep swamps in their natural state. The remainder of this paper seeks to set forth the significance of the living swamp in its unchanneled state, followed by reasons why landowners should maintain their swamp in a natural state.

The Alcovy in Education and Science

Since uplands, fields or forest are increasingly involved in subdivision and commercial enterprise, they are rapidly becoming scarce making it increasingly difficult to establish areas where school children and college students may learn on field trips the fundamental relationships between water, soil, plants and animals. The river swamps provide ideal natural laboratories, being generally available to almost all urban centers. The rich life system of the Alcovy is centrally located to serve a vast urban population, providing no channelization is done and the river can be set up under a state scenic rivers bill or established as a natural area by the State Natural

[8] Kelley, Charles D., personal communication dated February 21, 1969.

Areas Council entering into agreement with the owners.

Natural areas, such as the Alcovy bottomlands, are important to education in Georgia. Undirected education, such as the boy-swimming hole - cane pole - dog association, can be a very important educational experience. Channelization also makes it extremely difficult to teach the fundamental concepts of man and nature to school children, by depriving them of a comparatively inexpensive local environment which is available to many communities and which is *not* in demand for construction and development. The river swamps have all the attributes of natural outdoor laboratories — all our cities and towns desperately need these areas within an afternoon's bus ride.

The role which the life system or ecosystem of the swamp plays in maintaining water quality and in productivity and other basic questions requires that a large natural swamp such as that on the Alcovy be available for basic studies to provide answers of regional importance to all watershed management where the larger swamp forests are involved. The Alcovy swamp is centrally located to major universities and colleges. There is currently underway an International Biological Program to investigate the life systems of the earth. Inland wetlands are perhaps the least understood division of the Eastern Deciduous Forest Biome. Emory University is concentrating its efforts on the Altamaha system, primarily the granite outcrops and coastal estuary. Shorter College is investigating the occurrence of southern plant species in northern Georgia. The University of Georgia is concentrating its large facilities on major dry environments of forest and field. Georgia State is currently investigating food chains and ecology in the river swamps, including the Alcovy. Some very basic questions can be conducted in the Alcovy swamplands. Through sediment studies, C^{14} dating and pollen analysis questions as to the age of the swamps and historical hydrology may be answered. Such questions as the course and rate of sedimentation, changes in river channel and tree composition are vital to future planning involving river swamps. Effects of old channelization on the Alcovy, Big Flat, and lower Cornish Creeks need to be evaluated.

Existant croplands now flooding and likely to be aided by the Alcovy project lie on the headwaters of the Alcovy and Cornish projects, not within the larger swamplands. Attempting to drain the large swamps will not then prevent flooding of existing farmlands. Normally, in flood time, water spreads slowly out through the large swamps, some of it sinking into the ground, with the result that the head of floodwater is much reduced, and both rise and fall may take several days. Channelization would seek to hurry the water downstream making problems below and allowing the velocity of the water to carry sand and silt downstream in unprecedented magnitude. The 566 project will not prevent floods — it only lowers their incidence from yearly to every 3 years. Floods can come for several straight years or there may be several dry years in a row. Channelization is not designed to cope with the heavier floods which come with a probability cycle of every 5, 10, 15, 25, and 50 years. These heavier floods can come during any year. Any farming or fencing of bottomlands of the Alcovy is therefore done at considerable risk.

S.C.S. 566 projects are concerned with water quantity, not quality. The larger river swamps act as effective filters, depositing their silt loads over a large area, cleaning the river as it flows. With channelization much of the suspended material has no opportunity to settle out, the higher velocity of the water can carry it into Jackson Lake, which may rapidly become eutrophic and sterile, destroying particularly the Alcovy arm, which is the cleanest part of the lake. One has only to compare the turbidity of a channelized stream such as Little River emptying into Allatoona with the Alcovy. The river swamps act not only as settlement basins for suspended matter, but probably function as natural oxidation basins, purifying the water of pollution. Tim Douglas' work in Pennsylvania showed that where sulfate wastes were pumped into woodlands, the streams coming out were purer than the effluent from the best sewage treatment plants. Ed Hall, biologist of the State Water Quality Board, told me that he was astonished at

how the Flint River cleaned itself in the swampy stretch between Atlanta and Griffin.

Some ecologists suspect that the larger swamps may act in the natural regulation of water, absorbing it during the wet season and feeding the stream during the late summer and fall. The water-storage capacity of the Alcovy Swamps may be dependent in part on the water level within the main stream. Studies indicate that beaver ponds increase the ground water beyond their limits. A study at the Coweeta Hydrologic Station revealed that 24 inches of water poured daily onto the forest floor at the head of the stream in June and July, materially raised the stream flow at lower elevations during the dry months of September and October.

Productivity is measured in terms of the plant and animal life which the river swamp can grow. Although we lack data in this regard, Leonard Foote and other ecologists feel that the river swamps are very probably the most productive environments in the state. The fertility brought in by flooding, and that added by decaying organic material in the swamp itself are responsible. Thus these areas can grow timber rapidly and produce mammal, bird and fish life which can be harvested. Why export this fertility to Jackson Lake by channeling the river, when it can be used locally, Rick Foote took a five mile float trip down Little River before it was recently channeled and counted 300 mallards and black ducks. We have already seen that there is no comparison in fish productivity between channeled and unchanneled streams and that the growth of gum trees is dependent on the height of the water table and standing water. The channeled stream presents a dismal picture, its steep banks and constantly rolling sand bottom provide no foothold for the beginning of a food chain to support vertebrate life. Few fish can maintain themselves in a channeled stream. The tracks of muskrat, mink and raccoon will often be sought in vain along its edge. I have seen this tragic situation on Gum Creek in Newton County, channeled some years ago. Unless the landowner does much prompt side drainage, desirable trees die and impenetrable marshy areas are produced. Tree succession often appears to favor the undesirable river birch and frequently areas are covered with tangles of honeysuckle, privet and briers. In contrast, the swamp pools and ox-bows of unchanneled streams teem with life even in mid-winter, providing a stable basis for food chains involving fish, turtles, raccoon, mink and others. The tupelos, oaks, hickories, holly and innumerable grape vines provide food for a wide variety of birds and mammals. The Alcovy swamps are the refuge for a large tri-county deer population. The river swamps provide a greater variety of life than any other Piedmont habitat. There are no grounds for swapping this variety of quality game, fish, birds and mammals for more quail-cottontail habitat, already in abundance.

Recently the unlimited use of pesticides, and air and water pollution has vividly brought to focus the utter dependence of man upon his natural environment, no matter how deep within the levels of a modern city he may try to hide. Society can no longer ignore ecological principles — ecology is now really human ecology — and basic to our survival as individuals or as a nation. The relatively young discipline of ecology (the relation of life to the environment) has been strained to produce practical results of application to our burgeoning populace. Scientists have discovered in the nick of time that the vast expanses of what appeared to be useless marsh grass along the Georgia Coast was, in reality, a factory making food for millions of tons of shellfish and fish in the marshes and along the entire continental shelf of the state. Our factual knowledge of the function of the great river swamps, such as those of the Alcovy, is too meager to warrant their demise at this stage of human history.

People are reawakening to the startling fact that modern man, with all his technical genius, is scarcely better off than the pioneers. To them, at least, vast stores of unplundered soils and forests had yet to yield their richness. Need we destroy every vestige of the natural environment that may remain?

The winds of change have swept across the U.S. Army Corps of Engineers. According to Weathersbee [9] the Corps is receiving the "scorn

[9] Weathersbee, Christopher, The New Corps, *Science News*, Vol. 95 (1), February, 1969.

of a growing segment of the public which is desperate over the careless exploitation of natural resources." In April the Corps sent a circular to its engineers calling for the unprecedented consideration of non-construction alternatives in flood control planning. Despite billions spent on dams, annual flood losses continue to rise. The answer may lie "in simple zoning controls to keep construction off areas likely to be flooded while preserving the flood plain as a park." The Corps of Engineers has decided to make environmental quality, including both esthetic and ecological considerations, an additional primary objective.

Ecologists and conservationists of the state of Georgia would very much like to see officials concerned with P.L. 566 include among their objectives esthetic and ecological considerations; it is only in this re-recognition of man's true relationship to his natural environments that the quality life we demand will be satisfied. Our survival as a viable state and nation asks each of us to recognize this relationship to natural environments and participate in their preservation or lose not only our leadership in the world community, but our life.

Profitable Management of Alcovy Swamplands

The landowners who own the swamp in the vicinity of Covington have large holdings, and few appear to have any plans for the swamp. All appear to realize that it could never be commercial or residential property. All of these men seem to know that subdivision from residential expansion will, in a few years, bring such a return from the high ground, that the cost of clearing the swamp lands for possible pasture would hardly be worth while for the few years of yield that could be expected before they sold or developed their high ground. Only one owner would like to try farming some of this bottomland. He is apparently willing to take the risks and is prepared to invest in the necessary side ditching and care that would be needed to maintain this high-risk farming. It is not evident that landowners adjacent to the larger streams are enthusiastic about claiming bottom land.

Few follow-up studies appear to have been made on P.L. 566 projects. Leonard Foote (Wildlife Management Institute) indicated that on projects he has visited, he has seen only one example of a landowner trying to reclaim what had been large swamp forest. Too often, the effects of clearing and side ditching the larger bottoms appears to be offset by the accumulation of rainwater abetted by insufficient drainage, the normal lack of slope and the high berm of dredging spoil. These bottomlands converted to pasture frequently present the landowners with the invasion of inedible sedges, rushes and unpalatable, vigorous weed growth which is difficult to control because of the bogging down of machinery. Small wet places gradually coalesce into larger areas and are often abandoned. Normally, beavers do not attempt to dam streams as large as the Alcovy or the side streams in the flood plain forests. The spoil banks along a dredged stream, however, may stimulate beavers to dam side streams. The landowner should be prepared for their depredations.

What the Alcovy and Its Swamp Forest Can Mean to the Landowner

Providing that the channelization of the Alcovy and lower tributaries can be avoided, there are a number of approaches that will profit the landowner more than trying to reclaim terrain still subject to periodic flooding. These land use projects are outlined below.

(1) Help establish the Alcovy as a Scenic River at a state or national level. This would vastly increase the value of the wetlands adjoining the rivers as well as increase the tourist income of Covington, Monroe, Social Circle and the entire tri-county area.

(2) The individual landowners can protect the plant and animal communities of the Alcovy swamplands for purchase by groups, agencies and organizations for use as natural areas maintained for educational and scientific purposes, river parks, etc.

(3) The individual landowners can have access to lawyers in conservation groups who can assist them in obtaining tax relief. There is the possibility that property may be leased for educational purposes and that the fair rental value can be deducted from income tax, resulting in a saving that will offset ad valorum taxation. The

giving of a scenic easement also has advantages in income tax reduction and reduced tax valuation of the property involved. One Newton County landowner, by showing land value figures provided by Georgia Kraft, was able to get the County to lower the valuation of his swamp land from $85.00 - $89.00 to $60.00 per acre. It should be pointed out that swamp drainage may raise the landowner's taxes whether or not they can profitably farm any of the bottomland. There is, on the other hand a very excellent chance of having valuations lowered or eliminated by the proper type of use.

(4) Individual landowners can protect their swamps, managing them as natural areas, and derive an income from paid hunting, fishing, boating and camping. Paid camping, hunting and fishing and other outdoor recreation have seen fantastic recent growth. It is one of the opportunities of the future. The high productivity of ponds and of ox-bow lakes in river swamps is well established and growth rates are high.

(5) The "green belt" of the Alcovy River swamp will enhance the value of adjacent dry lands. The esthetic beauty and the wildlife of swamps along the Alcovy and Cornish Creek has already proven a substantial asset to subdivision. The beauty of swamps has brought to one wise landowner a group of purchasers who cherish this wild resource for hunting, fishing, but chiefly for *personal esthetic enjoyment*. As urban sprawl gobbles real estate, the swamp green belt more and more enhances the environment of housing and industry. Do not underestimate the lure and attractiveness of swamps to many people, particularly urban dwellers to whom a small piece of wild America can be a treasure of enjoyment.

Epilogue

Unless you spend much time in the field, the impact of the S.C.S. watershed projects may well have escaped your attention. In the Piedmont, a diminishing agriculture has led the S.C.S. to turn to flood control to maintain its power structure, and major planning has fallen into the hands of engineers. As biologists and ecologists who must work and live in the Southeast, it is our responsibility to help the S.C.S. find new values for cost-benefit ratios necessary for reservoir construction. Would it not make better sense to have these reservoirs protecting the swamplands from excessive water loss during dry months, than to try and prevent natural flooding, which is what the riparian swamps function upon? Or, could not the S.C.S. turn its talents and millions to rebuilding the organic horizon, now that what's left of the soil has been relatively stabilized from erosion, and thus make one enriched acre yield the equivalent of five? I challenge you, the scientific community in life and earth sciences in the Southeast, to lend your talent to save a significant American environment in its penultimate hour of life.

This is not a problem unique to the Piedmont. In the Coastal Plain few reservoirs are built — *channelization is the major method of flood control!* Whether its tupelo honey, alligators, crayfish, froglegs, muskrats, green turtles, catfish, or anadromous fishes such as shad and striped bass, coastal plain streams have even more to lose from an economic standpoint. No stream is too large or too small to escape. One has only to read Grits Gresham's *Atchafalaya Basin Crisis* to learn the stunning news that 1300 square *miles* of unique, irreplaceable wildlife habitat in Louisiana is in serious jeopardy by channelization. (In this case, by the U.S. Corps of Engineers).

It would be pleasing to see the S.C.S. recognize the multiple-use concept so effectively applied by the U.S. Forest Service, and put positive values on the southern swamps. Few of us relish the negative approach of calling the American taxpayer's attention to the fact that his dollars go to destroy an environment he needs for wildlife, recreation, education and science; that his dollars enhance land values for a few riparian owners; that he is helping put more land into agriculture while paying to keep it out of use and avoid higher crop subsidies, and that he is supporting a local enclave of landowners who can sponsor and vote on federal projects which will bring them financial gain.

If you are interested in this problem in your state you might: **1.** familiarize yourself with S.C.S. watershed projects from your state's headquarters **2.** contact your game and fish depart-

ment or other department concerned with environments and discuss the local impact of channelization **3.** make your wishes known to your representatives in House or Senate and ask them to attend hearings on agricultural appropriations.

We in Georgia are taking four additional steps:

1. A citizen's group, The Georgia Conservancy, is requesting that a senator seek the views of the Secretary of Interior; this will allow the federal agencies (Fish and Wildlife, Bureau of Outdoor Recreation) to make firm statements of position.

2. The Georgia Conservancy is writing President Nixon in his capacity as Presiding Officer of the Environmental Quality Council, asking that the Council both review and study the Alcovy plans as they affect natural beauty and outdoor recreation under para. 8(b), Executive Order 11472, dated 29 May, 1969.

3. Representatives of citizen's groups will travel to Washington and meet as a group with Secretary of Agriculture Clifford Hardin, requesting a moratorium on the Alcovy-Cornish Creek Projects until it has been demonstrated that channelization here is in the national interest.

4. The Georgia Conservancy is raising money to hire a competent economist to make a thorough, independent economic appraisal of the Alcovy-Cornish Creek Projects.

If you would have a natural scenic area of significance to yourself, your children and to fellow Georgians, I urge you to contact a Director of the Alcovy River Watershed Association, the County Commissioners of the cities and counties involved, or other officials, asking modification of the Alcovy project *only as regards channelization in the lower parts of the watershed.* One can cut a forest and eventually it will return. It is doubtful if channeled areas can recover their natural conditions within several lifetimes, if ever. Therefore, any decision that you make goes far beyond the few years during which some temporary local profit might be secured.

The Environmental Challenge

An Invitational Address to the Association of Southeastern Biologists Annual Meeting April 20, 1967, at the University of South Carolina, Columbia, South Carolina

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The land area of the world is relatively constant and fixed, but the number of people who live on it and the impact of their technology is increasing rapidly. The total world population is today about 3.3 billion and is presently growing at a rate of about 2% per year; if continued, this rate of increase will double the planet's population in 35 years. For the over two billion people of the developing countries, this rate of growth continues to accelerate, with little evidence of any slowdown. Even if world population were already stabilized, the tendency to aggregate in great urban clusters would doubtless continue, causing increasing human impact on the urban-suburban fringe.

This is also an age of the information "explosion," the communications "revolution," and profound permutations in technology. All of these alterations are radically transforming the physical landscape. Part of our difficulty in comprehending the scope of our environmental dilemma lies in the speed at which many of these changes in technology are occurring. We simply often do not have time to assess their effects upon the environment — and an understanding of the cumulative effect of all forms of environmental change seems far away, indeed.

In this age of the computer, the systems analyst, and the subsidization of national goals like the landing of men on the moon, where does an endangered species fit? How do we compute the aesthetic value of a vanishing natural habitat?

Perhaps, instead of supporting increasingly costly expenditures for the exploration of space, we should begin to look more closely at the patterns and processes man and nature have formed on earth. The late Adlai Stevenson once remarked:

> "We travel together, passengers on a little space ship, dependent on its vulnerable reserves of air and soil; all committed for our safety to its security and peace; preserved from annihilation only by the care, the work, and, I will say, the love we give our fragile craft."

This statement displays an insight which many of our present statesmen might well attempt to apply. Today only a tiny fraction of the United States' national budget is spent on the administration of our natural resources. Major decisions affecting our country's future environment are made primarily on the basis of cost/benefit analysis and/or political expediency and not on the basis of sophisticated understandings of resource ecology leading to long-term social benefit.

Much of the responsibility for this situation lies with the ecologist himself. Most of us involved in the natural sciences, and particularly in ecology, have failed to undertake scholarly long-term investigations into the various impacts of new technologies on the natural environment; similarly, we have failed to effectively communicate our results to the key decision-makers affecting nature. Without any viable counter-arguments, commercial interests are usually able to apply new technologies for short term economic gains; the potential long range contribution of the biologist and ecologist often is lost by default. As Dr. Stanley A. Cain, Assistant Secretary of Interior, recently put it:

> "We generally have utilized our rapidly growing scientific knowledge in the performance of specific and largely short term objectives with little or no concern for the side effects of our actions. Stated boldly, this is a serious accusation because it implies that the loss of quality of the physical environment has been a consequence of this narrow vision."

This, then, seems to be one of our key problems: that our industrial-technological society is

geared mainly to specialized, single-purpose activities — many of which have led to significant advances in specific facets of our culture — but our society has not yet proved itself capable of dealing with the long-term cumulative ecological effect of multiple environmental changes. Dr. Cain goes on to say:

"At long last, the heedless devotion to material progress, despite its many benefits, is bringing a realization that analysis must be balanced by synthesis, that specialization must be limited by generalization, and that commodities and marketable services cannot be equated with and replace real values which are intangible."

The specific problems symptomatic of the short-range, single-purpose approach are manifold; to mention only a few of the better-known examples: air and water pollution by chemicals and sewage; indiscriminate use of broad spectrum pesticides; soil erosion and structural deterioration; synthetic chemical, organic and thermal pollution of waters in lakes, rivers and estuaries; noise pollution in our major cities — now about to be compounded by development of supersonic air transport; contamination of the biosphere by nuclear wastes — a growing problem as peaceful application of atomic energy increases; destructive introduction of exotic organisms, both accidental and intended; insufficiently guarded use of new drugs and chemicals, as in the case of thalidomide; international assistance to support public health activities in lowering death rates without simultaneous and coordinated assistance to lower birth rates; direct physical destruction of important natural habitats by dredging, filling, bulldozing, and related activities; unplanned urban-suburban development into sites subject to natural constraints (such as floodplains, and major aquifers) or into areas of outstanding scientific or aesthetic value as open space. In each case, these activities are undertaken to fulfill a specific need, an immediate request, a quick answer. Clearly, other answers are needed.

As indicated in an earlier part of this paper, the ecologist, biologist and natural scientist bears much of the responsibility for changing the existing pattern of resource use by providing new data based on synoptic, long-term investigations of natural ecosystems as they are affected by various technologies. In order to do this, we will also need to preserve complete natural area systems representative of the nation's full range of natural ecosystems. Such areas are essential for training and observational (and, where necessary, manipulative) research into how differing undisturbed environments work.

The role of natural area preservation is a vital one for environmental research. These reserves provide important living laboratories against which we can measure the complexity and extent of man's technological impact on similar ecosystems elsewhere. As the scope and severity of environmental change accelerates, these protected natural areas will grow increasingly valuable to science. Hopefully, with the help of such efforts as the International Biological Program (IBP), the number and variety of research projects undertaken on research reserves will grow.

One of the main objectives of this international undertaking, which hopes to determine the biological basis for productivity, will be to support a series of intensive, multidisciplinary, and synoptic analyses of ecosystems. The preservation of large natural areas typical of each major ecosystem type is an obvious and essential first step to any such effort. The IBP will also attempt to insure an adequate distribution of intensively managed research reserves. Without this location and protection of research sites, the researcher is in danger of losing his central environmental reference point for continuing studies into the functioning of various ecosystems.

The Nature Conservancy, Wildlife Preserves, The Natural Area Council and a number of other private organizations in this country are attempting to locate, acquire, and preserve outstanding natural areas for science, education, and the simple aesthetic enjoyment of wild nature. State and federal government agencies have also worked to set aside important natural habitats. For example, the Bureau of Land Management recently set up a system of over 100 natural areas on the Public Domain, protected for scientific and educational purposes. This work is being extended to other land-managing agencies; the Wilderness Act also helps insure that substantial areas in the country will remain essentially natural.

Despite these advances, there are a number of major gaps in the country's existing system of pre-

served natural areas. One of the major objectives of the International Biological Program's U.S. Subcommittee on Conservation of Ecosystems will be to see the

"establishment within the United States and its possessions of a comprehensive system of protected research reserves. This system will include examples of intensively managed ecosystems and of all important natural ecosystems."

In order to accomplish this objective and related goals, such as the ecological description of all reserved areas and studies to determine appropriate reserve management, the Subcommittee will support:

1. Activities leading to better definition of *criteria* for designation of ecosystem types. A number of existing classifications will probably be adapted to fit the specific needs of IBP.

2. *Inventory* of major ecosystems in the United States and adjoining areas. Procedures for collection, collation, and dissemination of information will be developed in cooperation with Canada and Mexico. Where important knowledge gaps exist, the Subcommittee will encourage necessary new surveys.

3. Establishment of *priorities* for action. Since the creation of additional reserves cannot be accomplished simultaneously, a system of priorities for action is badly needed. Criteria for setting priorities will include: habitats immediately threatened, uniqueness, typicalness, areas not now included in any reserve, and areas of special research significance due to easy accessibility or long histories of research.

4. Cooperation with public and private agencies, to designate *new reserve areas* and to complete the reserve system.

5. *Comprehensive* ecological *surveys* and *research* on preserved areas to provide data for better protection and management. Such work will range from investigations into important legal procedures in assuring protection to research on needed management techniques to preserve or restore a particular stage of succession.

6. *Training* and *education* of people in descriptive ecology. Biology's recent emphasis on laboratory study has resulted in a relative decline in training people for descriptive work. The IBP foresees a shortage of qualified scientists interested in descriptive ecology of the kind necessary to carry out the program's objectives.

7. *International cooperation* to assist creation of a world-wide system of research reserves. Cooperative programs will stress common hemispheric projects but will also include capability to respond to specific requests from any other country for cooperation in IBP conservation programs.

There will doubtless be a close relationship between the quality of the future biosphere and the consequences of interdisciplinary research conducted on protected ecosystem reserves. As noted earlier, one of the major problems of our times is the rapidity with which technology and its impact on the human environment is accelerating. Man himself is being rapidly changed by his own works. Dr. Roger Revelle expressed his concern for this problem when he recently wrote:

"Our technology has outpaced our understanding, our cleverness has grown faster than our wisdom."

At this point it is important to emphasize the general failure of biological training to provide an educational basis for understanding the rational use of environmental resources. Biology must help prepare the average citizen to deal effectively with the multitude of environmental quality problems now facing him; this will mean much closer integration of basic environmental principles to be found in geography, economics, political science, psychology, sociology, regional planning, and law. Biology has a vital, indeed a primary, role to play in the development of environmental science. To date, however, we have tended to operate in a disciplinary vacuum — generally unwilling to relate our training and research to other disciplines concerned with environment; similarly, we have been unable to provide our students with a strong biological background for understanding their role and responsibilities in influencing the crucial interrelationship between human society and the biosphere. Providing such a framework for better environmental understanding must be the biologist's basic educational task for the future.

Beyond improving our training and educational programs, how will we, as scientists, meet the coming environmental revolution? Will we have the wisdom to study before we manipulate, to improve productivity while avoiding irreversible

change? If not, the pressures of human numbers and misdirected technology will result in environmental degradation and deterioration. The challenge is clear; man will change the face of the earth more rapidly in years to come than he ever has before. It will be up to the biologist, ecologist, and natural scientist to expand our understanding of long-term environmental processes and effectively communicate these understandings to shape social and economic decision-making.

In communicating our insights on environmental process to other disciplines, biology has been notably unsuccessful to date. Indeed, all of the natural sciences have been notorious for their unwillingness to treat social issues caused by or related to their own bodies of knowledge. The socially-concerned scientist must deal with at least three levels of decision-makers that affect the environment; the land owner, administrator, and politician-legislator; the engineer who actually modifies the environment; and the public. Over the past few years there has been some progress in educating the general public to be more aware of the multiple facets of the human environmental crisis, but in the attempt to forestall immediate threats we have often responded inadequately, dealing only with symptoms and not the basic causes of deterioration.

Lacking any adequate political and administrative responsibility for the many facets of environmental change, it will be up to that segment of our society best-informed about such problems to inform the public and work for the creation of more effective institutions to anticipate and deal with environmental matters. The biologist has a particularly important role to play in this education and re-orientation of our society. Until public comprehension and concern for the scope of the problems afflicting the biosphere is improved, there is little hope for sufficient consensus to change existing institutional approaches to environmental control. Therefore a greatly expanded program of public education on the ecological effects of human technology and industrial growth is urgently needed. We can no longer afford to turn our backs on problems that will determine the future well-being of our species.

Another realm in which the biologist must play an increasingly active role is in the improvement of communications at the legislative, political, and administrative decision levels. Once the ecologist's message is effectively understood and heeded by these decision-makers, the engineer and the "bulldozer mentality" will be presented with a new range of choices in how to more effectively channel their efforts into a more harmonious relationship with the biosphere. Biologist's efforts at general education should provide some basis of support for change, but we must utilize as many other methods as possible to encourage permanent alterations: discussions with friends, speeches, articles, radio and television talks, utilization of various audio-visual media, and support for various action organizations willing to assist in pressing for reform — most of these are channels open to all biologists.

But the permanent modification of our society's attitudes toward nature will require some deeper change in the political and administrative machinery of government; we need a means for institutional attention to the long-term, cumulative environmental results of complex systems of technological change. Traditionally, American government has had no such mechanism for development of overall environmental policy; instead we have substituted analysis and specific problem-solving and left resource synthesis and long-term goals to a "muddling through" process. Under such conditions, long-term environmental values are almost always sacrificed to immediate political, economic, and military advantages.

One of the central problems affecting the relationship between governmental policies and environment control has been the scattered, divided responsibility for environmental issues. Lacking any effective mechanism for coordination of diverse projects under equally diverse agency responsibilities, there has often been a deterioration of other values not considered — until their loss has underlined the importance of their conservation. Thus we often find ourselves in a situation where each agency tends to pursue its own unilateral course without regard to the broader environmental consequences of their programs. A multitude of special interest lobbies and interagency rivalries tend only to further fractionalize environmental policy-making.

There is considerable evidence that this period of environmental "laissez-faire" may be nearing an end. Over the past few years there have been several attempts to integrate the administrative means for improving environmental policy at the federal level. To mention only a few: the Ecological Research and Surveys Bill; the proposed Council on Environmental Quality directly under the President; the proposed Department of Natural Resources; and the recent creation of the Environmental Science Services Administration.

Some improvements have already been made in solving specific problems in environmental administration through legislation and a variety of interagency agreements and understandings that require joint planning and consultation. Control of water quality and pesticides are two good examples of complex resource issues that have been dealt with in this fashion. Nevertheless, the structure of federal government is still poorly adapted to handling the considerable array of important environmental policy decisions now facing it; this administrative failure is particularly true of those gradual and unobtrusive declines in environmental quality which individually have little dramatic impact, but when absorbed cumulatively over a long period of time threaten to change the whole structure of our society.

But how are we to create adequate administrative institutions for coordinating environmental understanding and control, Dr. Gilbert White, in 1958, concluded that the major obstacle to improvement of natural resource administration practices in our country was an absence of analysis that:

"would present estimates of the consequences of each of the politically practicable lines of public action. Thereby the political process of choice would be sharpened rather than curbed, and governmental intervention seen in perspective with the alternatives."

He saw such analysis as an important educational function, leading to better public perception of environmental issues. If fully effective, this could lead to public consensus and clearer possibilities for political and administrative action to create better institutions for environmental control.

Unless conservationists, biologists, and ecologists are able to build support for institutional evolution and innovation, much of our present concern for preservation of environmental quality will be to no avail. The natural area preservation movement, as vital as it is, has little hope of eventual success unless the environment surrounding such areas is protected and cared for as well.

The central thesis of this paper is that in a culture and economy capable of creating great canals and harbors by atomic blast; able to double and even triple the life span of man; and clever enough to tap fossil fuel, solar, and nuclear energy sources for a variety of purposes — we are woefully behind in understanding the total ecological effects of these changes. Until we make the ecological point of view a central focal point in our education, administration, and environmental action, there is little room for long-term optimism. Ecology, particularly as applied to questions of man-induced environmental change, is still relatively underdeveloped; yet, until we as biologists and ecologists are willing to interpret our insights to citizens, engineers, politicians, administrators and other decision-makers, the impact of new technologies will continue to accelerate uncontrolled environmental change. Therein lies a major personal challenge that all of us face. As Dr. Pierre Dansereau recently summarized this undertaking:

"Our consciousness of environment, and of ourselves in it, is complex but not unfathomable. Our instruments of research and our means of expression are extremely powerful. We are more limited . . . by the failure of our imagination than by any obstacle outside ourselves. A valid imaginary reconstruction of our world is now our greatest task. It may even be the condition of our survival."

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Paul Yokley, Jr., Receives 1969 ASB Research Award

Dr. Paul Yokley, Jr. of Florence State University was winner of the ASB Research Prize for 1969. The title of his research paper was "Life History of *Pleurobema cordatum* (Rafinesque, 1829)." A check for $100 was presented to Dr. Yokley by the Carolina Biological Supply Company at the ASB annual banquet on Friday, April 18, at Memphis State University.

Dr. Yokley holds degrees from Florence State University, George Peabody College, and Ohio State University.

Seven manuscripts were entered for the Research Prize in 1969. The papers were judged by biologists at Southern Illinois University under the leadership of Drs. Jacob Verduin and W. C. Ashby.

William L. Mengebier Receives 1969 Meritorious Teaching Award

Dr. William L. Mengebier, professor of biology at Bridgewater College, has been honored by The ASB for "especially meritorius teaching," one of the highest awards of the Association of Southeastern Biologists.

The award was made at the 30th annual meeting of the Association in Memphis in the form of a certificate and cash honorarium.

Dr. Mengebier, who taught and was department chairman for 14 years at Madison College before going to Bridgewater last fall, was nominated for the teaching award by faculty colleagues and former students of Madison College and other members of the Association.

Only one other Virginian has received the award since its inception in 1952 — Dr. Ruskin S. Freer of Lynchburg College in 1964.

Dr. Mengebier has been teaching at southern institutions since 1946 when, on leaving the Army infantry, he joined the faculty at The Citadel, Charleston, S.C., where he had received his undergraduate degree in pre-medicine. He earned further degrees at Oberlin College in zoology and the University of Tennessee in physiology.

On the Madison campus Dr. Mengebier served on the curriculum committee and the graduate council, was chairman of the college research committee, and was chairman of the Southern Association of Colleges and Schools evaluation of the education program of the college, among other assignments.

For the past several summers, he has been working at the Virginia Institute of Marine Science in a study of a disease which kills oysters in the Chesapeake Bay. The research may lead to a breed of oyster resistant to the disease.

This winter he was a participant in the accrediting team of the Southern Association of Colleges and Schools visiting Tennessee Wesleyan College at Athens.

A Harrisonburg resident, Dr. Mengebier and his wife, the former Clelia Matthew of Charleston, S.C., have three daughters, one of which will graduate in June from the College of William and Mary.

The Meritorious Teaching Award is supplied by the Will Corporation of Georgia.

[Ed. Note: The following letter from Dr. Mengebier was recently received in reference to the above award:]

There is very little that I can actually say that can express my feelings on being informed that I had won the Meritorious Teaching Award as presented by the A.S.B. It certainly is the high point of my twenty three years in college teach-

ing, and I consider it the highest honor that I could have achieved.

My thanks must, of course, go to my former students, wherever they may be, for their thoughtfulness in nominating me. They were, still are, and always shall be the challenge that makes teaching the great profession that it is. I only hope that my last ten years in the classroom will be half as rewarding as have been the past ones.

If possible, please try to find space in the bulletin for this note. I must say, that if the security of the nation was as efficient as that of the A.S.B., we'd never need to worry. I hadn't even suspected, else I certainly would have broken some other commitments to go to Memphis.

Sincerely,

William L. Mengebier
Professor of Biology
Bridgewater College

Because of administrative misunderstandings, the following abstract was omitted from the April, 1969, ASB Bulletin:

Comments on a New Genus and Species of Subterranean Fish from Alabama

JOHN E. COOPER AND ROBERT A. KUEHNE
Institute of Speleology and Department of Zoology University of Kentucky

On March 18, 1967, a unique subterranean fish, representing a new genus and species ostensibly of the family Amblyopsidae, was discovered in a cave in northwestern Alabama. Subsequent trips yielded six additional specimens of this fish from the type cave, and its apparent absence from other caves in the area indicates that it is an endemic relic at this locality. Preliminary investigation suggests that this fish represents a phyletic line distinct from both the *Typhlichthys-Chologaster* and the *Amblyopsis* evolutionary lines. It is anticipated that more complete investigations, now being conducted by us and by T. L. Poulson at Yale University, will reveal information concerning the relationships of the amblyopsids with other fishes. The type locality supports a large population of *Myotis grisescens* and contains a great deal of guano, which appears to find its way into the cave water and which holds a rich and varied invertebrate fauna. The aquatic community in the type cave includes other troglobitic elements, among them two species of crayfishes and an isopod.

Books and Periodicals

"WATER QUALITY CRITERIA," A Report of the National Technical Advisory Committee to the Secretary of the Interior. Published April 1, 1968, by The Federal Water Pollution Control Administration, U.S. Government Printing Office No. 0-178-250, for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. 234 pp. $3.00.

The basic purposes of this book are: (1) to recommend water quality criteria for recreational and aesthetic uses; and (2) to identify research needs and priorities relating to water quality for recreational and aesthetic uses.

Actually, since it is difficult to consider any aspect of water quality or environmental quality in isolation, this book is a very comprehensive study of pollutional problems in general and water quality problems in particular. A distinguished committee representing a variety of viewpoints and disciplines, including not only academic but industrial and governmental representatives as well, participated in organizing the information for this volume. Considering the complexity of the problem, and the variety of viewpoints and disciplines, it is truly amazing that such a useful volume has emerged. Since environmental problems affect each of us directly, and since almost every discipline is now involved in some way with environmental problems, this volume is an essential reference for college and departmental libraries, particularly those interested in ecology. In my opinion, much of the information is suitable for use in introductory courses in biology since most students want courses that are relevant to their lives — and environmental problems serve admirably to relate biology to the pressing social problems of today. In terms of information per dollar of cost, there are few books on the market today that can come close to this one. — JOHN CAIRNS, JR., *Department of Biology, Virginia Polytechnic Institute, Blacksburg, Virginia,* 24061.

Prentice-Hall

PLANT PROPAGATION PRINCIPLES AND PRACTICES, by H. T. Hartmann & D. E. Kester, July 5, 1968 ..... (cloth) $14.00

This fascinating book contains complete, up-to-the-minute information on all phases of plant propagation: its underlying principles and basic techniques.

Recognized throughout the world as the definitive work on the propagation of higher plants, the first edition has been revised and updated to include the

most significant developments and theories to emerge in recent years. The authors have devoted special chapters to newly prominent areas, such as tissue and organ culture, and emphasized the selection of proper materials for seed and vegetative propagation. The section on herbaceous ornamentals has been enlarged, and new chapters added to provide encyclopedic coverage of every aspect of plant growth.

RADIATION BIOLOGY, by Alison P. Casarett, August 30, 1968 ..... (cloth) $9.25

Radiation Biology is a broad, unified coverage of the effects of ionizing radiation in biological systems at the molecular, cellular, organ, organism, and community levels. Including introductory material on radiation physics, dosimetry, and general biology, the book gives special attention to mammalian radio-biology. Possibly the most outstanding feature of this fully illustrated book is its broad coverage without overemphasis on specific areas.

LABORATORY MANUAL FOR GENERAL MICROBIOLOGY, by C. Eklund & C. E. Lankford, September 7, 1967 ..... (paper) $4.95

INTRODUCTION TO BIOLOGICAL CHEMISTRY, by J. Awapara, June 24, 1968 ..... (cloth) $7.95

AUTORADIOGRAPHIC TECHNIQUES: LOCALIZATION OF RADIOISOTOPES IN BIOLOGICAL MATERIAL, by William D. Gude, 1968 ..... (paper) $3.95

THE CONTROL OF NUCLEAR ACTIVITY, L. Goldstein, Editor, June 2, 1967 ..... (cloth) $7.50

THE ORGANISM AS AN ADAPTIVE CONTROL SYSTEM, by John M. Reiner, January 3, 1968 ..... (cloth) $6.75

It is the aim of the author of this volume to present a unified picture, at the molecular level, of how cells and organisms work, based on the accomplishments of mathematical biophysics and molecular genetics in recent years.

BIOLOGY OF INVERTEBRATA, by James H. Wilmoth, August 29, 1967 ..... (cloth) $12.00

INTRODUCTION TO RESEARCH IN ULTRAVIOLET PHOTOBIOLOGY, by John Jagger, August 9, 1967 ..... (paper) $3.95

Pergamon Press

THE ULTRASTRUCTURE OF THE ANIMAL CELL, by L. T. Threadgold, January 15, 1968 ..... (hardbound) $13.00

O-LEVEL REVISION EXERCISES IN BIOLOGY, by J. D. Maunder & C. Johnston, August 21, 1967 ..... (cloth) $2.00

PROGRESS IN THE CHEMISTRY OF FATS AND OTHER LIPIDS, Vol. X, part I, by Colin C. Lucas & Jessie H. Ridout, August 21, 1967 ..... (cloth) $7.75

LIFE SCIENCES RESEARCH AND LUNAR MEDICINE, Proceedings of the Second Lunar International Laboratory Symposium, December 18, 1967 ..... (cloth) $10.00

MAGNETIC RESONANCE IN BIOLOGICAL SYSTEMS, Wenner-Gren Center International Symposium Series, September 18, 1967 ..... (cloth) $21.50

CELLULAR ASPECTS OF MEMBRANE PERMEABILITY, by E. Schoffeniels, October 23, 1967 ..... (cloth) $15.00

TROPICAL PLANT TYPES, by B. G. M. Jamieson and J. F. Reynolds, 1967. ..... (cloth) $8.50

The MacMillan Company

THE SCIENCE OF GENETICS, by George W. Burns, February 10, 1969 ..... (cloth) $8.95

Dr. Burns' new text conveys both the scope and excitement of genetics. It discovers the entire field of genetics, with appropriate attention to classical, molecular, and social aspects.

A talented and experienced teacher, Dr. Burns introduces genetics by citing simple observations which are within the experience of all students. Through skillful questioning, he evokes insights into the causes of observed phenomena, progressing from simple to more complex ideas until answers are obtained at the deepest molecular levels of life.

BASIC BIOCHEMISTRY, (2nd Edition) by Max E. Rafelson, Jr., & Stephen B. Binkley, June 24, 1968 ..... (paper) $6.95, (cloth) $9.95

The first edition of Basic Biochemistry (published in 1965) was widely praised as a clear, concise, systematic, and, above all, brief presentation of the fundamental principles of biochemistry. To achieve brevity, lengthy descriptions of organic reactions and biologic definitions were left to other, more exhaustive reference books. In this edition, as in the First Edition, the authors present the living organism as a chemical machine which utilizes the energy of foods to run chemical reactions so as to meet its own needs.

INVERTEBRATE ZOOLOGY, by Robert W. Hegner & Joseph G. Engemann, April 22, 1968 (Cloth) $10.95

Thoroughly revised and updated, the second edition of this classic text presents the most important concepts

of invertebrate zoology and includes recent research progress and trends in the field. Retaining both the philosophy and approach of the First Edition, Invertebrate Zoology is organized for ease of learning and compatibility with the structure of lecture and laboratory courses.

A DIFFERENT KIND OF COUNTRY, by Raymand F. Dasmann, March 18, 1968 ..... (cloth) $5.95

This book is about diversity and what has been happening to it. It is written in the belief that the most important thing we can do is to maintain this diversity so that tomorrow there will still be a different kind of country, a different way of life.

BIOLOGY FOR THE MODERN MIND, by Hans Joachim Bogen, January 20, 1969 ..... (cloth) $6.95

Biology for the Modern Mind deals extensively with today's molecular biology, the scientific discipline aiming to use atomic and molecular science to clarify such aspects as inheritance, growth, differentiation, movement, and memory. Many convincing examples and graphic illustrations show how biological phenomena can be explained, giving the general reader an amazingly clear understanding of a complicated subject. The volume is divided into seven chapters: Life in the Cell; Modern Genetics; A Glance into the Cell: New Information from the Electron Microscope; Regulation Technique within the Cell; Molecular Memory; Immunity and Microbiology; The Primeval Broth and the Future of Man.

ANIMAL FUNCTION: PRINCIPLES AND ADAPTATIONS, by Malcolm S. Gordon, April 15, 1968 .... (cloth) $12.95

Organized around physiological process, this book emphasizes adaptive functioning as it relates to survival of whole organisms in the natural world. Zoological, comparative, and evolutionary in approach and vertebrate in orientation, it illustrates the diversity of physiological mechanisms and adaptations evolved by animals.

Some topics which are not usually covered in physiology texts are included because they contribute to an understanding of how the variety of types of animals funetion and survive in the range of natural environments they inhabit. Specifically, these topics are: feeding mechanisms in animals; torpidity in endotherms; and information processing in nervous systems.

DNA: AT THE CORE OF LIFE ITSELF, by Lawrence Lessing, November 27, 1967 ..... (cloth) $3.95

DNA: At the Core of Life Itself, which won for Lawrence Lessing of Fortune magazine the Albert Lasker Medical Journalism Award, offers the non-specialist the most thorough explanation of the DNA molecule now available.

MOLECULAR GENETICS, by A. Gib DeBusk, May 20, 1968 ..... (paper) $1.95

Molecular Genetics distills the essence of biochemical genetics into a brief text suitable for the undergraduate student. Detailed descriptions of key experiments are included in order to convey to the reader the fact that the phenomenal progress in this field has been primarily due to ingenious experimental design by individual research geneticists. Extensive use is made of illustrations, especially to portray cellular mechanisms.

BIOLOGY OF THE LOWER VERTEBRATES, by Russell Hunter, March 11, 1968 ..... (paper) $2.95

A Biology of Lower Invertebrates presents a modern survey of "whole animal" physiology in the fifteen less complex phyla. Rather than dwelling on the details of classification and anatomy as in more conventional treatments, this text stresses functional morphology, characteristic adaptive behavior, and selected aspects of evolution, including functional homologies.

ECOLOGY OF POPULATIONS, by Arthur S. Boughey, May 20, 1968 ..... (paper) $2.50

Ecology of Populations leads from environmental requirements through population dynamics to community organization and evolution. It concludes with a chapter on human ecology.

A LABORATORY MANUAL OF MAMMALIAN ANATOMY & PHYSIOLOGY, by Sigmund Grollman, February 3, 1969 ..... (paper) $4.95

MICROBIOLOGY, by Kenneth L. Burdon & Robert P. Williams, June 3, 1968 ..... (cloth) $9.95

GRAPHIC BIOCHEMISTRY: CHEMISTRY OF BIOLOGICAL MOLECULES, by Thomas Peter Bennett, July 29, 1968. 2 Volumes ..... (paper) $3.95 each

THE HUMAN BODY: ITS STRUCTURE AND PHYSIOLOGY, by Sigmund Grollman, February 3, 1969 ..... (cloth) $9.95

EXPERIMENTAL CELL BIOLOGY, by William R. Bowen, February 10, 1969 ..... (paper) $4.95

EXPERIENCES IN LIFE SCIENCE (A LABORATORY GUIDE), by Eugene H. Kaplan, January 2, 1969 ..... (paper) $3.95

A LABORATORY SURVEY OF BIOLOGY, (2nd Edition), by William A. Cooper & Lawrence S. Dillon, January 2, 1969 ..... (paper) $5.95

PROBLEM SOLVING IN BIOLOGY, by Eugene H. Kaplan, March 25, 1969 ..... (paper) $4.95

BOTANY, A FUNCTIONAL APPROACH, by Walter H. Muller, February 17, 1969 ..... (cloth) $8.95

Aviaries (Residence of Supervisor in Background)

Duke University Field Station for Animal Behavior Studies

PETER H. KLOPFER
Director

Some years ago, a professor in the Zoology Department, needing a quiet, wooded area for some aviaries, was invited to use a portion of the Duke Forest. "Your activities are perfectly compatible with ours," the administration of the School of Forestry, guardians of the Forest, assured him. "We, too, seek to keep the Forest free of disturbance." A few weeks later, his birds in a state of frenzy from the growls of nearby chain saws, the unhappy zoologist complained to the Dean of the Forester's breach of faith. "Breach, indeed!," came the indignant response. "We created no disturbance. We were merely harvesting trees!"

Out of this confrontation came the realization that field facilities for the study of animal behavior have needs incompatible with many of the customary demands made of the University Forest. Thus, was born the Duke University Field Station for Animal Behavior Studies.

The conflicting demands of foresters, picnickers, sportsmen, and biologists can, sometimes, be reconciled. But the behaviorally oriented biologist or psychologist must be left out of such pacts. If (as is usually the case) his work demands extensive laboratory, in addition to field, facilities, or includes teaching responsibilities, his field station must be within a few minutes walk or ride from his labs and classes. At the same time, his field facilities must provide an adequate variety of natural habitats suitable to any animals he might require. They must, of course, be buffered from disturbances, and protected from vandals. And, despite the proximity of proper University laboratories, some provision for field labs and work-space is always a necessity.

Duke has met these needs by setting aside a wooded area some 85 acres in extent, 2 miles distant from the campus center. It is surrounded

by a belt of densely forested land in which activities are restricted so as to minimize interference with activities within the 85 acre core. The core itself is enclosed (and divided) by a 7 foot chain-link fence which serves to separate its licensed inhabitants from unwanted interlopers. The former include deer, raccoons, geese, and ducks of several species, to list but a few. Two small ponds provide sanctuary for some of these, various paddocks and pens allow for closer confinement of others, though still within their natural habitat. Adjoining this fenced area are a series of buildings that provide adjunct facilities. These include the exotic hexagons of the Primate Facility, a rustic log-cabin home for the Station Supervisor, barns and tool houses, and a ramshackle affair ("The Haven") that provides students of behavior sufficient in comfort to compensate for its esthetic lacks.

The actual population of the Station, the inhabitants of barns and cages, varies with the projects of any particular year's students. In 1968-69, a few of their studies included:

— an analysis of the mechanisms that underlie maternal behavior in goats;
— a study of social organization and signaling in fallow deer;
— comparisons of behavioral stereotype and niche size in tropical and temperate zone birds;
— longitudinal studies of the development of maternal care and communication in several species of lemurs;
— investigations of sensory capacities and perception in various beasts;
— studies of celestial navigation and orientation in birds.

Oversight of the Station is entrusted to a Director who answers to an interdepartmental Executive Committee which consists of representatives from the Zoology, Psychology, Anatomy, Anthropology, and Forestry Departments. A full-time Supervisor lives on the Station grounds and oversees the work of several part-time employees. Their salaries and much of the expense for routine maintenance is borne by the University itself, while the costs of feeding and vetting animals is charged to the research grants of the investigators using the Station. Many undergraduate and graduate students use the Station, too, of

One of Two Ponds for Water Fowl Studies

course, so the costs of its operations are legitimately considered both a "research" and an "educational" cost.

Much work in animal behavior requires only unlimited access to wilderness areas or refuges; other studies demand elaborately equipped labs and a few rooms for cages. Yet, it is becoming clear that the more significant questions in behavior cannot be answered in either the one domain or the other. Hence Duke is particularly fortunate in having both woods and labs in such close proximity. The publications of the behavior students at Duke provide impressive evidence of the advantages Duke's Field Station for Animal Behavior Studies confers.

Goat Barn and Part of Herd

The ASB

BULLETIN

Volume 16, Number 4 October, 1969

Aerial view of the Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland.

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The Association of Southeastern Biologists

ASB BULLETIN

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News Editor

DAVID J. COTTER, Business Manager

CONTENTS

Please note that the 1970 ASB annual meeting will be held at Florida Southern College in Lakeland, Florida, on the 2nd, 3rd, and 4th of April instead of the usual time approximately two weeks later. It is therefore very important that abstracts of papers to be presented at the meeting be sent to Dr. Margaret Gilbert, Chairman of the Program Committee, Dept. of Biology, Florida Southern College, Lakeland, Florida 33802, as far in advance of the January 10 deadline as possible.

Other deadlines associated with the annual meeting will be moved up as follows:

December 15. — Suggestions for nominations for ASB officers and executive committee members. (See information in this issue.)

January 10. — Titles and abstracts of papers to be presented at the April meeting. (Call for papers to be mailed to membership in November.)

February 1. — Applications for Goethe Travel Awards to graduate students. (See information in this issue.)

February 1. — Papers to be considered for the Association Research Prize. (See information in this issue.)

March 1. — Applications for the Ivey F. Lewis Fellowship at Mountain Lake. (See information in this issue.)

January 15. — Nomination letters for the Meritorious Award for Teaching. (See information in this issue.)

The research vessel "Alosa," used by the Bureau of Commercial Fisheries Biological Laboratory at Oxford, Maryland, for shellfish research in the shallow water of Chesapeake Bay.

The Bureau of Commercial Fisheries Biological Laboratory at Oxford, Maryland, Meeting the Problems of the Shellfisheries

ARTHUR S. MERRILL & ROBERT W. HANKS *

Clams, oysters, and crabs are among the 10 most valuable fisheries in the United States. The Chesapeake Bay region produces more eastern oysters, more soft-shell clams, and more blue crabs than any other section of our country. It is logical that much of the biological research on these animals is centered in Chesapeake Bay, and that one of the few Federal shellfish laboratories should be located on the Bay shore.

Originally established at Annapolis in the 1940's, and recently (1960) moved to an excellent, modern building at Oxford, Maryland, on the Bay's famed Eastern Shore, the Bureau of Commercial Fisheries Biological Laboratory is contributing vital research information to aid in maintaining and furthering the nation's shellfish industry.

Since the Oxford Laboratory was first occupied, a number of supporting facilities have been added. The physical plant includes 13,000 square feet of laboratory space for chemical, microbiological, histological, and immunological studies; and two rooms with running sea and estuarine water supplying a series of indoor and outdoor tanks. Office space, a conference room, and an excellent

* U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Oxford, Maryland 21654.

library of some 3,500 technical volumes plus many reprints and journals, are included in the main building. Other adjacent facilities comprise a shop-storage building, a small laboratory building for visiting investigators, an animal house, a greenhouse for culturing algae, and 4 one-quarter-acre earthen ponds for shellfish culture in a controlled environment.

The laboratory also maintains a substation on seaside Chincoteague Bay (Franklin City, Virginia), and another at Point Pleasant, New Jersey, providing access to a wide range of conditions, ranging from normal ocean salinity to brackish upper estuarine waters.

In addition to its research functions the laboratory houses the Federal Shellfish Advisory Service, which serves industry and the States by transmitting results of scientific research, and the mid-Atlantic area Office of Statistical Services, where fishery data are compiled and analyzed.

At present, the Oxford Laboratory has three major research programs: Shellfish Mortality, Surf Clam Biology, and Aquaculture. A brief description of each program will perhaps best delineate its objectives and achievements.

Shellfish Mortality Program:

The Shellfish Mortality Program occupies nearly half of the laboratory space and has the largest staff of research personnel. Oyster diseases have received the most attention because of massive mortalities in Delaware Bay and Lower Chesapeake Bay. Recently, however, disease research has been broadened to include crustaceans and fishes.

Phases of the Oxford Laboratory's disease research include histological, microbiological, parasitological, and immunological studies of mollusks and crustaceans. This program includes field activities to find disease-resistant oysters in both Chincoteague Bay, Virginia, and Chesapeake Bay in an effort to determine reasons for immunity or recovery of the resistant oyster. Other aspects of the field work are development of practical management methods to sustain oyster populations in enzootic areas, and to search for previously unknown oyster parasites.

Two haplosporidan species are causative agents in oyster mortalities. *Minchinia costalis* causes an enzootic disease in high-salinity bays, and *Minchinia nelsoni* is the infective agent in areas of lower salinity. It has so far been impossible to transmit either disease directly from oyster to oyster in the laboratory, whether by exposing healthy oysters in the same tanks with sick ones, or by any of several methods of inoculation of healthy oysters (with pathogenic organisms and diseased tissues). As a result, we suspect that *Minchinia* parasites have an intermediate host or vector, or that suitable environmental factors are required to stimulate infectivity. These possibilities are under examination.

We are exploring possible management methods that hinge upon the narrower environmental demands of the *Minchinia* organisms. Although *M. costalis* is tolerant to oceanic salinities and *M. nelsoni* thrives in less saline water, the oyster seems to succeed in water with salinities from 30% to 7%. Therefore, judicious use of oyster culture techniques, and movement of raft-cultured oysters from area to area, may alleviate losses from disease-induced mortalities.

In aquatic and marine environments, perhaps even more than on land, ever-present bacteria may act as primary or secondary causes of disease. To gain an insight into the numbers and types of bacteria present in the environment of Chesapeake Bay oysters and crabs, regular samplings are made of the water, mud, and animal tissues. Parallel studies are being run on animals from Chincoteague Bay, which has markedly different bacterial flora. The significance of these differences is under study.

Little is known about the microbiology of the blood of normal and diseased crabs. A study is underway to determine the normal bacteria in crab blood at different seasons and stages of ecdysis, and variations from the normal which may be attributable to disease.

Recent declines in the catch of blue crabs throughout Chesapeake Bay and other sections of the south Atlantic have led several of our scientists to intensify the study of crab diseases. In the initial stages of this study we have described a hitherto unknown commensal, a new pathogenic

amoeba, and a new species of haplosporidan. Also new biochemical diagnostic procedures have been developed to screen disease organisms by analyses of crab blood. Thus, crab studies promise to be extremely fruitful in advancing fundamental knowledge of shellfish diseases in the aquatic environment.

Surf Clam Program:

This program is a major research area at the Oxford Laboratory. The study is directed toward a comprehensive biological understanding of the bivalve mollusk, *Spisula solidissima*. Although this species has been used since colonial days, it is only in the last 20 years that the surf clam has become important commercially — largely because of the development of a deep-water hydraulic dredge. Production in the last 5 years ranged from 38 to 45 millions of pounds of clam meats.

The difficulty in obtaining biological information, particularly for population studies among deep-water species, is well known. Considerable progress has been made, however, in several directions. As a result of research cruises, the distribution and abundance of the surf clam in the middle Atlantic bight have already been ascertained. Growth rates of young clams have been studied, and extrapolated to indicate that a typical commercial-sized (5 inches) clam may be 6 or 7 years old. Experiments with young, but sexually mature, clams indicate that spawning starts at definite temperature thresholds. Gonad maturation of surf clams from the population off New Jersey is stimulated by a gradual increase in bottom temperatures during the spring and early summer. A major annual spawning, usually in mid-July, may be followed by a second gonad development and spawning in October-November.

Direct experiments are underway, with tagged clams, to determine parameters of the populations. When these data have been assembled, it will be possible to predict the replacement potentials of this clam.

The Aquaculture Program:

This program is concerned with the ecology of the Tred Avon River, an estuary on which the Oxford Laboratory is situated, and specifically with the development of oyster culture techniques. Members of this research group have made surveys of the hydrographic and biotic conditions of the river for several years. In this way, the influences of seasonal, climatic, and related factors upon the biota are evaluated in terms of effects on shellfish, and any significant deviations from the ecological "normal" are interpreted.

Part of the oyster culture research is development of culture techniques in natural and man-made salt-water ponds. Since 1964, culture and growth studies have been conducted in closed $\frac{1}{4}$-acre ponds; it has been found that these ponds permit control of oyster predators and competitors. Future studies on the addition of algal food for maximum growth are planned.

Another aspect of oyster research involves off-bottom culture experiments. Raft techniques, similar to those employed in Japan and Korea, as

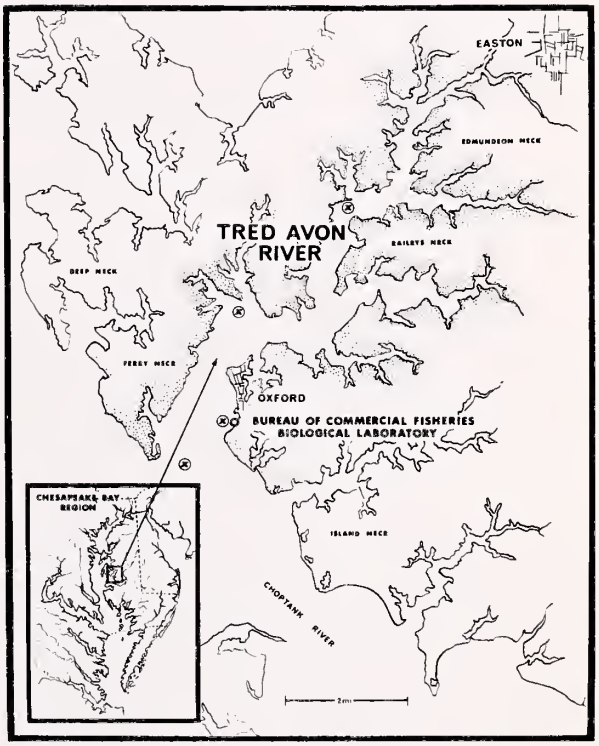

Chart of the Tred Avon River showing location of the Bureau of Commercial Fisheries Biological Laboratory, and general orientation of the area within the Chesapeake Bay Region (insert).

well as suspension of cultch shells from rigid, wharf-like structures, have been investigated. In both methods the oysters are suspended above the bottom where growth is faster, meat quality is higher, and survival is better than on the bottom. Off-bottom culture has proven to be particularly advantageous for growing oysters in areas where they would normally not grow because of soft bottom mud.

Present plans of this program include the establishment of experimental long-line culture (series of floats, with connecting submerged cables, to which are hung numbers of spat collectors); an investigation into the life history of the flatworm, *Stylochus ellipticus,* a major predator of young oysters in low-salinity water; studies of other oyster predators; and a more detailed ecological study of the closed ponds.

Plans are also underway to establish an oyster culture center in the Tred Avon River, opposite the Oxford Laboratory. Oysters will be grown off-bottom by four different methods — long-line, rigid structure, rafts, and trays. Interested people —watermen, industry, and researchers —will then have an opportunity to see the methods of off-bottom oyster culture that are practiced commercially in other countries.

The Oxford Laboratory, with a new physical plant and an active research staff, has therefore concentrated increased attention on our commercial shellfisheries. In all of our activities, as new problems and areas of investigation arise, fundamental research and practical help go hand-in-hand in a search for constant improvement of the shellfish industry.

Naming Fossil Fungi

FREDERICK A. WOLF
Duke University

The term fossil is widely accepted to connote the remains of animals or plants that have become calcified, silicified, or carbonized. Palaeontologists have provided evidence that, with ascent in time from the Devonian period and extending throughout all subsequent periods, fungi are present in a petrified state. They have been found to be especially abundant in the Pennsylvanian and Permian periods. Recent evidence, however, shows that fungi existed even during the Cambrian, and in all probability their existence began with the "dawn of life." Seward (1933), one of the most knowledgeable investigators of fossil plants, expressed the opinion that fungi must be regarded as among the most ancient members of the plant kingdom. Additionally, fungi have been found to occur in amber — the fossilized resin of conifers — and such fossilized specimens are known from the Tertiary, Cretaceous, and Jurassic periods.

The significance of morphological resemblances of petrified plants to contemporary genera and the bearing of such similarities on evolutionary, and hence taxonomic, relationships were matters of deep concern to early palaeobotanists. For this reason, and without implying that the given fossil is identical with a present-day form, they added the suffix *-ites* to the stem of the generic name of the similar contemporary genus. Since the fossilized remains become lithified — i.e., turned to stone — the stony specimens were named lithites. This name was early contracted to the suffix *-ites,* which was then appended to the given generic name. In extenuation of this procedure, Seward (1898) states that "A common custom is to alter slightly the recent name by adding the termination *-opsis* or *-ites.*" By so doing it is implied that the given fossil is closely related morphologically to a given contemporary genus. Boureau (1964) states that

the employment of the suffix *-ites* dates from 1784 when it was used as the generic name *Calamites,* by Suckow. In explanation, Boureau (1869) pointed out that "Si Volkman avait désigne, en 1720, les fragments sous le nom de genre, latin, linneen de la Canne à sucre, il aurait commis une erreur grave, ce que n'est pas le cas avec Suskow qui appele ces restes Calamites, et en les comparant avec *Equisetum giganteum!*"

Once this terminology had gained acceptance, several extensive classifications of fungi based upon resemblances with living genera appeared. These included the treatises by Meschinelli (1898, 1902) and Pia (1927). The former account deals with about 300 named species with *-ites* generic names, and the latter with *-ites* genera placed in 39 present-day families. But even with accord on generic names, vexatious questions on specific identities have remained unanswered. For example, are non-contemporaneous specimens specifically alike? Are specimens of the same geologic age but from different localities identical? Are specimens from different petrified hosts specifically distinct? Since fossil seed plants that are entirely unlike any contemporary flowering plants are known to occur, it becomes reasonable to believe that a similar situation could exist among fungi.

In scientific usage the term fossil is not restricted to stony or petrified remains of animals or plants, but includes the non-petrified or mummified remains of any organisms that have been preserved in the earth's crust. This concept has not gained wide acceptance among mycologists, to date, however, because of the supposed evanescent nature of fungi. Yet during recent years various investigators, including Dilcher (1965), Bradley (1967) and Wolf (1968) have demonstrated that the spores of many genera of fungi, if buried in sediments of ponds, lakes, marshes, swamps, streams, and other sites of alluvial deposits, have withstood the vicissitudes of time. The ages of deposits containing well-preserved spores are now known to range from late Pleistocene, throughout Eocene, and descending into Middle Devonian. Incredible as it may seem, many of these spores are morphologically like those of well-known contemporaneous fungal genera. Such similarities have resulted in the application by some investigators of the same generic name to the fossil genus as is given to the similar present-day genus, a very reasonable procedure. Seward (1933) expressed disapproval, however, of such a procedure, as follows: "Such a double use of the same term should always be avoided as likely to lead to confusion and as tending to admit a divorce between botany and palaeobotany."

The fact remains that palaeontologists have not been consistent in the use of the suffix *-ites*. The attachment of *-ites* to the stem of a name does not necessarily imply taxonomic affinity or relationship. The Code of Botanical Nomenclature does not prescribe how fossil names should be formed other than that they must be Latinized.

Problems bearing on the naming of non-petrified fungi that have not changed morphologically during a period of millions of years, but must have evolved and changed physiologically to have been able to survive, await solution. The environmental factors that govern their preservation in sediments have been given little study and remain quite unknown. The ability of many species of fungi to adjust to their environment and thus to survive from the time that life on earth began must be regarded as a remarkably adaptable feature and as a provocative subject for speculation.

Acknowledgment

I am appreciative of advice on fossil taxonomy given me by Dr. James M. Schopf, Geological Survey, Ohio State University, and by Prof. Dr. Edward Boureau, University of Paris.

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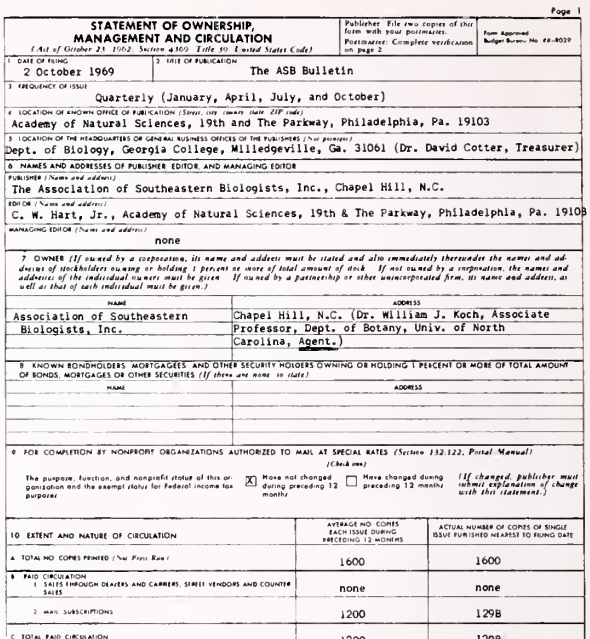
State University College at Buffalo Offers Graduate Assistantships

The Graduate School of the State University College at Buffalo, New York, is offering studies leading to the M.A. in Biology. Graduate assistantships (10 hr. maximum) with remission of tuition will be available in January. For information, write to Dr. William C. Schefler, Chairman, Dept. of Biology, State University College at Buffalo, 1300 Elmwood Ave., Buffalo, N.Y. 14222.



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POD Form 3526 May 1968

ASSOCIATION AFFAIRS

ASSOCIATION RESEARCH PRIZE

If you intend to present a paper at the annual meeting of the Association of Southeastern Biologists, we wish to call your attention to the Association Research Prize and invite you to submit your manuscript in competition. This prize of $100. is sponsored by the Carolina Biological Supply Company, Burlington, North Carolina. Rules and regulations are as follows:

1. The Research Prize is to be awarded for an especially meritorious paper actually presented at the annual meeting.

2. Only members are eligible to submit papers in competition for the Research Prize. This applies to all names on the submitted paper.

3. Papers submitted in competition may be in press but must not have been published prior to March 1 of the year of the current competition.

4. Papers submitted in competition are judged by eminent scientists in the various fields of biology. These individuals are selected by the Research Committee and are from schools outside the Southeast. Every effort is made by the Researeh Committee to keep the authors of submitted papers anonymous. Criteria for the award are left to the discretion of the judges' panel, who may withhold said award if no paper is considered to have sufficient merit.

5. Papers must be submitted *in triplicate* and in their entirety not later than *February 1, 1970, to Dr. Thomas L. Quay, Dept. of Zoology, North Carolina State Univ., Raleigh, North Carolina*

27607. One copy of the prize-winning paper will remain in the ASB files, but all other copies will be returned to the authors as soon as possible.

6. Announcement of the winner of the Research Prize will be made at the annual meeting.

SUGGESTED NOMINEES FOR ASB OFFICES AND EXECUTIVE COMMITTEE POSITIONS

To the members of the Nominating Committee:

I wish to suggest that you consider the following ASB members in selecting nominees for offices and executive committee positions:

PRESIDENT-ELECT .....

VICE-PRESIDENT .....

EXECUTIVE COMMITTEE MEMBERS (2 for 3-year terms) .....

Deadline: December 15

Mail to: DR. W. D. BURBANCK
Dept. of Biology
Emory University
Atlanta, Georgia 30333

MERITORIOUS AWARD NOMINATIONS

As in previous years an honorarium of $100 has been made available by the Will Corporation of Georgia, to be used as an award for the recognition of especially meritorious teaching by a member of the ASB. The regulations governing the award are as follows:

The recipient must be a member of the ASB in good standing. He should have taught biology in a southern institution for at least ten years, and must be currently teaching. He must not be a dean or have regular administrative duties beyond the department level (this particular criterion requiring interpretation in individual cases). Among evidences of his qualifications is the progress of the candidate as indicated by recognition in his own institution (important assignments and other contributions specifically related to good teaching); and the number and quality of students for whom he provided primarily the inspiration to continue in biology, especially those who later received advanced degrees.

Past recipients of the Meritorious Award for Teaching are as follows:

1952. Dr. Mary Stuart MacDougall (Agnes Scott)
1953. Dr. Orland E. White (Univ. of Virginia)
1954. Dr. Woolford B. Baker (Emory)
1955. Dr. John N. Couch (Univ. of North Carolina)
1956. Dr. Hugo L. Blomquist (Duke)
1957. Dr. Ezda Deviney (Florida State)
1958. Dr. Henry R. Totten (Univ. of North Carolina)
1959. Dr. Margaret Hess (Winthrop College)
1960. Dr. Ora C. Bradbury (Wake Forest College)
1961. Dr. Warren Deacon (Vanderbilt)
1962. Dr. Septima C. Smith (Univ. of Alabama)
1963. Father Patrick H. Yancey (Spring Hill College)
1964. Dr. Ruskin S. Freer (Lynchburg College)
1965. Dr. Harwell P. Sturdivant (Western Maryland College)
1966. Dr. Charles Ray, Jr. (Emory Univ.)
1967. Dr. H. J. Oosting (Duke University)
1968. Dr. Wade T. Batson (Univ. of South Carolina)
1969. Dr. William L. Mengebier (Bridgewater College)

In these times in which so much is heard about teaching, it is particularly important that excellence in teaching should be rewarded and publicized in every way possible. Members of the ASB are urged to make nominations and send the needed supporting material to *Dr. Wade T. Batson, Dept. of Biology, Univ. of South Carolina, Columbia, South Carolina 29208, by January 15, 1970.*

COMMITTEE
WILLIAM L. MENGEBIER
JACK H. FEHON
WADE T. BATSON, *Chairman*

IVEY F. LEWIS FELLOWSHIP AT MOUNTAIN LAKE BIOLOGICAL STATION

A Research Fellowship of $150.00 for summer course study or research at Mountain Lake Biological Station of the University of Virginia has been continued through the generosity of the Phipps and Bird Company of Richmond, Virginia. This fellowship, formerly known as the *Phipps and Bird Research Fellowship,* was re-named at the request of the Phipps and Bird Company. Any member of the Association may submit an application. The application should be accompanied by a summary of the planned work, by a list of important publications, and especially in the case of younger workers, by references and educational data. Applications should be sent to *Dr. J. J. Murray, Dept. of Biology, Univ. of Virginia, Charlottesville, Virginia 22903* not later than 1 March 1970. The selection will be made by the Research and Awards Committee of the ASB in consultation with the Director of the Mountain Lake Biological Station. The announcement of the recipient will be made at the annual meeting of the ASB.

COMMITTEE
J. J. MURRAY, *ex officio*
JAMES RIOPEL, *ex officio*
THOMAS L. QUAY, *Chairman*
ARTHUR W. JONES
PAUL YOKLEY, JR.

MARY GLIDE GOETHE TRAVEL AWARDS

For the thirteenth year there will be funds available through the generosity of the late Mr. C. M. Goethe for assistance to graduate students for expenses in connection with the annual ASB meetings, to be held this year at the Florida Southern College, Lakeland, Florida. Approximately $300 will be available from the contributions of Mr. Goethe, and it is anticipated that most of the awards will be for maintenance (lodging and meals), and departments are urged to provide travel allowances for their graduate students or to invite them to travel in cars with staff members. Some travel allowances may be awarded by the committee to those living most distant from Lakeland.

Staff members are requested to call to the attention of qualified students in their respective institutions the availability of these awards. If there is more than one applicant from a department, the Goethe Committee may request the department to aid the committee's selection by ranking the applicants.

Any graduate student needing financial assistance in order to attend the 1970 meeting of the Association of Southeastern Biologists is eligible. Rules for making application for the Goethe Awards are as follows:

1. Indicate if application is being made for maintenance or travel or both. Give details, such as total sum requested, how many nights and days are involved, if travel allowance is requested, the number of miles involved and the proposed method of transportation, and any other pertinent information.
2. Give information as to whether or not a paper is being presented by the applicant.
3. In a paragraph, give a brief history of your education to date, of how many years you have been — and plan to be — in graduate school, of your major field or fields of interest, of any publications which have appeared or which may be in preparation, and any other pertinent professional details. Give information on marital status and number of children.
4. Give your source or sources of support while in graduate school such as G.I. Bill, N.S.F., N.I.H., teaching assistantship, etc.
5. Have your major professor or departmental head write a letter supporting your application.
6. Applications and supporting letters, both in triplicate, should be in the hands of *Dr. William E. Brillhart, Dept. of Biology, Emory University, Atlanta, Georgia 30333,* by 1 February 1970. Applicants will be notified of the decision of the Committee as soon as possible.

FRANK R. BARCLAY
STEPHEN M. GITTLESON
WILLIAM E. BRILLHART, *Chairman*

Books and Periodicals

For every significant group of plants and animals in the sea, there should be a useful guide to their identification with illustrations, descriptions, habitat notes and other information, guides designed for the use of high ability high school students, undergraduates, the intelligent and curious layman, and professional scientists interested in organisms outside their field of specialization. Most of these guides must be more or less local in scope in order to avoid a complexity that defeats their purpose.

More marine biologists who are taxonomically oriented should write something of this nature, if for no other reason than to help develop the interest of young students in the biological sciences.

Two new books of this nature have recently appeared, both of which may be of interest to many members of ASB and their students.

Tropical Fishes

CARIBBEAN REEF FISHES, John E. Randall. T. F. H. Publications, Inc., 245 Cornelison Avenue, Jersey City, N.J., 07302, 1968, 318 p., 324 photographs (140 in color), $6.50.

Probably no other professional ichthyologist has used SCUBA equipment as extensively in his research as has Dr. John E. Randall, author of this valuable guide to the reef fishes of south Florida, the West Indies and Caribbean Sea.

Dr. Randall is one of the most skillful and experienced of amateur divers, having spent countless hours under water in all the tropical seas of the world. As

a result, he has felt the need of amateur divers for a guide to the reef fishes, and he has produced a book that meets such a need in the most creditable manner.

The author is ichthyologist at the Bernice P. Bishop Museum in Honolulu, and marine biologist at the Hawaii Institute of Marine Biology. He was formerly Director of the Institute of Marine Biology of the University of Puerto Rico, and was associated with Miami's Institute of Marine Science. It was during these years that he carried on the field work throughout the Caribbean area that led to the writing of this book.

Every one of the 300 species of fishes in his book is illustrated by a superb photograph made by the author, 140 of them in high fidelity color. Since he collects the fish himself, he has been able to make color photographs of fishes never before recorded in this way. Fishes of tropical waters must be photographed immediately after capture and preferably before they die in order to capture on film their unbelievable hues. In preservation the colors fade or change, sometimes in a matter of minutes.

Second in value to these remarkable photographs is Dr. Randall's description of each species and his habitat notes. He does not have to rely upon previous Literature for this information; he knows from experience much more than can be found in print about these colorful marine animals.

Dr. Randall's book deserves better typography, a better binding, and paper that is not coated — pages that will not stick together if they should get wet. But both he and the publisher were anxious to keep down the price of the book so that students could obtain it. This is the kind of book that should be available in a deluxe edition and in paperback or well.

Any young person who snorkels or dives among the Florida Keys or the islands of the West Indies will treasure this scientifically accurate field guide; for that matter, so will any professional marine biologist who works in the Caribbean area.

New England Algae

SEAWEEDS OF CAPE COD AND THE ISLANDS, John M. Kingsbury. The Chatham Press, Inc., Chatham, Mass., 02633, 1969, 212 p., 100 full-page line drawings, $12.50.

A phycologist and two artists have teamed up to produce a book of unusual beauty provided by its 100 line drawings and its good typography on high quality paper. This is a book that will be a useful field guide to anyone interested in the marine algae of New England because of author John M. Kingsbury's essays on each of the 100 or more species treated.

Through a combination of a generalized key, illustrations, a discussion, glossary, and a hand lens (to be supplied by the reader), users of the book will be able to make tentative identifications of most of the common marine algae of New England (or even from New Jersey to Nova Scotia), and reasonably reliable determinations of some of the less difficult species.

The illustrations provided by Marcia and Edward Norman, line drawings with a charcoal-like texture, are works of art. Their artistic quality and uniformity have been accomplished with some sacrifice of reference value for identification. It is difficult, however, to incorporate into life-size (or smaller) habit sketches of marine algae those characters that distinguish them as species. In some cases, an enlarged portion of the plant has been added, and these will be of great help.

Dr. Kingsbury is Cornell's well-known authority on marine algae of the northeastern coast. He conducts a summer field course in marine science at Isle of Shoals in Maine. He is also well-known for his books on poisonous plants of the United States and Canada. His current research interest is the ecology of "Irish moss", *Chondrus crispus* (L.) Stackhouse, the red alga that has been harvested heavily for more than 25 years for its valuable cell wall polysaccharides. — Harold J. Humm, Marine Science Institute, University of South Florida, St. Petersburg 33701.

FIRST NATIONAL INVENTORY OF MARINE RESEARCH COMPLETED

The first definitive report on marine research activities sponsored by the United States was released today by Dr. Edward Wenk, Jr., Executive Secretary of the National Council on Marine Resources and Engineering Development.

Marine Research — Fiscal Year 1968 contains descriptive summaries of 2589 unclassified marine research projects supported during fiscal year 1968 by Federal and non-federal organizations. Identified with these projects, both in the text and in supplemental indexes, are 3022 associated investigators, 457 performing organizations, 25 Federal supporting agencies, and 95 non-federal sources of support. The inventory was undertaken to assess the scope, balance and texture of the national effort to understand the world's oceans, and to assist and encourage the exchange of research information within the marine sciences community.

In a Foreword to the catalog, Vice President Spiro T. Agnew, Chairman of the Marine Sciences Council, stated that:

"The establishment of a long-range program to utilize the oceans for the benefit of all mankind was set forth as a national policy by the Marine Resources and Engineering Development Act of 1966. Meeting marine science needs and opportunities in turn depends significantly upon a strong research capability. Such research encompasses a broad spectrum of disciplines in support of, among others, the development of living and nonliving resources, environmental prediction, conservation

and recreation, maritime commerce, and national security activities. While these endeavors are supported largely by the Federal Government, they are conducted in some 95 academic institutions; several hundred State and local organizations and laboratories; over 35 private foundations and professional associations; hundreds of industrial organizations; as well as in more than 85 Federal laboratories.

"Maximizing benefits from the Nation's growing investment in the oceans requires developing the full potential of this widely dispersed research capability. Because of the very number and diversity of organizations and activities involved, however, there is a serious hazard of unwitting duplication or gaps in research efforts. Complete information about on-going research and effective information transfer thus become key elements for assuring that individual scientists, engineers, administrators, and policy officials have access to knowledge of 'who is doing what, where, and with whose support.'

"Toward that end, the National Council on Marine Resources and Engineering Development is releasing this report: *Marine Research — Fiscal Year 1968* ... It is hoped that among the benefits from this publication will be expanded recognition of the value of descriptive information about marine programs, and support for activities designed to improve the flow of information among specialists working in this area."

The catalog was prepared under contract by the Science Information Exchange of the Smithsonian Institution which had been assigned by the Council in April 1968 the continuing mission of serving as a national center to collect and disseminate information about current, unclassified marine research.

Marine Research — Fiscal Year 1968 is available for $5.50 from the U.S. Government Printing Office as document number 1969-350-238.

A New Way to Teach Microbiology

In too many beginning courses, though, the student learns about microbes by reading and listening to lectures. No doubt this is because experiments in microbiology are thought to require tools and techniques that are too costly or time-consuming for the high school laboratory.

Not so, says Millipore Corporation — at least, not any more. The Bedford, Mass., manufacturer of membrane filtration systems and scientific instruments has introduced a self-contained kit that enables any high school student, with little supervision, to isolate, grow and observe a variety of microorganisms. The illustrated manual furnishes a lively introduction to microbiology and detailed experiments involving many common microbes — bacteria, yeasts, mold — found in food, soil, the air, on the skin and in polluted rivers and streams.

For schools equipped with autoclaves, vacuum lines, Bunsen burners and binocular microscopes, the firm also offers an assortment of filtration systems and related apparatus ranging from the very simple to the very sophisticated. These are the same Millipore systems used by microbiological researchers, cytologists, clinical technologists, public health officials and a variety of others involved in clinical, biological and pollution analysis.

Millipore filters are thin plastic membranes with billions of microscopic pores per square inch. They work by trapping any particle or microbe larger than pore size on the filter surface. (They're available in pore diameters small enough to trap a polio virus). This makes it easy to isolate a few microbes from a large volume of fluid. The filter also furnishes a biologically inert white surface on which the microbes can be cultured to form visible colonies.

Microbes are cultured simply by placing the filter on an absorbent pad saturated with nutrient medium. The colonies are nourished by capillary action through the filter pores. As a result, microbes usually grow faster on a Millipore filter than they do when immersed in liquid medium. This is one reason for their value in clinical laboratories for identifying bacteria from blood and urine, where early diagnosis is so important.

The kit uses an inexpensive plastic filtration system, disposable filters, break-open ampoules of culture medium and presterilized Petri dishes, eliminating the time-consuming preparation of agar plates and doing away with most of the messy housekeeping chores associated with other bacteriological culturing procedures.

In addition to their use as a research and analytical tool, membrane filters are used in the pharmaceutical, aerospace, electronic, chemical processing, food and beverage industries to microfilter all sorts of critical gases and liquids. Drinking water used by the Apollo astronauts is sterilized through Millipore membrane filters, as are many vaccines, insulin, antibiotics and intravenous solutions.

These unusual filters are also doing yeoman work in industrial bacteriology, industrial air sampling, and in the processing of beverages, hydraulic fluids, artificial sweeteners, photochemicals, reactor coolants, cosmetics and dozens of other fluids requiring extreme cleanliness, purity or freedom from microscopic contaminants.

News of Biology in the Southeast

About People

John D. Freeman was appointed Assistant Professor, Department of Botany and Plant Pathology, Auburn University (Alabama), in September, 1968. He received the B.A. degree from Austin Peay College and the Ph.D. degree from Vanderbilt University. His research is in plant taxonomy.

Elizabeth Lee Klepper was appointed Assistant Professor, Department of Botany and Plant Pathology, Auburn University (Alabama), in July, 1968. She received the B.A. from Vanderbilt University and the M.A. and Ph.D. degrees from Duke University. She also attended Exeter University in England on a Marshall Scholarship and conducts her research in mineral nutrition and water relations of plants.

Fernando J. Subirats was appointed Instructor, Department of Botany and Plant Pathology, Augurn University (Alabama), in July 1968. He received the B.S. degree from Havana University and the M.S. degree from Auburn University. He conducts research on fundamental and applied aspects of field crop pathology.

U. L. Diener and **N. D. Davis**, both Professors, Department of Botany and Plant Pathology, Auburn University (Alabama), have been awarded a grant of $11,000 by the USPHS to conduct a research program entitled "Growth and Toxin Production of Food-Storage Fungi."

D. E. Davis, Alumni Professor, and B. Truelove, Associate Professor Department of Botany and Plant Pathology, Auburn University (Alabama), have been awarded $17,000 by USPHS to study "Fate and Mechanism of Action of Herbicides."

E. A. Curl, Professor, and R. Rodriguez-Kabana, Assistant Professor, Department of Botany and Plant Pathology, Auburn University (Alabama), have been awarded a three year grant of $66,000 in support of a research program entitled, "Interactions of Herbicides and Soil-Borne Cotton Disease Fungi."

J. D. Freeman, **W. E. Goslin**, and **E. L. Klepper**, Department of Botany and Plant Pathology, Auburn University (Alabama), have each been awarded University grants to study plant taxonomy, aquatic plant ecology and plant physiology, respectively. Likewise, D. E. Dacis and J. A. Lyle received five commercial grants for research in herbicide physiology and fungicidal diseases, respectively.

David G. Davis has been appointed Associate Professor of Biology at the University of Alabama, Tuscaloosa. He comes following a tenure as a USPHS Special Research Fellow in the Laboratory of Genetics, University of Wisconsin.

Herbert S. Schwartz, Department of Biology, University of Alabama, Tuscaloosa, has been awarded a three year grant of $81,650 by USPHS to support research investigating the reactions of mitomycin C and porfiromycin in proliferating and non-proliferating cells of rats and mice.

A two year grant of $29,000 has been awarded **Joseph C. O'Kelley**, Department of Biology, University of Alabama, Tuscaloosa, by NSF. The photobiology of cytoplasmic cleavage in *Protosiphon botryoides* is the research supported.

Jan Eagles has joined the staff of the Department of Biology, Alabama College, Montevallo. She recently was awarded the Ph.D. in the Department of Anatomy, University of Alabama Medical School, Birmingham.

J. F. Fitzpatrick, Jr., News Editor for the *Bulletin,* has been appointed Associate Professor of Biology, Randolph-Macon Woman's College, Lynchburg, Virginia. He is leaving a position at Mississippi State University, State College.

An expansion of the Botany Department at the University of Kentucky, Lexington, has resulted in the appointment of four new people to the Botany staff during the past year: **Jerry M. Baskin** (Ph.D., Vanderbilt, plant ecologist) came following a year of postdoctoral study at the University of Florida, Gainesville; **James H. Eley** (Ph.D., Texas, plant biochemist) came following an NIH postdoctoral fellowship at Brandeis; **Thomas J. Leonard** (Ph.D., Indiana, fungal genetics and physiology) came following an NIH postdoctoral fellowship at Harvard; **Willem Meijer** (Ph.D., Amsterdam, the Netherlands, plant taxonomist-ecologist) joined the faculty following nine years of study on the taxonomy and ecology of the plants of Sabah (Borneo).

Langley Wood, Head of the Department of Environmental Physiology at the Virginia Institute of Marine Science, Glouces.er Point, has been appointed Professor of Zoology and Chairman of the Department of Zoology at the University of New Hampshire, Durham. He will assume his duties there on July 1, 1969.

Sohan P. Modak, Cell Growth and Differentiation Group, Oak Ridge National Laboratories, Oak Ridge, Tennessee, left the Group after a three year tenure on 14 February. After a three month sojourn at the University of Kentucky, Lexington, he returned to his home in India.

R. B. Williams, USDI, FWS, BCF Radiobiological Laboratories, Beaufort, North Carolina, has been appointed Associate Editor for the *Proceedings of the National Shellfisheries Association* and also was elected a Fellow of the American Association for the Advancement of Science.

J. W. Angelovic, USDI, FWS, BCF Radiobiological Laboratories, Beaufort, North Carolina, was appointed to the Radioecology Committee of the Ecological Society of America.

Rudolf K. Achazi has joined the Cell Growth and Differentiation Group, ORNL, as a Deutsche Forchungsgemeinschaft Postdoctoral Fellow. He received the Ph.D. from the University of Heidelburg, West Germany.

Fumitoshi Chino has joined the staff of the Radiation Immunology Group, ORNL. He received the M.D. degree in 1959 and the Ph.D. in 1964 from the Shinshi University School of Medicine, Matsumoto City, Japan.

R. A. Brown has left the Radiation Immunology Group, ORNL, to accept a position at the Puerto Rico Nuclear Center, University of Puerto Rico, USAEC, San Juan.

W. L. Russell, ORNL, attended a Ciba Foundation Symposium on "Mutation as a Cell Process" in London, England, presented a paper, and conferred with colleagues in Munich, Germany, and Rome, Italy, before returning home.

Charles B. Metz, Professor of Zoology, University of Miami [Florida] Institute of Molecular Evolution, will direct the Woods Hole summer research program in reproduction physiology for the eighth consecutive year in 1969. The program, which Dr. Metz helped found, has been supported since its inception by the National Institute of Child Health and Human Development, HEW, and it has been supported again by a five year grant of $478,275 from the same agency.

Robert D. Faulkner, after receiving a Career Development Award from NIH, took leave of absence from the University of Nebraska to join the Nucleic Acid Chemistry Group, ORNL.

Kurt M. Hilse left the Mammalian Genetics Group, ORNL, on 28 February to return to his position at the Max-Planck-Institüt für Biochemie, Munich, Germany.

Alexander Hollaender, ORNL, has been elected a "membro Correspondente de la Academia Brasileira de Ciencas" (Corresponding member of the Brazilian Academy of Sciences).

Toshihiko Sado left the Radiation Immunology Group, ORNL, to accept a position with the National Institute of Radiological Sciences, Chiba, Japan.

Kenneth E. Muse has been appointed Research Associate and Supervisor of the Electron Microscope Center, North Carolina State University, Raleigh.

Amir Muhammed who received his Ph.D. from Oxford University, England, has joined the Molecular Photobiology of DNA Group of ORNL.

Irene Boliek has been awarded the endowed Vivian Gay and J. L. Coker, Jr., Professorship for distinguished

teaching at Coker College, Hartsville, South Carolina. Dr. Boliek has been Professor and Head, Department of Biology since 1965.

Richard D. Brock has joined the Mammalian Cytogenetics Group, Oak Ridge National Laboratories, Oak Ridge, Tennessee, as a Consultant. Dr. Brock received his degree in genetics from the University of London, England, and is a member of the Division of Plant Industry, Commonwealth Scientific and Industrial Research Organization, Canberra, Australia.

John B. Storer has joined the Pathology and Immunology Section, ORNL, leaving the post of Deputy Director, Division of Biology and Medicine, U.S. AEC.

James E. Strickland has joined the staff of the Enzymology Group, ORNL, as a postdoctoral fellow following receipt of his degree in biochemistry from Tulane University, New Orleans, Louisiana.

David L. Groves left the Biology Division, ORNL, to accept a position with the Department of Microbiology, Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, North Carolina.

Amir Muhammed left the Biology Division ORNL, to return to the Radiation Genetics Unit, Lyallpur, West Pakistan.

James A. Knopp left the Biology Division ORNL, to accept a position in the Department of Biochemistry, North Carolina State University, Raleigh.

William S. Riggsby left the Biology Division, ORNL, to accept a position at the University of Tennessee at Knoxville. Dr. Riggsby will be a Consultant to the Nucleic Acid Enzymology Group, ORNL.

Robert A. Weisburg left the Biophysics Group, ORNL, to join the Laboratory of Molecular Genetics, National Institute of Child Health and Human Development, Bethesda, Maryland.

J. R. Ramirez-Martinez of the Instituto Venezolano de Investigaciones Cientificas, Caracas, Venezuela, has joined the Nucleic Acid Chemistry Group, ORNL, as a Loanee. Dr. Ramirez-Martinez received his degree from the University of California, Berkeley.

D. A. Wolfe, U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Radiobiological Laboratory, Beaufort, North Carolina, began on 1 July a 14-month research training period at the Puerto Rico Nuclear Center, Mayaguez.

Rother R. Johnson, Professor of Biological Sciences, Tennessee Agricultural and Industrial State University, Nashville, and **Chester L. Jordan**, Professor of Biology, Grambling College, Grambling, Louisiana joined the Pathology and Physiology Group and Mammalian Genetics Group, respectively, ORNL, as summer Research Participants.

Claire M. Berg, University of Connecticut, Storrs, joined the Biophysics Group, ORNL, as a Consultant.

David S. McDevitt, Assistant Professor of Animal Biology, University of Pennsylvania, School of Veterinary Medicine, Philadelphia, has joined the staff of the Cell Growth and Differentiation Group, ORNL, as a Consultant.

James M. Collins, a USPHS Postdoctoral Fellow in the Biochemistry of Cell Differentiation Group, ORNL, was appointed Assistant Professor of Biochemistry, Medical College of Virginia, Richmond.

Ronald W. Johnson, a graduate of the University of California, Berkeley, has joined the Biochemical Regulation Group, ORNL, as a USPHS Postdoctoral Fellow.

Robert E. Bird has joined the Biophysics Group, ORNL, as a Biology Division Postdoctoral Fellow following receipt of his degree in molecular biology from Kansas State University, Manhattan.

The News Editor regrets to report the recent death of **Herman O'Dell**, Professor of Biology, East Tennessee State University, Johnson City, in an automobile accident.

Oscar T. Owre has been named Robert E. Maytag Professor of Ornithology at the University of Miami, Coral Gables, Florida. Dr. Owre becomes the second Maytag chair, joining C. Richard Robbins who is Maytag Professor of Ichthyology.

Michael J. Snodgrass has joined the Immunology of Carcinogenesis Group, ORNL. He was awarded the Ph.D. in anatomy by the University of North Dakota Medical School, Grand Forks.

John M. Yuhas who received his Ph.D. in radiation biology and zoology from the University of Maryland, College Park, joined the staff of the Pathology and Immunology Section, ORNL.

Wesley D. Wicks has left the Biology Division, ORNL, to become Assistant Professor of Pharmacology at the National Jewish Hospital, Division of Research, University of Colorado Medical Center, Denver.

Preston O. Ritter, a Biology Division Postdoctoral Investigator, ORNL, has been named Research Assistant Professor of Pharmacology, Baylor University College of Medicine, Texas Medical Center, Houston.

Although **Libbie Henrietta Hyman** was not a member of ASB, your News Editor would feel remiss if he did not note, with regret, her death on 3 August 1969, following a long illness.

The News Editor regrets to report the death of **Ladley Husted**, Professor of Biology at the University of Virginia, Charlottesville.

Richard T. Hamlin, University of Georgia, has received a 2-year National Science Foundation grant of $38,000 for a project entitled "Comparative Morphology of Perfect and Imperfect States of Ascomycetes."

Marvin W. Scott has been appointed chairman of the department of natural sciences at Longwood College, after having served as acting chairman since February. He succeeds **Dr. Robert T. Brumfield**, who resigned after eight years as department head in order to devote full time to teaching and research in which he was engaged prior to becoming chairman. A 1959 graduate of Hampden-Sydney College where he taught biology for one year, Dr. Scott came to Longwood in 1966 as assistant professor of biology.

About Institutions

The departments of Biology, Math-Physics, and Chemistry have recently moved into a new building at **Alabama College**, Montevallo. The building has been officially dedicated to the memory of Arthur Fort Harman, a former president of the college. The building consists of some 250 000 square feet and was built at a cost of $1,100,000, exclusive of furnishings. An attractive feature of the building is a spacious courtyard which has been developed using, almost exclusively, native shrubs and flowers. In the courtyard is also a geode, reported to be the largest ever unearthed in this country.

Auburn University (Alabama) has discarded its old system of offering separate elementary courses in botany and zoology and has substituted an interdepartmental program in biology involving three basic laboratory courses and one lecture-only course. The new program will permit instruction in basic biological principles to all students and subsequent appropriate in depth study for non-majors and majors. W. H. Mason of the Zoology-Entomology Department has been named Coordinator.

The Department of Biology, **University of Alabama**, Tuscaloosa, is completing plans for a new Biological Sciences Building. The structure, scheduled for completion in 1971, will contain approximately 88,000 square feet and cost approximately $3 million.

The initial meeting of the Triangle Mycolloquium [sic!] was convened by Royall T. Moore (Asst. Prof. of Botany, **North Carolina State University** at Raleigh) as a seafood buffet. The more than 30 mycologists in attendance represented the North Carolina State University at Raleigh; the University of North Carolina at Chapel Hill, Duke University (Durham) and the Research Triangle. Plans were developed for professional and social intercourse between mycologists of the Research Triangle area. Among other plans was a joint foray with mycologists from neighboring states into the Highlands area which is being organized for the Fall by Larry F. Grand (Asst. Prof. of Plant Pathology, North Carolina State University at Raleigh).

A comprehensive graduate program has been developed by the Departments of Botany, Plant Pathology, and Microbiology at the **University of Georgia**. Training is being offered at both the M.S. and Ph.D. degree levels, with the degree being awarded by the department in which the student enrolls. The program is designed with sufficient flexibility to permit students to pursue any special interests; students entering the program through Plant Pathology, for example, need not specialize in plant pathology, but may take a majority of their courses in related fields, such as botany and microbiology. The following courses are now being offered in the mycology program: Introductory Mycology (R. T. Hanlin), Medical Mycology (G. E. Michaels), Biology of Phycomycetes (M. S. Fuller & D. L. Porter). Biology of Ascomycetes (R. T. Hanlin), Biology of Basidiomycetes (E. W. Ross), Physiology of Fungi (W. K. Wynn), Physiological Genetics (K. E. Papa), and Microbial Genetics (H. B. Howe). Others participating in the mycological research program are E. S. Luttrell (Ascomycetes and Deuteromycetes), R. W. Roncadori (Ecology of Fungi), J. E. Giddens (Soil Mycology), W. A. Campbell and F. F. Hendrix, Jr. (Pythiaceae). Facilities are available for work in most areas of research, including taxonomy, morphology, genetics, physiology, and ecology. An additional electron microscope facility is presently under construction. The University also has strong programs of instruction in related fields, such as botany, microbiology, ecology, plant pathology, and biochemistry. Anyone desiring further information is invited to write to me or directly to the others listed above. — Richard T. Hanlin, Department of Plant Pathology, University of Georgia, Athens, Georgia 30601.