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PROCEEDINGS OF THE TENNESSEE ACADEMY OF SCIENCE FOR 1951

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

MEETING OF THE EXECUTIVE COMMITTEE
Nashville Meeting

A meeting of the Executive Committee of the Academy was held at the Joint University Libraries at Nashville on February 10, 1951, with the following members present: Clinton L. Baker, Moffatt G. Boyce, Warren M. Deacon, Carl K. Seyfert, E. Bayliss Shanks, Jesse M. Shaver, and Arlo I. Smith. Other members of the committee were unable to attend because of a severe ice storm. Minutes of the last Executive Committee meeting were read and approved.

Appointments approved were as follows:

Member of the Executive Committee: Dr. Samuel L. Meyer, University of Tennessee, Knoxville to serve for 1951, 1952, and 1953.

Historian: Dr. George R. Mayfield, Nashville.

Representative on the Council of the A. A. A. S.: Dr. Clinton L. Baker, Southwestern at Memphis.

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

The appointment by Clinton L. Baker, Director of the Reelfoot Lake Biological Station, of Dr. Royal E. Shanks, University of Tennessee, Knoxville, as a member of the Advisory Committee of the Reelfoot Lake Biological Station to serve for 1951, 1952, and 1953, was confirmed.

Reports: A. A. A. S. Representative Clinton L. Baker reported he was elected President of the Council of Academies for the year 1951 and hoped to get the Council in functioning order. He mentioned that he could still be the representative from the Tennessee Academy as he was elected in June, 1950. Brief interim reports were given by the Editor, the Treasurer, and the Secretary. These reports were brief because of the short span of time since the Fall Meeting.

Unfinished Business: Appointment of a Membership Committee was to be left to the president, the secretary being only an ex-officio member, not chairman this year. It was suggested that special emphasis be placed upon getting Sustaining Members.

New Business:

1. A motion was made by Dr. Baker that a membership certificate be mailed by the secretary immediately to each member upon election to membership and that a membership card be mailed out to each member by the Treasurer upon payment of his dues. This motion was unanimously approved by the Committee.

2. Review of the status of types of membership was discussed and a recommendation was made that we should seek out individuals of influence as well as

those who have done research and give them an Honorary Membership. This action was recommended by the Committee.

3. In view of the above recommendation, motion was made by Dr. Baker that the following men be recommended to the Academy members for election to Honorary Membership in the Tennessee Academy of Science:

Mr. Lou Williams of Chattanooga, Immediate Past President and Founder of the Tennessee Conservation League, and president for the past five years. He was presented a 1951 Oldsmobile at the annual Convention of the League held in Nashville on February 9 as a token of appreciation by its members. He is a member of the Board of the Outdoor Writer's Association of America, Chairman of the Keep Tennessee Green Committee, and now very active in campaigning to eliminate pollution from the streams of Tennessee.

Mr. Lucius E. Burch, Jr., of Memphis, first Chairman of the Tennessee Game and Fish Commission, attorney, promoted through the legislature the Model Game Law, and installed the state civil service for game wardens.

The Executive Committee voted unanimously to recommendation for honorary membership both Mr. Williams and Mr. Burch.

4. Interpretation of Science: After much discussion on the subject, the following suggestions were made: more emphasis should be made on getting members from various industries; more people should know of the Academy, its aims, activities, and composition; membership should be circularized as to their willingness to participate in a publicity program and probable topics they might be qualified to discuss; a syndicated column under the heading of "interpreting science" or "understanding science" might reach more readers than a radio program and might also be more successful than a speaker's bureau. The Committee recommended that a Publicity Committee be organized and that Dr. George R. Mayfield be made Chairman. Since the President, Dr. Carl T. Bahner was unable to attend this particular meeting of the Executive Committee and because Dr. Mayfield had not been contacted, the Committee left this as a recommendation.

5. Improvement of Science Teaching: The following are suggestions to be kept in mind as the Academy progresses but not to be acted upon all at one time. Change our Fall Meeting programs to a more popular variety that will encourage attendance of secondary school teachers; present less detailed research results at meetings; organize a Section on Science Teaching or at least have an annual symposium; possibly elect a Liason Officer whose responsibility would be to keep the Academy properly informed of proposed activities of the Tennessee Educational Association and related organizations and to make recommendations pertaining to those activities, and perhaps initiate the formation of a basic science board which might make recommendations as to the qualification of science teachers, content of science courses in secondary schools, proper standardization and other related subjects.

6. Support of Research: The Executive Committee initiated the formation of a Research Committee which would coordinate activities of research and public relations, promote greater academy interest in research and in supporting it, seek advice from industrial and organized research organizations, and seek out and notify members of available research grants.

7. Conservation of Natural Resources: Seek a liason committee to coordinate and cosponsor activities of the State Game and Fish Departments, Game and Fish Commission, Tennessee Conservation League, and all other interested organizations. Perhaps study the possibility of organizing a section in the Academy on Conservation and/or Agriculture.

8. Natural History Studies: This topic under discussion proved of such scope that it was decided to leave the gathering of data in the various fields to organized committees for each. These committees are to be found under a separate section of these proceedings.

9. The organization of a Collegiate Section: Since last fall the newly formed Collegiate Section has been making plans for better programs, progress being very satisfactory.

10. Standards and Quality of Fall Meetings: The Committee, realizing that

improvement is needed, suggested a call for more papers concerning teaching methods, more general rather than specific detailed research papers, emphasize quality rather than quantity on the program, invite other organizations where possible, to join us in the state meetings, ask other state academies to send representatives to our meetings and seek to reciprocate, and finally the committee suggests the formation of a committee to present national and state political proposals which might be of influence on state scientific activities.

Because several members of the Executive Committee were unable to attend this meeting, final action was not taken at this time on the above topics, but the material was transmitted to those not present with the recommendation that they be acted upon at the earliest convenience. Most of those problems were probably considered by the president in his later appointments.

The Executive Committee adjourned until the time of the Fall Meeting to be held in Clarksville.

Clarksville Meeting

The Executive Committee of the Academy was called to order on the night of November 9, 1951, in the Administration Building of Austin Peay State College at 8:00 p.m. by President Carl T. Bahner. In addition to Dr. Bahner those present were, Carl K. Seyfert, Vice-President, Arlo I. Smith, Secretary, Moffatt G. Boyce, Treasurer, Jesse M. Shaver, Editor, Warren M. Deacon, and Royal E. Shanks. Unable to attend were the other two members, Clinton L. Baker and Irvin W. Grote.

Minutes of the Nashville meeting were read and approved.

Reports of officers were as follows:

The Editor of the *Journal of the Tennessee Academy of Science* reported that the Journal was in fair shape but that some recognition must be given to the fact that the Editor was soon to reach retirement age and would not be able to carry on his duties much longer. The Secretary reported there were sixty-seven names of new members to be voted upon by the members. These were read and the Committee passed upon the applications of those mentioned above. The Secretary reported more members dropping than additions to the Academy during the past year, indicating that the membership committee should make a concerted effort in the future to get more members. The Treasurer made a preliminary report to the Committee.

Appointments approved were as follows:

Member of the Executive Committee: Royal E. Shanks, University of Tennessee to take the unexpired term of Samuel L. Meyer who has left the state. His term is for 1951, 1952, and 1953.

Auditing Committee: Archibald N. McPherson and F. Lynwood Wren.

Fauna Committee: A. C. Cole, Jr., Mike Wright, J. C. Howell, Arthur Stupka, Perry C. Holt, and James J. Friauf.

Flora Committee: Royal E. Shanks, Eleanor McGilliard, Jesse M. Shaver, Elsie Quarterman, L. K. Clarke, T. A. Frick, Frank Barclay, Arthur Stupka, Robert W. McGowan, Charlotte Gailor, A. J. Sharp, and Arlo I. Smith.

Conservation of Natural Resources Committee: Lillian A. Worley, W. B. Jewell, J. H. Padfield, Jr., A. F. Ganier, T. N. Lewis.

Committee on Improvement of Science Teaching: (also functioning as the Science Talent Search Committee) James L. Major, Calvin A. Buehler, Howard C. Kirksey, Katherine Matthews, Charles S. Shoup, and Hanor A. Webb.

Research Committee: Russell S. Poor, J. H. Coulliette, E. E. Litkenhous, Frederick T. Wolf, Carl M. Hill, and M. L. MacQueen.

Publicity Committee: G. R. Mayfield.

Committee on Arrangements: John B. Bond, Sam K. Bright, Haskell Phillips, Ted C. Cobun, George Rollins.

Program Committee: R. R. Spafford.

Resolutions Committee: A. F. Ganier, Flora Haas, and Eleanor McGilliard.

Nominating Committee: H. A. Webb, H. D. Dawson, and Clinton L. Baker.

Unfinished Business: None remained to be considered.

New Business:

1. The president reported receipt of invitations for the 1952 Fall Meeting from The Gatlinburg Chamber of Commerce, The University of Chattanooga, and Memphis State College. After careful consideration of the factors involved, the Executive Committee accepted the invitation extended by the University of Chattanooga and voted to express the appreciation of the Academy to the other invitees and to ask that they invite the Academy again in the near future.
2. The Committee approved the payment of railroad fare to the Academy Representative to the Council of Academies of the A. A. A. S. for the Fall Meeting, 1951.
3. The Committee voted to delay action on making the A. A. A. S. Grant-in-aid for research until later. This action was necessary as the Committee did not have on hand all pertinent data desired in order to reach a satisfactory decision.

After much discussion of the ways and means of science improvement in the state, the Committee adjourned *sine die*.

THE SIXTY-FIRST ACADEMY MEETING

General Remarks

The Sixty-First Academy Meeting was held November 9 and 10, 1951, at Austin Peay State College, Clarksville, Tennessee. Following registration on Friday morning the First General Session met with the Academy President presiding. At noon the members adjourned to a very fine luncheon in the A. P. S. C. Cafeteria, it is to be congratulated for serving such fine well-prepared food at such reasonable cost. Several remarks were heard reflecting the open minded attitude of both the college and the academy in not segregating the colored members of the academy from the other members.

Friday afternoon was given to the various sectional meetings with the following chairmen presiding: *Botany Section,* James W. Shaw; *Chemistry Section,* H. D. Dawson; *Geology-Geography Section,* Stewart W. Maher; *Mathematics Section,* E. Baylis Shanks; *Physics-Astronomy Section,* Ingram Bloch; *Psychology Section,* Julian C. Stanley; *Zoology Section,* Perry C. Holt. Immediately following the meetings of the sections, the Austin Peay State College Faculty played host to the Academy at a reception in the Home Economics Department at the Science Building. The annual persidential address was presented by Dr. Balmer following the Academy Dinner which was held in the Governor's Room of the Hotel Montgomery. Saturday morning was quite crowded with events being held simultaneously, a condition which should be remedied so that more people could attend each meeting. The Academy Business meeting, the Collegiate Division, and the Junior Academy were all meeting at the same time and the Business Meeting was followed by the Second General Session (Carl K. Seyfert, presiding). The Collegiate Section met for its second annual meeting and the Junior Academy for its tenth annual meeting.

GENERAL SESSIONS

Friday Morning

The Effect of a Fence-Row Tree. Royal E. Shanks, *University of Tennessee,* Knoxville. Sampling of height and yield in a corn field adjacent to a fence-row tree provided a basis for evaluating the cost of the tree. The smooth trend of decreasing effect away from the tree suggests the use of root competition as an experimental tool where a series of soil moisture levels below field capacity is required.

Statement of a Biological Principle. W. H. and Herman Silva, *U. S.*

Quartermasters Depot, Charlotte, N. C. Biological principles, as they are understood and interpreted, form frames within which the phenomena of life fit. Whether followed consciously or not, these principles confine the work of teachers and researchers. If principles are consciously recognized, the reasons for many more limited interpretations could be appreciated, and there would be a tendency to purify both the narrower conclusions and broader principles, through criticism. The biological principles of "Progressive Development," "Survival of the Fittest," and others have had an effect on mankind far more than academic interest, and they are destined to be followed consciously and deliberately by some segments of society. It is suggested that some previously stated principles may be interpreted as expressions of a broader, unifying principle, which has hitherto not been popularly recognized.

Apparatus for Measuring the Radioactivity of Live Fish. J. M. Garner, Jr., *Health Physics Division,* Oak Ridge. An instrument consisting of two probes for measuring the beta and gamma activity of live fish, with a preamplifier and a battery-operated portable scaler is described. The method of the calibration and the use of the instrument is discussed.

Portraits of Western Plants. Aaron J. Sharp, *University of Tennessee,* Knoxville. About fifty color slides of plants characteristic of the California coastal range are presented, among those being the following: the Redwood, the Big Tree, Monterrey Cypress, White Flowering Raspberry, Mariposa Lily, Chilean Strawberry, Sea Fig, Owl Clover, Brodiaea, an arboreal red alga, Western Old Man's Beard, Western Dogwood, Western Alum Root, Marine Algae, Rhododendrons, Western "Lilac," and "Willows at Dawn."

Saturday Morning

Education and Scientific Method. Wilbur K. Butts, *University of Chattanooga,* Chattanooga. Most science courses designed to give an understanding of meaning and method are also devoted to the subject matter of some particular field. There is thus confusion of purpose. If much attention is given to philosophical aspects, subject matter study is curtailed. The author gives a course devoted entirely to understanding science. Students are assigned "research" problems. The philosophy and logic of science are discussed in relation to their research. Among the topics included in the course are: Bibliographical search, theories of method, limitations, history, semantics, statistics, planning experiments, errors in collecting and interpreting data; relation of science to mathematics, religion, language, art, and every day life. By giving training in solving problems it is of value for both science and general education.

Bahama Report. William G. Hassler, Director, *Children's Museum,* Nashville, Tennessee. This summer the Nashville Children's Museum sent an expedition to the Bahamas to collect specimens of marine life for a large diorama. When completed, it will depict an underwater coral reef scene. This will be constructed and installed in the museum as time and funds permit. The six weeks expedition was made possible by Dr. Rudolph A. Light, Vanderbilt surgeon and Trustee of the Museum, and was co-sponsored by the Nashville Banner. Fish were cast in plaster and then preserved in the field by the Museum's preparator Mr. Phil Crouch. Color photos were made for color notes. Considerable diving was done by members of the party and about a ton of coral and other specimens was brought back. The finished group will shown not only colorful and unusual life in the sea, but will be of use to teachers and students, presenting a great variety of invertebrates and vertebrates and the adaptation of life to a specific environment.

BOTANY SECTION

Some Effects of the 1951 Drouth on Cedar Glade Vegetation. Elsie Quarterman, *Vanderbilt University,* Nashville.

Progress Report on the Study of Plant Succession After Chestnut Death in the Southern Appalachians. Frank W. Woods, *University of Tennessee,* Knoxville. A critical study of chestnut replacement is being made in the southern Appalachians. The method of study is based upon the study

of forest types in which chestnut was present and the individual openings in the forest canopy brought about by the death of chestnut trees. The method of study is outlined and some data are discussed.

REPORT ON THE BOTANICAL STUDIES OF THE ECOLOGICAL PROGRAM OF WHITE OAK CREEK, OAK RIDGE, TENNESSEE. Felton R. Nease, *Oak Ridge National Laboratory,* Oak Ridge. The ecological study of White Oak Creek and Lake began in July 1950, with investigations in the fields of fisheries biology, limnology, and botany. The botanical program includes the study of land, marginal, and aquatic vegetation of this watershed. The entire study is related to the question of radiation damage, with special reference to the rate and amount of absorption, genetic abnormalities, morphological changes, or excessive mortality in the flora. To date, the results indicate no significant changes in the flora that might be related to radiation damage.

SOME MEDICAL PLANTS OF TENNESSEE. L G. McLean, *Tennessee Conservation Department,* Nashville.

PHOTOMICROGRAPHY. Haskell C. Phillips, *Austin Peay State College,* Clarksville. With increased use of photomicrographs as an aid to teaching, many teachers and students are finding it desirable to take photographs in their laboratories. This is not a difficult task providing one has a reasonable amount of equipment and understands a few simple rules. The ordinary microscope is used. The camera may be either the box type or a more expensive type, or one made especially for the purpose. The light source is important particularly if color photographs are attempted. Photomicrographs are a valuable aid in teaching botany. They broaden the usefulness of the microscope in that a preview can be given of a microscope slide and a post view can be used for discussion.

PATHOLOGY OF CAMELLIA LEAVES INFECTED BY EXOBASIDIUM CAMELLIAE VAR. GRACILIS SHIRAI. Frederick T. Wolf, *Vanderbilt University,* Nashville. *Exobasidium Camelliae* var. *gracilis* causes a disease of *Camellia Sasanqua* characterized by an enlargement of all leaves on new shoots and exfoliation of the lower epidermis and contiguous tissues. Histological examination indicates that both hypertrophy and hyperplasia of host cells are involved. Differentiation of the leaf mesophyll is inhibited as a result of the infection. Basidia begin their development within the leaf and cause a sloughing off of the lower epidermis and contiguous cells, whereupon the basidia are exposed and complete their development on the new surface resulting. This organism in culture produces indole acetic acid. It is suggested that this substance may account for a part of the pathological changes.

PURSUIT OF THE ALGAE OF THE TENNESSEE VALLEY REGION. Herman Silva, *U. S. Quartermasters Depot,* Charlotte, N. C. This is a report on investigations begun ten years ago but interrupted for some time by World War II service. Collections for the study have been made in seventy-five of the ninety-five counties of Tennessee, and in seven of the surrounding states. Over two thousand collections were examined and almost eight hundred species in 230 genera were identified, approximately half of which were green algae. All major groups of fresh water algae were included however, and over one hundred diatoms were recorded. Fifteen new species and varieties were encountered, including *Rhizoclonium giganteum* sp. nov. which is the largest single filament alga ever encountered in fresh water. The major portion of the investigation has been systematic, and problems have been encountered which made impossible the mere identification of species according to past ideas.

DYSMORPHOCOCCUS GLOBOSUS SP. NOV. FROM THE CANEY FORK RIVER. Harold C. Bold, *Vanderbilt University,* Nashville. The genus *Dysmorphococcus* was established by Takeda in 1916 for Chlamydomonas-like algae encased in a non-compressed lorica with two flagellar apertures. The present species, *D. globosus,* differs in several morphological respects from other species of the genus; these include cell size, form, number of pyrenoids, arrangement of contractile vacuoles, presence of papillate protuberance on the lorica, and ornamentation of the latter. *D. globosus* was collected in rock pools of Caney Fork River at Rock Island, Tennessee, August 2, 1951. It has been maintained in soil-water cultures

in the laboratory since that time. Its morphology and reproduction are described and illustrated.

SOME NOTES ON MARCHANTIA PALEACEA. Roderick Outland, *Vanderbilt University,* Nashville. Two locations in Tennessee are reported for *M. paleacea* Bertol. A description of the distinguishing characteristics of the species and a discussion of the ontogeny of the air chambers are present. The specimens collected possess the atributes characteristic of *M. paleacea* except that they lack sclerotic cells in the compact ventral tissue. Cytological investigation indicates that the air chambers arise endogenously by an enlarging of intercellular spaces just underneath the epidermis.

SOME VARIATIONS FOUND IN THE TENNESSEE MATERIAL OF THE CINNAMON FERN (OSMUNDA CINNAMONEA). Jesse M. Shaver, *George Peabody College for Teachers,* Nashville. One hundred twenty collections of the cinnamon fern from Tennessee have just been studied. In this process, five variations of a minor nature, affecting mainly the shape, margin, and veining of the segments, were discovered. This report is a brief description of these variations.

PROGRESS OF THE STATE FLORA PROJECT. Aaron J. Sharp, *University of Tennessee,* Knoxville.

A CHECK-LIST OF THE WOODY PLANTS OF TENNESSEE. Royal E. Shanks, *University of Tennessee,* Knoxville. With the publication of an annotated list of woody plants, another major phase of the state flora project will be completed. This list and distribution notes are based on a series of spot maps available for reference at the University of Tennessee. Problems in certain critical groups remain to be solved. Attention to these groups and extensions of known ranges are invited.

AZALEAS ON GREGORY BALD. Fred Galle, *University of Tennessee,* Knoxville.

CHEMISTRY SECTION

STUDIES OF STRUCTURE OF KETENE DIMERS. Carl M. Hill, Mary E. Hill, Helen I. Schofield, and Lonnie Haynes, *Tennessee A. & I. State University,* Nashville. Recently several investigators have reported studies attempting to elucidate structure of both mono- and di- substituted ketene dimers. Five possible structures for mono-substituted ketene dimers have been given consideration. The results of ozonization, catalytic hydrogenation, and lithium aluminum hydride studies of several omega-cyclohexyl substituted alkylketene dimers are presented as supporting evidence for the beta, gamma-unsaturated beta-lactone structure.

GEOLOGY-GEOGRAPHY SECTION

No abstracts received.

MATHEMATICS SECTION

INTERESTING MATHEMATICAL PROPERTIES USED IN SURVEYING THEORY. Walter W. Graham, *Vanderbilt University,* Nashville. For purposes of determining the area of a plot of land or for drawing a map of such, it is necessary to get lengths and directions of the lines which make up its boundary. By choosing a convenient set of axes, coordinates for the corners of the area can be determined. The property which is used in determining square units in the area may be stated as follows: the area is one half the sum of the products of each abscissa times the difference between the following and the preceding ordinate, reading in counter-clockwise direction. Before a highway can be paved its base must be graded so as to give a smooth riding effect and to allow for sight distance when going over a rise. The vertical curve used in such grading is that of a parabola. One of the properties of a parabola which is most useful is this: The distance from the tangent line to a parabola to the parabola itself varies as the square if its distance from the point of contact of tangency. Another property which is a most convenient check is: The second differences between the ordinates on a parabola, when equally spaced abscissas are used, are equal. Horizontal curves used in designing

a highway are usually circles. These were discussed and also the lag of a chain in chainings.

NON-EUCLIDEAN GEOMETRY IN A PROGRAM OF TEACHER TRAINING. J. H. Banks, *George Peabody College for Teachers,* Nashville. To be published in full in a forth-coming number of the Journal.

SOME PROPERTIES OF THE FUNCTIONS DEFINING PEANO'S SPACE-FILLING CURVE. Moffatt G. Boyce, *Vanderbilt University,* Nashville. Let x(t) and y(t) denote the functions given by Peano in 1890 as defining a curve which passes at least once through every point in the unit square as t ranges from 0 to 1. These functions have interesting properties when considered separately as functions of t. Each is single-valued and continuous but non-differentiable at every point in the interval 0 to 1. They are easily shown to be of unbounded variation on every sub-interval. The set of values of t which give a constant value of x (or of y) is perfect and has the cardinal number of the continuum but has measure zero and is non-dense in every sub-interval. Each x (or y) which is representable as a terminating fraction in the ternary scale is a relative maximum for a non-denumerable number of values of t and also is a minimum for such a set of values. Finally the integral of x(t) or of y(t) between any two values of t representable as terminating ternary fractions can be found in a finite number of steps.

A NON-ASSOCIATIVE ALGEBRA GENERATED BY SQUARE MATRICES. G. C. Holt, *Tennessee Polytechnic Institute,* Cookeville. This paper is suggested by a problem in finite dimensional vector space over the field of complex numbers.

DISTANCIAL EXTENSION FUNCTIONS. E. Baylis Shanks, *Vanderbilt University,* Nashville. A distancial extension function is a function f(d) such that f(d(p, q)) is a distance function when d(p, q) is a distance function.

AN APPLICATION OF THE SCHWARZ-CHRISTOFFEL TRANSFORMATION. L. T. Ratner, *Vanderbilt University,* Nashville. The Schwarz-Christoffel transformation which maps the interior of a polygon conformally upon the upper half-plane, is a standard tool in the theory of a complex variable. We apply this transformation to several degenerate polygons in order to determine the electric potential and field components within a pair of idealized cyclotron dies. Physically, this is of use in determining the initial ion motion in the fixed frequency cyclotron.

PHYSICS AND ASTRONOMY SECTION

SCINTILLATION SPECTROMETRY. J. I. Hopkins, *Vanderbilt University,* Nashville. Although alpha particles have been detected by scintillation phosphors for some time, it was not until after 1947 that the era of scintillation counters came into being as a result of the development of photomultiplier tubes and fast electronic circuits. All types of radioactive particles and radiations can not only be detected but can be classified according to their energy. A conventional scintillation spectrometer composed of a suitable phosphor, photomultiplier tube, preamplifier, linear amplifier, differential pulse height selector and scaler can be used to study the energy spectrum of any source. It has been found that the light flashes produced in phosphors by ionizing particles such as electrons and protons are linearly proportional to their energy with few exceptions. This linear relation does not exist for alpha particles. A discussion will be given on the choice of phosphors, counting efficiency, line resolution, and results obtainable.

THE DETERMINATION OF THE DISINTEGRATION ENERGY FOR RADIOISOTOPES WHICH DECAY BY CAPTURING AN ORBITAL ELECTRON. S. K. Haynes, *Vanderbilt University,* Nashville. Of the three types of radioactive decay involving electrons, namely decay with emission of a negative beta particle, decay by emission of a positive beta particle, and capture of an orbital electron by the nucleus, only the first two furnish charged particles whose maximum energy can be measured to get the disintegration energy. In the case of orbital capture only neutrinos, infrequent continuous gamma rays, X-rays, and Auger electrons are always emitted. Two general methods can be used to determine the disintegration energy: (1) measure the upper limit of the continuous gamma

ray spectrum with a scintillation spectrometer; (2) measure the ratio of the capture of L electrons to capture of K electrons by studying the X-rays and Auger electrons by various methods. The disintegration energy can be calculated if this ratio is known. Scintillation, proportional, and magnetic spectrometers are useful for these measurements.

FLUCTUATIONS IN THE APPARENT CURVATURE OF ISOBARIC CUTS IN THE NUCLEAR ENERGY SURFACE. David L. Hill and Martin L. Gursky, *Vanderbilt University,* Nashville. When we hold constant the mass number (A) in the semiempirical equation for nuclear energy, the equation predicts a parabolic form for the graph of energy versus proton number (Z). A review of the existing data on beta-decay chains confirms this expectation of parabolic shape for the isobaric cuts of the nuclear energy surface. A comparison of the parameters fitting these parabolic cuts with those given by the semi-empirical equation indicates an apparent fluctuation in curvature of the surface and in nuclear radius. We find that a major part of these fluctuations may be associated with nuclear shell structure.

FORCE CONSTANTS AND CALCULATED THERMODYNAMIC PROPERTIES OF NITROSYL FLUORIDE. C. V. Stephenson and E. A. Jones, *Vanderbilt University,* Nashville. The force constants of NOF were calculated by the Wilson FG matrix method with a valence potential function containing one interaction term. Unique values could not be calculated since the number of force constants exceeded the number of fundamental vibrations; however, upper and lower limits for the force constants were set. The thermodynamic functions of NOF —heat capacity, entropy, heat content and free energy—were calculated for temperatures ranging from 273°K to 1500°K with the aid of the rigid rotator, harmonic oscillator approximation.

SPECTROGRAPHIC DETERMINATION OF TRACE METALS IN TISSUE. Isabel H. Tipton, Anatole Kotloby, and W. D. Foland, *University of Tennessee,* Knoxville and *Oak Ridge National Laboratory,* Oak Ridge. In determining maximum permissible concentrations of radioisotopes in the human body, in water, and in air, it is desirable to know among other things the concentration of the particular element in question in the various human tissues normally. Since the concentrations of most metals are very low, spectrographic determination is the method of choice. A laboratory is being set up at The University of Tennessee to make these determinations. This paper reports the preliminary qualitative survey of liver, kidney, heart, bone, and skeletal muscle from one autopsy.

THE EDUCATIONAL BACKGROUNDS OF AMERICAN CHEMISTS AND PHYSICISTS. Robert Lagemann, *Vanderbilt University,* Nashville. The teacher of physics is often called upon, as he should be, to advise his students concerning suitable graduate schools where the student may profitably continue his studies. While many criteria must enter into such a choice, that of the creative productivity of the graduates of such institutions has never been quantitatively assayed. This paper will discuss the results of a study of the life-time literary productivity of the 250 chemists and of the 250 physicists starred in *American Men of Science.* The institutions granting the various degrees to the most productive workers will be listed, and comparisons made of the publication records of the "average" chemist and physicist.

PLANS FOR THE NEW VANDERBILT OBSERVATORY. Carl K. Seyfert, *Vanderbilt University,* Nashville. The new Vanderbilt observatory housing a 24-inch reflecting telescope of new design will be located eight miles south of Nashville on a large flat-topped hill, 1100 feet above sea level. A new paved road, more than a mile long, has been constructed to the observatory site. Engineering drawings and specifications for the building have been completed. Gifts of building materials, services, and money, the equivalent of approximately $142,000.00, have been given or promised to date, principally by Nashville business men.

The building will contain offices, shop, library, and an auditorium which will include a Spitz planetarium for public use and for teaching purposes in astronomy and navigation. The telescope, now under construction, is being built

around the 24-inch fused-quartz mirror, a gift of Miss Alma Ferguson and Miss Grace Ferguson of Cleveland, Ohio. This mirror, built as a test mirror for the 200-inch telescope, is the largest fused-quartz disk in existence. The telescope will be a combination convention reflector and wide-angle Schmidt type camera designed by Dr. James Baker. Research programs will include photo-electric studies of variable stars, galactic structure investigations, and studies of solar-terrestrial relationships. It is hoped that construction will be started at an early date.

A Method for Alpha Radiation Dosimetry in Single Cells. R. W. Rogers, *Oak Ridge National Laboratory and University of Tennessee,* Knoxville. A modification of the well-known scintillation counting technique for alpha particles is suggested for measuring alpha radiation dose rates in biological materials, particularly single cells. Both dose rate and "field intensity" variations can be measured with some accuracy. A single zinc sulfide crystal comprises the scintillation screen, rather than the many crystals typically used. Crystal size may be selected to compare with the cell dimension and ranges from a few to fifty or more microns. Observations are made with binocular microscope at magnification of 100X. Scintillations may be readily counted in crystals of only five microns diameter, under properly dark-adapted conditions. Consistent agreement between theoretical and empirical data regarding probability distribution of alpha particles is obtained at ranges of one centimeter or greater; marked disparity is observed at ranges of only one or two millimeters.

PSYCHOLOGY SECTION

Special Considerations in the Testing of Cerebral Palsied Individuals. Clarence W. Spence, *George Peabody College for Teachers,* Nashville. A definition of cerebral palsy and the major classifications of this handicap were given. The problems encountered in testing the intelligence of the cerebral palsied and the need for an interpretation of results from such testing were emphasized. A proposed check-list to provide information that might be useful in an interpretation of test results for cerebral palsied individuals was presented for criticism and suggestions.

Simplified Method for Computing Reliability Coefficients. Julian C. Stanley, *George Peabody College for Teachers,* Nashville. By utilizing Rulon's formula for the reliability coefficient of a whole test secured via split-halves, together with Jenkins' short-cut method for computing the standard deviation, the writer shows how r_{11} and the variance error of measurement may be obtained with minimal effort. This procedure, which should usually give a more precise reliability estimate than the Kuder-Richardson Formula 21, seems suitable for individual teachers, committees of teachers, and others who administer an unspeeded test to a considerable number of persons. When N is fairly large(say 200 or more), the technique should yield r_{11}'s that agree closely with those procured in the usual manner. If N exceeds 400 and a test-scoring machine is not available, the writer suggests the possibility of estimating the variance error of measurement from only half the papers, thus eliminating the labor of split-halving the other 50 percent.

Problems in Group Methods of Counseling Adolescents. L. H. Stewart and C. R. Meek, *George Peabody College for Teachers,* Nashville. Mr. Meek presented a brief paper outlining some theoretical considerations on group counseling. His main contention was that group counseling is a valuable technique in its own right and is not necessarily a supplement to individual counseling. Dr. Stewart followed with a discussion of some of the problems a counselor faces in trying to help youth with their problems on an individual basis. The counselor can usually focus his attention only on the poorly adjusted individuals. Two suggestions were presented as possibilities for alleviating this situation: the use of more clerical help and the use of group guidance or counseling techniques. The need for research in the latter area was emphasized.

Differential Predictive Value of the American Council on Education Psychological Examination. Joseph P. Roberts, *George Peabody College for*

Teachers, Nashville. Aptitude tests seem more promising than any other kind of tests for predicting scholastic success. The ACEPE, a widely used aptitude test for college freshmen, is quite useful as a predictor of grade averages. Its quantitative (Q) and linguistic (L) sections vary considerably from school to school in their predictive efficiency. Best results are obtained from estimating equations derived from particular local populations for which predictions are to be made. A study by the writer at the University of Chattanooga found that L scores were as good as T scores as predictors (T score = raw Q score + raw L score), and that Q scores tend to be erratic as predictors. It is recommended that, for maximum predictive efficiency, aptitude tests be combined with other measures, such as achievement tests and previous grade averages. Coefficients of correlation between grades of 281 juniors and seniors at the University of Chattanooga and T, Q, and L scores were .56, .40, and .55, respectively.

An Experimental Study of the Effects of Dexedrine (d-amphetamine sulfate) on Motor and Mental Performance and Some Factors in Mood. J. C. Balloch, T. A. LaSaine, and J. M. Robinson, *Fisk University and Meharry Medical College,* Nashville. Eighteen male and eighteen female subjects were tested on Whipple's steadiness tester and tapping board, one form of a questionnaire made up from items from the *Personal Audit* and the *Minnesota Multiphasic Personality Inventory,* a set of five *Thematic Apperception Test* pictures and a set of Koh's designs. One week later six males and six females received 10 mg. and a similiar group received 20 mg. of Dexedrine in solution per 150 lbs. of body weight. A third group received a placebo. Ninety minutes later, the subjects were retested on a steadiness tester and tapping board and also on the form of the remaining tests which they had not received in the first session. In addition, the subjects gave subjective reports of their feelings. The differences between the subjects pre-Dexedrine scores and scores obtained in the second session were treated by an analysis of variance technique. Although differences in subjective report as a function of the amount of Dexedrine ingested seemed to exist, none of our tasks yield significant differences which are directly attributable to Dexedrine. Discrepancies between our findings and earlier studies utilizing Dexedrine are discussed.

Play Therapy. Theodore Landsman, *Vanderbilt University,* Nashville. While adults rely principally on talking or interview therapy to solve adjustment problems, children utilize the expressive language of play. The fundamental component of the play therapy situation is the perception on the part of the child of the therapist's complete acceptance of him as an integral individual. Techniques which facilitate this phenomenological acceptance include the therapist's reflecting the feelings of the child's play as contrasted with its content and setting few but consistent limits for the child in a warm, friendly but not overwhelming manner. The theory underlying this acceptant approach states that the child's perceptual field broadens in an accepting atmosphere, permitting him to search for answers to his adjustment problems with maximum internal resources being made available.

ZOOLOGY SECTION

Changes in the Physical Nature of the Mitotic Spindle During Cell Division. J. Gordon Carlson, *Oak Ridge National Laboratory and University of Tennessee,* Knoxville. Microdissection studies of living neuroblasts of the grasshopper, *Chortaphaga viridifasciata,* indicate that the mitotic spindle at metaphase is a semisolid body situated in a cytoplasm of low viscosity. Its structural components are oriented longitudinally. It is developed during prometaphase from the fluid material of the nucleus. During anaphase the portion of the spindle between the separating groups of daughter chromosomes liquifies progressively as the chromosomes move to the poles, leaving in the interzonal region only highly fluid protoplasm and the interzonal fibers that connect the distal ends of sister chromosomes.

Four Years of Bird Banding in Knox County, Tennessee. Samuel R. Tipton, *University of Tennessee,* Knoxville. A report is made of almost 1000

banding records in the Fountain City area just north of Knoxville. More than one-third of the banding records are of individuals from three species, the towhee, the white-throated sparrow, and the cardinal. About ninety percent of the total are composed of winter, summer, and all-year resident species. The high number of returns is undoubtedly due to a large extent to the high proportion of resident species banded. There is some evidence to indicate that cardinals and towhees, although present as a species during winter and summer, may leave the banding area for extensive periods, yet there is little evidence of actual migration.

POPULATIONS OF THE GENUS DROSOPHILA IN THE GREAT SMOKY MOUNTAINS, TENNESSEE. John M. Carpenter and Joseph F. Giordano, *University of Tennessee,* Knoxville. *Drosophila* population samples were collected during a period of four months at ten stations in the Great Smoky Mountains, Tennessee. Stations ranged from 1150 to 6000 feet in altitude and varied greatly in vegetation and other ecological factors concerned with their habitats. A total of seventeen species were found. Of these thirteen were wild and four were domestic species. One of them was an endemic species, being taken only at an elevation of 6000 feet. Monthly population peaks were definitely demonstrable for eight species in the area of Cades Cove. Altitudinal population fluctuations of the various species were also observed. Of the species considered, only *D. affinis* and *D. putrida* were found to increase in population percentage with altitude. It is suggested that the extreme variability of the ecological factors may be responsible for the population peaks and fluctuations exhibited throughout this transect.

OBSERVATIONS ON THE MAMMALS OF THE CUMBERLAND MOUNTAINS OF TENNESSEE. J. C. Howell and C. H. Conaway, *University of Tennessee,* Knoxville. This paper is to be published in full in a future number of the Journal.

SOME FACTORS AFFECTING DELAYED SEPARATION IN PARAMECIUM AURELIA. H. K. Wood, *Tennessee A. and I. State University,* Nashville. With certain stocks (e.g., 29,47,51) in variety 4, *Paramecium aurelia,* the phenomenon of delayed separation following conjugation normally occurs through the formation of a cytoplasmic strand at some point along the oral groove surfaces between the two members of a conjugating pair. If it occurs at the paroral regions, the pair is designated as a post-delay. If near the middle of the oral grooves, the pair is referred to as an even delay. Rarely, it may occur near the anterior end of the oral grooves. As such, the pair is called an anterior delay. The effect of certain factors on this delayed separation was described.

TEMPERATURE AS A FACTOR IN THE SIZE AND ACTIVITY OF WILD POPULATIONS OF DROSOPHILA. Richard Stevenson and James H. St. Clair, *East Tennessee State College, Johnson City.* During the months of April, May, and June, 1951, Drosophila collections were made on the campus of East Tennessee State College, in an effort to determine what correlation, if any, existed between the number of flies taken and the mean temperature. Eight species of Drosophila were collected during the three-month period. All populations showed fluctuations that corresponded rather closely with fluctuations in mean temperature. The largest collections were made in late May and early June when the mean temperature ranged between 60 and 70 degrees Fahrenheit. Most species showed at least two widely separated peaks corresponding to similarly separated temperature peaks. It is suggested that temperature influences the physiological processes of the flies themselves. This study also points to the possibility that the species collected may have more than one "optimum" temperature range.

THE ACADEMY DINNER

The Annual Dinner program was opened with the invocation by Dr. Harry L. Law of the Geography Department of Austin Peay State College and was presided over by Dr. Carl K. Seyfert, Vice-President of the Academy. The Austin Peay State College Faculty Quartet composed of George C. Grise, Lew W. Bodine, William J. Hurt, and Charles L. Gary did excellent harmony on several popu-

lar numbers which were enjoyed by all. Dr. Halbert Harvill gave a brief welcoming address after which the members enjoyed an excellent dinner. Following the dinner, Dr. Bahner stirred the members and visitors with the Annual Presidential Address. This address, "Are We Wearing Blinders" was particularly effective in calling attention to the many points we seem to be missing as we go about our own selfish pursuits.

THE COLLEGIATE SECTION

Pete Neblett, Carson-Newman College, President of the Collegiate Section, called the Second Annual Meeting of the section to order on Saturday morning with excellent attendance present. Other officers who functioned exceptionally well during the year were Walter Bryan, Vice-President, University of Tennessee, Knoxville; Gertrude Earl, Secretary-Treasurer, East Tennessee State College, Johnson City; and William Hildreth, News-Letter Editor, East Tennessee State College. Papers presented in the Collegiate section were as follows:

Observation of Honeybees on Goldenrod. Bobbye Jean Frazier and others, *Carson-Newman College,* Jefferson City.

Successful Study on Lake Chickamauga, Dayton, Tennessee. James Kirtley, *William Jennings Bryan University,* Dayton.

Sulfonium and Selenium for Chemotherapy Studies. Pete Neblett, *Carson-Newman College,* Jefferson City.

A Method for Solving a System of Four Equations in Four Unknowns of First Degree. Harold Heroth, *Austin Peay State College,* Clarksville.

How to Use a Tomahawk on a Cubic Equation. Sue Berry, *Austin Peay State College,* Clarksville.

Construction of a Campus Carrier Current Station. Fred C. Pritchard, *Southwestern at Memphis,* Memphis.

What Few Can See. Harold Green, *George Peabody College for Teachers,* Nashville.

The Relative Growth Rate of a New Stock of Paramecium aurelia at Different Temperatures. Leroy E. Thompson, *Tennessee A. and I. State University,* Nashville.

An Experimental Study of Maze Behavior in Carassius auratus. Juanita Scales, *Tennessee A. and I. State University,* Nashville.

At a business meeting following the presentation of papers the following officers were elected: John Nealey, President, *Austin Peay State College;* Kenneth Simonds, Vice-President, *East Tennessee State College;* Sue Berry, Secretary-Treasurer, *Austin Peay State College;* and Barbara Truax, Editor, *Memphis State College.* Activities of the Collegiate Section are expected to be presented to its members in a publication *The Collegiate Scientist,* to be published in October and April. Councilor for the year was Robert W. McGowan, *Memphis State College.*

TENNESSEE JUNIOR ACADEMY OF SCIENCE

The program of the Tenth Annual Meeting Junior Academy got under way with Ted Cobun and Glenn Norfleet presiding. A word of welcome "*How Much Do You See*" by Carl T. Bahner, President

of the Academy was given. Papers presented by the members were as follows:

How I Got My F. C. C. Operator's Licenses and Built My Own Radio Station. Goebel Davis, *Clarksville High School,* Clarksville.

How I Got My Private Pilot's License and Am Now Building My Own Plane. Leon Kennedy, *Clarksville High School,* Clarksville.

A Fossil Key to the Stratigraphy of the Nashville Basin. Don H. Miller, *West End High School,* Nashville.

Counting Splitting Atoms. Alvis M. Holladay, *George Peabody College for Teachers,* Nashville.

The Science Talent Search. James H. Major, *Clarksville High School,* Clarksville.

How I Designed and Modeled a Car for the Fisher Body Guild. Glenn Norfleet, *Clarksville High School,* Clarksville.

Flashing Electric Sign. Lee Hyatt, *West End High School,* Nashville.

A Collection of Butterflies Made in Davidson County in 1951. Ray Spence, *West End High School,* Nashville.

Yours Is the Land (Film) preceded announcements of A. A. A. S. awards. The farewell address was given by Ted Coburn, *Austin Peay State College.* Sponsor of the Junior Academy is Dr. Frances R. Bottum, *George Peabody College for Teachers,* Nashville.

ANNUAL BUSINESS MEETING OF THE ACADEMY

The Tennessee Academy of Science met for its annual business meeting at 8:30 A.M., Saturday, November 10, 1951, with Dr. Carl T. Bahner presiding. The Secretary read the minutes of the meeting of the Executive Committee of the previous evening and they were approved as read. Reading of the minutes of the Sixtieth meeting of the Academy was waived since they had been published in the April, 1951, issue of the Journal.

The following reports were made by officers of the Academy: (1) The preliminary report of the Treasurer, Moffatt G. Boyce, was read and approved. (2) The Secretary reported the names of sixty-seven new members recommended by the Executive Committee for acceptance. These recommendations were approved by unanimous vote of the members present. (3) The Editor reported that the cost of the Journal was quite high in comparison with recent years. (4) The Director of the Reelfoot Lake Biological Station, Clinton L. Baker, said his report would be printed in the January issue of the Journal.

There was no unfinished business to be transacted at this time. Transactions of new business was in reference to committee reports and this section is therefore given below.

Committee on Improvement of Science Teaching. Reports by the Chairman, James L. Major, and Hanor A. Webb, indicate that improvement should be accomplished in a number of ways: increase the amount of individual laboratory activity; teachers should join the National Science Teachers Association and use copies of the *Science Teacher,* its publication; relate sciences more closely with life in the community; achieve a better integration of the sciences with each other; and emphasize the teaching of large concepts and principles rather than memorization of so much factual details. The Committee would like to cooperate more fully with the Tennessee Science Teachers Association and would like to make up a mailing list of the science teachers in the state. Dr. Clinton L. Baker moved that the Academy make $50.00 available for the express purpose of making up such a mailing list. This motion met with unanimous approval. After much discussion on the subject of requesting the Department of Education to raise standards required of proposed science

teachers, Dr. Royal E. Shanks moved the Academy empower the Committee on Improvement of Instruction and the Executive Committee to take action in the name of the Academy in making any recommendations to the State Department of Education after a thorough study has been made. This motion was unanimously approved by the members present.

Science Talent Search Committee. James L. Major in a very fine report informed the Academy of the progress being made by the past recipients of awards wherein Tennessee ranks very high. The Committee has written the teachers of the state requesting their continued excellent support of the Search.

The Fauna Committee. Through the Chairman, A. C. Cole, the Committee presented the following adopted objectives: (1) to obtain and organize all significant information concerning the fauna of the state; (2) to make provisions for the dissemination of information, as set aside by the first objective, by letter, publication, or some other means; (3) to consider the establishment of a state natural history museum. Chairmen of sub-committees responsible for various groups of animals are as follows: Fish, Amphibians, and Reptiles, Glenn Gentry; Birds and Mammals, J. C. Howell; Insects and other Arthropods, A. C. Cole; Parasites, Helen Ward; Other Invertebrates, Perry C. Holt; Smoky Mountain National Park Fauna, Arthur Stupka. The following plans for the implementation of the objectives were adopted: (1) compilation of Tennessee faunal lists by the sub-committees; (2) preparation of a bibliography of the fauna; (3) making a study of plans for a natural history museum, including location, physical plant, and personnel; and (4) sending a news letter to members of the Tennessee Academy of Science in order to bring attention and increase interest in the activities of the Fauna Committee. Other suggestions were made as follows: (1) contacts with other interested lay organizations; (2) determining the availability of funds for carrying out the activities of the Committee; (3) listing the locations of special faunal areas; and (4) contacting sportsmen's clubs regarding interest in a Tennessee natural history museum.

The Flora Committee. Dr. Aaron J. Sharp, chairman of the Committee reported that of seventeen questionnaires sent out concerning plant taxonomy only nine were returned. The Committee met at Clarksville on November 10, 1951, and decided it would serve as the clearing house for new records (either additions to the state flora or extensions in range within the state) to be published annually or as often as needed in the *Journal of the Academy,* the collector being given credit for his discovery.

Committee on Conservation of Natural Resources. As the chairman, Miss Lillian A. Worley, was not present no report was given. An informal statement was made by A. F. Ganier indicating their activity.

The Publicity Committee. Dr. George R. Mayfield gave a very good report indicating he had access to outlet of all publicity the Academy members could present to him and encouraging all members to report all items of interest to him.

The Academy Representative to the Academy Conference of the A. A. A. S., Clinton L. Baker, who is also the president of the Academy Conference, gave a very spirited report on the activities of the Conference, its aims and objectives. He called upon the Tennessee Academy to take an active part in the plans at the national meeting.

The Resolutions Committee. The Chairman, Albert F. Ganier read the following report: *Resolved*:—That the Tennessee Academy of Science go on record as being sincerely appreciative to (a) the president, Halbert Harvill, and the faculty of Austin Peay State College at Clarksville for the use of its buildings and other facilities, for the use of our 1951 meeting. (b) To the Clarksville Leaf-Chronicle for the generous publicity it has given on the occasion of this meeting. (c) To the Hotel Montgomery, our downtown headquarters for the many courtesies extended to us. (d) To Dr. Sam K. Bright and his committee on local arrangements and to Dr. R. R. Spafford, program chairman, for the efficient handling of these details. (e) To Dr. Jesse M. Shaver, our editor, for the production of another fine volume of our Journal, (f) To

Dr. Carl T. Bahner, President; Dr. Carl T. Seyfert, Vice-President; Dr. Arlo I. Smith, Secretary; and to Dr. Moffatt G Boyce, Treasurer for their time and effort in capably serving the Academy in their respective capacities.

The Nominating Committee composed of Hanor A. Webb, H. D. Dawson, and Clinton L. Baker, through the chairman, Dr. Webb presented the following nominations: for Treasurer, Dr. Moffatt G. Boyce; for Secretary, Dr. Elsie Quarterman; for Vice-President, Dr. Aaron J. Sharp; and for President, Dr. Carl K. Seyfert. There were no nominations from the floor and Dr. Royal E. Shanks moved the nominations cease and that the entire ballot be cast in favor of those nominated. The motion was carried unanimously and the slate was declared elected by acclamation.

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

NEW MEMBERS ELECTED AT CLARKSVILLE NOVEMBER 10, 1951, TENNESSEE ACADEMY OF SCIENCE

Adams, Mrs. Gladys B., Biology Dept., Tenn. A. and I. State University, Nashville
Allen, Mrs. Martha M., Biology Dept., Tenn. A. and I. State University, Nashville
Baker, William K., Biology Div., ORNL, Oak Ridge, Tenn.
Bradshaw, Charles L., 1403 McCullough Ave., Huntsville, Alabama
Brewer, Benny, Box 4, Memphis State College, Memphis, Tenn.
Brown, Floyd, L., 602 Greenwood Avenue, Clarksville, Tenn.
Brown, Dr. Mary J., Biology Dept., Bethel College, McKenzie, Tenn.
Bunch, Noah A., P. O. Box 17, Auxavasse, Missouri
Burch, Lucius E., Jr., 1006 Exchange Bldg., Memphis, Tenn. (Honorary 1951)
Campbell, Glenn R., 127 Oakenwold Terrace, Staunton, Virginia
Cole, Walter Earl, Box 914, Vanderbilt University, Nashville
Cushing, Elliott M., Memphis General Depot, Memphis, Tenn.
Davis, Robert M., 824 East Sprague St., Winston-Salem, North Carolina
Dennis, Clifford J., Box 447, Middle Tenn. State College, Murfreesboro, Tenn.
Estrada, Elizabeth A., Holy Names School, Keel & Woodlawn, Memphis, Tenn.
Fennema, Helen, Baylor-Haven School, 1214 Jessie St., Jacksonville, Florida
Galle, Fred C., Horticulture Dept., University of Tenn., Knoxville, Tenn.
Garner, J. M., Jr., 208 Outer Drive, Oak Ridge, Tenn.
Garrett, James A., Jr., Box 2633, Geo. Peabody College, Nashville 4, Tenn.
Goins, William F., Jr., Sci. Ed. Dept., Tenn. A. and I. State University, Nashville 8, Tennessee
Hill, David L., Physics Dept., Box 26, Vanderbilt University, Nashville, Tenn.
Hull, George, Jr., Biology Dept., Tenn. A. and I. State University, Nashville 8
Jones, Ernest A., Physics Dept., Box 24, Vanderbilt University, Nashville, Tenn.
Lacy, Miss Margaret Graham, Math Dept., Austin Peay State College, Clarksville
Lagemann, Robert T., Physics Dept., Box 223, Vanderbilt Univ., Nashville, Tenn.
Leathers, C. M., Biology Dept., Tenn. A. and I. State University, Nashville 8
McConnell, John C., Box 792, Peabody College, Nashville, Tenn.
McCormick, Marion Y., 1595 Linden, Memphis 4, Tenn.
McEachern, Harold V., Watertown, Tenn.
Mann, Henry M., 546 Missouri Ave., Phoenix, Arizona
Mapp, F. E., Biology Dept., Tenn. A. and I. State University, Nashville 8, Tenn.
Maryland, Miss Catherine A., Sci. Educ. Dept., Tenn. A. and I. State University, Nashville 8
Nease, Felton R., TVA Biologist, 515 W. Vanderbilt Dr., Oak Ridge, Tenn.
Ogle, Mrs. James O., Jr., 504 McMillan Ave., Birmingham, Alabama
Outland, Roderick H., 2304 West End, Nashville, Tenn.
Paden, William L., Jr., Box 46, Peabody College for Teachers, Nashville 4
Padfield, James H., Jr., Tenn. Game & Fish Comm., Franklands Bldg., Jackson, Tenn.