

PROCEEDINGS OF THE TENNESSEE ACADEMY OF SCIENCE FOR 1950

ARLO I. SMITH, *Secretary*
Southwestern at Memphis, Tennessee

MEETINGS OF THE EXECUTIVE COMMITTEE SUMMER MEETING

A meeting of the Executive Committee of the Academy was held in the Joint University Libraries at Nashville on June 10, 1950, with the following members present: Samuel L. Meyer, University of Tennessee; Marion L. MacQueen, Southwestern College; Arlo I. Smith, Southwestern College; James J. Friauf, Vanderbilt University; Jesse M. Shaver, George Peabody College for Teachers; Clinton L. Baker, Southwestern College; Carl K. Seyfert, Vanderbilt University; and Warren M. Deacon, Vanderbilt University.

Minutes of the last Executive Committee meeting were read and approved.

Appointments approved were as follows:

Science Talent Search Committee: James Major, *Chairman*, C. A. Buehler, C. S. Shoup, Howard Kirksey, Hanor Webb, Katherine Matthews.

Committee on Reactivation of the Physics Section: W. Roger Rusk, *Chairman*, John S. McCartney, M. S. McCay, and Ingram Bloch.

Membership Committee: Arlo I. Smith, *Chairman*, Paul Hollister, W. K. Butts, T. A. Frick, Clare H. Bennett, Harry Klepser, Carl T. Bahner, G. S. Bruton, J. S. Bond, Edward McCrady, H. D. Dawson, and John A. Hyden.

Member of the Executive Committee: Irvin W. Grote, University of Chattanooga to serve 1950, 1951, and 1952.

Representative on the Council of the A. A. A. S.: Clinton L. Baker.

Sponsor of the Junior Academy of Science: Frances R. Bottum.

Confirmation of the appointment by Clinton L. Baker, Director of Reelfoot Lake Biological Station, of Willis King, Chief, State Game and Fish Commission, as a member of the Advisory Committee of the Reelfoot Lake Biological Station to serve 1950, 1951, and 1952.

Elections: Jesse M. Shaver was unanimously reelected to a new three-year term as Editor of the JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE to serve 1951, 1952, and 1953. Clinton L. Baker was unanimously reelected to a new three-year term as Director of the Reelfoot Lake Biological Station to serve 1951, 1952 and 1953.

Reports: C. L. Baker, Director of Reelfoot Lake Biological Station reported fewer people were doing research at the station each summer in spite of financial encouragement being offered. He suggested that schools offering graduate work should take a greater interest in the station and that future directors should come from such institutions. The director reported his offer of facilities for use by the State Department of Conservation was refused.

Jesse M. Shaver, Editor of the JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE, suggested the publication of a twenty-five-year index to the JOURNAL, and of a brief history of the JOURNAL as a fitting tribute to the JOURNAL'S success for the period.

James J. Friauf, Treasurer, reported that 217 members were in arrears in dues after two notices had been sent them. The treasurer's interim report of the financial condition was received as in good condition.

Arlo I. Smith, Secretary, reported a total of 784 members as of June 1, 44 new ones since the last fall meeting. A mimeographed membership list indicating the section interest of each member has been completed and is available for those needing it.

Samuel L. Meyer, President, reported that few members responded to his request for suggestions as to what the Academy could do to improve science in Tennessee but that those few presented many suggestions which he hoped to incorporate in his annual presidential address.

Unfinished Business: none remained to be considered.

New Business:

1. The President notified the Executive Committee of the intention of the Association of Southeastern Biologists to formulate their own publication and to cease publishing their proceedings in the *JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE*.

2. An invitation from the Southern Association of Science and Industry that the Academy affiliate with them was accepted by unanimous vote of the Committee.

3. The A.A.A.S. 1949 Research Grant of \$111.50 was awarded to Ray Kinslow of Tennessee Polytechnic Institute as an aid in his work on "A Negative Transconductance Effect Which Occurs in Crossed Electrostatic and Magnetic Fields." Disposal of the 1950 A.A.A.S. Research Grant of \$135.50 was deferred until the December meeting at Johnson City. The Committee unanimously approved a motion by Clinton L. Baker that each recipient of a research grant be required to make a progress report each November to the Executive Committee in addition to his final report.

4. The President suggested some recognition should be given in the *JOURNAL* of completion of 25 years of its publication. After some discussion the Editor asked that publication of the index he suggested be decided later after estimates of its cost could be made. The committee unanimously approved the publication of a brief history in the October, 1950, issue of the *Journal*.

5. The Committee accepted the resignation of C. S. Shoup as Academy Historian and unanimously approved the appointment of George R. Mayfield to that position.

6. The President reported receipt of invitations for the 1951 Annual Meeting from both Austin Peay College and the University of Chattanooga. Action on these invitations was deferred until the December meeting at Johnson City.

7. Due to the continually increasing demands upon the time of an Academy Representative to the Council of the A.A.A.S. which demands that he forego many of his personal desires in attending meetings of his choice the Executive Committee unanimously agreed that some financial aid should be given this representative. Action upon this was deferred until later.

8. The Committee recommended the appointment of Robert W. McGowan of Memphis State College to thoroughly familiarize himself and the Executive Committee with the details of formation of a Collegiate Section of the Tennessee Academy of Science and to make a report at the next Committee meeting.

9. After quite a long meeting of the Executive Committee, the President made a motion that it adjourn until Thursday night, December 7, in Johnson City.

FALL MEETING

A meeting of the Executive Committee of the Academy was held at Johnson City, Tennessee on December 7, 1950, with the following members present: Samuel L. Meyer, Arlo I. Smith, James J. Friauf,

Carl K. Seyfert, and Warren M. Deacon. Unfavorable weather conditions prevented the attendance of Marion L. MacQueen, Jesse M. Shaver, Clinton L. Baker, and Irvin W. Grote.

Minutes of the last Executive Committee meeting were read and approved.

Reports of officers were as follows:

A summary report of the Director of the Reelfoot Lake Biological Station was read by the secretary as the director could not be present. No action was necessary.

The Editor of the *JOURNAL OF THE TENNESSEE ACADEMY OF SCIENCE* could not be present and no report was given at this time.

The Secretary reported membership in the Academy now of 828 of which 112 are tentative since the last meeting and are to be voted upon at this meeting. This list was read and the acceptance of these new members was recommended by the committee.

The Treasurer gave a detailed report which was approved by the Committee but is not recorded here as it is published in the *JOURNAL* separately.

Various letters of correspondence pertaining to the functions of the office of the President were discussed and his action approved.

Reports of committees were as follows:

Committee on the Formation of a Collegiate Section. A written report by Robert W. McGowan, Chairman, was read by the Secretary. In this report Mr. McGowan requested approval for holding an organizational and trial meeting to get active interest aroused. Since response so far had considerably exceeded expectations, the Committee approved the formation of such a section at the December meeting at Johnson City. Robert W. McGowan was appointed Councillor for the new Collegiate Section and it was recommended he choose a local chairman at the host institution for the 1951 meeting.

The Secretary as Chairman of the Membership Committee suggested a vote of appreciation be given Jesse M. Shaver who personally had gained more members than perhaps anyone else in the Academy. It was emphasized that 42 participants on the program of the Sixtieth Meeting of the Academy were not members but that they have been invited to membership.

Unfinished Business:

1. A progress report from Ray Kinslow of Tennessee Polytechnic Institute, recipient of the 1949 A.A.A.S. Grant in Aid of Research, was read and approved.

2. Motion was made by Warren M. Deacon and seconded by the Secretary that the A.A.A.S. Representative to the Council of Academies for the 1950 meeting be reimbursed five cents per mile for travel expenses. This was unanimously approved by the Committee members present. It was further suggested that this action be voted upon each year depending upon the financial condition of the Academy at the time.

New Business:

1. A request from the Barnard Astronomical Club of Nashville that they be reaffiliated with the Tennessee Academy of Science was read and the Committee unanimously approved their reaffiliation.

2. A request from the Tennessee Psychological Association through their president, Stanford C. Ericksen, asking that they be elected to the status of an affiliated society and removed from status as a section in the Academy was considered by the Committee. Because of insufficient evidence of the extent of the interest of those who are at present and expect to remain active members

of the Academy, the Executive Committee felt it unwise to discontinue the present Psychology Section of the Academy. The Committee feels it should maintain the section for those who are interested. Hence, the Committee acted unanimously in favor of (1) rejecting the request to discontinue the psychology section in favor of an affiliated society, (2) congratulating the Tennessee Psychological Association upon its affiliation with the American Psychological Association, and (3) inviting the psychologists of the state of Tennessee to continue to support the Academy and to take such active interest in its functions as it has in the past.

3. Motion was made by Carl K. Seyfert that the Executive Committee recommend to the membership of the Academy that a Collegiate Section be organized in an attempt to bridge a gap between the Junior Academy and the Academy. This motion met with unanimous approval of those present. Robert W. McGowan of Memphis State College was elected Councillor for the Collegiate Section contingent upon approval of the latter's formation by the membership.

4. The following applications for Grants in Aid given by the A.A.A.S. and the Academy were considered: Ralph M. Sinclair, Park Naturalist, *Shelby Forest State Park*, Lucy, Tennessee, requesting a \$50.00 grant for a taxonomic study of the salamander, genus *Grimophilus* in middle Tennessee; Wilson M. Whaley, *University of Tennessee*, Knoxville, requesting aid for extraction and therapeutic uses of the alkaloid Cepharanthine in treating tuberculosis and leprosy; H. B. Crouch and Joseph Rucker of *Tennessee Agricultural and Industrial State College*, Nashville, requesting aid for a study of the use of radioisotopes for ecological studies on certain freshwater crustacea. After much deliberation the Committee decided to add \$64.50 of the Academy funds to the \$135.50 available from the A.A.A.S. and to grant \$100.00 to Wilson M. Whaley for his work and \$100.00 to H. B. Crouch and Joseph Rucker for their work.

5. Invitations requesting the sixty-first (1951) meeting of the Academy be held at their institution were read from both the *University of Chattanooga* and *Austin Peay State College* of Clarksville. After much discussion and reluctance to reject either invitation the Committee decided to accept the invitation of *Austin Peay State College* requesting if possible that the dates be arranged between October 19 and November 10, 1951, at the convenience of the host institution.

THE SIXTIETH ACADEMY MEETING

GENERAL REMARKS

The Sixtieth Academy Meeting was held December 8 and 9, 1950, at the host institution, *East Tennessee State College*, at Johnson City, Tennessee. Unfortunately icy conditions prevailed over the central and western parts of the state at this time and attendance was curtailed somewhat. Following registration on Friday morning the First General Session met with the President of the Academy presiding. Several papers of particular interest were presented at this time after which the members had a very fine luncheon at the ETSC cafeteria. Friday afternoon was given over to section meetings followed by a tea at the home of the President of ETSC, Dr. Burgin E. Dossett. A well attended Academy Dinner climaxed the evening Friday. Saturday morning was devoted to a second General Session followed by the Annual Business Meeting of the Academy and adjournment at noon the same day. Conjointly with the Academy meetings the Tennessee Junior Academy of Science met for its Ninth Annual Meeting on Saturday morning.

Sectional Meetings were held on Friday afternoon with the following chairmen presiding: *Botany Section*—Frederick T. Wolf, *Vanderbilt University*; *Chemistry Section*—George K. Schweitzer, *University of Tennessee*; *Geology-Geography Section*—H. B. Burwell, *State Geologist*; *Mathematics Section*—Winston Massey, *University of Chattanooga*; *Physics-Astronomy Section*—W. Roger Rusk, *University of Tennessee*; *Zoology Section*—Samuel R. Tipton, *University of Tennessee*; *Collegiate Section*—(Saturday morning) Richard Stevenson, *East Tennessee State College*; and the *Tennessee Junior Academy*—John H. Bailey, *East Tennessee State College* and Russell Lacy, presiding. Meeting of the *Psychology Section* was postponed by its chairman, T. E. Newland of the *University of Tennessee*.

GENERAL SESSIONS

Friday Morning

CHARACTERISTICS OF AN ATOMIC EXPLOSION. R. D. Birkhoff, *University of Tennessee, Knoxville*. Head, Radiological Defense, State of Tennessee. The important effects of an atomic explosion have been released to the public as a preliminary step in the National Civilian program. These are found to include: (1) a light flash, (2) heat radiation, (3) radiation, (4) neutron radiation, (5) a blast wave, (6) radioactive contamination from "Fall Out," induced activity, and unexploded bomb fragments, and (7) a "Fire Storm." The nature of each was examined from the standpoint of its physical origin, and its effects on civil installations and populations. In particular, the radiological defense program for the state of Tennessee is discussed.

THE RHODODENDRON GARDENS OF ROAN MOUNTAIN. D. M. Brown, *East Tennessee State College, Johnson City*. Since the Rhododendron Gardens of Roan Mountain are attracting more people each year, and since return visitors have been prone to describe a better previous season, the author was challenged to follow the trends with camera and pen. Data over a ten year period indicate that variations in yield may be as great as ten to one.

RHODODENDRON IN PRIMEVAL CULTURE. Elsworth Brown, *The Chattanooga Medicine Company, Chattanooga*. Field surveys of eastern Tennessee wilderness areas of various Rhododendron growths have been undertaken for the collection of information about soil, climatic conditions, and physical development of the dominant species. A proposed series of survey reports was introduced. One of the localities which are being observed was described, thus indicating the scope of the field reports planned to follow. The first report pertains to the azalea growth on Little Junction, a peak on State Ridge, Tennessee and North Carolina state line, where decomposition of the rocks of the Ocoee formation is associated with naturally provided leafy compost of nutritional significance, and annually watered by 72 inches of rainfall.

THE PHYSICIST LOOKS AT COTTON. C. J. Craven, *University of Tennessee Fiber Research Laboratory, Knoxville*. Individual fibers of a sample of cotton vary widely in such properties as length, perimeter, specific area, wall thickness, and weight per inch. Average values of these properties, however, are significant with regard to suitability of the cotton for certain uses. Physical tests were described which quickly arrived at average values of these properties.

Saturday Morning

MEXICO AGAIN. A. J. Sharp, *University of Tennessee, Knoxville*. A mountain, El Tigre, above El Limon, Tamaulipas, was visited this past summer. The vegetation was found to be a unique mixture of temperate and tropical genera and species. The known ranges of certain species were extended, some to the

north and some to the south. Among the unusual biological phenomena noticed were redbud trees (one foot in diameter and sixty feet tall) and fox-fire which covered literally acres of forest soil one evening. The area is relatively primitive and so rich in flora and fauna that it ought to be preserved as a national park.

PERCENTAGE OF BREEDER SQUIRREL KILLED DURING THE 1949 SEASON AND ITS EFFECT UPON SETTING THE 1950-51 SEASON. Al Marsh, Chief, *State Game and Fish Commission*, Nashville. Entire paper published in the January, 1951, number of the Journal.

TEMPERATURE PATTERNS OF THE MOUNTAIN CLIMATES OF THE GREAT SMOKY MOUNTAINS. Royal E. Shanks, *University of Tennessee*, Knoxville. Weekly maximum and minimum temperatures at the one foot level and soil temperatures at six inch depth provide a relatively sensitive measure of micro-climatic differences as well as the general altitudinal temperature gradient. These observations can be evaluated with reference to records from nearby weather stations and may therefore be used to approximate "standard shelter" temperatures, making possible the interpretation of the mountain climatic pattern in terms of standard climatic systems. The magnitude of microclimatic temperature differences in relation to the general altitudinal gradient provides a partial explanation of the frequent local modifications in altitudinal zonation of vegetation types.

BOTANY SECTION

A TAXONOMIC SURVEY OF THE MYXOMYCETES OF THE GREAT SMOKY MOUNTAIN NATIONAL PARK. Arthur L. Welden, Jr., *University of Tennessee*, Knoxville. A taxonomic study of Myxomycetes in the Great Smoky Mountain National Park is reported. We find that there are 93 species of Myxomycetes now reported from the Park, some for the first time. Methods of collections, including a new bark-culture method, and preparation of a punch-card key are described.

DEVELOPMENT OF POST-FERTILIZATION STRUCTURES IN PRIMITIVE FLORIDEAE WITH SPECIAL REFERENCE TO *LEMANEA AUSTRALIS* ATK. John M. Mullahy, S. J., *Vanderbilt University*, Nashville. Cytological events antecedent and consequent to the probable reduction division of the zygote in the carpogonium include the activity of "Nahrzellen," embryonic-cell formation, nuclear migrations and rapid proliferation of carpospores.

A THIRD STATION FOR *WOODWARDIA VIRGINICA* IN TENNESSEE. Jesse M. Shaver, *George Peabody College for Teachers*, Nashville.

CONIFER TRANSPLANTS TO A ROAN MOUNTAIN GRASSY BALD. D. M. Brown, *East Tennessee State College*, Johnson City. The presence of numerous grassy balds in the Southern Appalachians has not yet been explained. Recent studies (Brown, 1941) indicate that the grassy balds of Road Mountain are on the decline. In the fall of 1937, individual and block transplants of spruce and balsam were set near the center of the largest grassy bald on Roan Mountain in order to study the problems of survival. Two years later another group of conifers were set to determine the effect of prevailing winter winds upon survival. Photographs and other data over a twelve year period show that conifers will survive and grow to a cone-bearing age. This indicates that the grassy balds of Roan Mountain may eventually give way to coniferous forests.

THE TROPICAL ELEMENT IN TENNESSEE FLORA. A. J. Sharp, *University of Tennessee*, Knoxville. Attention has been called repeatedly to the boreal element in our flora, but we also have representatives of tropical genera and families. Numerous examples include such species as the Unicorn Plant (*Martynia louisiana*), Jessamine (*Gelsemium sempervirens*), and the Cross Vine (*Bignonia capreolata*). Many common and widely distributed species belong to large families, most of whose members are to be found south of Tennessee. Such families include Acanthaceae, Apocynaceae, Verbenaceae, Solanaceae, Lythraceae, Araceae, Theaceae, and Malvaceae. Even *Smilax* is essentially a tropical genus.

CHANGES IN THE THREE-DIMENSIONAL SHAPE OF LIVING MERISTEMATIC CELLS. Hugh N. Mazingo, *University of Tennessee*, Knoxville. The epidermal cells of the actively growing apical meristem of *Phleum pratense* roots were examined. It was found that 121 cells just before division averaged 11.26 faces. Immediately after these cells had divided the 200 daughter cells which could be traced had an average of 9.25 faces and just before they divided again they were found to average 11.43 faces while they in turn produced 400 cells which produced an average of 9.23 faces. Among old cells ready to divide the commonest faces were pentagons, quadrilaterals, and hexagons in that order. However, the young cells just after division had quadrilaterals, pentagons, and hexagons as the commonest faces. As would be expected, cells just before division were found to have the highest number of combinations. The shape of cells in this tissue in the final analysis appears to depend upon those physical and chemical factors which determine the location of the cellplate during cytokinesis.

FEMALE GAMETOGENESIS AND EARLY EMBRYOLOGY OF *CRINUM ASIATICUM* VAR. *SINICUM* BAKER. Roderick H. Outland, *Vanderbilt University*, Nashville. From greenhouse material studied, it was found that the epigynous ovary, characteristic of the Amaryllidaceae, contains three carpels, each with four anatropous ovules, two rows two tiers in depth, making a total of twelve ovules in each ovary. During gametogenesis the earliest stage found was that of a 2-nucleate female gametophyte. Two further divisions follow resulting in a pre-cellular 8-nucleate gametophyte which organizes at maturity into a typical 8-celled gametophyte. After fusion of the two polar nuclei and double fertilization, the zygote divides forming a two-celled embryo both cells of which continue forming a massive embryo. Many anomalies as to the number and development of ovules were observed. No cases of "Inverted" polarity such as reported by Swamy (1946) for *Crinum asiaticum* L. were found in this study; however, the antipodals frequently assumed a beak-shaped structure similar to that of the synergids, but no cell at the chalazal end in such instances resembled the typically vacuolated egg cell.

DISTRIBUTION OF LILIACEAE IN TENNESSEE. Eleanor McGilliard, *University of Chattanooga*. From information gathered at the University of Tennessee Herbarium, National Herbarium, Philadelphia Academy of Sciences, New York Botanic Garden, and Gray Herbarium it was learned that there are 29 genera of the 33 listed in the new Gray's Manual in the state, one that is out of manual range, most of which are native to the state and represented by 60 species. Most common species include 12 of *Trillium*, 10 of *Smilax*, 5 of *Lilium*, 4 of *Uvularia*, 3 of *Allium*, 3 of *Polygonatum*, and one or two of each of the other 19 genera. The three genera with the most limited distribution are *Melanthium*, *Oxyria*, and *Zygadenus* while those of the widest distribution are *Chamaelirium*, *Trillium*, and *Smilacina*. Records of species are from 73 of the 95 counties in Tennessee, these include all but three of the counties in east Tennessee. Counties in which most species are recorded are Sevier, Blount, Davidson, Knox, and Hamilton, probably due to greater taxonomic studies therein.

THE GENUS *ILEX* IN TENNESSEE. Frank W. Woods, *University of Tennessee*, Knoxville. There are known to be five species of *Ilex* in the state of Tennessee. All of these vary geographically as to leaf form and future species descriptions should include the delineation of such clines. The habitat ranges of the various species can usually be correlated with soil moisture conditions.

A form of *I. Montana* not previously described, and falling outside of the current descriptions of the species, is characterized from collections made in Franklin County.

THE FLORISTIC CHARACTER OF A FOREST STAND: SAMPLING TECHNIQUES. Royal E. Shanks, *University of Tennessee*, Knoxville, and Dorothy L. Crandall, *Randolph-Macon College*, Lynchburg, Virginia. Four methods were used in sampling the ground cover of a typical second growth forest stand in the Mountain Lake region of Virginia. Apparent "minimum area" varied from

45 sq. m. to 1000 sq. m., and included from 43 to 64 species, depending upon the sampling design and method of analysis. Meter strip and line sampling were most efficient in terms of the species-area relationship and in terms of time required for any desired level of sampling.

REPORT ON THE TENNESSEE FLORA PROJECT. A. J. Sharp, *University of Tennessee*, Knoxville. The bulk of the collecting for the project has been completed. All of the collections have been sorted as to family and most of them to genus. Identifying the collections as to species has been partially completed. Various authorities are aiding in this phase of the project. The Cyperaceae and Gramineae are being monographed by Professor J. K. Underwood; the Liliaceae by Professor Eleanor McGilliard; and the Scrophulariaceae by Dr. T. A. Frick.

A REPORT ON THE SEVENTH INTERNATIONAL BOTANICAL CONGRESS, STOCKHOLM, SWEDEN, JULY 1950. Russell B. Stevens, *University of Tennessee*, Knoxville. Little reference was made to content of several hundred papers presented; but rather some comments on the personnel in attendance, the excursions, and the languages employed. Color pictures of points of botanic interest were included.

NOTES ON SOME FERNS FROM SHELBY FOREST STATE PARK. Ralph M. Sinclair. *Shelby Forest State Park*, Lucy, Tennessee. A check list includes the following: *Polypodium polypodioides* (L.) Hitchc., *Phegopteris hexagonoptera* (Michx.) Fee, *Adiantum pedatum* L., *Asplenium platyneuron* (L.) Oakes, *Athyrium pycnocarpon* Wherry, *Athyrium asplenioides* Roth., *Polystichum acrostichoides* (Michx.) Schott., *Cystopteris fragilis* (L.) Bernh., *Woodsia obtusa* (Spreng.) Torr., *Onoclea sensibilis* L., *Osmunda regalis* L., *Osmunda cinnamomea* L., *Botrychium obliquum* Muhl., *Botrychium virginianum* (L.) Sw., *Athyrium thelypteroides*, and *Lygodium palmatum* (Bernh.), the latter not substantiated but the Senior Naturalist, L. G. McLean, says he has collected it there. Many of the identifications were furnished by Dr. Jesse M. Shaver.

FURTHER OBSERVATIONS ON THE GALL OF ERIOPHYES SP. ON PRUNUS SEROTINA. Herman O'Dell, *East Tennessee State College*, Johnson City. The galls, collected in late April and early May, were about 1 mm. in length. The gall cavity was occupied by a single female mite. The epidermal cells were much larger than the normal epidermal cells and outer walls of these cells formed papilla-like projections into the gall cavity. The development of these cells into trichomes, a correlation of this development with the egg deposition, and the subsequent development of the larval mite will be the subject of further investigation.

CHEMISTRY SECTION

THE CHEMOTHERAPY OF TUBERCULOSIS. Wilson M. Whaley, *University of Tennessee*, Knoxville. A discussion of the chemical attack which has been made upon the tubercule bacillus during the last ten or so years. The object of the direct approach to chemotherapy in general may be stated as the "elimination of the parasite." However, this simplification tends to falsify the clinical status of tuberculosis, in which the host and the parasite unite in a process which hinders treatment of the disease. The present position of the drugs currently undergoing clinical evaluation is discussed, these drugs being represented by sulfones, streptomycin, *p*-aminosalicylic acid, and tibione. It can be stated without hesitation that none of these drugs represent a cure for tuberculosis. Among some of the less well established drugs or among the drugs not yet examined, may be found the answer to the problem of the chemotherapy of tuberculosis.

MODIFIED METHOD FOR POTASSIUM. John A. Dean, *University of Tennessee*, Knoxville. Passage through a perchloric acid-alumina chromatographic column has been found to be a rapid and effective method for the removal of sulfate and fluoride ions preceding the determination of potassium as potassium perchlorate. This permits either a sulfuric-hydrochloric acid or a hydrofluoric-

perchloric acid mixture to be used for the decomposition of insoluble silicates, and eliminates the lengthy steam distillation required for the removal of the last traces of fluoride by the latter method.

MODIFIED METHOD FOR COBALT. John A. Dean, *University of Tennessee*, Knoxville. This method involves the removal of Cobalt as the Nitroso-R-Salt complex by chromatographic ion-exchange. This technique has been extended to the rapid determination of cobalt in steels, cast irons, and nickel-base alloys. The sulfonic acid groups of the Nitroso-R-Salt are exchanged on an perchloric acid-washed alumina column; the nitroso- and phenolic groups remain free to participate in the formation of the well-known inner complex cobalt compound. Whereas nickel, copper, iron, and chromium interfere seriously in the normal colorimetric determination of cobalt with this reagent, due to the color of their aquo ions, these cations are not absorbed on the acid-alumina column and thereby can be washed out of the column. The cobalt complex absorbate is then eluted with sulfate ions and estimated colorimetrically. Amounts of cobalt between 0.080 and 0.090 percent in Ni-Cr-Cu (16-2-6) cast iron and Cr-Ni (18-10) Ti steel have been determined with an accuracy of 3 percent. The method is also ideal for removal of cobalt when it is an interference and for the concentration of trace amounts of cobalt in samples.

PENICILLIN-CYTOCHROME INTERACTION. I. M. Klotz, *Northwestern University*, Evanston, and W. W. Weber, *University of Tennessee*, Knoxville. The success of penicillin as a chemotherapeutic agent is generally recognized, but its mode of action is not definitely established. One avenue of approach to solution of the problem may be through consideration of the interaction between negatively charged penicillin and positively charged enzymes such as cytochrome "c". Spectrophotometric studies indicate some type of interaction occurs between cytochrome "c" and samples of penicillins G, K, X, and F. Preliminary experiments suggest complex formation between the enzyme and antibiotic but more detailed investigations indicate the changes in the cytochrome absorption are due to the reducing action of the anion of penicillic acid present in minute quantity in the penicillin samples as a consequence of internal rearrangement of the penicillin molecule. The possible physiological significance of the results of these experiments is suggested.

THE RACEMIZATION OF TRIS (2,2'-DIPYRIDYL) NICKEL (II) CHLORIDE. George K. Schweitzer, *University of Tennessee*, Knoxville. The racemization of this chloride has been investigated. The effects of acid, base and excess common constituents upon the rate of racemization have been noted. A number of somewhat anomalous results have been observed when the complex is racemized in mixed solvents.

PHYSIOLOGICAL ACTIVITY OF SOME NEW QUATERNARY AMMONIUM SALTS. Henry A. Rutter, Jr., *Carson-Newman College*, Jefferson City. Many of the quaternary ammonium salts have been prepared and subjected to screening as possible anti-cancer agents. The most active preparations have contained quaternized heterocyclic nitrogen, in particular the phenacyl halide derivatives possessing structural relation to colchicine. A new heterocyclic series was prepared by the reaction of alkyl- and arylalkyl- halides with 2,8-dimethyl-5,11-methanodibenzo(b,f)(1,5) diazocine commonly called Troger's base.

These compounds were tested against transplanted Sarcoma 180 in mice at The Sloan-Kettering Institute for Cancer Research. The compounds were lethal at about 16 mg/kg body weight. Death was preceded by tremor and hyperexcitability. Safer dosage showed no specific effect on Sarcoma 180.

CHEMOTHERAPY AND REPLACEMENT THEORY. Georg E. Cronheim, Director, *The S. E. Massengill Co.*, Bristol, Tennessee. The great advances in recent years in the drug therapy of diseases have been the results of very extensive research in different fields of science. The present discussion is limited to chemotherapeutic agents most of which are organic compounds of known composition and structure. One of the greatest problems in "discovering" a new and therapeutically useful agent has been the question, which of the

available or possible organic compounds to select for testing against a specific disease. Thus chance and luck were important collaborators in this field of investigation. Perhaps one of the most far reaching consequences of recent progress in chemotherapy is the fact that it has provided a new and better understanding of the mechanism of drug action. This in turn has enabled the investigator to place the search for new chemotherapeutic agents on a more rational and scientific basis. The concept of this hypothesis which is known as "Replacement Theory" is explained in several examples.

GEOLOGY-GEOGRAPHY SECTION

STRATIGRAPHIC SUBDIVISIONS OF THE CHICKAMAUGA GROUP IN THE OAK RIDGE AREA. P. B. Stockdale and Harry Klepser. *University of Tennessee*, Knoxville.

THE GREAT SMOKY FAULT. Robert B. Newman, *U. S. Geological Survey*, Gatlinburg.

A NEW PLEISTOCENE VERTEBRATE LOCALITY IN EAST TENNESSEE. Stuart W. Maher, *U. S. Geological Survey*, Knoxville.

NOTES ON GROUND WATER IN MIDDLE TENNESSEE WITH EMPHASIS ON KNOX AQUIFIERS. F. M. Alexander, *Tennessee Division of Geology*, Nashville.

PLANS FOR TENNESSEE DIVISION OF GEOLOGY. H. B. Burwell, *Tennessee Division of Geology*, Nashville.

MATHEMATICS SECTION

THE GALOIS GROUP OF A POLYNOMIAL EQUATION OVER A FINITE FIELD. Charles L. Bradshaw, *Tennessee Polytechnic Institute*, Cookeville. The primary purpose of this paper was to demonstrate a method for the determination of the Galois group of a polynomial equation where the coefficients are in a finite field. The method is an extension of a method given by Wilson (*Duke Math. Jour.*, Dec., 1950) and is as follows: (1) Determine all of the subgroups of the symmetric group, S_n , n being the degree of the polynomial under consideration. The Galois group G must be one of these subgroups or S_n itself. Since it is known that in the case of the finite field, G must either be cyclic or a direct product of cyclic groups, it is possible to rule out certain subgroups, and perhaps S_n , as possibilities for G . (2) Each of these subgroups is tested by constructing an induced equation and applying criteria given in theorems proved in the paper to determine whether or not the subgroup tested contains G . (3) If G is contained in one of the subgroups tested but is contained in no subgroup of the subgroups being tested, then the subgroup being tested is G .

A FUNCTION THAT DEFINES A FLOW WITH FINITE WAKE. Garnet L. Tiller, *Southwestern at Memphis*, Memphis.

MATHEMATICS IN GENERAL EDUCATION IN THE JUNIOR COLLEGE. Earl C. Rice, *George Peabody College for Teachers*, Nashville. From an extensive study of literature it was found that, in the light of the aims of general education, there is a need for mathematics in the general education program in the junior college. It was also found that this need is not being met by the usual sequence of preparatory mathematical courses for the majority of students, including a large group of terminal students and a smaller group of transfer students who will continue their formal education in some field other than mathematics. A special course in mathematics is recommended to meet this need. Material should be selected on the basis of its usefulness to the average member of society and should be arranged so as to emphasize numerous interrelations and applications.

SOLUTIONS OF LAPLACE'S AND POISSON'S EQUATIONS BY MEANS OF RELAXATION. Ray Kinslow, *Tennessee Polytechnic Institute*, Cookeville. These equations are perhaps the most important partial differential equations of applied mathematics. Their solution is often impossible by orthodox mathematical

methods, but all such equations may readily be solved by the relaxation method developed by Sir Richard Southwell of Oxford University. The relaxation method is not limited to the solution of Laplace's and Poisson's equations but to any problem that can be formulated, can be solved by the use of simple arithmetic. A mathematician formulates the governing equation and develops a relaxation pattern after which the problem can be solved by clerks who may have no idea what the entire problem is about.

ANOTHER METHOD OF ATTACKING PARTIAL FRACTIONS. Frank W. Stallard, *East Tennessee State College*, Johnson City. By applying the algebraic theorem: If two polynomials A and B are relatively prime then there exist polynomials f and g such that

$$Af + Bg = 1$$

to the relatively prime factors of the denominator of a rational function of the form $\frac{Q}{AB}$, this paper shows how a rational function of this form may be decomposed into its partial fractions. In particular, this paper shows the method in action in solving the problem (See *Amer. Math. Mon.*, Classroom Sec., Mar., 1950)

$$\frac{3x + 1}{(x + 3)(x^2 + x + 1)^8}$$

Furthermore, this paper points out that while the method is easily understood by a student of the elementary calculus, it is not found in any of the standard texts. It is found in some algebra books (for example, Birkhoff and MacLane, *A Survey of Modern Algebra*).

TRANSLATIONS OF SEMIGROUPS. E. E. Posey, *University of Tennessee*, Knoxville.

AN APPLICATION OF THE ITERATION METHOD. George Griffing, *East Tennessee State College*, Johnson City. The application of Schwarz's iteration method of solving differential equations is explained for a problem of nuclear physics. In order that the method be successful, one must perform integrations. It is pointed out that possibly the iteration method might still be applied when the integrals are evaluated by an approximate method.

DIOPHANTINE EQUATIONS CONNECTED WITH TWO CIRCLES AND THEIR TANGENTS. Herbert L. Lee, *University of Tennessee*, Knoxville. Let R and r be the radii of two circles, T and t their external and internal tangents. Let r be less than R . It is shown that t is less than T . Consequently, there are six sets of inequalities connecting r , R , t , and T . The Diophantine equations connecting r , R , and t , are derived; similarly, equations for r , R , and T . There are also equations connecting r , R , t , and T . If the condition is imposed that the quantities r , R , t , and T , be in arithmetic progression, it is seen that no two of the quantities could be equal, for then all quantities would be equal contrary to t is less than T which is always true. The solutions in integers of the sets of Diophantine equations are found where possible. It is found that in only one case may all four of the above quantities be in arithmetic progression, and in that case they are of the form $d, 2d, 3d, 4d$.

PHYSICS—ASTRONOMY SECTION

VIBRATIONS OF A WATER STREAM IN AN ELASTIC TUBE. I. Bloch and E. B. Carnes, *Vanderbilt University*, Nashville. Vibrations are sometimes produced in a fluid column flowing through a constricted elastic tube. A preliminary study of such vibrations has been made. The frequency of the vibrations has been found to be inversely proportional to the distance from the constriction to the discharge end of the tube. This result has suggested that the frequency is determined by standing elastic waves in the tubing downstream

from the constriction. An approximate calculation of the velocity of dilational waves on the tubing being used gives frequencies which agree reasonably well with those observed.

A STUDY OF SOLAR ENERGY CONDUCTORS. M. S. McCay, *University of Chattanooga*, Chattanooga. (Read by Barry V. Rhodes). An evaluation of the capabilities of various solar energy conductors utilizing internal reflection channeling and the reflections from cylindrical, polished metal films. Methods of measurement of the energy beam, limitations on the energy density of the beam and the use of the University's 20 inch astronomical telescope for a collector are discussed.

AN INFRARED STUDY OF THE POLYMERIZATION OF HYDROGEN FLUORIDE VAPOR. Russell Shelton, *University of Tennessee*, Knoxville. The only observed infrared absorption band of polymerized HF gas has been thoroughly investigated in a comparatively wide range of temperature and pressure variations. Pressures ranged from one atmosphere to vacuum, and temperatures ranged from 32°C. to 88°C. Three definite absorption peaks have been observed in the polymer band, whereas only two have been reported in previous work. These three absorption peaks have been ascribed to three degrees of perturbation of the HF bond. A check on partial pressures showed the polymers to be relatively scarce. The perturbed HF bond showed itself to be a much more effective absorber than the unperturbed HF bond.

PHOTOELECTRIC OBSERVATIONS AND RESULTS FOR THE ECLIPSING STAR AK HERCULIS. Carl K. Seyfert and Ewell E. Mason, *Vanderbilt University*, Nashville. A photoelectric photometer and a DC amplifier built by John Hallowes (Vanderbilt University, Master's thesis, 1948) and modified by Edward M. Lewis (Vanderbilt University, Master's Thesis, 1948) was used with the 12-inch DeWitt telescope to measure the light variations of the eclipsing star AK Herculis. The light curve shows that the stars revolve in a period of 10 hours 14 minutes. During each cycle two eclipses occur, a primary eclipse in which the light is diminished 0.49 magnitudes, and a second eclipse in which the light is reduced 0.32 magnitudes. The probable error of a single one of the 150 observations is ± 0.013 magnitudes. Analysis of the light curve indicates that the two stars are ellipsoidal and revolve nearly in contact with each other with orbital speeds of about 475,000 miles per hour. The distance between the centers of the two stars is about 750,000 miles and the masses of the larger and smaller stars respectively are about 0.25 and 0.15 solar masses.

ANALOG SOLUTION OF THE CONDENSER MICROPHONE EQUATION. Robert A. Weeks, *University of Tennessee*, Knoxville. This investigation is concerned with the relation between differential equations and physical analogs of the equations. A particular differential equation of simple form is selected for study, partly because of some mathematical questions concerning its solution and partly because of its technological importance. The experimental work is then directed toward constructing an analog of this equation. For a convenient and interesting measure of the success of this experimental effort, the resolution of the mathematical question is made on the basis of the results of the experiment.

THE TEACHING OF ASTRONOMY AT THE UNIVERSITY OF TENNESSEE. Mary W. Peters, *University of Tennessee*, Knoxville. "Beginning with the fall terms of 1901, the study of meteorology which has hitherto been confined to one year, will be made a two years' course." This quotation from the University Catalogue of 1901, continues: "The first two terms will be devoted to the study of descriptive astronomy." This two years' course was taught at that time by Mr. Weston Fulton, the United States Weather Observer, the United States Weather Station being on the University Campus. After this beginning a course in Astronomy was taught off and on by different members of the faculty, including a President of the University and a Dean of the College of Liberal Arts. The Introductory Astronomy teaching was resumed in the fall of 1948 after a lapse of several years.

PHOTOGRAPHIC CAMERA ATTACHMENT FOR 20-INCH REFLECTOR OF JONES OBSERVATORY IN CHATTANOOGA. Barry V. Rhodes and Cord H. Link, Jr., *University of Chattanooga*, Chattanooga. The purpose of this attachment is to produce pictures which might require little or no enlargement thus reducing graininess in the final print. The camera functions as an enlarger, or copying camera, using the prime focus image as a real object and reprojecting it on the film several times enlarged. The camera has been used on the moon and a few of the closest planets with good results. The frame is of 1-inch angle iron, 12 x 12 x 36 inches, the entire assembly weighing less than 40 pounds. The original shutter and 9-inch focal length lens are used in the camera. An additional lens of about 10-inch focal length is used in an adapter, producing an effective focal length of about 4½ inches. Within the 36 inches of total optical length available, magnifications of the order of 5x are easily obtained.

THE UNIVERSITY OF CHATTANOOGA'S EIGHT-FOOT WIND TUNNEL. Barry V. Rhodes and M. S. McCay, *University of Chattanooga*, Chattanooga. Design, construction, and calibration of the Physics Department's Laboratory-model wind tunnel with detailed description of the methods of measurement by which wing sections up to 24 inches in length may be tested for air stream speeds up to 100 miles per hour; the use of a small-sized wind tunnel for demonstration purposes in studies of aerodynamics, and for research and development tests of standard and nonconventional aircraft models.

THE MURRAY, KENTUCKY, METEORITE. Carl K. Scyfert, *Vanderbilt University*, Nashville. On September 20, 1950, a brilliant meteor exploded near Murray, Kentucky, showering fragments over a wide area. The extremely brilliant flash was followed by one or more explosions. At least seven observers heard fragments thudding into the ground approximately thirty seconds after the explosion, indicating a terminal velocity well below that of sound. One fragment which fell through the roof of a house did not dent nor scorch the floor where it fell. Thus this fragment was relatively cool despite the fact that it, like all recovered fragments, was fused on the outside. Approximately 15 pounds of fragments have been recovered so far, the largest weighing 7½ pounds. Measurements of some of the fragments with a scintillation counter by Thomas Cook indicate the presence of radiations of less than 600,000 electron volts. The measures are being continued by James Carter and the author to determine the nature and source of this radiation and to attempt to confirm the extraordinary 100 mev radiations reported by Stücklen from older meteorites.

A GAS TURBINE PLANT SUPPLIED BY AN HYDRAULIC AIR COMPRESSOR. Llewellyn Evans, Chief Consulting Engineer, *T. V. A.*, Chattanooga. An illustrated discussion of the Canadian Cobalt Plant hydraulic air compressor operating from the waters of the Montreal River to develop 5,000 to 6,000 hp at an air (gauge) pressure of 120 psi. The theory and design of a gas turbine system utilizing this potential power supply will be outlined.

THE PHILOSOPHY OF THE TWO WORLD SYSTEMS (PTOLEMAIC AND COPERNICAN) UNDER NEW LIGHT. Karel Hujer, *University of Chattanooga*, Chattanooga.

This paper is being published in its entirety in the Journal.

ZOOLOGY SECTION

STUDIES ON THE MORPHOLOGY OF BURSARIA TRUNCATELLA WITH SPECIAL REFERENCE TO THE NEUROMOTOR APPARATUS. Sue McGinty Newberry, *University of Tennessee*, Knoxville. The large size and universal occurrence of the ciliate, *Bursaria truncatella*, make it a desirable animal for study. The main objection to its use in the laboratory is the fact that it is not easy to culture. Phase microscopy was used to study the details of structure in living specimens, cleared, unstained whole mounts, whole mounts stained with alum cochineal, and sections stained with Mallory's connective tissue stain and with iron hematoxylin. Results of the study show certain morphological details not described before.

TWO BLACK BASS NEW TO TENNESSEE. Willis King and John Parsons, *State Game and Fish Commission*, Nashville. Two species of black bass not previously reported from Tennessee were collected from the Conasauga River system in Polk County. The first is the Alabama spotted bass, *Micropterus punctulatus henshalli*, Hubbs and Bailey, taken by Dr. King from the river on May 5, 1950, by angling. The second species is the redeye bass, *Micropterus coosae*, Hubbs and Bailey. A good series of the latter were taken by state fish biologists, including the junior author, from Sheeds Creek, a tributary of the Conasauga River, August 2, 1950. Both species are considered common in the Alabama-Coosa River system, but presumably are confined to the Conasauga drainage in Tennessee. The red-eye, an inhabitant of small streams, offers some promise of use in stocking small warm water streams unsuited to the northern small mouth bass.

FLEAS OF THE GREAT SMOKY MOUNTAIN NATIONAL PARK. D. W. Pfitzer, *Great Smoky Mountain National Park*, Gatlinburg. Collections of mammals were made during the summer and fall of 1950 in the Park, from which the external parasites were removed. The present paper deals with the fleas removed from nearly 200 mammals. Nineteen species were collected, representing three new species and two new subspecies of fleas. These new fleas show remarkable affinities with species known to occur in southern Canada and extreme northeastern United States as well as with species collected by Major Robert Traub in the highlands of Mexico. Extreme extensions of the ranges of eight forms were recorded. All of these range extensions are for fleas previously known only from southern Canada or northern United States.

RECENT COLLECTIONS OF MAMMALS IN THE GREAT SMOKY MOUNTAIN NATIONAL PARK. D. W. Pfitzer, *Great Smoky Mountain National Park*, Gatlinburg. During the summer and fall of 1950 nearly 200 mammals were collected in the Park, the main purpose being to fill in gaps in the series of study skins in the Park collection. Of the 23 species of mammals collected, several species are of considerable importance at this time. The Blood Mountain wood rat previously considered rare was found to be quite common throughout the lower elevations. The spotted skunk was taken for the first time from the Tennessee side of the mountains. Low and high altitudes were recorded for the Smoky Mountain vole. The habitat type of the Roan Mountain jumping mouse was more clearly understood. The Carolina red-backed mouse was rather scarce, indicating a wane in the population cycle.

NOTES ON THE CAVE SALAMANDER, *EURYCEA LUCIFUGA RAFINESQUE*. Ralph M. Sinclair, *Shelby Forest State Park*, Lucy, Tennessee. For the past three years the author has studied the cave salamander at Nashville, Tennessee, and results of these studies are presented with reference to range in the United States and in Tennessee, environment, habits, size of adults, egg laying, newly hatched larvae, length of larval period, mature larvae, and transformation.

NOTES ON THE REPRODUCTION OF THE GROUND SNAKE *HALDEA V. VALERIAE* (BAIRD AND GERARD). Ralph M. Sinclair, *Shelby Forest State Park*, Lucy, Tennessee. A search of the literature concerning this ground snake reveals little knowledge about it. Two specimens studied by the author contained eggs which suggests that this snake is ovoviviparous.

SOME REMARKS ON THE AMERICAN GENERA OF BRANCHIOBELLIDAE (ANNELIDA, OLIGOCHAETA). Perry C. Holt, *East Tennessee State College*, Johnson City. Data based on comparative morphological studies of the reproductive systems of the genera of the Branchiobdellidae are presented. Attention is called to the need for the revision of some of the genera. Conclusions as to the possible phylogenetic relationships within the family are discussed and the importance of the data derived from the studies of the reproductive systems in arriving at such conclusions is emphasized.

THE ADHESIVE FUNCTION OF THE TRICHO CYSTS OF PARAMECIUM. Will J. Cloyd and Arthur W. Jones, *University of Tennessee*, Knoxville. The authors observed that when *Paramecium bursaria* was dragged by an air-water inter-

face across a pressure mount, the adherent trichocysts remained attached to the cover and slide, being withdrawn from the ectoplasm and appearing as knobbed threads. This observation supports the view of Saunders. (*Proc. Cambridge Philos. Soc., Biol. Sci.* 1:249-269, 1925.) that the trichocysts have an adhesive function.

ALTITUDINAL DISTRIBUTION OF SPECIES OF *DROSOPHILA* (DIPTERA) ON UNAKA MOUNTAIN, TENNESSEE-NORTH CAROLINA. Richard Stevenson, *East Tennessee State College*, Johnson City. During the summer of 1950, collections of *Drosophila* were made at various elevations on Unaka Mountain in Unicoi County, Tennessee, and Mitchell County, North Carolina. The collecting area covered some 20 square miles, ranging in elevation from 2200 feet to 4800 feet above sea level at ten different stations. The collection records showed that the populations at any given locality fluctuated widely from month to month, both in actual numbers of individuals taken and in species collected. The populations were generally larger and the species more numerous at the lower elevations. The survey indicates a need for a thorough study of the ecology of these collecting sites and an understanding of the interplay of ecologic and genetic factors. Included are a description of the individual collecting sites, consolidated collection records, and histograms showing population fluctuations in the more common species collected at the various elevations.

SOME CONTRASTS OF ANT POPULATIONS AND DISTRIBUTION IN THE CHILHOWEE AND GREAT SMOKY MOUNTAINS, TENNESSEE. A. C. Cole, *University of Tennessee*, Knoxville. This is largely a progress report of a study of the ants of the Chilhowee Mountains, Tennessee. The highest elevation is approximately 3,600 feet. Ant distribution is zoned according to two contrasting habitats, namely, (1) dense forest with permanently moist soil and little penetrating sunlight and (2) well lighted open forest with drier upper soil layers. In general the ant species are those which nest in comparable places in the Smokies. The known ants of the Chilhowees belong to 41 species in 23 genera and those of the Smokies to 82 species in 28 genera.

POLYMORPHISM AND THE WORKER CASTE OF THE FUNGUS-GROWING ANT, *ATTA TEXANA* (HYMENOPTERA; FORMICIDAE). Will J. Cloyd, *University of Tennessee*, Knoxville. The purpose of this study was to determine if the worker caste of *Atta texana* Buckley, 1860, shows a polymorphic condition. Measurements of the overall thorax length and the antennal scape were made on random samples taken from two colonies of ants. Measurements were made of 2,040 ants, 1,013 from one nest, and 1,027 from another. Frequency distributions were plotted for each set of measurements. The frequency distributions give a monomodal curve in all cases. The asymmetry of the population is proved by the test for skewness. Morphologically, no character could be found by which the individuals could be separated into distinct groups. The results are interpreted as indicating a monomorphic condition in the worker caste.

A TECHNIQUE FOR THE RAPID PREPARATION OF TAPEWORMS FOR IDENTIFICATION. Frank H. Dowell and Arthur W. Jones, *University of Tennessee*, Knoxville, Tenn., and Donald E. Cooperrider, *University of Georgia*, Athens, Ga. The tapeworms are simultaneously fixed, cleared, and preserved in lactophenol and are then studied with the aid of phase difference microscopy.

SOME HISTOPATHOLOGICAL CHANGES PRODUCED BY ELECTROCEREBRAL SHOCK IN WHITE RATS. Duke C. Bradford, *University of Tennessee*, Knoxville. A series of 13 male albino rats were subjected to convulsive electro-shock. The shock was administered by padded electrodes attached to the ears. The animals were killed after intervals of one hour to 28 days following a series of shock treatments. Brain tissue and selected endocrines were sectioned and stained. The following changes were noted in the brain. Many of the blood vessels of the subarachnoid spaces and some of the vessels in the cortex were dilated or ruptured. There was one notable case of hemorrhage in the pons-medulla region characterized by a clot containing a predominance of lympho-

cytes and polynuclear leucocytes. Clot reabsorption was involving the surrounding tissue. There were alterations of the Purkinje and pyramidal cells, probably of the reversible type. No histological changes were noted in the adrenals, pituitary, thymus, or gonads. Gross changes were not determined.

THE CHROMOSOMES OF *DAVAINEA PROGLOTTINA*. Arthur W. Jones, *University of Tennessee*, Knoxville. *Davainea proglottina*, a cestode parasite of poultry, has a diploid chromosome number of 18. The complement consists of one pair of large, two pairs of medium large, five pairs of medium small, and one pair of very small chromosomes. This species is remarkable among the cestodes in having the highest number of chromosomes thus far reported. A full report is being published in *Trans. Amer. Microscopical Soc.*

SOME OBSERVATIONS ON THE AVIAN CLOACA FROM HATCHING TO SEXUAL MATURITY. Clare H. Bennett, *Memphis State College*, Memphis. Observations were made on the cloacas of fowl, partridge and pheasant. These showed that the cloaca consists of three compartments. The individual compartments show that the coprodaeum of the three species studied is the largest while the urodaeum is the smallest. The proctodaeum is intermediate in size between the other two compartments. The three compartments and their limits are essentially the same in the three species studied. The position of the uretal and genital papillae is similar in all three. Likewise all species studied were similar in that they showed a bursa connected to the dorsal surface of the proctodaeum by a funnel shaped canal and a broad fold extending along the mid dorsal wall of this chamber.

THE ACADEMY DINNER

The Annual Academy Dinner was held on Friday, December 8, in the John Sevier Hotel with Dr. Samuel L. Meyer presiding. An address of welcome to the Academy was given by Dr. Burgin E. Dossett, *President of East Tennessee State College*. An informal session followed in which members introduced themselves to the assembly and the president introduced the newly elected section officers, which are listed as follows:

Botany—L. F. Bailey, Chairman, *University of Tennessee*.

James W. Shaw, Secretary, *Cumberland University*.

Elsie Quarterman, Editor, *Vanderbilt University*.

Chemistry—H. D. Dawson, Chairman, *East Tennessee State College*.

Geology-Geography—Stuart W. Maher, *U. S. Geol. Survey*, Knoxville.

Mathematics—E. Baylis Shanks, Chairman, *Vanderbilt University*.

Sam Bright, Secretary, *Austin Peay State College*.

Physics-Astronomy—Ingram Bloch, Chairman, *Vanderbilt University*.

Mary W. Peters, Secretary, *University of Tennessee*.

W. Roger Rusk, Editor, *University of Tennessee*.

Zoology—Perry C. Holt, Chairman, *East Tenn. State College*.

A. C. Cole, Editor, *University of Tennessee*.

The Annual Evening Address was that given by the retiring president, Dr. Samuel L. Meyer, entitled "*The Sticks Remained Unbroken*." A very vivid picture of cooperation and working together was painted by Dr. Meyer in his portrayal of an ancient Indian legend. This picture was then super-imposed upon the tasks ahead of the Academy if it is to achieve the progress necessary to the advancement of science in the state of Tennessee. The address was very well received and is to be sent out to all the members of the Academy.

THE COLLEGIATE SECTION

An organizational meeting to form the Collegiate Section of the Tennessee Academy of Science was held at Johnson City in conjunction with the sixtieth meeting of the Academy. The newly elected Councillor of this section, Mr. Robert W. McGowan of Memphis State College, could not be present and Mr. Richard Stevenson of East Tennessee State College presided. Much interest was shown by both the students present and the members of the Academy. Representatives were present from East Tennessee State College, Carson-Newman College, King College, Austin Peay State College, and the University of Tennessee. Officers for this section were elected as follows:

Pete Neblett, President, *Carson-Newman College*.
Walter Bryan, Vice-President, *University of Tennessee*.
Gertrude Earl, Sec.-Treasurer, *East Tennessee State College*.
William Hildreth, Newsletter Editor, *East Tennessee State College*.

In approving the formation of the Collegiate Section, the Executive Committee of the Academy recommended membership dues of one dollar per year to cover expenses of running the organization. This does not include subscription to the JOURNAL of the Academy. It was further recommended that a local chairman be selected by the councillor for each annual meeting.

THE NINTH ANNUAL MEETING OF THE TENNESSEE JUNIOR ACADEMY OF SCIENCE

PROGRAM

Friday Evening, December 8

Entertainment for visiting students given by the Science Club, East Tennessee State College Training School. Gymnasium of the Training School.

Saturday Morning, December 9

Little Theatre, Library Basement, East Tennessee State College, John H. Bailey and Russell Lacy, Johnson City, Presiding.

THREE-STORY MEN—a word of welcome. Samuel L. Meyer, *President*, Tennessee Academy of Science.

WHAT SCIENCE MEANS TO THE HIGH SCHOOL STUDENT. Phyllis Alexander. E. T. S. C. Training School, Johnson City.

CONSERVATION OF MATTER. Jerry Grise, E. T. S. C. Training School, Johnson City.

ELECTROPLATING. Sonny Payne, E. T. S. C. Training School, Johnson City.

SYNTHETIC RUBBER. Roland Brooks, Central High School, Knoxville.

PRODUCTION OF ARGON. Roger Bley, E. T. S. C. Training School, Johnson City.

BLACK AND WHITE FILMS IN THE POLAROID CAMERA. Steven Voorhees, Young High School, Knoxville.

PLASTIC EMBEDDING. Donna Kassapi, E. T. S. C. Training School, Johnson City.

CERAMICS. John Bamberg, Young High School, Knoxville.

ANNOUNCEMENT OF THE SCIENCE TALENT SEARCH.

THE CONSTRUCTION OF ANIMAL SKELETONS. Edward Menhinick, Central High School, Knoxville.

A SUMMARY OF SEMI- AND FULLY ELECTRONIC ORGANS. William H. Mitchell, Jr., McMinn County High School, Athens.

INSECT FLIGHT AND ITS PRACTICAL APPLICATIONS. Jimmy Cowan, Jr., Maryville High School, Maryville.

TAXIDERMY AS A HOBBY. Carl Kincheloe, Science Hill High School, Johnson City.

CHALLENGE: SCIENCE AGAINST CANCER (FILM).

Announcement of the Awards of the American Association for the Advancement of Science and of the Tennessee Academy of Science.

EXHIBITS AND DEMONSTRATIONS

Students of E. T. S. C. Training School

The Complete Story of Milk. The Biology Class.

Making Water Safe to Drink. The Chemistry Class.

Electrostatic Demonstration. The Physics Class.

The Telegraph. The Ninth Grade Class in General Science.

White Rats. The Eighth Grade Class in General Science.

Students of E. T. S. C., Johnson City

Chemical Flowers. Bill Bailey.

Exhibit of Electrical Apparatus and Phenomena. Tyson Whitehead.

ANNUAL BUSINESS MEETING OF THE ACADEMY

The Tennessee Academy of Science met for its annual Business Meeting at 10:00 A.M., Saturday, December 9, 1950, with Dr. Samuel L. Meyer presiding. The Secretary read the minutes of the transactions of the fall meeting of the Executive Committee, which were approved. The reading of the minutes of the fifty-ninth meeting of the Academy was waived since they had been published in the October, 1950, issue of the Journal.

The following reports were made by officers of the Academy: (1) The report of the Treasurer, James J. Friauf, was read and approved. (2) The Secretary reported the names of 112 new members recommended by the Executive Committee for acceptance. These memberships were confirmed by unanimous vote of those members present.

The Secretary reported as chairman of the Membership Drive Committee and John B. Bond as chairman of the Resolutions Committee, both reports being accepted by the Academy. D. M. Brown gave the report of the Local Arrangements Committee and expressed deep appreciation for the splendid cooperation he received from all concerned.

There was no unfinished business to be transacted at this time.

New business transacted was as follows: (1) Motion was made by Warren M. Deacon that the Executive Committee consider having Friday evening after the Annual Dinner of the Academy given over

to meetings of the Collegiate Section and the Tennessee Junior Academy of Science and, further, that the Annual Presidential Address be given at a lunch period instead of at the dinner. This motion was seconded by Perry C. Holt and met with unanimous approval of the members present. (2) D. M. Brown requested that information be made available for local chairmen of the fall meetings in order to insure more smooth running meetings; this information to be handed down from year to year. D. M. Brown agreed to start by writing up what he could from his experiences at this, the sixtieth, meeting of the Academy. The President expressed the thanks of the Academy for these suggestions. (3) Motion was made by Mike Harris and seconded by Warren M. Deacon that "a *Science Action Committee*" be appointed with Samuel L. Meyer the chairman and composed of the Executive Committee and adding a representative from each Section not already represented, to consider the problems outlined in the Annual Presidential Address by Dr. Meyer "The Sticks Remained Unbroken," take action, and report to the members by March 30, 1951; further, that this report include a return blank requesting members to retaliate with answers and ideas by a certain specified date." With great enthusiasm, the members voted unanimously in favor of this motion. (4) L. F. Bailey made a motion, seconded by Arlo I. Smith, that the Annual Presidential Address "The Sticks Remained Unbroken" be mimeographed and sent out to all members of the Academy. This motion was unanimously approved by the members present.

The Nominating Committee composed of Warren M. Deacon, Chairman, H. D. Dawson, Winston Massey, M. L. MacQueen, and Paris B. Stockdale made the following nominations for officers of the Academy.:

President: Dr. Carl T. Bahner, Department of Chemistry,
Carson-Newman College, Jefferson City.

Vice-President: Dr. Carl K. Seyfert, Department of Physics-
Astronomy, Vanderbilt University, Nashville.

Secretary: Dr. Arlo I. Smith, Department of Biology, South-
western at Memphis, Memphis.

Treasurer: Dr. Moffatt G. Boyce, Department of Mathematics,
Vanderbilt University, Nashville.

There were no nominations from the floor and Edward McCrady made a motion that the nominees be approved as read. The motion passed with unanimous approval after which the Academy instructed the Secretary to cast the vote for the entire slate of officers.

The business having been transacted, the Sixtieth Meeting of the Tennessee Academy of Science adjourned *sine die*.

NEW MEMBERS OF THE TENNESSEE ACADEMY OF
SCIENCE ELECTED AT THE SIXTIETH MEETING
OF THE ACADEMY AT JOHNSON CITY, TENN.,

- Adams, Walter G., Box 4258, Univ. of Tenn., Knoxville, Tenn.
 Andrews, Gould A., Oak Ridge Institute, Oak Ridge, Tenn.
 Barker, Lincoln, Maryville College, Maryville, Tenn.
 Barrington, Burness A., Jr., King College, Bristol, Tenn.
 Battle, Merriel H., Cullowhee, N. C.
 Bright, Sam K., Math. Dept., Austin Peay State Coll., Clarksville, Tenn.
 Bradford, Duke C., Jr., 701 Longview Road, Knoxville, Tenn.
 Bryan, Walter H., Botany Dept., Univ. of Tenn., Knoxville, Tenn.
 Burchett, Charles R., 602 Greenwood Ave., Clarksville, Tenn.
 Burger, W. Leslie, Jr., Zool. Dept., Univ. of Illinois, Champaign, Ill.
 Burkhardt, Thelma, 3416 Spottswood, Memphis, Tenn.
 Carder, Clarence A., East Tenn. State College, Johnson City, Tenn.
 Crouch, H. B., Tenn. A. and I. State College, Nashville, Tenn.
 Davis, Graham J., Brenau College, Gainesville, Ga.
 Davis, Robert A., Wofford College, Spartanburg, S. C.
 Dean, Robert E., 42 N. Dunlap, Memphis, Tenn.
 DeMarco, Prospero Louis, 1501 McGavock Place, Nashville, Tenn.
 Dickson, Fred J., Game and Fish Comm., 412 State Capitol, Atlanta, Ga.
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