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PROCEEDINGS OF THE TENNESSEE ACADEMY OF SCIENCE FOR 1956

DONALD CAPLENOR, Secretary
George Peabody College for Teachers, Nashville, Tennessee

MEETINGS OF THE EXECUTIVE COMMITTEE

FEBRUARY MEETING

The Executive Committee of the Tennessee Academy of Science met in Room 217, of the University of Tennessee Student Center, Knoxville, Tennessee, at 9:00 A.M., February 4, 1956. The following members were present: Dr. W. W. Wyatt, Dr. F. T. Wolf, Dr. Helen Ward, Dr. Isabel Tipton, Dr. A. J. Sharp, Dr. Myron McCay, Dr. Harris J. Dark, Dr. C. S. Chadwick, and Dr. Donald Caplenor.

Copies of the minutes of the meeting of December 2, 1955 were distributed, read, and approved. The Editor of the Journal of the Tennessee Academy reported that there was a fairly large collection of manuscripts in her hands, mostly in the field of biology. The Secretary reported (1) good attendance at the December 2, 1956 meeting at which 156 Senior members, 22 Collegiate members, and 183 Junior Academy members were registered, (2) that the method of registration at this meeting was very successful, and (3) that about one-half of the members who were in danger of being striken from the roll because of non-payment of dues were high school teachers. Suggestion was made that these be contacted before being finally dropped.

The Treasurer distributed an audited report showing a balance of $3,522.-52. It was voted to accept the report with commendation. The Treasurer reported that the cash balance was about $400.00 above that of two years ago. He also reported that the turnover in membership is almost 25% per year.

The President reported that only 5 programs were returned of approximately 600 which were sent out for the December 2, 1955 meeting. He suggested that henceforth the President-Elect should serve as Chairman of the Program Committee and should handle plans for the annual meetings. The retiring President reported that all records of his office had been turned over to the President. The Research Committee reported that funds were available for research grants, and recommended that grants of $55.00 each be made to Mr. J. G. Parchment of Vanderbilt University for Limnological studies on Stone's River and to Miss Lois P. Lord of the University of Tennessee for studies on the Saxifraga of Southeastern United States.

The Executive Committee nominated the following people as Fellows of the Tennessee Academy of Science: Dr. C. L. Baker, Dr. Carl T. Bahner, Dr. JesseM. Shaver, and Dr. C. S. Shoup. The above persons with the exception of Dr. Jesse M. Shaver were then nominated by the President to act as the Specilal Fellows Committee of the Tennessee Academy of Science.

The Special Junior Academy Committee submitted a report. This was summarized by Dr. W. W. Wyatt for the Executive Committee. The Executive Committee voted to accept the report of the Special Junior Academy

Committee. The following suggestions were made: (1) That the key to the success of new ventures with regard to the Junior Academy is communication between the Senior Academy and high school teachers. (2) That a letter be sent in the spring to every senior member suggesting that each one get in touch with a high school teacher in his area to offer help and encouragement. (3) That prizes for awards to Junior Academy members be paid in cash. (4) That certificates of merit continue to be given, but that they have appropriate ribbons and seals affixed upon them, and (5) that some type of key be awarded to first, second, and third place winners of each sex.

A motion was carried asking that members of the Special Fellows Committee be asked to design a certificate to be awarded Fellows of the Tennessee Academy of Science.

A motion was carried authorizing the President to appoint a Special Committee to design a Seal for the Tennessee Academy of Science.

A motion was carried that the Academy accept an invitation from Dr. Q. M. Smith to hold the annual meeting at Middle Tennessee State College in Murfreesboro on November 30—December 1, 1956.

A motion was carried to increase the subscription rate of the Journal to libraries from $2.00 to $3.00 beginning with the Volume for the year 1957.

A tentative schedule for the November 30—December 1, 1956 meeting was proposed as follows:

November 30:
10:00 O'clock — Executive Committee Meeting
12:00 O'clock — Group meetings for lunch
1:30 O'clock — General Session
4:00 O'clock — Business Meeting
6:30 or 7:00 O'clock — Dinner
9:00 or 9:30 O'clock — Smoker

December 1:
8:30 — 12:00 O'clock — Junior Academy Meeting
9:00 — 12:00 O'clock — Senior Academy Sectional Meetings and Collegiate Sectional Meeting.

There being no further business, the meeting adjourned at 11:50 A.M.

DECEMBER MEETING

The Executive Committee of the Tennessee Academy of Science met in the Conference Room of the Science Building of Middle Tennessee State College, Murfreesboro, Tennessee on November 30, 1956. The meeting was called to order by President C. S. Chadwick at 10:10 A.M. Members present were C. L. Baker, Donald Caplenor, C. S. Chadwick, Harris J. Dark, Dewey Large, Myron McCay, A. J. Sharp, Isabel Tipton, Helen Ward, Fred T. Wolf, Woodrow Wyatt.

The minutes of the February 4 meeting of the Executive Committee were distributed and approved.

Comments were made upon the booklet form and size of the program of the 66th meeting. Recommendations were made and passed that the present format which includes the committee personnel and the dinner program be continued.

The secretary reported that a fund of $111.66 was available from AAAS for use by the Academy in 1957. Although the fund is not specifically allocated, it is suggested by AAAS that the major portion of it be used in connection with work concerned with high school or college students.

The secretary reported that 62 names had been submitted for membership during 1956. The Executive Committee recommended that these people plus those who shall duly apply for membership during this annual meeting be presented to the business meeting of the Academy for approval.

The treasurer submitted an interim report which was accepted with commendation by the Executive Committee.

A recommendation was made and carried that a person applying for membership and paying dues before August 1 of any year, should be routinely considered a new prospective member of the current year and should receive all Journals for the current year. If applications and dues are received after August 1, the applicant should be considered a member (after election) as of January 1 of the following year, but will receive the October number of the Journal.

A recommendation was made and carried that the treasurer henceforth be sent three copies of each issue of the Journal so that he may send copies of advertisements to respective advertisers along with the invoices.

The Editor of the Journal reported that a large number of reprints dealing with the High School Science Sections are available for distribution.

It was recommended and passed that, in the event that the current Chairman of the Committee on Local Arrangements is not a member of the Executive Committee, he be invited to attend the Executive Committee meeting at the Annual Meeting.

The Executive Committee voted to recommend to the general session on November 30 the following changes in the bylaws: (1) that Bylaw number 2 be changed to read:

"A program committee, of which the president-elect shall be the chairman, shall be appointed by this chairman at least six months in advance of the date of the meeting."

(2) That Bylaws number 6, 7, and 8 be made Bylaws number 7, 8, and 9 respectively, and that new Bylaw number 6 read,

"The single subscription price of the Journal of the Tennessee Academy of Science is $3.00 per year."

A report was received from the Chairman of the Coordinating Committee restating 6 proposals from the Coordinating Committee with respect to work with the Junior Academy. A discussion was held of the progress made in meeting the suggestions of these proposals.

A report was received from Dr. Baker, of the Fellows Committee. Two proposals of the Fellows Committee were recommended for presentation to the business meeting of the afternoon of November 30, 1956.

The meeting adjourned at 12:10 P.M.

THE SIXTY-SIXTH MEETING

The Sixty-sixth meeting of the Tennessee Academy of Science was held on November 30th and December 1st, 1956 at Murfreesboro, Tennessee with Middle Tennessee State College as host. There were 498 persons registered, 247 being in the Senior Academy, 200 in the Junior Academy and 51 in the Collegiate Division. J. E. Wiser was Chairman of the Committee on Local Arrangements and Isabel H. Tipton of the University of Tennessee was Program Chairman.

On Friday, November 30th, registration was held in the lobby of the Student Union Building beginning at 12:30 P.M. On Saturday, December 1st, registration for the Senior Academy and the Collegiate Division was held in the Science Building from 8:00 A.M. to 12:00, while registration for the Junior Academy was held in the lobby of the Student Union Building at same time. The General Session was held on Friday afternoon in the Tennessee Room of the Student Union Building with Academy President Claude S. Chadwick presiding. The business meeting was held in Room 304 of the Student Union Building at the conclusion of the General Session.

The Academy Dinner was held at 7:00 P.M. Friday evening in the Tennessee Room with 153 persons present. Two addresses were presented. The first was by I. E. Wallen, of the Science Teaching Improvement Program, American Association for the Advancement of Science, and was entitled, "The Challenge of the Crisis in Science Education." The second address was by the President of the Academy, Claude S. Chadwick. His topic was "The Work of the Committee on Educational Policies of the National Research Council."

On Saturday morning, meetings of the several sections, the Collegiate Division, and the Junior Academy were held in rooms of the Student Union Building, Science Building, and Administration Building. All of these meetings were well attended.

ANNUAL BUSINESS MEETING OF THE ACADEMY

The Business Meeting of the Tennessee Academy of Science was held in Rom 304 of the Student Union Building at Middle Tennessee State College at Murfreesboro, Tennessee at 5:00 P.M. on November 30, 1956, with President Claude S. Chadwick presiding.

The minutes of the Business Meeting of 1955 were not read since they had been published in the Journal. Copies of the minutes of the February 4, 1956 meeting of the Executive Committee were distributed and approved. The minutes of the Executive Committee meeting of November 30, 1956 were read and approved with two corrections.

In compliance with a recommendation of the 1955 Annual Meeting, a motion was made that Constitution Article IV, Section 1, be amended to read "The officers of the Academy, the immediate past president, the sponsor of the Junior Academy, and three other members shall constitute the Executive Committee." The motion passed.

In compliance with the recommendation of the Executive Committee, the Secretary moved that the following changes be made in the bylaws: (1) that Bylaw number 2 be changed to read

"A program committee, of which the president-elect shall be the chairman, shall be appointed by this chairman at least six months in advance of the date of the meeting,"
and (2) that Bylaws 6, 7, and 8 be made Bylaws 7, 8, and 9 respectively and that new Bylaw number 6 read

"The single subscription price of the Journal of the Tennessee Academy of Science is $3.00 per year."

The Secretary submitted a list of new members for approval. The list was accepted by unanimous vote of members present.

The Treasurer submitted an interim report which was approved.

Dr. H. A. Webb moved that a telegraphic night letter of appreciation and remembrance be sent by the Secretary to Dr. Frances Bottum, who was reported to be seriously ill. The motion was seconded and carried.

The President, in compliance with Executive Committee action of February 4, 1956, recommended that C. L. Baker, Carl T. Bahner, Jesse M. Shaver, and C. S. Shoup be elected Fellows of the Tennessee Academy of Science. A motion to this effect was made, seconded, and carried.

The Fellows Committee, composed of C. S. Shoup, Chairman, C. L. Baker, and Carl T. Bahner made the following recommendations, (1) that the following names be recommended by the Academy to the AAAS as Fellows of the AAAS:

W. W. Grigorieff, Oak Ridge, Tennessee
C. C. McClure, Nashville, Tennessee
F. G. Walton Smith, Coral Gables, Florida

and (2) that a design presented by Dr. Baker to the members present be accepted as the design for the Official Seal of the Tennessee Academy of Science. The above recommendations were approved by the members present. The Fellows Committee also made the following report:

> We, the undersigned members of the Committee, have selected certain criteria for your approval that will be a guide for nomination of Fellows of the Academy. The criteria selected have been arrived at with due cognizance that being elected a Fellow of the Tennessee Academy of Science is a distinctive honor that expresses recognition of scientific accomplishment and active participation in and contribution to Academy affairs. We have, further, taken into consideration the fact that many of our members deserve distinction and that there are manifold aspects of their contributions to scientific endeavor through the years of their membership.
>
> We offer for your adoption the following recommendations:
>
> 1. The Committee on Academy Fellows may request Fellows of the Academy to make nominations to the Committee.
>
> 2. In recommending eligible members to the Executive Committee, the Committee on Academy Fellows will observe the following criteria:
>
> a. Each nominee shall be recommended by three Fellows of the Academy.
>
> b. Each nominee shall have a record of scientific accomplishment and stature and should be well-known in his field.
>
> c. Each nominee shall have demonstrated research competence and shall have contributed to the advancement of science through research or teaching or by other means of outstanding significance.
>
> d. Each nominee must have been a member of the Tennessee Academy of Science for 10 years or more, and must have actively participated in the programs and the administration or business of the Academy.

The above recommendations were approved unanimously by the Academy members with the exception that "10 years" in 2,d, was changed by unanimous vote to "5 years."

The Nominating Committee, composed of F. T. Wolf, A. J. Sharp and Myron S. McCay proposed the following slate:

President: Isabel H. Tipton, University of Tennessee, Knoxville

President-Elect: Arlo I. Smith, Southwestern at Memphis, Memphis

Secretary: Donald Caplenor, George Peabody College for Teachers, Nashville

Treasurer: Harris J. Dark, David Lipscomb College, Nashville

There were no nominations from the floor, and it was moved that nominations cease and that the entire ballot be cast in favor of those nominated. The motion was carried and the slate was declared elected by acclamation.

The Committee on Resolutions reported that it would make a full statement of Resolutions at the Annual Dinner. A copy of the Report of the Committee on Resolutions follows these minutes.

The Tennessee Science Talent Search Committee presented a brief report summarizing the activities of the Ninth Annual Tennessee Science Talent Search. There was also presented information dealing with the progress of winners of the Talent Search for 1949 through 1954.

The Fauna Committee submitted a written report which follows the Report of the Committee on Resolutions at the end of these minutes.

There being no further business, the meeting was adjourned at 6:10 P.M.

REPORT OF THE COMMITTEE ON RESOLUTIONS

WHEREAS the Tennessee Academy of Science, the Tennessee Junior Academy of Science, and the Collegiate Division of the Tennessee Academy of Science are enjoying a very pleasant and profitable series of meetings at Murfreesboro, Tennessee, and

WHEREAS the success of these meetings is due largely to the efforts of the following individuals and organizations: President Claude S. Chadwick, President-Elect Isabel H. Tipton, Secretary Donald Caplenor, Treasurer Harris J. Dark, Editor Helen L. Ward; the Biology, Chemistry, and Home Economics Clubs of Middle Tennessee State College; to W. W. Wyatt, Sponsor of the Tennessee Junior Academy of Science, E. D. Watts and Ian Sutherland, Sponsor and President respectively of the Collegiate Division of the Tennessee Academy of Science; to the Chairmen of the various sections: Isabel H. Tipton, General Session, Claude S. Chadwick, Business Session, Elsie Quarterman, Botany Section, H. W. Patton, Chemistry Section, Ray Kinslow, Engineering Section, George D. Swingle, Geology-Geography Section, Moffatt G. Boyce, Mathematics Section, James R. Lawson, Physics-Astronomy Section, and Arthur W. Jones, Zoology Section; and to J. E. Wiser, Chairman of the Committee on Local Arrangements.

WHEREAS the needs of the Academy and its members have been graciously provided for by our host institution, Middle Tennessee State College,

BE IT therefore resolved that the total Tennessee Academy of Science express its sincere appreciation to these individuals and organizations who have so generously contributed to the success of these meetings, and

BE IT further resolved that these resolutions be spread upon the minutes of the Tennessee Academy of Science, and that copies be sent to President

Q. M. Smith, the Chairman of the Local Committee, and the Presidents of the Biology, Chemistry, and Home Economics Clubs of Middle Tennessee State College.

Hanor A. Webb
Fred Norris
Richard Stevenson, Chairman

ANNUAL REPORT OF THE FAUNA COMMITTEE OF THE TENNESSEE ACADEMY OF SCIENCE

Either there have been fewer faunal studies completed or in progress during the year or else some investigators have been too busy with their projects to submit information for an annual report.

The most complete sections are those on fish, amphibians, and reptiles—thanks to the exceptionally fine cooperation of Dr. Gentry, one of the members of this committee.

Fish

The following seven studies are those of the state Game and Fish Commission:

1. Investigations to determine the depth distribution of fish by seasons in main stream reservoirs.

2. Tagging studies on Reelfoot Lake and Kentucky and Cherokee reservoirs.

3. Determination of the influence of warm water from the new Johnsonville steam plant on fish and plankton populations.

4. The warm water stream survey, begun in 1953, has been completed.

5. The effects of impoundments on fish populations and movements into secondary streams.

6. Effects of fertilization on fish populations of the Obed River. (To be completed in December, 1956.)

7. A new species of chub (*Hybopsis cahni*), collected from the Powell and Clinch Rivers in Claiborne and Anderson Counties, and two new subspecies (*H. insignis insignis*, from various localities in the Cumberland and Duck River drainages; and *H. insignis eristigma*, collected from the west prong of the Little Pigeon River, in Sevier County) have been described by Carl L. Hubbs and Walter R. Crowe, of Michigan.

8. The U. S. Fish and Wildlife Service has begun a study of mussels in the Tennessee River and its tributaries.

Amphibians and Reptiles

9. Work has been started on a handbook of Tennessee amphibians and reptiles, by Glenn Gentry (Tennessee Game and Fish Commission).

10. The reptile section of "An annotated check list of the amphibians and reptiles of Tennessee" has been published in the *Journal* by Glenn Gentry, and reprints of the complete list are now available.

11. General studies of amphibians and reptiles, including distribution of the box terrapin, *Terrapene triunguis*, and life histories of certain salamanders, are being continued by Glenn Gentry.

12. Taxonomic and zoogeographic studies of the reptiles and amphibians of Tennessee and also those on the distribution and ecology of *Acris* in Tennessee, are being made by Ralph Sinclair (State Health Department, Nashville).

13. Richard M. Johnson (Tennessee Wesleyan College) is making herpetological studies of East Tennessee and has published a paper on intergraduation of the painted turtles, *Chrysemys picta picta* and *picta marginata*.

Birds

14. James T. Tanner (University of Tennessee) has continued his studies of the effects of temperature on nesting.

15. A study of the house wren has been published by Lee R. Hendron (Elizabethton).

16. John B. White, *et al,* have published an annotated check list of the birds of Greene County.

17. Studies of ceilometer casualties of birds at Nashville and Knoxville (for 1951 and 1954) have been published by J. C. Howell (University of Tennessee) and those at Smyrna and Nashville (for 1955) by Amelia R. Laskey (Nashville).

18. A paper on the birds of Knox County, by Mrs. R. A. Monroe (Knoxville and J. C. Howell, is nearly ready for publication.

Invertebrates (except Insects)

19. Taxonomic work on the Branchiobdellidae is being continued and a study of host specificity has been initiated by Perry C. Holt (Virginia Polytechnic Institute).

20. Taxonomic studies of helminths are being continued by Arthur W. Jones (University of Tennessee).

21. Harry C. Yeatman (University of the South) has published on plankton studies of Woods Reservoir.

Insects

22. Sidney Edwards (Vanderbilt University) has completed his dissertation on Trichoptera of Middle and West Tennessee.

23. Thomas P. Copeland (Tusculum College) has continued his studies of Collembola.

24. Will J. Cloyd (East Tennessee State College) has been making taxonomic and distributional studies of ants in the genus *Aphaenogaster.*

25. Entomological studies of waters polluted by pulp mill effluents, with special reference to the role of gambusia in mosquito control, have been made by A. C. Cole (University of Tennessee) and W. J. Cloyd (East Tennessee State College).

26. Studies by A. C. Cole of ants of the Chilhowee Mountains are still in progress.

27. Collections and lists of insects, particularly Coleoptera, are being made by Benard Benesh in the vicinity of Burrville. Mr. Benesh is also making taxonomic studies of the family Lucanidae.

28. Under the supervision of Stanley Averbach (Oak Ridge National Laboratory) there is in progress an ecological survey of insects in the vicinity of White Oak Lake.

29. H. F. Howden (University of Tennessee) is continuing his biological and taxonomic studies of the Geotrupinae.

30. R. P. Trogdon (University of Tennessee) is incorporating into the insect collections of the University of Tennessee, large numbers of insects taken in light traps operating in the state.

31. S. E. Bennett (University of Tennessee) is studying the biology of insects associated with the strawberry.

32. S. L. Breeland (University of Tennessee) is working on the biology of army worm parasites.

GENERAL SESSION

Friday, November 30, 1:30 P.M. — Tennessee Room of Student Union Bldg.
President C. S. Chadwick, Presiding

THE ACCURACY OF MANOMETERS. Ray Kinslow, Tennessee Polytechnic Institute, Cookeville.

TELEVISING MARS. J. H. DeWitt, R. H. Hardie and Carl K. Seyfert, Arthur J. Dyer Observatory, Vanderbilt University, Nashville.

BIRD BANDING — A FIELD FOR COOPERATIVE RESEARCH IN ORNITHOLOGY. Ralph Dunckel, Tennessee Polytechnic Institute, Cookeville.

THE KING COLLEGE EFFORT TO STIMULATE INTEREST IN NATURAL SCIENCE IN NEIGHBORING HIGH SCHOOLS. Edward W. Burke, Jr., King College, Bristol.

REPORT OF REPRESENTATIVE TO ACADEMY CONFERENCE. Isabel H. Tipton, The University of Tennessee, Knoxville.

REGIONAL SCIENCE MUSEUMS AS EDUCATIONAL TOOLS. Dewey E. Large, Museum Division, Oak Ridge Institute of Nuclear Studies, Oak Ridge.

AEC-SPONSORED RESEARCH IN THE SOUTHEAST. H. S. Morton, Atomic Energy Commission, Oak Ridge.

RECENT DEVELOPMENTS IN THE PROGRAM OF THE OAK RIDGE INSTITUTE OF NUCLEAR STUDIES. L. K. Akers, Oak Ridge Institute of Nuclear Studies, Oak Ridge.

BOTANY SECTION

Saturday, December 1, 8:30 A.M. — Room 32, Science Building
Elsie Quarterman, Chairman

MISCELLANEOUS NOTES ON BRYOPHYTES. A. J. Sharp, The University of Tennessee, Knoxville.

Merceya ligulata, of interest as a "copper-moss," is recorded from Polk County in addition to Sevier and Blount.

A *Diplophyllum,* new to Tennessee but of uncertain identity, has been found on Mt. LeConte.

Bryophytes may be found on fungi and lichens: *Brachythecium* has been found on *Fomes; Dicranum* on *Gyrophora;* and in Michigan, *Radula* on *Peltigera.*

The use of plastic bags for collecting has its hazards. If not emptied soon, the bryophytes may continue to grow producing bizarre forms difficult to identify.

COMPAREATIVE CHLOROPHYLL CONTENT OF SPOROPHYTIC AND GAMETOPHYTIC GENERATIONS IN CERTAIN BRYOPHYTA. Frederick T. Wolf, Vanderbilt University, Nashville.

Gametophytic plants of *Anthoceros carolinianus, Atrichum angustatum, Dicranum scoparium,* and *Ploytrichum commune* bearing well developed sporophytes were separated into gametophytic and sporophytic fractions. These were analyzed separately for chlorophyll content by a procedure involving extraction of the pigments with acetone, their transfer to ether solution, and their estimation by a spectrophotometric method. While in all cases the total *quantity* of chlorophylls (*A* plus *B*) is greater in the gametophytes than in sporophytes, nevertheless the *concentration* of chlorophylls per gram of tissue was found to be greater in the sporophyte than in the gametophyte in three of the four species studied. The significance of this finding in relation to the "nutritional dependence of sporophyte on gametophyte" in this group of plants is discussed.

CONTROL OF SEXUALITY IN CHLAMYDOMONAS CHLAMYDOGAMA BOLD. Francis R. Trainor, Vanderbilt University, Nashville.

Conditions of growth are discussed. Sexuality can be controlled by using three-day-old cultures, harvested into a solution deficient in nitrogen, placed in a 12-hour diurnal illumination at a temperature of 26°C. Synchrony of illumination with 26°C., and darkness with 20°C. yields the best results. Evidence for partial inhibition of sexuality by light is presented. In exhibiting control of sexuality by nitrogen concentration, *C. chlamydogama* is similar to *C. eugametos* and *C. reinhardti,* but unlike *C. meowusii.* Strength of sexual reactions was determined by zygospore yields.

SOME ASPECTS OF THE CYTOLOGY OF CHLAMYDOMONAS. Neal Buffaloe, Vanderbilt University, Nashville.

Results of cytological studies of 4 species of *Chlamydomonas, C. eugametos* Moewus, *C. chlamydogama* Bold, *C. reinhardti* Dangeard and *C. moewusii* Gerloff, are reported. The haploid chromosome number of each of these species is approximately n=8. When grown in continuous light at intensities of 200-800 foot-candles, vegetative cells of *C. eugametos* and *C. moewusii* develop polyploid nuclei which eventually undergo reduction as daughter cells are produced. This phenomenon is not observed in *C. chlamydogama* and *C. reinhardti*. The exact mechanism of this reduction process is as yet unknown.

MOVEMENT OF PHOSPHATE INTO THE XYLEM OF CORN ROOTS. Richard C. Smith, The University of Tennessee, Knoxville.

Experiments were performed in which corn root segments were surrounded by Hoagland's solution containing radioactive phosphate label while simultaneously the xylem was being flushed with a solution of similar composition except that it contained no phosphate. Results showed that rate of movement into xylem was increased by increased rate of removal from the xylem. Presence of azide (0.001M), which markedly reduced accumulation in the root, did not greatly reduce movement into the xylem though it did reduce response to increased rate of removal from the xylem. Implications of these and other results will be discussed.

THE EFFECTS OF CERTAIN GROWTH SUBSTANCES ON HETEROPHYLLY IN PROSERPINACA. Graham J. Davis, The University of Tennessee (Martin), Martin.

Proserpinaca is an amphibious genus belonging to the family Haloragaceae. *Proserpinaca palustris,* which forms both serrate and highly divided leaves, and *Proserpinaca pectinata,* which always produces highly divided leaves in nature, were treated with certain known or possible leaf growth substances to determine their effects on leaf shape. The chemicals, indole-3-acetic acid, 2, 3, 5-triiodobenzoic acid, adenine sulfate, and 2, 6-diaminopurine were applied in various concentrations and combinations to plants growing both terrestrially and submerged. In most instances the highest concentration of triiodobenzoic acid (10.0 mg/l) resulted in decreased vein growth. Indoleacetic acid stimulated vein growth in *P. palustris* maintained submerged. In one experiment with *P. Pectinata* low concentrations of indoleactic acid and adenine sulfate resulted in excess mesophyll growth in some plants, especially when these chemicals were applied together. In *P. palustris* 100.0 mg/l diaminopurin, an adenine antagonist, resulted in excess mespophyll production and inhibited vein growth. These results indicate that indoleacetic acid, called a vein growth factor, and adenine, said to be a mesophyll growth factor, may interact in controlling both vein and mesophyll growth.

PRELIMINARY STUDIES OF TRILLIUM STAMINEUM HARBISON. Jesse M. Shaver, George Peobody College for Teachers, Nashville.

Dark lines encircling the rootstock represent the bases of the outer sheath surrounding the base of the aerial stem or stems. It seems that only one of these is formed each year; so counts of these may be made to estimate rootstock age (which was twelve years in the mature population studied). Young roots appear just back of the terminal crown and are contractile to become transversely wrinkled and to pull the rootstock deeper into the ground. This often causes rootstocks to lay at an angle or even become inverted. At a depth of about seven to eight centimeters, thin non-contractile nutritive roots are formed and the rootstock become horizontal. As plants mature fruit, the reddish color of the ovary disappears with the ovary be-

coming green (the three persistent pistils, the six persistent stamens, and the three persistent petals retain their purple color). At this stage, the pistil breaks away from the receptacle, leaving behind a large white scar, and falls to the ground. Here it remains open basally but does not dehisce.

BOTANICAL OPPORTUNITIES IN MIDDLE TENNESSEE. H. R. DeSelm, The University of Tennessee, Knoxville.

An area of particular ecological and floristic interest on the eastern Highland Rim is the Manchester prairie. It has a known flora of 212 species of which at least 15 are of costal plain destribution. Here also are 27-30 per cent of the plants recorded as characteristic of the Kentucky barrens and the Ohio prairie. Only about 15 per cent are characteristic of the prairie of Alabama and Mississippi.

The occurrence of other noteworthy plants of the Central Basin and Rim are discussed.

$C^{14}O_2$ INCORPORATED IN GAMMA-HYDROXYGLUTAMIC ACID IN TWO SPECIES OF PHYLOX. Gordon E. Hunt, The University of Tennessee, Knoxville, and Biology Division. ORNL, Oak Ridge.

Experiments showed the presence of this recently reported amino acid (abbreviated as GHGA) in two species of *Phlox, P. paniculata, and P. drummondi,* and its absence in two others, *P. subulata,* and *P. divaricata.* With excised leaves of *P. paniculata,* an exposure of 6 hours in light to 50 microcuries of $C^{14}O_2$ resulted in no activity in GHGA. Assimilation of 10 times this amount of radioactive carbon by a large shoot of the same plant, in only 2 hours, but followed with a dark period of 20 hours, still showed little or no activity in GHGA. A spot on paper chromatograms which disappeared on mild acid hydrolysis and yielded GHGA as a partial product, grew slightly radioactive in the 22-hour experiment. Chromatographic separation of the hydrolysed analogue showed barely trace activity in the GHGA moiety. In an effort to supply a possibly closer precursor to GHGA than the immediate products of photosynthesis, both methyl-labeled glycolic acid and uniformly labeled sucrose were supplied to both excised leaves and roots of *P. paniculata* for periods of up to 72 hours. Analysis of the plant extracts showed no activity in GHGA. Further labeling experiments are in progress. A highly purified preparation of glutamic acid decarboxylase from squash showed as great activity in decarboxylating GHGA as in decarboxylating glutamic acid. GHGA was found also in the hydrolysate of the water and 80% alcohol insoluble fraction and was consequently presumed to be present in the plant protein.

VARIATION IN SPORE SIZE IN THREE SELECTED SPECIES OF MOSSES. Edward C. Clebsch, The University of Tennessee, Knoxville.

Forty spores from each of five capsules of three different species of mosses were measured. The variation in size within each capsule and among the five capsules has been determined statistically for each species.

CHEMISTRY SECTION

Saturday, December 1, 8:30 A.M. — Room 8, Science Building
H. W. Patton, Chairman

USE OF THE "COMMON-ION" EFFECT TO SEPARATE LITHIUM CHLORIDE FROM BARIUM CHLORIDE. P. S. Baker, W. C. Davis, R. L. Bailey, F. M. Scheitlin, and F. B. Thomas, Oak Ridge National Laboratory, Oak Ridge.

The separation of lithium chloride from barium chloride, after barium reduction of isotopically enriched Li^7Cl, is carried out by repeated crystali-

zations of a hydrochloric acid solution of the residue from the reduction. Barium chloride, being less soluble than lithium chloride, crystallizes preferentially. As the lithium chloride concentration continues to increase in the mother liquor, the barium chloride solubility is still further decreased, so that the ultimate separation is essentially complete.

PURIFICATION OF SALTS BY PRECIPITATION WITH CONCENTRATED NITRIC ACID. W. C. Davis, F. B. Thomas, R. L. Bailey, F. M. Scheitlin, and P. S. Baker, Oak Ridge National Laboratory, Oak Ridge.

Isotopic samples of strontium, barium, and lead have been recovered and refined by a precipitation method using concentrated nitric acid. Strontium and/or barium may be quantitatively separated from calcium and many other cations. Special procedures,such as electrolysis and chromate precipitation, are required to separate the three elements when they occur together.

CRITICAL ANALYSIS OF YOGURT PREPARED BY DIFFERENT METHODS. Ali Riza Kavlak, L. Margaret Johnson, and Arthur Cook, George Peabody College for Teachers, Nashville.

1. To review the process of yogurt in various sections of the world.
2. To prepare a yogurt culture of high quality, desirable flavor, acidity and texture.
3. To prepare yogurt from soybean powder with cow's milk.

Findings:

In some yogurt manufacturing dairies in the United States, the cultures are incubated at 110° to 115°F. for 5 hours instead of 70°F. for 14 to 16 hours. The flavor and the aroma of the finished product is affected by the method used.

In the incubation of yogurt the temperature of the room should be between 110° to 115°F. for 3 to 5 hours and should remain constant until yogurt is produced. If the temperature fluctuates, the flavor of the finished product will vary.

The flavor of yogurt is greatly affected also by the acidity which depends upon the original acidity of the milk and of the culture. Milk with the highest fat content gives a better flavor to the finished product.

The specific gravity of milk is a factor in producing yogurt of high quality.

When 50% soybean powder is mixed with 50% cow's milk containing 4.5% fat, yogurt with a good flavor and texture can be produced.

RELATIONSHIPS BETWEEN MAJOR AND TRACE ELEMENTS IN PLANT NUTRITION. A. A. Nikitin, Tennessee Corporation Research Laboratories, College Park, Georgia.

The availability and effective utilization of certain nutrient elements are effected by the valence state in which they are furnished to plants. It has been found that the divalent forms of copper, manganese and iron are more readily assimilated by plants. Oxidation-reduction reactions between elements often render ions ineffective for plant metabolism. For example, tetravalent manganese oxidizes ferrous iron to ferric iron which is precipitated as an insoluble compound. Such oxidation-reduction reactions take place in both soil and plant.

The balance between nutrient elements in many instances determines their effectiveness in plant metabolism. Both manganese and iron deficiencies are caused in most cases by a lack of balance between the two elements

rather than by the actual content of either. An iron-manganese ratio between two and seven has been found satisfactory for most crops.

Antagonism between elements is being used in many areas to minimize toxic effects of certain ions. For example, calcium reduces the uptake of boron which at high concentrations is toxic to most plants. On Florida muck soils, copper is widely used in pastures to reduce the toxic effect of molybdenum.

It has been possible to estimate ratios of major elements, nitrogen, phosphorous, and potassium, that are most effectively utilized by certain crops. Fundamental relationships between trace and major elements are also being established for various crops. The result of these developments will be more effective crop production through the use of balanced fertilizers containing both major and trace elements.

USE OF ADSORBENTS IN VAPOR-PHASE CHROMATOGRAPHY. H. W. Patton and J. S. Lewis, Tennessee Eastman Company, Kingsport.

Although the gas chromatographic methods first described in the literature involved the use of active adsorbents, there is no doubt that at the present time the gas-liquid partition method is applicable to a greater variety of problems. However, the two techniques are somewhat complementary, and there are many separations for which adsorbents are either necessary or preferable.

This paper reviews the results of gas chromatographic studies involving adsorbents as column packings. The principles of elution and displacement development are discussed. The types of adsorbents which have been used and the separations obtainable by each are reviewed. Typical applications are briefly described. Some advantages and disadvantages of absorbents as compared with partitioning agents are listed.

Future developments in gas chromatography will undoubtedly result in increased utility of both adsorption and partition methods. It is particularly difficult to assess reliably the ultimate scope of adsorption methods because of the limited number of relevant studies. The variety of adsorbents investigated for gas chromatographic use is rather limited, and preparation of special adsorbents to meet the requirements of the method has not been studied systematically. Alteration of adsorbents by pretreatment with small amounts of substances that are premanently adsorbed is a promising approach that has received only slight attention. Regardless of the outcome of studies concerning problems such as these, the use of adsorbents in gas chromatographic work will undoubtedly remain important.

EXTRACTIVE BEHAVIOR OF SOME RARE EARTHS IN TRIBUTYL PHOSPHATE-NITRIC ACID SYSTEMS. Boyd Weaver, Oak Ridge National Laboratory, Oak Ridge.

Concentrations of several rare earths in tributyl phosphate and aqueous nitrate solutions at equilibrium have been determined. Studies have been made of the effects of acid and salt concentrations over wide ranges. Practical application of the differences among the elements have been made in the separation of considerable quantities of some of them.

GEOLOGY-GEOGRAPHY SECTIONS

Saturday, December 1, 8:30 A.M. — Room 400, Administration Building
George D. Swingle, Chairman

SOME UNREPORTED SULFIDE OCCURRENCES IN EAST TENNESSEE. Stuart W. Maher, Tennessee Division of Geology, Knoxville.

Recent investigations by the Division of Geology have resulted in the examination of several unreported sulfide mineral occurrences in East Tennessee. Two occurrences of chalcopyrite in the Mascot formation in Chestnut

Ridge, Hawkins and Hancock Counties are discussed; as is an occurrence of chalcopyrite and galena in a quartz vein which cuts the Ocoee shales in Cocke County.

A zinc-lead prospect in the Conasauga group in Carter County and an occurrence of sphalerite near Maryville, Blont County are described. The latter occurrence is in the Kingsport formation, and is of the Mascot-Jefferson City type mineralization. The area of this prospect has been studied geochemically and an anomaly found.

DEFORMATION OF THE BEECH GRANITE IN NORTHEASTERN TENNESSEE. Robert C. Milici, The University of Tennessee, Knoxville.

SOME OBSERVED TEXTURAL VARIATIONS OF THE BASAL KNOX SANDSTONE IN EAST TENNESSEE. Stephen E. Collins, The University of Tennessee, Knoxville.

Thirty-nine samples were collected along outcrops of the basal Knox sandstone extending from Bristol southward to Englewood, a distance of 150 miles. The thickness of the sandstone increased in a northeasterly direction and was observed to vary from one to eighty inches. As determined from sieve analyses, the median diameter decreased and the sorting increased to the south and southwest. Thin sections of nine composite samples were made and the roundness values and feldspar frequencies are now being determined.

Observations to date indicate that the source of the sandstone probably lies to the northeast.

CHARACTER OF THE CHATTANOOGA SHALE IN THE LOWER KENTUCKY RESERVOIR AREA. John M. Kellberg, Tennessee Valley Authority, Knoxville.

Recent investigations between river miles 60 and 100 in the lower Kentucky Reservoir area have disclosed changes in thickness of the Chattanooga shale and the presence in some areas of a zone of basal weathering. Five sites have been explored by core drilling, and at four of these the entire thickness of the Chattanooga was penetrated. Within the limits of the investigations, the Chattanooga shale thickens northward from 30 feet at Johnsonville river mile 100) to 75 feet at Shannon Creek (river mile 60). At two of the sites where the Chattanooga is underlain directly by the highly fractured Camden chert there is a zone of basal weathering of varying thickness. Where the Pegram formation intervenes between the Chattanooga and the Camden, this basal weathering in the Chattanooga has not been observed.

GROUND-WATER RESOURCES OF THE MISSISSIPPI ALLUVIAL VALLEY, TENNESSEE. Sanford I. Strausburg, United States Geological Survey, Memphis.

THE CHEROKEE BLUFF CAVERN—LEGEND AND FACT. H. K. Brooks, The University of Florida, Gainesville, and Herbert A. Tiedemann (speaker), Tennessee Division of Geology, Knoxville.

Legend and facts bearing on the existence of a subterranean passage between Chilhowee Park and Cherokee Bluff were investigated. Stratigraphic and structural barriers exist rendering it unlikely that such a channel could originate through the natural solution of carbonate rocks. Even if such a passage did exist below the Tennessee River, it would be flooded and impassable to humans. The extent of the cavern on Cherokee Bluff was extensively explored and mapped, proving the limited extent of its passageways.

LOWER PENNSYLVANIAN GEOLOGY OF THE SOUTHERN APPALACHIAN REGION. Richard G. Stearns, Tennessee Division of Geology, Nashville, and Robert M. Mitchum, Jr., Carter Oil Company, Tulsa, Oklahoma.

The geology of the Pennsylvanian is illustrated by 5 correlation sections, 4 isopach and lithofacies maps, and 3 structural maps.

Deposition began during the early Pottsville in 2 separated areas and then spread by basal onlap out and beyond the present-day erosional limits. Trends of deposition are illustrated by isopach and lithofacies maps.

The Cincinnati arch ended in northeast Mississippi, and in middle Pottsville time there was an area of deposition, now destroyed, similar to the Mississippi Embayment, extending across West Tennessee.

The present structural configuration is not like the original tectonic form. More recent uplift has formed a broad southeast-plunging nose in southern Tennessee and northern Alabama.

MARL ACCUMULATION NEAR GREENEVILLI, TENNESSEE. George D. Swingle, The University of Tennessee, Knoxville, and Stuart W. Maher (speaker), Tennessee Division of Geology, Knoxville.

Several stream valleys near Union Temple, north of Greeneville, Tennessee. contain marl deposits. The best exposed of these deposits is along Crabtree Branch west of state Highway No. 93 where the marl is 25 feet thick. It consists of essentially horizontal layers of travertine, carbonaceous matter and coquina. The most striking feature of the deposit is the presence of many cedar logs. The well preserved state of these logs suggests that the rate of marl accumulation has been fairly rapid.

Water, marl, and log samples have been submitted for chemical analyses and C-14 age determination.

MATHEMATICS SECTION

Saturday, December 1, 8:30 A. M. — Room 201, Administration Building
Moffatt G. Boyce, Chairman

SOME PROBLEMS IN MATHEMATICAL EDUCATION. M. L. MacQueen, Southwestern at Memphis.

Much concern is being given to existing conditions of mathematical education at the secondary school level. Major problems for which solutions must be sought include the large proportion of high school students who discontinue the study of mathematics at an early stage, the problem of teacher competence, and a mathematics curriculum which has not kept up with the development of mathematics and with recent changes which have been taking place in college and university programs. Consideration is given to certain efforts now being made to effect improvement in mathematical education at the secondary school level.

ON THE POLYSECTOR OF AN ANGLE. Herbert L. Lee, The University of Tennessee, Knoxville.

Texts on Analytic Geometry give a method of bisecting an angle formed by two given lines. In this paper a discussion of an analytic method of dividing an angle into any number of equal parts is given. In this discussion there arises an equation of the nth degree in one unknown, which has n real roots. This means that for irrational roots difficulty in our construction arises. An example of trisection is given.

SOME NOTES ON *Universal Mathematics*. Ralph T. Donnell, Union University, Jackson.

The books entitled *Universal Mathematics, Part* 1. *Functions and Limits.* and *Part II. Structures in Sets,* written in 1954 by the collective efforts of a committee of the Mathematical Association of America, are an important contribution to developing a modern curriculum in colleg mathematics. In this paper a review of the events leading to the writing project was given, and the subject matter of the books was discussed.

ON ELECTIONS INVOLVING m CANDIDATES FOR n OFFICES. Jack U. Russell, Southwestern at Memphis.

If an election involves m candidates competing for n offices, and if a candidate is one of the winners when he receives more votes than m-n other other candidates, then:

1. A candidate receiving c votes: wins if c exceeds (the total vote) divided by n+1; loses if c is less than (the vote remaining after n—1 candidates receive a maximum vote) divided by m—n+1; might win or lose if c is between these numbers.

2. A candidate is more likely to win if a voter votes for him only rather than voting for n candidates as is his privilege.

3. If each voter votes for n candidates, and the number of voters (p) exceeds n+2, then at least one winner is guaranteed if and only if m=n+1 and m does not divide p. No choice of m, n, and p will insure exactly n winners.

MATERIALS FOR COMPUTER PROGRAMMING. Gustave H. Lundberg, Vanderbilt University, Nashville.

A PROSPECTUS ON THE FOURTHCOMING YEARBOOK *Insight Into Modern Mathematics*. F. Lynwood Wren, George Peabody College for Teachers, Nashville.

During recent years we have witnessed an almost phenomenal development in the field of mathematics. The specialist in mathematics can, by discriminating selection, keep very well informed in the area of his specialty and basically enlightened in significantly related areas. The teacher of secondary mathematics, by the very nature of his profession, cannot be highly trained in any specific area. This creates a real problem. How can such a teacher keep informed about what is going on in his field of major interest? How can modern developments in mathematics be interpreted for non-specialists? Among the more significant efforts to write expository treatments of such modern developments in mathematics is the forthcoming yearbook of the National Council of Teachers of Mathematics, INSIGHTS INTO MODERN MATHEMATICS.

THE DENSITIES OF PRIMES AND OTHER PHENOMENA OF NUMBER THEORY PREDICTED FROM PROBABILITY MODELS. Robert Weir Rempfer, Fisk University, Nashville.

The 'sieve of Erotosthenes' enables us precisely to ascertain whether a given integer is prime—other number-theoretic facts are established (also precisely) by Euclid's logarithm and the like. If these precise selection-processes are replaced by random selection processes instead, and the resulting probability distributions compared with the known number-theoretic distributions, there turns out to be remarkable agreement. Moreover, the probability distributions can be used to predict certain number-theoretic distributions where these are, as yet, unknown.

PHYSICS-ASTRONOMY SECTION

Saturday, December 1, 8:30 A.M.—Room 12, Science Building
James R. Lawson, Chairman

AN ANALYSIS OF INFRARED SPECTRUM OF CARBONYLBROMOFLUORIDE. Richard R. Patty, Vanderbilt University, Nashville.

The sample of carbonylbromofluoride was prepared by bubbling carbon monoxide through bromine trifluoride, and its infrared spectrum was ob-

tained from two to thirty-eight microns with a Perkin-Elmer, Model 21, spectrophotometer with NaCl, KBr, and CsBr optics. The frequencies of the proposed fundamental vibrations are 1874, 1068, 721, 620, 398, and 335 cm—1. Five fundamental frequencies were determined directly, and the fundamental at 335 cm—1 was determined approximately from overtone and combination bands. The spectrum is interpreted on the basis that COBrF belongs to the Cs point group. In the interpretation, use is made of, first, molecules which contain similar groups of atoms, and, second, properties of the asymmetric top molecule with this configuration. The fundamental frequencies of COF_2 and COClF are compared with those of COBrF, and the values for the fundamental vibrations are seen to be consistent with those expected upon the substitution of the heavier bromine atom.

STUDIES OF THE VIBRATIONAL SPECTRA OF HNCO AND HNCS. H. W. Morgan, Oak Ridge National Laboratory, Oak Ridge, and J. R. Lawson, Tennessee A & I State University. Nashville.

The infrared spectra of isocyanic acid, isothiocyanic acid and their deuterated species have been observed with prism resolution. A normal coordinate analysis has been made, and the observed isotope shifts compared with those predicted by reasonable values of the force constants. The Torkington method for the evaluation of force and interaction constants has been applied and criticized. A study of the preparative chemistry of these molecules has been made, resulting from the need for pure compounds in the vapor phase.

RAMAN SPECTRUM OF SbF_5. Julian Dunlap, Vanderbilt University, Nashville.

The Raman spectrum of SbF_5 was obtained with a Hilger Model E-612 Raman Spectrograph utilizing mercury arc excitation and photographic detection. The SbF_5 was obtained from a commercial supplier, and a suitable sample was purified by distillation in a monel vacuum system. Photographic exposure times extended from 15 minutes to 20 hours. Nine Raman active vibrations were discovered. These vibrations were at 140, 187, 225, 265, 301, 348, 671, 717, and 750 cm—1. The vibrations were all assigned as fundamentals. The Raman data fixes the SbF_5 symmetry group as C_4v (quadratic pyramid structure) with a fair degree of certainity. Reported infrared bands can be accounted for as overtones or as combinations of the various Raman active fundamentals.

THE INFRARED SPECTRA OF CORROSION FILMS ON ALKALI HALIDE WINDOWS. Ernest Jones, Vanderbilt University, Nashville.

Fluorine gas and various molecules containing fluorine are noted for their chemical reactivity and, unfortunately, attack crystalline NaCl and KBr, widely used window materials for sample cells. This paper will report on the formation of these window bands and will identify the nature of the compounds formed under attack by gaseous F_2, HF, and ClF_3. A report will be given on the spectra and structure of $NaHF_2$ and KHF_2.

CORRELATION OF VIBRATION SPECTRA AND CRYSTAL STRUCTURE OF LOG-CHAIN HYDROCARBONS. Albert H. Woollett, Fisk University, Nashville.

In the vibration spectra of hydrocarbons and their derivatives, frequencies characteristic of end groups and substituents have been known for some time; but the spectrum of the hydrocarbon chain itself has not been fully understood. The infrared spectra obtained by others have been supplemented by new Raman data obtained for some long-chain normal paraffins and polyethylenes which have a low percentage of branching. Attempted correlation of observed vibration frequencies and proposed crystal structure yields insight into the nature of vibrations and raises some puzzling problems.

X-RAY DIFFRACTION IN INDUSTRY. H. W. Dunn, Oak Ridge National Laboratory, Oak Ridge.

A brief description of x-ray diffraction instruments and equipment and a discussion of information that can be obtained will be given. Specific examples of data obtained in the laboratory and techniques used will also be discussed.

A NEW METHOD OF DETERMINING THE CHARGE TO MASS RATIO OF AN ION. Gertrude Fleming Rempfer, Fisk University, Nashville.

This method of measuring q/m is based on the lateral motion acquired by an ion in passing through a transverse magnetic field. If L is the distance (measured in the direction of the ion's initial velocity) over which the magnetic field extends and H the field strength, the lateral velocity acquired by the ion is given by

(1) $v_x = (HL/c)q/m.$

Ions of different q/m can be distinquished by measurement of the time of flight for a given lateral displacement. Alternatively, measurement of the stopping potential corresponding to the lateral velocity can be used to obtain q/m. We are constructing a simple mass spectrometer based on this theory. Since (1) is independent of the initial speed of the ion, an instrument operating on this principle would have the advantage that the resolution is not impaired by fluctuations in accelerating voltage, or distribution in energy at the source.

PROGRESS REPORT ON THE PROGRAM FOR SPECTROGRAPHIC ANALYSIS OF HUMAN TISSUE FOR TRACE ELEMENTS. Isabel H. Tipton and Robert L. Steiner, The University of Tennessee, Knoxville, and Oak Ridge National Laboratory, Oak Ridge.

The program for spectrographic analysis of human tissue for trace elements which was set up at The University of Tennessee in 1951 has been reported at The Tennessee Academy meetings every year since then. During the past year tissues from some 50 autopsies from Dallas, Texas and Miami, Florida, a number of tissues from African natives, and a number of still-births from American cities have been analyzed. It is interesting that cadmium, which occurs in such large amounts in the kidneys of American adults, does not occur in African natives of the same age nor does it occur in still-births.

PHOTOELECTRIC PHOTOMETRY OF A RAPIDLY VARYING STAR. C. Don Geilker, Vanderbilt University, Nashville.

CONSTRUCTION OF AN OBSERVATORY AT KING COLLEGE. Edward W. Burke, Jr., King College, Bristol.

For the teaching of an Astronomy course and for extensive observing the heavy "portable" telescope mount constructed at the college several years ago was impractical. For the past twelve months a small observatory with a metal dome, and a new equatorial mount have been under construction. The work has been done on the campus by college personnel at a relatively small cost. The more interesting details of the construction and the continuing development of the telescope design and operation will be described.

THE IMPROVEMENT OF EQUIPMENT HANDLING IN THE BASIC PHYSICS LABORATORY. Myron S. McCay, University of Chattanooga, Chattanooga.

This is an analysis of a proposed system of equipment packeting, designed to improve the efficiency of the basic laboratory system.

SUMMER INSTITUTES FOR HIGH SCHOOL SCIENCE TEACHERS. Guy Forman, Vanderbilt University, Nashville.

This is a report on the National Science Foundation's Science Institute held at Marshall College last summer, together with comments on the prospects for the coming summer.

STUDIES OF DEUTERON BUILD-UP TARGETS FOR NEUTRON PRODUCTION. Ray T. Arnold, Vanderbilt University, Nashville.

The capture in several metal targets of deuterons accelerated by potential differences of 35 to 70 kilovolts was examined. Neutron yield resulting from impact between deuterons was monitored. The highest yields at 70 KV were approximately 2 x 10^4 neutrons/sec. per microampere at 25°C.

Yield variation over the temperature range —40°C to 110°C was obtained for nickel and silver. The increased deuteron retention of nickel at —40°C remained constant as the temperature slowly rose to 60°C. Some observation on diffusion from the metal after bombardment ceased was also made.

The rate of buildup to equilibrium varied greatly from one material to another as did also. to some extent, the shape of the yield versus time curve.

Equilibrium yield versus accelerating voltage curves for certain targets indicated uniformity of deuteron concentration to the depth of penetration independent of deuteron energy.

A NEUTRON TIME-OF-FLIGHT SPECTROMETER. T. P. Lang, Vanderbilt University, Nashville.

A time of flight neutron spectrometer now being developed at Vanderbilt University for measurement of fast neutron energy spectra is described. The electronic circuit used to measure the time intervals will be a variation of the chronotron circuit in which two electrical pulses defining the time interval are applied to opposite ends of a transmission line. Detectors placed at intervals along the line determine the point at which the pulses meet. In order to have an energy resolution of 5% at 3 mev, time intervals must be measured to an accuracy of 10^{-9} sec (for one meter flight path). Since the time intervals involved are very short, special techniques are required. The spectrometer will be a multichannel device with ten to twenty channels. The minimum channel width is expected to be a few times 10^{-10} sec.

THE VANDERBILT DOUBLE-FOCUSING, BETA-RAY SPECTROMETER. Sherwood K. Haynes, Vanderbilt University, Nashville.

A double-focusing, beta-ray spectrometer using no iron is being constructed at Vanderbilt University. It is hoped that the minimum percent line width will be about 10^{-4}. The maximum transmission of the instrument is 1%. The magnetic field is provided by eight accurately positioned coils. The field of these coils must be accurately proportional to the square root of the radius and must be controllable to an accuracy of 0.01%. With a vacuum pumping system capable of at least 10^{-8} mm. of mercury and with acceleration of the beta-rays before they pass through the counter window, the spectrometer should be capable of comparing intensities from about 250 electron volts up to about 2 million electron volts. The spectrometer will be used to study yields of auger electrons and L. to K. capture ratios.

PROGRESS TOWARD A BILLION-VOLT ACCELERATOR FOR THE SOUTH. Sherwood K. Haynes, Vanderbilt University, Nashville.

The speaker is a member of the joint ORINS-ORNL Accelerator Committee. He will report on the present state of progress toward such an accelerator and will indicate wherein help is needed from the universities and colleges of the region.

THE COCKCROFT-WALTON PROJECT AT VANDERBILT. Gordon Ray Harrison and Cyril D. Curtis, Vanderbilt University, Nashville.

An accelerator project is under way at Vanderbilt with the installation of a 400 Kev accelerator. The high voltage is supplied to the accelerator by a four-stage Cockcroft-Walton generator. The machine accelerates positively charged particles, such as protons and deuterons. These positive ions are supplied by an r.f. ion source of the type developed at Oak Ridge National Laboratory. Electrostatic and magnetic analyzers are to be employed in producing a monoenergetic beam of particular mass particle. The accelerator is being used to study deuteron build up targets. Experiments are in preparation to study charged particle reactions in light nuclei, along with elastic scattering. Work is also under way preparing to use the accelerator as a high intensity monoenergetic neutron generator to study elastic and inelastic neutron scattering as well as nuclear reactions using the neutron as the projectile particle.

ZOOLOGY SECTION

Saturday, December 1, 8:30 A.M., Room 37, Science Building
Arthur W. Jones, Chairman

AN INTERESTING NEW GENUS OF NORTH AMERICAN ANTS. Arthur C. Cole, The University of Tennessee, Knoxville.

A new genus of North American ants has been erected and will be validated by publication in the January, 1957, number of this journal. It is related to the genera *Myrmica* Latreille and *Manica* Jurine and the new species on which it is based is a social parasite, or inquiline, of *Myrmica strielagaster* Cole with which it shows a convergence of certain structural characteristics. This is the first new genus, based upon an equally new species, that has been discovered in the United States during a period of more than fifty years. The ants were collected by the author in the Davis Mountains of western Texas during the summer of 1956 and constitute a large series of workers and their queen.

SOME CHEMISTRY OF SOMITE FORMATION IN THE CHICK EMBRYO. Ronald C. Fraser, The University of Tennessee, Knoxville.

By explanting definitive primitive streak embryos onto synthetic media of known composition, either with or without pretreatment, it has been possible to assay the effects of various sulfur-containing compounds on somite formation in the early chick embryo. A comparison of average numbers of somite pairs formed in embryos on the media indicate that the free sulfhydryl radical of cysteine is highly beneficial to somite production. The embryo has shown limited ability to unite H_2S with alanine, presumably in the formation of active cysteine. A large variety of sulfur-containing compounds, in general, showed little or no effectiveness in this meristic event.

While the precise role of the active SH group on cysteine has not been worked out in definitive form, certain pieces of information suggest that it acts in a rate-influencing manner. There is a definite optimum in somite-forming ability with cysteine at a concentration of 10 mg.%, with the number of somite pairs falling with concentrations on both sides of this figure. The regulative role of the SH radical through its oxidation-reduction potential is not clear, since glutathione has essentially no activity. H_2O_2 at a suitable concentration completely inhibits somite development, while the inhibitory action of $HgCl_2$, a known sulfhydryl inhibitor ,is reversed by the subsequent administration of cysteine.

A STUDY OF HUMAN PARASITIC INFESTATION. Albert K. Nielsen, Hardin County General Hospital, Savannah.

During 1955 and 6 month of 1956, 101 stool examinations for parasites were conducted in this laboratory on clinically suspicious individuals. The usual technique was to administer a laxative (Phospho-Soda) and collect three specimens. These were examined immediately by direct smear, and in addition, approximately 60 of the 101 cases were concentrated by the zinc sulphate flotation method. A limited number were also cultured for amoeba. Parasites detected were as follows:

Enterobius vermicularis (Pinworm)	5 infestations
Giardia lamblia	4 infestations
Endamoeba	3 infestations
Trichomonas intestinalis	3 infestations
Ascaris lumbricoides (Roundworm)	1 infestation
Hymenolepis nana (Dwarf tape worm)	1 infestation

Negative Tests, 85 or 85.14%; Positive tests, 15 or 14.85%.

Two individuals had multiple infestations.

PRODUCTIVITY STUDIES ON TWO LAKES OF THE NASHVILLE AREA. C. Wymer Wiser, Middle Tennessee State College, Murfreesboro.

Productivity studies were made as a part of a comparative limnological investigation on Radnor and Marrowbone Lakes, artificial reservoirs near Nashville. Estimates of productivity were attempted, using the mean annual standing crops of net plankton and benthic organisms as indices. Standing crop estimates were based upon sampling at regular monthly intervals for one year and expressed in terms of both census count and biomass per unit volume and area. The Areal Standard Unit was used as indicative of the plankton biomass, making estimates of the mass of individual species and higher categories possible. Seasonal variations in standing crops of phytoplankton, zooplankton and bottom organisms also are shown. Correlations between the standing crops of the different trophic levels are attempted the apparent influences of chemical, physical and morphometric conditions of the lakes are examined.

NEW RECORDS OF THE ARRENURUS (HYDRACARINA) OF TENNESSEE. James L. Wilson, Belmont College, Nashville.

Collections of Hydracarina have been made from 36 counties in middle Tennessee since May 1955. The genus *Arrenurus* has been found to be most abundant and characteristic in ponds and lakes especially where there are large quantities of aquatic vegetation.

C. Clayton Hoff, while making a study of the microcrustacea of Reelfoot Lake in the summer of 1942, found 14 species of the genus *Arrenurus*. This is the only study of Hydracarina reported for the state of Tennessee.

Of the 201 lake and pond collections made in middle Tennessee, 20 collections from 5 localities studied so far contained a total of 14 species of *Arrenurus*. Eight of the 14 species were reported by Hoff from Reelfoot Lake. The following 6 species are reported for the first time from Tennessee: *Arrenurus bartonensis, A. lyriger, A. superior, A. fissicornis, A. flabellifer, A. cardiacus*. Three of the four major subgenera of the genus *Arrenurus* are represented by the above 6 species. The fourth subgenus, containing only 2 species, has not been reported from Tennessee.

Several probable new species have been found but a closer study and more specimens of each are needed before a description will be made.

SECTION OFFICERS FOR THE YEAR 1957

Botany Section:

Chairman: H. R. DeSelm, University of Tennessee, Knoxville.
Vice-Chairman: Arlo Smith, Southwestern at Memphis, Memphis.
Secretary: Paul L. Hollister, Tennessee Polytechnic Institute, Cookeville.
Editor: Frederick T. Wolf, Vanderbilt University, Nashville.

Chemistry Section:
Chairman: Albert L. Myers, Carson-Newman College, Jefferson City.
Secretary: H. W. Patton, Tennessee Eastman, Kingsport.
Editor: Carl M. Hill, Tennessee A. and I., Nashville.

Engineering Section:
Chairman: William A. Goodwin, University of Tennessee, Knoxville.
Secretary: James D. Womack, University of Tennessee, Knoxville.
Editor: James S. Brown, Tennessee Polytechnic Institute, Cookeville.

Geology-Geography Section:
Chairman: Robert L. Wilson, University of Chattanooga, Chattanooga.
Editor: W. B. Jewell, Vanderbilt University, Nashville.

Mathematics Section:
Chairman: Jack U. Russell, Southwestern at Memphis, Memphis.
Secretary: William G. Stokes, Austin Peay State College, Clarksville.
Editor: E. D. Eaves, University of Tennessee, Knoxville.

Physics-Astronomy Section:
Chairman: Wendell G. Holladay, Vanderbilt University, Nashville.
Secretary, Editor: Douglas Shields, Middle Tennessee State College, Murfreesboro.

Zoology Section:
Chairman: John A. Patten, Middle Tennessee State College, Murfreesboro.
Secretary: Ronald C. Fraser, University of Tennessee, Knoxville.
Editor: A. C. Cole, University of Tennessee, Knoxville.

COLLEGIATE DIVISION OF THE TENNESSEE ACADEMY OF SCIENCE

Seventh Annual Meeting
Saturday, December 1, 8:30 A.M.—Science Building
I. D. W. Sutherland, Carson-Newman College, Chairman

ULTRAVIOLET AND VISIBLE LIGHT ABSORPTION OF STYRYL QUINOLINES. Clarence Cook, Carson-Newman College.

CONSTRUCTION OF A RADIO FREQUENCY TITRIMETER AND SOME EXPERIMENTAL RESULTS. Roy Clark, Middle Tennessee State College.

DIPOLE MOMENTS OF ALKYL HALIDES. Stanley Von Hagen, Carson-Newman College.

DIPOLE MOMENTS OF STYRYL QUINOLINES. Theresia Boehm, Carson-Newman College.

MUSIC IN SCIENCE LABS. Sammie McCormack, Carson-Newman College

FOUR GENERATIONS OF SHORT MIDDLE FINGER ON THE LEFT HAND OF A TENNESSEE FAMILY. Jack L. Church, George Peabody College for Teachers.

DRAWING OF THE SQUID. Barbara Darden, Austin Peay State College

DRAWINGS OF THE DOGFISH SHARK. Bill Kovach, East Tennessee State College.

PRIZE WINNERS

First Place and AAAS Award: Roy Clark, Middle Tennessee State College.
Second Place: Jack L. Church, George Peabody College for Teachers.
Third Place: Theresia Boehm, Carson-Newman College.

OFFICERS OF COLLEGIATE SECTION FOR 1957

President: Stanley Von Hagen, Carson-Newman College.
Vice-Pres.: Paul Whitehead, East Tennessee State College.
Sec.-Treas.: Jean Bradley, Morristown College.
Reporter: Ann Reel, East Tennessee State College.
Sponsor: E. D. Watts, Middle Tennessee State College.

TENNESSEE JUNIOR ACADEMY OF SCIENCE

Fifteenth Annual Meeting

General Chairman, John T. Johnson, Young High School, Knoxville. The meeting was held in the Tennessee Room of the Student Union Building.

Welcome: Dr. C. S. Chadwick, President, Tennessee Academy of Science.

DISSECTIONS OF CANIS FAMILIARIS. Judith K. Qualls, Athens.

GEOLOGICAL AND MINERAL RESOURCES OF TENNESSEE. Sam B. Upchurch, Nashville.

SCIENCE IN ADVERTISING. Jesse A. Scruggs, Nashville.

SHELLS OF THE ATLANTIC AND PACIFIC COAST. Judith A. Davenport, Chattanooga.

EMBRYOLOGY OF THE HUMAN. Judith A. Davenport, Chattanooga.

LEAVES. Lansden R. Good, McMinnville.

THE SECRET OF ARTHROPODS STRENGTH. Frederick N. Offott, Knoxville.

THE PLACE OF AN ELECTRIC FURNACE IN A HIGH SCHOOL LABORATORY. Thomas H. Larkins, Clarksville.

CRYSTALLOGRAPHY. Mickey L. Bibbey, Chattanooga.

THEORY OF FLIGHT. Alan Walker, Chattanooga.

SOLAR PURIFICATION UNIT. Don T. Perkinson, Chattanooga.

A STUDY OF THE INHERITANCE OF THE CRESTED-HEADED CANARY. Ann W. Simmons, Knoxville.

RESTORING A SKULL. Trula P. Hodges, Knoxville.

CHECKS ON THE LEARNING ABILITY OF SNAILS AND SLUGS IN A MAZE. William H. Damewood, Knoxville.

MEASURING A PERSONS REACTIONS TO VARIOUS TYPES OF MUSIC. John A. Walker, Knoxville.

COMPARING THE REACTION OF SLUGS AND SNAILS TO COLOR. Martha L. Shobe, Knoxville.

A STUDY IN SOUND. Alvin J. Sanders, Knoxville.

A STUDY OF REGENERATION IN EARTHWORMS. Elizabeth Ann Compton, Knoxville.

A STUDY OF SLUGS. Margaret L. Moulton, Knoxville.

GROWING CRYSTALS. Steve Bond, Fountain City.

TAKING MILK APART. Michael Lewallen, Fountain City.

INSECTS: USEFUL AND HARMFUL. Adrian R. Lawler, Oak Ridge.

THE COMPONENT PARTS OF LIGHT AND EFFECTS ON PHOTOSYNTHESIS. Karl M. Elza, Oak Ridge.

VEGETABLES IN MEDICINE. Sandra D. Whitten, Oak Ridge.

SKELETON EFFECTS OF RADIATION ON EMBRYO OF MOUSE. John L. Emlet, Oak Ridge.

ELECTROPHORESIS. Wendell C. Countess, Oak Ridge.

ELECTRONIC CALCULATOR. William H. Murray, Chattanooga.

THE FUTURAMA HOME. Jackie Elizabeth Bobo, Chattanooga.

REFLECTING TELESCOPE (NEWTONIAN)—ASTRONOMICAL. Ted E. Howard, Jr., Chattanooga.

A DEMONSTRATION OF PLANETS AND THEIR RELATION TO OUR SUN. Tommy A. Davis, Knoxville.

A STUDY OF HYBRIDIZATION IN HAMPSTERS. Miner L. Moore, Knoxville.

DERIVATION OF MODERN NUMERICAL SYSTEM. Carolyn Huffstetler, Knoxville.

THE ORIGIN OF THE POLYNESIANS. Henry M. Weeks, Knoxville.

TRANSMISSION OF SOUND BY WATER. Don G. Prater, Knoxville.

THE DEVELOPMENT AND APPLICATION OF FLEXIBLE POLY-METHYL METHACRYLATE. Gilbert W. Stewart, Knoxville.

PHOTOGRAPHY. Kyle Smith, Knoxville.

PLANT GALLS OF KNOX COUNTY. Arthur D. Pratt, Knoxville.

THE ELECTRIC COMPUTATOR. Douglas McPeters, Knoxville.

POSTERS OF ZOOLOGY AND BOTANY. Martha Ann Griffiths, Chattanooga.

STATE FLOWERS. Patricia Ann Parnell, Chattanooga.

ALCOHOL EXTRACTION. Wilbur D. Hixon, Chattanooga.

TRANSMITTER EFFICIENCY. Clyde W. Pearson, Chattanooga.

WILSON CLOUD CHAMBER. BenjaminC. Johnston, Chattanooga.

BIRDS. Fredrick A. Joyner, Chattanooga.

A STUDY IN POULTRY GROWTH. Paul Peak, Chattanooga.

ROCK COLLECTION. John D. Hudson, Chattanooga.

HOW HEAT IS TRANSFERRED. Judy Marie Cooper, Nashville.

CLOTHING FOR SUMMER AND WINTER. Patricia Ann Smith, Nashville.

NUTRITION. Dorothy N. Denny, Baxter.

EFFECT OF BETA-PARTICLE BOMBARDMENT ON EMBRYONIC DEVELOPMENT OF CHICKEN. Ralph J. Mitchell, Fountain City.

DETERMINING CONCENTRATIONS DURING ELECTROLYSIS. Barbara F. Minton, Fountain City.

DEVELOPMENT OF HUMAN TEETH. Judy Jo Bolinger, Fountain City.

COLOR'S EFFECT ON FOOD PREFERENCES OF THE TEENAGER. Carolyn Jane Shafer, Fountain City.

EFFECTS OF LIGHT COLORATION ON PLANT GROWTH. Joseph R. Parrish, Jr., Fountain City.

CONSTRUCTION OF A 3-D RELIEF MODEL DEMONSTRATING THE CYCLE OF EROSION. Leland S. Grant, Fountain City.

ELEMENT FUNCTION IN THE BRAIN. Robert L. Davis, Fountain City.

CONCEPT AND DETECTION OF DIABETES. Olivia Ann McKissick, Fountain City.

AWARD WINNERS

Girls:
First Place and AAAS Award: Elizabeth Ann Compton, Knoxville.
Second Place: Carolyn Huffstetler, Knoxville.
Third Place: Carolyn Jane Shafer, Fountain City.

Boys:
First Place and AAAS Award: Wendell C. Countess, Oak Ridge.
Second Place: Miner L. Moore, Knoxville.
Third Place: Ralph J. Mitchell, Fountain City.

NEW MEMBERS, TENNESSEE ACADEMY OF SCIENCE FOR 1956

Atrsip, Robert L., Freed-Hardman College, Henderson.
Bailey, Roy H., King College, Bristol.
Barber, Edward M., Jr., Lyn Mar Hills, Morristown.
Bardwell, Dwight C., Chemistry Dept., Vanderbilt University, Nashville.
Boye, Charles Andrew, Jr., Tenn. Eastman Company, Kingsport.
Brame, Arden H., Jr., 340 South Clark Drive, Beverly Hills, Cal.
Brown, Carl D., Biology Dept, Memphis State College, Memphis.
Brown, Emma M., 412 East Second, N., Morristown.

Carpenter, Dr. John M., Dept. of Zoology, Univ. of Ky., Lexington.
Chanin, Martin, Memphis State College, Memphis.
Cheng, Thomas Clement, Miller School of Biology, Univ. of Va., Charlottesville.
Chapman, Joe, Carson-Newman College, Jefferson City.
Church, Jack, Box 74, George Peabody College, Nashville.
Clipp, Wendell V., David Lipscomb College, Nashville.
Connor, Stanley J., 1206 Morgan Street, Rushville, Ind.
Cook, Arthur H., 1401 18th Ave. So., Nashville.
Davis, Graham J., Dept. of Biology, Univ. of Tenn. Martin Branch, Martin.
Deweese, Mr. Robert, 105 Malvern Road, Oak Ridge.
Driscoll, Mr. J. J., Notre Dame High School, 308-310 E. Eighth St., Chattanooga.
Dunlap, Mrs. Mary Burton, 2701 Hawthorne Pl., Nashville.
Ellis, William H., 2019 Montgomery Parkway, Clarksville.
Gaines, Jane McMahon, Box 828 Station B, Vanderbilt Univ., Nashville.
Garth, Richard E., Box 754, East Tenn. State College, Johnson City.
Goodwin, Mr. William A., Perkins Hall, Univ. of Tennessee, Knoxville.
Grenchik, Raymond T., Vanderbilt Univ., Nashville.
Haynes, James D., Dept. of Botany, Univ. of Tenn., Knoxville.
Hawkins, James L., 1600 Laurel Ave., Apt. 3, Knoxville.
Heustess, Mr. James H., Tenn. Military Institute, Sweetwater.
Johnson, Charles L., Burt High School, 110 Bailey St., Clarksville.
Kammerud, Robert L., 2712 Westwood Ave., Nashville.
Kavlak, Ali Riza, Box 2571, George Peabody College, Nashville.
Kerce, Mr. R. H., David Lipscomb College, Nashville.
Key, James F., George Peabody College, Nashville.
King, Lloyd A., Martin.
Kingman, Owen, Ducktown.
Kroll, Jr., Harry H., 7025 Nubbin Ridge, Knoxville.
McGinnis, John T., 1431 Island Home Avenue, Knoxville.
Macon, David R., 224 N. Purdue No. 108, Oak Ridge.
Markovitch, Simon, Agricultural Experimental Station, Knoxville.
Martin, Mrs. Gloria Jean, 178 Green St., Athens.
Moulton, F. R., AAAS Library, 1515 Massachusetts Ave., N. W., Washington, D. C.
Nicks, E. Bailey, 411 32nd Ave. S., Nashville.
Otis, Marshall V., 1505 Linville, Kingsport.
Peterson, Mrs. Sigfred, 332 E. Fairview Rd., Oak Ridge.
Rankin, Miss Betty Joy, William Jennings Bryan Univ., Dayton.
Roesel, Mrs. Hilde, 235 F—Street, Elizabethton.
Scott, Dan D., Middle Tenn. State College, Murfreesboro.
Shields, Dr. Fletcher D., Route 6, Murfreesboro.
Shipe, Miss Lula, Route 12, Knoxville.
Sierk, Herbert A., Dept. of Botany, Univ. of Tennessee, Knoxville.
Skinner, John Taylor, Box 84A, Tenn. Poly. Inst., Cookeville.
Slaughter, E. J., 115 W. Vance Rd., Oak Ridge.
Stokes, William G., 504 College St., Clarksville.
Taylor, Donald Marberry, 2215 Belmont Blvd., Nashville.
Thompson, Hughes M., Chemistry Dept., Tusculum College, Greenville.

Thurnauer, Hans, American Lava Corp., Chattanooga.
Wade, John Sperry, Jr., Box 80, Middle Tenn. State College, Murfreesboro.
Watts, Exum D., Middle Tennessee. State College, Murfreesboro.
Wilkes, Dr. James C., Jr., Jacksonville State College, Jacksonville, Alabama.
Wiser, J. Eldred, Dept. of Chemistry & Physics, Middle Tenn. State College, Murfreesboro.
Wishart, A. Paul, Box 2819, Atlantic Refining Co., Dallas, Texas.
Wolfe, Mrs. Crilla, Rutledge High School, Rutledge.
Womack, James D., Berry Hall, Univ. of Tenn., Knoxville.

CONSTITUTION AND BYLAWS OF THE TENNESSEE ACADEMY OF SCIENCE CONSTITUTION

(As revised at The Annual Meeting on November 30, 1956)

ARTICLE I

Names and Objects

Section 1.—This organization shall be known as the Tennessee Academy of Science.

Section 2.—The purposes of this organization shall be to promote scientific research and the diffusion of knowledge concerning science; to secure communication between persons engaged in scientific work, especially in Tennessee; to assist by investigation and discussion in developing and making known the material, educational, and other resources and riches of the state; to arrange and prepare for publication such reports of investigations and discussions as may further the aims and objects of the Academy.

ARTICLE II

Membership and Dues

Section 1.—The membership of the Academy shall consist of seven classes: Members, Fellows, Sustaining Members, Life Members, Honorary Members, Industrial Members, and Patrons.

Section 2.—Members. Any person of good moral character, interested or engaged in scientific work may be nominated for membership. Nominations must be made through the Secretary and must be endorsed by two members. Members are selected at the annual meeting by a majority of the members present. In the interim between meetings the Executive Committee shall elect members, subject to ratification at the next annual meeting.

Section 3.—Fellows. Members who are professionally engaged in scientific work and who have advanced science by research or other activities may be elected fellows at any regular meeting by a three-fourths vote of the members present, after having been recommended by the Executive Committee.

Section 4.—Sustaining Members. Any member who contributes ten dollars ($10.00) or more to the Academy becomes a sustaining member for that year. Institutions may also become sustaining members.

Section 5.—Life Members. Any member who makes a single payment of $75.00 becomes a Life Member and may enjoy all the privileges of the Academy without further payment of dues.

Section 6.—Honorary Members. Persons who have attained prominence in, or made outstanding contribution to, science or any other branch of learning, on the recommendation of the Executive Committee, may be elected honorary members at any regular meeting by a three-fourths vote of members present. No more than three honorary members shall be elected in any year.

Section 7.—Industrial Members. An industrial organization may be elected by the Executive Committee to industrial membership. The annual dues for such memberships are $25.00.

Section 8.—Patrons. Any person, institution, or business organization contributing $100.00 or more to the Academy becomes a patron of the Academy.

Section 9.—Dues. The dues of sustaining members, life members, industrial members and patrons shall be as given in sections 4, 5, 7, and 8 respectively of this article. The annual dues of members and fellows are three dollars ($3.00). Honorary members are exempt from the payment of dues.

ARTICLE III

Officers

Section 1.—The officers of the Academy shall consist of a President, President-Elect, Secretary, Treasurer, Editor, and Director of the Reelfoot Lake Biological Station. All officers except the Editor and the Director of the Reelfoot Lake Biological Station shall be elected by ballot at the annual meeting and shall hold office for one year. The new officers shall take office on January 1 following the annual meeting at which they are elected. The Editor and Director of the Reelfoot Lake Biological Station shall be elected by the Executive Committee and shall hold office for three years. Officers shall be eligible for re-election.

Section 2.—The President shall preside over all meetings of the Academy and of the Executive Committee. He shall be responsible for the administrations of all activities of the Academy and shall cause the provisions of the constitution and bylaws to be faithfully carried out. He shall call special meetings of the Academy and Executive Committee whenever he shall consider such meetings necessary, or upon written request of a majority of the Executive Committee. He shall appoint all standing committees.

Section 3.—The President-Elect shall, in the absence of the President, preside over all meetings and shall assume the powers and prerogatives of the President. The President-Elect shall become the President at the end of one year.

Section 4.—The Secretary shall keep a record of all meetings of the Academy and of the Executive Committee and shall prepare them for publication in the Journal. He shall conduct all correspondence relating to the Academy. He shall also keep a record of the membership of the Academy and shall inform the Treasurer of any changes affecting the status of members.

Section 5.—The Treasurer shall receive and disburse all of the funds of the Academy excepting those pertaining to the Reelfoot Lake Biological Station. He shall keep a record of the dues paid by the members. He shall present at the annual meeting a tentative report of the receipts and disbursments to date. In January he shall present for publication in the Journal a detailed written report to the Executive Committee which has been approved by the auditing committee appointed at the preceding annual meeting. The fiscal year shall be the same as the calendar year.

Section 6.—The Editor shall edit and manage the Journal of the Tennessee Academy of Science and such other publications as the Academy may from time to time publish. He shall be assisted by an Editorial Board consisting of one editor elected by each section, by an editor of the News of Tennessee Science, and by an editor of a section devoted to th High School Science Teacher, both of the latter to be approved by the Executive Committee.

Section 7.—The Director of the Reelfoot Lake Biological Station shall have charge of the laboratory. He shall select an Advisory Committee, members of which shall be subject to confirmation by the trustees. He shall

prepare a report of the activities of the biological station for the current year to be presented at the annual meeting and this report shall be published in the Journal.

ARTICLE IV

Executive Committee and Board of Trustees of the Tennessee Academy of Science; the Representative to the A.A.A.S.; Committees.

Section 1.—The officers of the Academy, the immediate past president, the sponsor of the Junior Academy, and three other members shall constitute the Executive Committee of the Tennessee Academy of Science. Each newly elected President shall appoint one member of the Committee. Each appointed member shall serve for three years. The business of the Academy not otherwise provided for shall be in the hands of the Executive Committee. It shall also pass on any business matters that arise in the interim between meetings, including the election of new members. These latter shall be subject to ratification at the next meeting of the Academy.

Section 2.—A vacancy in the Executive Committee may be filled by a vote of remaining members of the Committee.

Section 3.—A quorum of the Executive Committee shall be a majority.

Section 4.—The Executive Committee shall constitute a Board of Trustees of the Tennessee Academy of Science.

Section 5.—The Executive Committee of the Academy shall constitute the Board of Trustees of the Reelfoot Lake Biological Station.

Section 6.—The Executive Committee shall appoint a representative to the Council of the A.A.A.S. and Academy Conference who meets the requirements established by the A.A.A.S.

Section 7.—The following Committees shall be Standing Committees of the Tennessee Academy of Science.

Auditing	Necrology	Research
Fellows	Nominating	Resolutions
Membership	Program	Tennessee Science Talent Search

All Standing Committees shall be appointed by the President. Other Committees may be appointed by the President subject to the approval of the Executive Committee.

ARTICLE V

Affiliations; Affiliated Societies; Sections.

Section 1.—Provision is hereby afforded for the affiliation of the Academy with the A.A.A.S.

Section 2.—Affiliated Societies. Any state scientific organization, or section of a national organization may, upon application, be elected, an Affiliated Society by the Executive Committee. Such Affiliated Societies may have a brief report of their annual meeting published in the Journal of the Tennessee Academy of Science.

Section 3.—Sections of the Academy. Upon application to the Executive Committee by not less than fifteen members, permission may be granted to form a section of the Academy, subject to ratification at the annual meeting. These sections in general shall correspond to those of the American Association for the Advancement of Science. Officers of these sections shall be a Chairman, a Secretary, and an Editor, to be elected by the section.

Section 4.—Provision is hereby afforded for sponsorship of a Junior Academy of Science by the Tennessee Academy of Science.

Section 5.—Provision is hereby afforded for sponsorship of a Collegiate Division of the Tennessee Academy of Science.

ARTICLE VI
Publications

Section 1.—The official publication of the Academy shall be called the Journal of the Tennessee Academy of Science and shall be published quarterly in January, April, July, and October.

Section 2.—On recommendation of the Editor, the Executive Committee may from time to time provide for special or additional publications.

ARTICLE VII
Meetings

Section 1.—An annual meeting shall be held at a time and place to be determined by the Executive Committee. Other special meetings may be held at such time and places as the Executive Committee may determine.

Section 2.—Twenty-five voting members shall constitute a quorum for the transaction of business.

ARTICLE VIII
Accounts

Section 1.—The fiscal year of the Academy shall end on December 31. All annual dues for the ensuing year shall be due on January 1. Any member in arrears for dues for two years shall be dropped from the roll of members, provided he has had at least four notices mailed to him.

Section 2.—A Committee of two shall be appointed by the presiding officer at each annual meeting to audit the accounts of the Treasurer for the closing fiscal year. This committee shall be known as the Auditing Committee.

ARTICLE IX
Amendments

Section 1.—This constitution may be amended at any annual meeting by a two-thirds vote of the voting members present, provided that the amendment has been proposed at the preceding annual meeting, or has been recommended by the Executive Committee and that a copy has been sent to every voting member of the Academy at least fifteen days before the date of the meeting.

ARTICLE X
Bylaws

Bylaws may be adopted, amended, or repealed at any annual meeting by a majority vote of the voting members present.

BYLAWS

1. Notice of all meetings of the Academy shall be sent to all of the members at least 2 months in advance of the date of the meeting.

2. A program committee, of which the President-Elect shall be the chairman, shall be appointed by this chairman at least six months in advance of the date of the meeting.

3. Election of officers, except the Editor and the Director of the Reelfoot Lake Biological Station, shall be by ballot, but, with unanimous consent of the members, the Secretary may cast one ballot, representing the unanimous vote of the members present. A nominating committee shall be appointed by the president before the annual business meeting to nominate officers to serve the Academy during the ensuing year.

4. A committee of three on resolutions shall be appointed by the President before the annual meeting.

5. Any member one year in arrears for dues shall be ineligible to vote or to hold an elective office in the Academy. The Journal of the Tennessee Academy of Science may be withheld from members in arrears at the discretion of the Executive Committee, until dues in arrears shall have been paid.

6. The single subscription price of the Journal of the Tennessee Academy of Science is $3.00 per year.

7. The order of the business at annual meetings shall be as follows:
   1. Call to order by the President.
   2. Reading of the minutes of the previous meeting.
   3. Reports of officers.
   4. Election of members.
   5. Business.
   6. Reports of committees.
   7. Election of officers.
   8. Adjournment.

   The order of business may be changed.

8. Bylaws may be adopted, amended, or repealed at any annual meeting by a majority vote of the voting members present.

9. The rules contained in Robert's Rules of Order shall govern the Academy in all cases in which they are not inconsistent with the Constitution and Bylaws of this organization.

News of Tennessee Science

Newsworthy items suitable for this column should be addressed to the News Editor, Dr. Carl Tabb Bahner, Carson-Newman College, Jefferson City, Tennessee

Department of Biology, Vanderbilt University

Harold C. Bold will direct the course in Marine Botany at the Marine Biological Laboratories, Woods Hole, Mass. from June 11 - July 20. He will also lecture at Cornell University during the last two weeks of the summer institute in botany for college teachers which is to be sponsored by the Botanical Society of America and supported by the National Science Foundation.

Gina Arce will assist during the summer in the Marine Botany course at the Marine Biological Laboratories at Woods Hole.

Arthur P. Harrison will be a Research Participant at Oak Ridge for the months of June, July and August.

The Smithsonian Institute recently announced the publication of "Chiggers of the Genus Euschöngastia" by Charles E. Farrell.

Fred T. Wolf is the recently elected Botany Editor of the Tennessee Academy of Science Journal.

Elsie Quarterman has received an $8100 grant from the National Science Foundation to continue study of hardwood stands in the Coastal Plain of the Southeast. Catherine Keever, State Teachers College, Millersville, Pennsylvania is co-investigator.

Department of Biology, George Peabody College for Teachers

Claude S. Chadwick, of George Peabody College for Teachers, attended the meeting of the Committee on Educational Policies of the National Research Council in Washington, D. C. on Jan. 11 and 12. Dr. Chadwick is a member of the committee.

(*Continued on Page* 151)