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PROCEEDINGS OF THE TENNESSEE ACADEMY OF SCIENCE FOR 1957

WENDELL G. HOLLADAY, SECRETARY
Vanderbilt University, Nashville, Tennessee

MEETINGS OF THE EXECUTIVE COMMITTEE

JANUARY MEETING

The Executive Committee of the Tennessee Academy of Science met at 9:00 o'clock on the morning of January 26, 1957, in Room 218 of the University Center Building of the University of Tennessee in Knoxville, Tennessee. President Isabel H. Tipton presided. Members present were Woodrow W. Wyatt, Frederick T. Wolf, Helen L. Ward, Arlo I. Smith, Myron S. McCay, Harris J. Dark, Claude S. Chadwick, Donald Caplenor, and Clinton L. Baker.

The meeting was called to order by the President. The minutes of the meeting of the Executive Committee of November 30, 1956, and of the Annual Business Meeting of the same day were read and approved with minor corrections.

In a brief report the Sponsor of the Junior Academy reported that a definite effort had been made to interest more teachers in the activities of the Junior Academy. He reported that 32 teachers were present at the Junior Academy meeting of December 1, 1956, and that 58 entries were made.

The Director of the Reelfoot Lake Biological Station reported that (1) the Station still received an appropriation from the State of Tennessee, (2) that 2 persons were in residence at the Station during the summer of 1956, (3) that 22 persons from the University of Wisconsin had used the Station as a headquarters briefly in 1956, and (4) that the primary uses of the Biological Station remain, (a) headquarters for visitors for the week-end, (b) headquarters for members in residence, and (c) a place for visiting scientists to use as a base for studies involving Reelfoot Lake.

The Editor of the Journal of the Tennessee Academy of Science reported that the four numbers of Volume 31 (1956) of the Journal contain a total of 326 pages. This volume contains 32 research or review articles of which 23 are in the field of Zoology, and the remaining nine are in other fields as follows: General Biology, 1; Botany, 1; Bacteriology, 1; General Science, 1; Chemistry, 1; Geology, 1; Anthropology, 1; Mathematics, 1; and Engineering, 1.

The Treasurer submitted an audited report showing a cash balance of $3,369.94. The report was accepted with commendation.

A motion was presented, seconded and passed that application be made by the Treasurer to the State of Tennessee for a Tax Exemption Number for the Academy.

The President reported, (1) that progress had been made in selecting a new appointed member of the Executive Committee, and (2) that plans were being made to send a newsletter to all members in the spring.

A motion was made that the Executive Committee recommend to the Annual Business meeting of 1957 that the first sentence of Article IV, Sec-

tion 1, of the Constitution of the Tennessee Academy of Science be amended to read "The officers of the Academy, the immediate past president, the sponsor of the Junior Academy, the sponsor of the Collegiate Section, and three other members shall constitute the Executive Committee of the Tennessee Academy of Science." The motion passed.

The Representative of the Tennessee Academy of Science to the Academy Conference of December 1956 gave a report on that conference. Some of the chief points of the report were as follows:

1. The Tennessee Academy of Science is an affiliate of A.A.A.S., and should take such affiliation seriously.
2. One of the major activities of the A.A.A.S. at present is the Science Teacher Improvement Program.
3. He reported that there was to be a Junior Academy of Science Conference at Chicago on February 16 and 17, 1957.
4. The Academy Conference recommended that each state Academy of Science:
   (a) Appoint a Committee on the History of the Academy.
   (b) Recognize this committee as a standing committee.
   (c) Devote a part of the next annual meeting to Academy history.
   (d) Consider subsidization of a National Historian for the Academies of Science.

Dr. C. L. Baker reported on the progress made in the design of the Seal of the Tennessee Academy of Science, and was instructed by the Executive Committee to proceed with the completion of the Seal of the Tennessee Academy of Science.

The Executive Committee voted to accept an invitation to hold the annual meeting of 1957 at Southwestern at Memphis.

A motion was made, seconded, and passed that the annual meeting be held on the week-end preceding the Thanksgiving holidays. The following schedule for the annual meeting was agreed upon.

Friday, November 22:

10:00 A.M._____Executive Committee Meeting
1:30 P.M._____General Session
4:00 P.M._____Annual Business Meeting
5:00 P.M._____Tea
7:00 P.M._____Dinner
9:00 P.M._____Smoker

Saturday, November 23:

8:00 A.M._____Sectional Meetings
10:00 A.M._____Junior Academy Meeting
12:30 P.M._____Junior Academy Luncheon and Presentation of Awards.

General agreement was reached without official action in the following cases:

1. That the Sponsor of the Junior Academy and the President of the Tennessee Academy of Science appoint a Judging Committee for the Junior Academy.
2. That the Sponsor of the Collegiate Section select judges for the Collegiate Section, and that he submit names of these judges to the President of the Tennessee Academy of Science six months prior to the Annual Meeting.
3. That, with respect to the Junior Academy, (a) cash prizes be discontinued, (b) number of awards be increased, and (c) the Junior Academy for purposes of competition, be divided into a senior high school group, and a junior high school group.

4. That the Research Committee process the forms requesting Academy Grants.

A motion was made, seconded, and passed that the regular annual contribution be paid to help defray expenses of the Academy Conference for 1957.

The Executive Committee recommended that $50.00 be transferred from the Reelfoot Lake Biological Station Fund to Dr. C. L. Baker to help defray expenses of his trip to the 1956 Academy Conference.

A motion was made, seconded, and carried that the travel expenses of non-resident members of the Executive Committee to this meeting be paid from the Academy Treasury.

The meeting was adjourned at 12:50 P. M.

Donald Caplenor
Secretary

November Meeting

The Executive Committee of The Tennessee Academy of Science met in the Faculty Lounge of Burrow Library, Southwestern-at-Memphis, November 22, 1957. The meeting was called to order at 10:00 A. M. by the president, Isabel H. Tipton. Members present were C. L. Baker, C. S. Chadwick, H. J. Dark, W. G. Holladay, R. T. Lagemann, A. I. Smith, E. D. Watts, F. T. Wolf, and W. W. Wyatt.

After the president welcomed the members, the minutes of the executive meeting of January 26, 1957, were distributed, read, and approved.

The president reported on her activities to provide bus transportation to the Academy meeting for the members of the Junior Academy. The offer involved reimbursement of one-half the round trip bus fare from the place of residence of the Junior Academy member to Memphis. She reported an enthusiastic response in some quarters to this offer, resulting in 74 participants at the present Junior Academy meeting, which is something over 130% of the participants at last year's meeting. The cost of this project was about $480. Some local organizations have rallied to support this endeavor financially. The president reported plans to contact other similar organizations in the state as well as to enlist the support of the National Science Foundation. The president suggested that perhaps a transportation committee should be formed to pursue these possibilities.

It was discussed whether these funds could be better utilized to support scientific and scholarly activity by establishing awards or grants for research. No action was taken, pending further discussion of these matters at future meetings.

The president concluded her report by stating that Dr. Donald Caplenor had resigned the post of Secretary in May, 1957, because of his imminent departure from the state. She asked W. G. Holladay to fill his post temporarily. He consented to do so.

The president-elect, being also the chairman of the program committee, presented some ideas which reflected this dual responsibility. Since Section chairmen usually have considerable difficulty in getting together a program of research papers, he suggested that it might be more stimulating to have joint sessions among the biological sciences and among the physical sciences in which perhaps talented and famous people would be asked to come and lead the discussion of the group, or perhaps a representative from one of the 29 institutions of higher learning and 2 industries, which are represented in our membership, might be asked to report on scientific activities in their area. He further recommended that the Academy be more active in

coordinating the various scientific activities and organizations of the state and that the Journal, in addition to publishing research papers, ought to become a publication that could be more useful and informative to the high schools. He suggested that we should seek for better integration of the activities of the Junior Academy, the Collegiate Division, and the Senior Academy. It was discussed whether a spring rather than a fall meeting could better accomplish some of these objectives. No definite action was taken on this point, except a suggestion that the executive committee explore the possibilities of a spring meeting on an experimental basis.

The program chairman was commended on the attractiveness of this year's program. He then submitted a bill of $118 for the printing of this program.

The secretary reported 33 names have been submitted for membership, and 24 names have been dropped from the roll during the current year. It was moved and passed that these 33 names and all others who have applied for membership during this annual meeting be presented to the business meeting of the Academy for approval.

The secretary further reported that the 1957 research grant to the Academy from A.A.A.S. amounts to $108.

The treasurer submitted an interim report which was accepted by the executive committee. He further announced that a tax exemption number has been procured. The method of billing sustaining and industrial members was discussed. In order to maintain the support of these members and to obtain new members, a motion was made to recommend to the new president to charge the membership committee to handle the problems concerned with industrial and sustaining members and patrons. It was felt that this approach was unwieldly, and the motion failed. A motion was then made and passed to have the treasurer send a bill of $10 to the sustaining members and a bill of $25 to the industrial members, with a covering letter from the president expressing the gratitude of the Academy for their past support and earnestly requesting thier much-needed support in the future.

Clinton L. Baker, the director of the Reelfoot Lake Biological Station reported that it operated this year on the same budget as last year, that three people were in residence there during the past summer, and several classes of students visited the station. The director of Reelfoot Lake Station was unanimously reelected to this post.

Nominations were requested for the Distinguished Service Awards of the Tennessee Academy of Science to be presented to Tennessee science teachers for inspiring science students and promoting science activities. The names of the following nine teachers were placed in nomination:

Miss June Anderson, Howard High School, Nashville, Tennessee
Miss Esther Mae Ayers, Smithwood School, Knoxville, Tennessee
Mrs. M. A. Caballero, Redbank High School, Chattanooga, Tennessee
Mrs. Burt Francis, Isaac Litton High School, Nashville, Tennessee
John T. Johnson, Young High School, Knoxville, Tennessee
James L. Majors, Clarksville High School, Clarksville, Tennessee
J. D. Redding, Treadwell High School, Memphis, Tennessee
George T. Sanidas, Germantown High School, Germantown, Tennessee
Miss Lula Shipe, Central High School, Knoxville, Tennessee

The motion was unanimously passed to approve them for Distinguished Service Awards. In taking this action the executice committee acted as an interim committee pending the appointment of a committee on Distinguished Service Awards.

Dr. Baker reported that the Seal of the Tennessee Academy of Science is now available. As a member of the Fellows Committee, he offered a re-

port in which nine members were nominated as Fellows of the Tennessee Academy of Science for the year 1958, and three names for Fellowship in the A.A.A.S. Those nominated were:

Fellows of the Academy:
Louis J. Bircher, Nashville, Tennessee
Calvin A. Buehler, Knoxville, Tennessee
A. F. Ganier, Nashville, Tennessee
L. R. Hesler, Knoxville, Tennessee
George R. Mayfield, Nashville, Tennessee
M. L. McQueen, Memphis, Tennessee
Aaron J. Sharp, Knoxville, Tennessee
Paris B. Stockdale, Knoxville, Tennessee
Hanor A. Webb, Nashville, Tennessee

Fellows of the A.A.A.S.
Edmund W. Benz, Nashville, Tennessee
Perry C. Holt, Blacksburg, Virginia
John Kirby-Smith, Oak Ridge, Tennessee

This report was received, and it was unanimously recommended that these nominations be presented to the business meeting of November 22, 1957.

The meeting adjourned at 12:30.

THE SIXTY-SEVENTH MEETING

The Sixty-seventh meeting of the Tennessee Academy of Science was held on November 22-23, 1957, at Southwestern-at-Memphis, Memphis, Tennessee. There were 317 persons registered, 104 being in the Senior Academy, 161 in the Junior Academy, and 52 in the Collegiate Division. Clinton L. Baker was chairman of the Local Arrangements Committee, and Arlo I. Smith was program chairman.

On Friday and Saturday November 22-23, registration for the Senior Academy was held in the Adult Education Center, Burrow Library, beginning at 10:00 A. M. The General Session was held Friday afternoon in the Adult Education Center, in which there followed the businness meeting. At 5:20 P. M., after the business meeting, Dr. and Mrs. Peyton Rhodes were host at a Presidential Tea in the Faculty Lounge, Burrow Library.

The Academy dinner was held at 7:00 P. M. Friday evening in the Adult Education Center. The room was filled to capacity. The retiring president of the Academy, Dr. Isabel H. Tipton of the University of Tennessee, gave the address of the evning. It was entitled, "What Are Little Boys Made Of?" and consisted of a report of her research, covering seven or eight years, on the distribution of the chemical elements in human tissue.

At the dinner a report was made by the Committee on Resolutions. A copy of this report follows the minutes of the annual meeting.

On Saturday morning, meetings of the several sections were held, beginning at 8:00 A. M., in various buildings on the campus. Registration in the Collegiate Division was held at 8:00 A. M. in Room 101 Science Building, after which at 8:30,

the annual meeting was held. Registration in the Junior Academy began at 8:00 A.M. in the Neely Mallory Memorial Gymnasium. At 10:00 A.M. in the same building the meetings of the Junior Academy were held. Following the meetings the Junior Academy retired at 12:30 to the Adult Education Center for luncheon, at which time awards were presented by the president, Isabel H. Tipton. All of the Saturday morning sessions were well attended even though inclement weather existed and a flu epidemic was in progress.

ANNUAL BUSINESS MEETING OF THE ACADEMY

The Business Meeting of the Tennessee Academy of Science was held in the Adult Education Center, Burrow Library, Southwestern-at-Memphis, at 4:30 P. M. on November 22, 1957, with President Isabel H. Tipton presiding.

The minutes of the Business Meeting of 1956 were not read, since they had been published in the Journal. Minutes of the Executive Committee meeting of January 26, 1957, were read. After a statement by Dr. C. L. Baker that he had not used the $50 referred to in the minutes, they were approved. The president had previously announced that such approval would automatically put into effect the recommendations contained therein. The same procedure was followed with the minutes of the Executive Committee meeting on the morning of November 22, 1957, which were read and approved.

The Reelfoot Lake Biological Station director made a brief statement on the usefulness of the Station as an "in service" training facility for some students.

The treasurer read the interim financial report.

The secretary read the names and addresses of those whose dues notices were returned, for the purpose of obtaining the correct addresses.

The president-elect re-emphasized his position as outlined in the Executive Committee meeting on the morning of November 22, 1957, and called upon the Section Chairmen to bring up for discussion in their business meetings on the morrow the possibility of altering the format of the Section meetings.

The president reported invitations from the Oak Ridge National Laboratories, the Oak Ridge Institute of Nuclear Studies, and the Oak Ridge Public Schools to have the Annual Meeting in Oak Ridge in 1958. It was moved and passed to accept these spontaneous and gracious invitations.

Dr. F. Lynwood Wren of Peabody College presented a proposal for a cooperative program of the Tennessee Academy of Science, the State Department of Education and local school systems for the improvement of teaching of science and mathematics. The proposal is herewith appended. To a suggestion that the Academy should not act hastily, Dr. Wren emphasized the need for action on this proposal at the present meeting. He further expressed a belief that the cost of the program to the Academy would be slight, but that the Executive Committee should authorize some money to defray the expense of the meetings mentioned in the report and for the cost of the correspondence. He expressd a hope that the proposal would be underwritten by the National Science Foundation. A motion was made and passed to accept the proposal in principle and to have the Executive Committee work out the details of its implementation.

A report by Mr. James L. Major on the Tennessee Science Talent Search was accepted with commendation and is herewith appended.

The Nominating Committee, composed of C. S. Chadwick, F. T. Wolf, and J. W. White, proposed the following slate of officers:

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

President-Elect: R. T. Lagemann, Vanderbilt University

Secretary: W. G. Holladay, Vanderbilt University

Treasurer: Harris J. Dark, Middle Tennessee State College, Murfreesboro

There being no nominations from the floor, it was moved and passed that the entire ballot be declared elected by acclamation.

There being no further business, the meeting adjourned at 5:20 P. M.

RESOLUTION OF THE TENNESSEE ACADEMY OF SCIENCE

WHEREAS the Tennessee Academy of Science, the Tennessee Junior Academy of Science, and the Collegiate Division of the Tennessee Academy of Sciences are enjoying a pleasant and profitable series of meetings at Southwestern-at-Memphis, and

WHEREAS the success of these meetings has resulted from the efforts of the officers and sponsors of these organizations, the chairmen of the respective sections, the members of the local committee, C. L. Baker, Chairman, M. L. MacQueen, Jack U. Russell, Imogene Hill, Arlo I. Smith, Jack H. Taylor, James L. A. Webb, and from the gracious provisions made by our host institution,

BE IT therefore resolved that the entire Tennessee Academy of Science expresses its appreciation to these individuals whose generous contributions assured the success of these meetings, and

BE IT further resolved that these resolutions be included in the minutes of the Tennessee Academy of Science, and that copies be sent to Dr. Peyton N. Rhodes, President of Southwestern-at-Memphis, and to Dr. Baker, Chairman of the Local Committee.

Prepared by the Resolutions Committee:

J. Eldred Wiser, Samuel R. Tipton, Samuel P. Massie

PROPOSAL FOR A COOPERATIVE PROGRAM OF TENNESSEE ACADEMY OF SCIENCE, STATE DEPARTMENT OF EDUCATION, AND LOCAL SCHOOL SYSTEMS FOR THE IMPROVEMENT OF TEACHING OF SCIENCE AND MATHEMATICS

A. The Tennessee Academy of Science sponsor the program.

B. The Program

I. Three joint meetings of college, high-school, and elementary teachers of science and mathematics each academic year (symposia, workshops, institutes, etc.)

1. Set-up in each of the respective areas already determined by State Department of Education for assignment of responsibility for supervision of instruction.

2. Planned so that teachers can meet requirements for in-service training.

3. Located and timed for minimum expense to teachers attending.

4. Planned for cooperative participation by all attending.

5. Suggested times and purposes:

a. *Fall Meeting* — in conjunction with Tennessee Academy of Science for planning new year's program, reporting on previous year's program, and benefiting from joint meeting

and association with the teachers of science and mathematics from the entire state. This should be the only state-wide meeting. It is usually held during the latter part of November.

b. *Winter Meeting* — A planned meeting in each of the seven areas of the state. Should be held during the latter part of January.

c. *Spring Meeting* — A planned meeting in each of the seven areas to be held during the latter part of March.

C. Academy participation

I. Constitute a committee to be known as the "Committee for the Improvement of the Teaching of Science and Mathematics."
1. Appointed by Executive Committee.
2. Chairman named each year by the Executive Committee.

II. Constitution of Committee
1. Eight members
2. One member selected from each of the respective supervision areas set up by the State Department of Education.
3. Each member to seek cooperation of the Supervisor of Instruction in his area in planning the programs, in working with city and county superintendents for meeting requirements for in-service training, in selecting place of meetings for maximum accessibility, in arousing interest among the teachers of the area and securing their cooperation in making the programs of maximum value to all concerned.
4. The eight-members should be appointed in groups of four each year, for a two-year period on the committee. This staggering to provide for continuity of the program. (The first year one group of four would be for only one year service.)

III. Enlarge the program of the Academy to promote effective teaching as well as significant research in science and mathematics.

TENTH ANNUAL TENNESSEE SCIENCE TALENT SEARCH — 1956

Sponsored and Financed by: The Tennessee Academy of Science

Director: Mr. James L. Major, Chairman, Science Talent Search Committee, Chemistry and Physics Teacher, Clarksville High School, Clarksville.

Honored in Annual Tennessee Science Talent Search: First: (1946) 25; Second: (1948) 4; Third: (1949) 17; Fourth: (1950) 22; Fifth (1951) 23; Sixth: (1952) 23; Seventh: (1953) 24; Eighth: (1954) 27; Ninth: (1955) 31; Tenth: (1956) 28.

National Honorable Mentions

Elmo R. Burgess, Jr., 17, Cumberland Co. H. S., Snakes of Cumberland County.

James Bloomer, 17, Fulton H. S., Knoxville, Isotopes of Lithium.

Edward Pollard, Jr., 18, Oak Ridge H. S., Experimentation on the Vortex Tube.

State Winners

Gerald A. Gann. 17, Chattanooga H. S., Electronic Oscillators.

Joseph G. Baker, 17, Harriman H. S., Designing an Electronic Balance.

Charles B. Deering, 17, Central H. S.. Knoxville, Shielding of Gamma Rays

John E. Solomen, Jr., 17, Central H. S., Knoxville, Quaternary Alloy System.

Stephen W. Lockett, 17, East H. S., Knoxville, Apparatus for Measuring Carbon Dioxide.

Stephen Scheinberg, 16, Central H. S., Memphis, Qualitative Analysis.

Samuel Kelsall, IV, 17, Treadwell H. S., Memphis, Cottonseed.

William G. Crump, 17, Isaac Litton H. S., Nashville, Extraction of Plant Pigments.

Robert Larson, 17, Oak Ridge H. S., Binary Multiplier-Translator.

Harvey A. Simmonds, 17, Ct. Andrews H. S., Hydrophonics.

State Honorable Mention

Stephen Henninger, 17, Bristol H. S., Minerals and Radio-Active Substances.

Douglas Herbst, 17, Notre Dame H. S., Mechanics of an Automobile Transmission.

Dale Dean Fox, 17, Cumberland Co. H. S., Electronics.

David Valentine, 18, Bearden H. S., Knoxville, The Gas Turbine Engine.

Hal M. Harrison, 16, East H. S., Knoxville, Small Radios.

John E. Lord, 17, East H. S., Knoxville, Duration of Auditory Impression.

Michael W. Merritt, 17, Fulton H. S., Knoxville, Photomicrography.

Albert J. Grobmyer, 17, Christian Bros. College, Planaria and Their Powers of Regeneration.

Frances L. Bowers, 17, Messick H. S., Memphis, Construction and Use of a Wind Tunnell.

Henry L. Luschen, 17, Treadwell H. S., Memphis, The History of Life on Earth.

Roy N. Adams, 17, Central H. S., Nashville, Spherical Trigonometry.

Vernon Gerth, Jr., 17, Hillsboro H. S., Nashville, Modulation in Radio-Telephony.

Carl Seyfert, Jr., 17, Hillsboro, Nashville, Mineralization of Fossils.

Thomas E. Davis, 17, Bledsoe Co. H. S., Geological Study of Bledsoe County.

Ellison Vandiveer, 17, Whitehaven H. S., Building a Cyclotron.

Awards: A Certificate of Award was presented to each of the members of the Honors Group. Thirty-six colleges and universities were requested to consider them for scholarships.

Judges:

Mr. James L. Major (Chairman)

Dr. Howard C. Kirksey, Dean of Instruction, Middle Tennessee State College, Murfreesboro.

Dr. Calvin A. Buehler, Head, Chemistry Dept., University of Tennessee, Knoxville.

Miss Katherine Matthews, Head, Science Dept., West End H. S., Nashville.

Dr. Charles S. Shoup, Chief, Biology Branch, Research & Medicine Dept., U. S. Atomic Energy Commission, Oak Ridge.

Dr. Hanor A. Webb, Editor and Lecturer, Peabody College, Nashville.

Entertainment: None

Publicity: Twenty newspapers carried the announcement of winners in the Tenth Tennessee STS. Articles were written for "Tennessee Teacher" magazine and "Tennessee Academy of Science Journal."

Plans for the Future: Give Publicity in fall by writing article for "Tennessee Teacher" magazine and contacting all science teachers' meetings. Suggest research projects to teachers and students, cooperate with promoters of Science Fairs and Science Clubs of America.

Progress of Previous Winners: (No information on previous winners for 1946 and 1948.)

1949 — THIRD TENNESSEE SCIENCE TALENT SEARCH

National Winner

Thomas C. Barr, Jr., A.B., M.A., Harvard, Vanderbilt, Animal Ecology, Working toward Ph.D. at Vanderbilt on Fellowship.

National Honorable Mention

*Beverly Gerregano (Mrs. Everett), BS, Vanderbilt U., Chemical Engineering, Employed as Chem. Engr. by Carbide and Carbon Chem. Co., Oak Ridge.

Additional

William J. Bibb, BS, MD, U. of Tenn. Coll. of MED., Medicine, Interning, St. Francis Hospital, Wichita, Kans.

Paul D. Bowers, Jr., BS, U. of Ill., Architecture, Field Construction, U.S.A.

Roland Downing, $ BS, Vanderbilt, Chemistry, U.S.N. Engr. Office.

Loyal Durand, III, BS, Yale University, Physics. Grad. work in theoretical physics. 6 yr. scholarship. Leigh Page Mem. prize in physics (1954) NSF scholarship (1954-55).

Patrick J. Haverty, U. of Tenn., Chemical Engr., Employed Volunteer Life Insurance Company.

Richard H. Hogan, BS, Sewanee, MA, Yale, Forestry, Forest Management.

James C. Lett $ BS, U. of Tenn., Medicine, Student.

*Mary Williamson Mayhew (Mrs.), BS, U. of Tenn., Bacteriology, Bacteriologist, Army Chemical Corps.

Clyde Peters, Jr., BS, Vanderbilt, No recent information.

Joe Stitt, Jr., BS, U. of Tenn., Engineering, Employed, Gen. Electric.

Antonio Venzia, Jr., BS, U. of Tenn., Dentistry, Student.

Vernon Wells, Jr., BS, Kings College, Chemistry, In service.

Horace Williams, MA, BS, Vanderbilt, Engineering, Instructor, Applied Math., Vanderbilt Sch. of Eng'rg.

1950 — FOURTH TENNESSEE SCIENCE TALENT SEARCH

National Winner

Donald McCormick $ BS, MS, Vanderbilt, Bio-Chemistry, Working toward PhD.

National Honorable Mention

Daniel W. Bruce, BS, U. of Tenn., Medicine, Student.

David L. Hoover, BS, Colo. Sch. of Mines, Geology, No 1956 Report.

Thomas W. Scott, BS, Vanderbilt, U. S. Naval Reserve

Thomas H. Traylor, BS, Georgia Tech., Chem. Engr., Tech. Asst. in Polyethylene Prod., Carbide & Carbon Chem. Co., W. Va.

Additional

Robert W. Beard, BS, Southwestern, Medicine, Student.

James Blankenship, BS., U. of Tenn., Engineering, No 1956 Report.

Allen Cleveland, III, Georgia Tech., Architectural Engineering, Architectural draftsman.

Leon E. Griffin, Memphis State, USMC, no recent report.

Thomas R. Henley, BS, U. of Tenn., Chemistry, Student.

Robert G. Horn, BS, Vanderbilt, Medicine, Student, research work.

Milton Hunnicut, Chattanooga, Engineering, Student. Service done.

Gerald A. Lee, U. of Tenn., Geology, No report.

Robert L. Lowery, U. of Tenn., 2nd/Lt. Dept. Defense.

William F. McCormick, BS, U. of Tenn., Medicine, student.

Joseph L. Moore, BS, U. of Tenn., Ind. Engr., In service.

John R. Perkins, USNA, Midshipman.

Phillip Riggins, BS, Austin Peay, Chemistry, Grad. student, Vanderbilt.

William Turner $ Tulane, Physics, Student.

Charles Shires, $, Vanderbilt, Naval Research, Service.

Joseph E. Walk, $, Southwestern, Chemistry, Student.

Edward Woodfin, $, Vanderbilt, Elec. Engr., Student.

1951 — FIFTH TENNESSEE SCIENCE TALENT SEARCH

National Winner
James Cowan, III, $, U. of Tenn., Mech. Eng., Student.
National Honorable Mention
Walter Graham, III, $, US Naval Acad., Elec. Engr., Student.
*Patricia Winters, BS, Engineering, Elect. Engr. RCA Guided Missile Testing Project.

Additional
William H. Barton, BS, Harvard, Medicine. No 1956 report.
Richard E. Ballamy, USAF.
William Christenberry, Chrysler Inst., Mech. Engr., Student engineer.
Goebel Davis, Jr., U. of New Mex., Student.
*Anne E. Dodd, Memphis State, Chemistry, No recent report.
James E. Fields, Aviator, USN.
Vincent P. Ellis, In service, X-Ray tech.
Paul F. Haar, $, St. Ambrose, Philosophy, Student.
Jack Kennon, BS, Vanderbilt, Clinical Psych.
Charles Marshall, Vanderbilt, Elec. Engr., Student.
James Massengill, $, U. of Tenn., Pre-Med., Student.
Wallace B. Rogers, BS, Georgia Tech., Mech. Engr., Project Adm. for elec. corp.
Carl D. Todd, BS, Ala. Poly. Inst., Communications, Engr. for Gen. Elect.
Robert Watkins, No information.
James E. West, BS, T.P.I., Elec. Engr. A.E.D.C., Tullahoma, Tenn.
*Mary E. West, BS, Carson-Newman, Chemistry, Chemist, Tenn. Eastman Co.
Donald Zanders, T.P.I., Engr., No recent information.

1952 — SIXTH TENNESSEE SCIENCE TALENT SEARCH

Name	**Now Studying**	**At**
National Honorable Mention		
Charles A. Moser	Russian Literature,	Yale
Additional		
Samuel Blackwell, Jr., $,	Physics,	Ala. Poly. Inst.
Arthur F. Brunn, Jr.	Chemical Engineering,	U. of Tennessee
Charles J. Cain	Physics,	Vanderbilt.
Lynn W. Craig	Electrical Engineering,	U. of Tennessee.
Charles H. Dennis, Jr.,	Electrical Engineering,	Christian Bros. Coll.
Phillip J. Dirmeyer	Philosophy,	St. Ambrose College.
Joe D. Etheridge	Communications,	USN.
John H. Hatcher, Jr.	Business Administration,	Vanderbilt.
Alvin G. Haworth, Jr.	Engineering,	US Naval Academy.
Dewey J. Newman, $,	Forestry,	U. of Idaho.
*Virginia Marino Norton (Mrs.)	Homemaker,	
Glenn D. Norfleet, $, BS,	Mechanical Engineering,	Vanderbilt.
Robert Scott, III,	Chemical Engineering,	U. of Tennessee.
Leland B. Stanford, $,	Chemistry,	Vanderbilt.
Terrell Wilson, $,	Chemistry,	U. of Tennessee.
Thomas C. Wray, Jr.,	Philosophy,	Vanderbilt.

1953 — SEVENTH TENNESSEE SCIENCE TALENT SEARCH

National Honorable Mention
Robert D. Elliott Chemistry, Vanderbilt.

Additional
William L. Breazeale, $, Engineering Physics, U. of Tennessee.
Clarence E. Cook, $, Chemistry, Carson-Newman.
George E. Drewry, $, Biology, George Peabody College.

Louis C. Hines, $, Business Administration, Vanderbilt.
Patrick W. Kelly, Chemical Engineering, Georgia Tech.
Edward A. Lacy, Physics, T.P.I.
Thomas L. Ledger, Jr., $, Physical Sciences, Memphis State College.
William C. McWhorter, $, Chemical Engineering, Vanderbilt.
Walter E. Mooney, Jr., Electrical Engineering, Georgia Tech.
Charles P. Rader, $, Chemistry, U. of Tennessee
James C. Slone, Jr., US Navy.
Dan R. Stovall, Petroleum Engineering, Louisiana State U.
*Delores Urquiza, $, Physics, Duke.
William B. Walker, Chemical Engineering, U. of Tennessee.
James W. Wheatley, US Marine Corps.

1954 — EIGHTH TENNESSEE SCIENCE TALENT SEARCH

National Honorable Mentions
Revis E. Compton, Jr., Electrical Engineering, Vanderbilt.
William B. Rucker, "New Plan" Gen. Arts Degree, U. of Chicago.

Additional
Robert H. Alford, Chemistry, Vanderbilt.
Milner S. Ball, $, English, Princeton.
*Jane Blankenship, $, Chemistry, U. of Tennessee.
Fairman P. Cumming, Biology, Davidson College.
Robert E. Deweese, $, Civil Engineering, U. of Pennsylvania.
Cafus V. Dodd, III, Engineering Physics, U. of Tennessee.
J. Gordon Eversole, $, Chemistry, Purdue.
John A. Hagen, $, Government, Harvard.
Lawrence Hendrix, $, Chemical Engineering, U. of Tennessee.
Robert C. Holt, $, Industrial Engineering, Georgia Tech.
Robert D. Johnson, $, Mechanical Engineering, U. of Wisconsin.
Henry LaBiche, Jr., $, Physics, Christian Bros. College.
Michael C. McCord, $, Mathematics, U. of Tennessee.
J. Forrest McDowell, Jr., Engineering, Christian Bros. College.
Donald H. Miller, $, Social Science, U. of Chicago.
Les Pettit, Electrical Engineering, Vanderbilt.
Jimmy W. Richens, Music, Memphis State College.
John D. Roberts, Chemical Engineering, Vanderbilt.
Ronald L. Smith, Chemical Engineering, Vanderbilt.
Crawford L. Sachs, Physics, U. of Tennessee.
*Jennifer Tipton, $, English, Cornell.
Joe B. Trahern, Jr., $, English, Vanderbilt.
Robert E. Trent, $, Chemical Engineering, U. of Tennessee.
*Beulah Marie Woodfin, Chemistry, Vanderbilt.

1955 — NINTH TENNESSEE SCIENCE TALENT SEARCH

National Winner
Stanley W. Marshall, $, Chemistry, Vanderbilt.

National Honorable Mentions
Hal Douglas Bishop, Pre-Med, U. of Tenn., Martin Br.
Thomas H. Clark, $, Chemical Engineering, U. of Tennessee.
William C. McHarris, Chemistry, Oberlin College.
Benjamin Z. Meers, $, Electrical Engineering, U. of Tennessee
William F. Pitcher, No information.
Samuel T. Scott, Jr. $, Physics, M.I.T.

Additional
*Nancy Lynn Adkins, Speech Therapy, Texas St. Coll. for Women.
Lee N. Bolen, Jr., Physics, U. of Mississippi.
Gary O. Cohen, Vanderbilt.
John T. Dennison, Chemistry, Vanderbilt.

Andy A. Francis, Chemistry, East Tenn. State Coll.
Tom F. Goodman, Jr., $, Chemistry, Vanderbilt.
Charles Hendren, II, $, Engineering, U. of Tennessee.
Frank Inman, Mathematics, Georgia Tech.
Joe F. Lentz, $, Chemistry, Vanderbilt.
Alan J. Lutz, Mathematics, Southwestern-at-Memphis.
W. Joseph Miller, Engineering, U. of Tennessee.
Isaac B. Moore, $, Electrical Engineering, U. of Tennessee.
*Marian Oates, C, Chemistry, U. of Tennessee.
John Rather, $, Physics, M.I.T.
Edward M. Reaves, Pre-Med, Washington & Lee.
John A. Reeder, Chemical Engineering, Purdue.
Charles J. Schwartz, $, Electrical Engineering, Georgia Tech.
John Healy Sumner, $, Journalism, U. of Tennessee.
David Ivan Tresan, Yale.
*Shirley Williams, Electrical Engineering, U. of Tennessee.

$ indicates accepted scholarship (s); * indicates woman.

The Director of the 1957 *Tennessee Science Talent Search will be*:

Mr. James L. Major

1957 REPORT OF 1956 HIGH SCHOOL GRADUATES TENNESSEE SCIENCE TALENT SEARCH FINALISTS

Name **Now Studying** **At**

National Honorable Mentions
Elmo Burgess, Jr., Engineering, T.P.I.
James Bloomer, $, Chemistry, U. of Tennessee.
Edward Pollard, Jr., $, Aero, Engr., M.I.T.

Additional
Roy N. Adams, $, Chemical Engineering, Vanderbilt.
Joseph G. Baker, $, Chemistry (Naval Science), Vanderbilt.
Francis L. Bowers, $, Aero, Engr., U. of Illinois.
William G. Crump, Botany, U. of Tennessee.
Thomas E. Davis, Electrical Engineering, Georgia Tech.
Charles B. Deering, $, Engr. or Physics, U. of Tennessee.
Dale Dean Fox, No report.
Gerald Alvin Gann, Electrical Engineering, Georgia Tech.
Vernon Gerth, Jr., $, Engineering, Vanderbilt.
Albert Grobmyer, III, Pre-Med, U. of Tennessee.
Hal M. Harrison, Math-Physics, Carson-Newman.
Stephen Henninger, No Report.
Douglas Herbst, Mechanical Engineering, Georgia Tech.
Samuel Kelsall, IV, Chemistry, Georgia Tech.
Robert Larson, No Report.
Stephen W. Lockett, $, Chemical Engineering, U. of Tennessee.
John E. Lord, $, Electrical Engineering, U. of Tennessee.
Henry L. Luschen, $, Engineering, U. of Michigan.
Michael W. Merritt, $, Botany, U. of Tennessee.
Stephen Scheinberg, Math-Physics, M.I.T.
Carl K. Seyfert, Jr., Physics, Vanderbilt.
Harvey A. Simmonds, Jr., $, Undecided (Chemistry), Williams College.
John Solomon, Jr., $, Astro-physics, U. of Michigan.
David Valentine, $, Chemistry, U. of Tennessee.
Ellison Vandiveer, No report.

$ denotes Scholarship

TENNESSEE SCIENCE TALENT SEARCH

Sponsored by the Tennessee Academy of Science

Committee:
Calvin A. Buehler, U. of Tenn., Knoxville, Tenn., James F. Key, Peabody College, Nashville, Tenn., James L. Major, Chm., Clarksville High, Clarksville, Tenn., Katherine Matthews, West End High, Nashville, Tenn., J. H. Wood, U. of Tenn., Knoxville, Tenn., Hanor A. Webb, Peabody College, Nashville, Tenn.

Honors Group for 1957

Honorable Mention in the National Science Talent Search

Name and Address: James D. Marquis, 3680 Faxon Ave., Memphis 12, Tenn.
Sponsor & School: J. D. Reding, Treadwell High
Science Project: Building and using a 6 inch telescope

Name and Address: Randall W. Pack, 1330 Cardinal Drive, Nashville 6, Tenn.
Sponsor & School: Mrs. Burt Francis, Isaac Litton High
Science Project: The Effect of Variation in Temperature on the Conductivity of Electricity.

2nd Place
Name & Address: Conley Miller, Jr., 2938 Summer, Memphis 12, Tenn.
Sponsor & School: J. D. Reding, Treadwell High
Science Project: The Mouse

3rd Place
Name & Address: Gene R. Ezell, 1602 Eastern Hills, Clarksville, Tenn.
Sponsor & School: Joseph Minor, Clarksville High
Science Project: Modification and Construction of a Wide Range Music System.

4th Place
Name & Address: James Poteat, 522 Factory, Trenton, Tenn.
Sponsor & School: Gertie Morris, Peabody High
Science Project: The Application of Chromatography in the Extraction of Natural Leaf Pigments.

5th Place
Name & Address: Alan R. Cohen, 403 W. Hillwood, Nashville 5, Tenn.
Sponsor & School: Mrs. Gerard A. Dvorsky, Hillsboro High
Science Project: A Peaceful Use of the Atom: The Reactor.

6th Place
Name & Address: Clifton B. Briley, Jr., 1406 Winding Way Road, Nashville 6, Tenn.
School & Sponsor: Mrs. Burt Francis, Isaac Litton High
Science Project: The Construction of a Tesla Coil.

Name & Address: John R. Knox, Jr., 704 College, Trenton, Tenn.
Sponsor & School: Gertie Morris, Peabody High
Science Project: Topology and Its Relationship to Material Structure.

Name & Address: Gilbert W. Stewart, 6913 Sheffield Dr., Knoxville 19, Tenn.
Sponsor & School: C. M. Bridges, Jr., Bearden High
Science Projects The Development of Flexible Lucite.

7th Place
Name & Address: Michael M. Garland, 220 Forbes Ave., Clarksville, Tenn.
Sponsor & School: Joseph Minor, Clarksville High
Science Project: The Construction of a Small Refracting Telescope.

8th Place
Name & Address: Mary Grace Spencer, 610 Westview Ave., Nashville 5, Tenn.
Sponsor & School: Mrs. Gerard A. Dvorsky, Hillsboro High
Science Project: The Armillary.

9th Place

Name & Address: Charles Gholson, 1094 Wrenwood Lane, Memphis 12, Tenn.
Sponsor & School: J. D. Reding, Treadwell High
Science Project: Recovery Methods of Oil.

Name & Address: Mary J. Mahoney, 17 Bluff View, Chattanooga, Tenn.
Sponsor & School: Sister Hyacinth, Notre Dame High
Science Project: Chromatography of Pine.

10th Place

Name & Address: William Highfield, 3506 Audobon Dr., Chattanooga, Tenn.
Sponsor & School: Sister Hyacinth, Notre Dame High
Science Project: Chromatography.

GENERAL SESSION

Friday, November 22, 1:30 P. M. — Adult Education Center, Burrow Library

President Isabel H. Tipton, Presiding

REELFOOT LAKE. J. H. Nichols, State Game and Fish Commission, Tiptonville.

CHUCKALISSA — AN ARCHAEOLOGICAL PROJECT. Charles H. Nash, Tennessee Division of State Parks, Memphis.

CONTENT OF BASIC COURSES IN ENGINEERING DRAWING AS RECOMMENDED BY COLLEGES AND INDUSTRY. Norbert Koch, University of Chattanooga, Chattanooga.

FURTHER EXPLORATIONS IN ARCTIC ALASKA. Royal E. Shanks and John Koranda, University of Tennessee, Knoxville.

REPORT OF ACADEMY CONFERENCE, A.A.A.S. C. L. Baker, Southwestern at Memphis, Memphis.

A PROPOSAL FOR A COOPERATIVE PROGRAM OF COLLEGE AND HIGH SCHOOL SCIENCE TEACHERS FOR THE IMPROVEMENT OF SCIENCE TEACHING. F. Lynwood Wren, George Peabody College for Teachers, Nashville.

TRAVELING SCIENCE DEMONSTRATION LECTURE PROGRAM. Joseph E. Bowles, Oak Ridge Institute of Nuclear Studies, Oak Ridge.

BOTANY SECTION

Saturday, November 23, 8:00 A. M., Adult Education Center, Burrow Library

H. R. DeSelm, Chairman

AN ADDITION TO THE LIST OF TENNESSEE FERNS. Herman O'Dell, *East Tennessee State College*, Johnson City.

During the Annual Wildflower Pilgrimage to the Great Smoky Mountains National Park, the third week in April, 1957, a fern was discovered along the Huskey Gap Trail which did not lend itself readily to identification in the field. After further study this proved to be a species not previously reported from Tennessee. This represents an addition to the list of Tennessee plants and an extension of the range for this species, since up to this time the southernmost station was in Maryland. Professor Ogden of Alfred University tells me that he knows of stations in West Virginia.

A specimen of this plant was deposited in the Herbarium of the Great Smoky Mountains National Park.

SOME NOTES ON THE DISTRIBUTION OF SPANISH MOSS (*TILLANDSIA USNEOIDES*) IN NORTH AND SOUTH AMERICA. Richard E. Garth, *East Tennessee State College,* Johnson City.

The correlation of the North American distribution of Spanish Moss with the Southeastern Coastal Plain area has been responsible for many speculations concerning the present distributions. A review of the herbarium specimens from the Smithsonian Institute of collections made in South America indicates that there is no adherence to any geophysical contour lines in the distribution of Spanish Moss. The South American data indicate most of these speculations to be in error. This information, coupled with previously reported experimental evidence, indicates the present distribution pattern to be primarily fortuitous.

INTERESTING PLANTS FROM TENNESSEE. A. J. Sharp, *University of Tennessee,* Knoxville.

Arenaria lanuginosa, A. brevifolia, Ranunculus harveyi, R. sardous, Palygala nana, Ceanothus ovatus, Hedyotis boscii and *Chrysopsis nervosa* are reported for the first time from Tennessee. *Aster gracilis,* described by Nuttall from the prairies of Kentucky and Tennessee, was found in Miller's Cove along Chilhowee Mountain. The following weeds: *Adonis autumnalis, Myosotis arvensis* and *Chrysopsis pilosa,* are established in Tennessee and are spreading, the last very rapidly. *Comptonia peregrina* and *Schwalbea australis* were collected in 1842 from Scott County by Rugel.

NOTES ON TENNESSEE LICHENS. Herbert A. Sierk, *The University of Tennessee,* Knoxville.

Little attention has been paid to lichens in the state of Tennessee. Other than the work of Degelius (1941) on the lichens of the Great Smoky Mountains, there has been but incidental and occasional mention of these plants in the state. It is hoped that interest may be stimulated in the study of lichens in Tennessee.

Tropical, northern, oceanic and Asian affinities may be pointed out which parallel patterns in previously studied elements of the flora.

In addition to this, several new stations may be reported for *Cladonia linearis* Evans.

THE GENUS *RUBUS* IN TENNESSEE. Royal E. Shanks, *the University of Tennessee,* Knoxville.

A provisional Key to Tennessee *Rubus,* prepared in connection with the state flora project, contains 33 entries, of which 5 are introduced species. The most conservative treatment would reduce the total number to 13. Some groups of dewberries and blackberries are highly variable and poorly understood and more collections are needed.

TENNESSEE PRAIRIE AND BARREN. H. R. DeSelm, *The University of Tennessee,* Knoxville.

Sampling from eight widely scattered Tennessee prairie remnants led to compilation of an herbaceous species list of 380 taxa.

Comparison of this list with others suggests that our grassy openings are more similar to ones to the west and southwest than northwest. Of the species occuring on 50% or more of the openings none are restricted to such openings. Openings from which certain species are absent might well be called barrens.

The large number of taxa and low presence values for most species suggest ancient origin of the openings.

FRESHMAN CONCEPTS OF DIGESTION. Fred H. Norris, *The University of Tennessee,* Knoxville.

Study of the process of digestion by beginning botany students often yields vague and unsatisfactory results. Despite specific laboratory consideration and continuing reference to the process throughout the course students frequently do not grasp its basic essentials. Results of a pretest given

to 182 first-quarter botany students disclose a variety of ideas including the following misconceptions: during digestion foods are converted into energy (78%); digestion is not a process of hydrolysis (76%); digestion occurs with the release of appreciable amounts of energy (69%); digestion is the movement of food, as from the stomach into the bloodstream (58%); the process is interpreted in a personifying sense in that it occurs in order to release energy for life processes, or to prepare food for use in growth (51%); and the process does not convert insoluble foods into soluble foods (41%). Correct ideas commonly held include: the process is not peculiar to plants alone (99.5%), or to human beings alone (95.6%); during the process "simpler" foods are not converted into "complex" foods (97.8%); and finally the process is a chemical reaction (81.8%). In view of this meagre understanding it seems apparent that the process merits major attention in college-level biology courses.

THE EFFECT OF INFECTION BY *PSEUDOMONAS PHASEOLICOLA* UPON THE RESPIRATION OF THE RADICLE OF THE GREEN BEAN. Elmo S. Dooley, Charles D. Jeffries, Gordon E. Hunt, *The University of Tennessee,* Knoxville.

In order to study the physiology of infected plant tissue, bean root tips were placed in variously treated cultures of *Pseudomonas phaseolicola* and the rate of oxygen consumption of the radicles determined in the Warburg apparatus. Experiments were carried out first with normal root tips and those inoculated with a suspension of the bacteria and the respiration measured at 24,, 48, and 72 hours. The QO_2 of the infected root tips was consistently slightly greater at each 24, 48, and 72 hour period after infection. The cell suspensions were then treated in three ways and the root tips immersed in the treated suspensions and measured as follows: (a) Boiled cell suspension, result, (compared to control), about a 50% increase in respiration rate of 24 hours, and return to about control rate at 48 and 72 hours. (b) Boiled bacterial cell autolysate, result, slight rise at 24 hours, drop to normal at 48 hours, and almost 50% rise again at 72 hours. (c) Supernate only of boiled bacterial suspension, result, a sharp drop at 24 hours, nearly complete respiratory inhibition at 48 hours, and rebound to about 25% increase over the controls at 72 hours. Warburg values were determined in at least two replicates in each case, and it was determined that bacterial oxygen consumption over the experiment was negligible.

STIMULATION OF RESPIRATION OF CONOCEPHALUM SP. BY GIBBERELLINS. Gordon E. Hunt and Herbert Sierk, *The University of Tennessee,* Knoxville.

Thalli of *Conocephalum conicum* were collected from the University greenhouse, washed, and 0.4 g. aliquots placed on a moistened filter paper in Petri dishes. Mixed gibberellins (provided by the courtesy of Dr. F. H. Stodola) were made up to concentrations of 100, 10, 0.1, and 0.01 PPM and 2.5 ml. of each of these concentrations, plus 2.5 ml. distilled water was then pipetted on one of the cultures. After 48 hours, each aliquot was placed in a Warburg flask and the oxygen consumption measured in the dark over a three hour period. The QO_2 values, in ml. O_2/g. dry wt./hr. for the *Conocephalum* thalli were as follows: dist. water treatment, 113; 0.01 PPM, 137; 1 PPM, 146; 10 PPM, 169; 100 PPM, 203. It was obvious that a direct stimulation, consistent over the concentration range and time of the experiment, on the oxygen uptake of gibberellin treated liverwort tissue.

CHEMICAL NATURE OF THE PHOTORECEPTOR PIGMENT INDUCING FRUITING OF PLASMODIA OF *PHYSARUM POLYCEPHALUM*. Frederick T. Wolf, *Vanderbilt University,* Nashville.

Previous studies by W. D. Gray have shown that plasmodia of *P. polycephalum* will not fruit when grown in continuous darkness, that the shorter wavelengths of the visible spectrum (blue light) are most efficient in stimulation of fruiting, and that a pH of 3.0 is optional. It was concluded that the yellow pigment of the plasmodia is a photoreceptor. The

present observations indicate that the plasmodium contains a system of two yellow pigments, separable by paper chromatography or column chromatography. Both of these are shown, by the characteristics of their absorption spectra and fluorescence, to be pteridines. The spectral characteristics of one pigment are such as to offer a reasonable explanation of the effect of blue light and acid conditions in the production of the morphogenetic response of fruiting.

VEGETATION STUDIES ON AN AREA CONTAMINATED WITH RADIOACTIVE WASTES. Royal E. Shanks and H. R. DeSelm, *The University of Tennessee,* Knoxville.

Studies on vegetation on the White Oak Lakebed, Oak Ridge National Laboratory area have to date included: assembling background information on the history, geology, soils and vegetation, plant collections determining community and litter composition and bulk.

Future work will include determining precise distribution of certain soil nucleids, uptake of these nucleids by important plants, and relation of uptake to deposition in litter.

SOUTHWESTERN ARBORETUM. Arlo I. Smith, *Southwestern-at-Memphis,* Memphis.

The Southwestern Arboretum was instituted two years ago through the joint efforts of the Lumbermen's Club of Memphis and Southwestern. The native plants on the campus have been identified and some of all the different species of trees labeled with permanent signs. More trees are added from time to time as they are available. Most important activity of the past year seems to have been the addition of three Self-Guided Tree Trails. These are made up of about twenty trees each trail. Mimeographed leaflets are placed at the beginning of each trail. These leaflets describing each tree or station visited as indicated by the map in the guide. Students from Memphis schools have visited these trails nearly every afternoon during the fall months, the first season they were open, and their interest seems to indicate a similar system would be advisable for other botanists to follow.

THE ORIGINAL FOREST OF JOHNSON COUNTY, TENNESSEE. Frank H. Barclay, *East Tennessee State College,* Johnson City.

A survey of the vegetation of Johnson County was made for the purpose of ascertaining the pattern of the original forest. Historical background included data obtained from pollen analysis and witness tree statistics. The original forest on the slopes of Johnson County were predominantly oak-chestnut. Chestnut, the principal dominant, sometimes composed more than 60% of a stand. Cove hardwoods with hemlock occupied mesic slopes along mountain streams. White pine was abundant, especially on the lower slopes and valley floors. Yellow pines, sometimes with xerophytic hardwoods or in almost pure stands with heath understory, occupied more xeric sites. Oak-chestnut gave way above 4500 feet to northern hardwoods in which red oak and sugar maple were prominent. Above 4800 feet yellow birch grew to rather large size, becoming scrubby at 5400 feet. The present forest in relatively undisturbed areas closely resembles the original forest except for the presence of mixed hardwoods which have replaced chestnut. The ratio of pine types to hardwoods has also increased.

CHEMISTRY SECTION

Saturday, November 23, 8:00 A. M. — Room 108, Science Building
Albert L. Myers, Chairman

ASPHALT ADDITIVES. James L. A. Webb, *Southwestern at Memphis.*

THE DIPOLE MOMENTS OF CERTAIN SPYRYL QUINOLINES. Albert L. Myers, *Carson-Newman College,* Jefferson City.

RADIO-ISOTOPE ANALYSIS BY GAMMA-SPECTROSCOPY. Lester Van Middlesworth, *University of Tennessee Medical Units,* Memphis.

PORPHYRIN ANALYSIS AND PORPHYRIN METABOLISM. Frank S. Schlenker, *Veterans Administration Medical Teaching Group Hospital,* Kennedy Hospital, Memphis.

DETERMINATION OF CHOLINE ESTERASE IN PLASMA AND CELLS. Homer Biggs and Dempsey Morrison, *University Medical Units,* Memphis.

PLASMA HEMOGLOBIN, DETERMINATION AND SIGNIFICANCE. Hans N. Naumann, *Veterans Administration Medical Teaching Group Hospital,* Kennedy Hospital, Memphis

REACTION OF EPINEPHRIN WITH ETHYLENEDIAMINE. James G. Young and Robert L. Fisher, *University of Tennessee Medical Units,* Memphis.

AN ATTEMPT TO IMPROVE ORGANIC LABORATORY INSTRUCTION. William K. Easley, *East Tennessee State College,* Johnson, City.

The traditional organic laboratory instruction leans heavily upon "cookbook" techniques. We have discarded this approach in our final twelve weeks of the organic laboratory work.

The students have been given an introduction to the organic chemistry literature with laboratory work assigned that draws upon primary literature references. The student is permitted a greater degree of freedom of operation than before.

Some of the projects undertaken were: (1) Preparation of furoin, (2) Nitrations, (3) Diazotation, (4) Reduction.

Results of this program are incomplete, but student interest in the organic laboratory work has been increased.

ENGINEERING SECTION

Saturday, November 23, 8:00 A. M. — Room 105, Science Building
W. A. Goodwin, Chairman

SOME EFFECTS OF BOUNDARY ROUGHNESS UPON TURBULENT FLOW IN PIPES. Harry H. Ambrose, *The University of Tennessee,* Knoxville.

A review of available literature will reveal that there is still much to be learned about the effects of boundary roughness upon the turbulent flow of fluids. Since 1949 a program of experimental research has been in progress at the University of Tennessee for the purpose of adding to the knowledge in this field. Tests made with the flow of water through a pipe roughened by systematic patterns of artificial roughness elements have, thus far, indicated that the longitudinal spacing of the roughness elements is the most important single characteristic of the boundary-roughness effect.

U. S. AND BRITISH POWER REACTORS. Earle Thomas, *Boiler Engineering Company,* Chattanooga.

Both reactors discussed have some very unusual features, and I will detail the entire reactor structure and operation on a non-technical level. Comparisons and comments on both likenesses and differences will be made. Only Calder Hall in England and Shippingport reactors are discussed, with occasional reference to others as needed.

PRECAST & PRESTRESSED CONCRETE BRIDGES. Eugene F. Bespalow, *Choctaw, Inc.,* Memphis.

This paper covers the design and testing and construction and erection of precast concrete bridge units for short span highway bridges from 15 ft. to 40 ft. spans. The paper discusses the economy and time saving in the use of these units and the necessity for standardization in this field. Colored slides will show manufacture and erection of these units on various state, federal-aid, and county highways as well as their use in cities.

RESEARCH ON CLOSED LOOP CONTROL SYSTEMS IN THE ELECTRICAL ENGINEERING DEPARTMENT OF THE UNIVERSITY OF TENNESSEE. Charles Hadley Weaver, *The University of Tennessee,* Knoxville.

The basic concept of closed loop control is described. Research on closed loop control systems carried out during the past ten years is discussed, with emphasis on such factors as basic sciences used and contributions made to the status of the art. The research has been done as master's theses, and titles, authors and brief descriptions of these theses are presented. The investigations are divided into four main groups — problems of instrumentation, problems on artificial feel, problems on motion memorizing, and development of new techniques of system design, analysis and synthesis. Typical examples of each of these groups are presented in detail.

RESEARCH ON ANTENNA SYSTEMS IN THE ELECTRICAL ENGINEERING DEPARTMENT OF THE UNIVERSITY OF TENNESSEE. James D. Tillman, Jr., *The University of Tennessee,* Knoxville.

Several antenna systems have been developed at the University of Tennessee during the past five years. The methods of analysis and experimental verification used are described. Several of the antennas investigated have circular symmetry, and the mathematical techniques adaptable to this kind of array are discussed. The instrumentation needed for an antenna pattern range is considered in some detail.

LAPLACE TRANSFORMATIONS, SINUSOIDS, AND IMPEDANCE. Frederick R. Redwine, *University of Chattanooga,* Chattanooga.

HYDRAULIC ANALOGIES. Ray Kinslow, *Tennessee Polytechnic Institute,* Cookeville.

GEOLOGY-GEOGRAPHY SECTION

Saturday, November 23, 8:00 A. M. — Room 107, Science Building

Robert L. Wilson, Chairman

HUMAN FACTOR IN THE EVALUATION OF COAL RESERVES. E. T. Luther, *Tennessee Valley Authority,* Nashville.

PALEOGEOGRAPHY DURING DEPOSITION OF PENNSYLVANIAN SAND BODIES IN TENNESSEE. Charles W. Wilson, Jr., *Vanderbilt University* and Richard G. Stearns, *Tennessee Division of Geology,* Nashville.

Pennsylvanian sand bodies in Tennessee have two distribution patterns: (1) widespread blankets and (2) long, narrow, digitate masses.

Owing to erosion, no single sand body is now entirely preserved. However, it is thought that originally the Rockcastle and older blanket sands thickened southeastward and interbedded with carbonaceous sediments; northwestward, they abruptly thinned from about 100 feet to a few feet. The younger Crossville and Wartburg sandstones pinch out abruptly southeastward and, through a thin equivalent, join with remnants of digitate sands farther southeast. Still younger sands are digitate with no (preserved) blanket equivalent.

It is believed that the lateral contact of blanket sands with carbonaceous sediment represents a shoreline. Abrupt thinning is presumably due to a deepening of water. Digitate sands are thought to be submarine distributary channels where sediment-laden water was discharged at stream mouths down a sloping sea bottom into deeper water.

During deposition of the Rockcastle and older sands, a northeast-trending shoreline is inferred near the southeast edge of the coalfield. Most of the coalfield was a shallow, agitated open body of water, but deeper, quieter water occurred in the northwest corner.

When the younger Crossville and Wartburg sands were deposited, this northwest area became a site of blanket sand deposition on the northwest edge of an asymmetric, deeper water basin. A steeper southeast margin is inferred from the northwest-trending digitate sands developed there.

Still younger digitate sands extend westward far out into the coalfield, which was probably the westward-sloping side of a much wider body of water.

GEOLOGIC OBSERVATIONS IN THE APPALACHIA TUNNELL. B. C. Moneymaker, *Tennessee Valley Authority*. Knoxville.

THE URANIUM CONTENT OF SURFACE WATER IN EAST TENNESSEE AND WESTERN NORTH CAROLINA. S. W. Maher and G. D. Swingle, *Tennessee Division of Geology*. Nashville.

Samples of surface water from 20 localities in the crystalline complex of eastern Tennessee and western North Carolina were collected and the uranium content determined fluorimetrically. In some localities uranium minerals are present, in others no uranium is known to occur.

Based on these samples the "background" for the area is 0.2 ppb U or less; and 0.3 ppb appears to represent the threshold of an anomaly.

THE CHANGING AGRICULTURAL SCENE ON THE CUMBERLAND PLATEAU. George W. Webb, *Memphis State University*, Memphis.

The existing American geographical literature which covers the Cumberland plateau has not kept pace with the changes that have come to the region. Students still read from their texts such statements as, "Here one finds true subsistence farming, and pioneer customs that date back to the first frontier." On the whole the agriculture of the Cumberland plateau has always been of a self-sufficient rather than of a commercial character, but a detailed study of Cumberland County, Tennessee in the years 1954, 1955, and 1956, which included several traversals of the county, interviews with farmers, crop inspections, and several consultations with the County Agricultural Agent, disclosed that the agricultural scene, as well as other phases of the culture of the region, is undergoing some change. In particular, the introduction of vegetable and tobacco crops as well as an increase in cattle production indicates that it is no longer sufficient merely to say that subsistence farming is practiced.

GEOLOGY OF THE MAX PATCH GRANITE AREA. C. P. Finlayson, *University of Tennessee*, Knoxville.

URANIUM ENRICHMENT IN THE CHATTANOOGA SHALE. George D. Swingle and W. D. Hardeman, *Tennessee Division of Geology*, Nashville.

A unique deposit of the Chattanooga shale is exposed on a secondary road in DeKalb County, Alabama. This occurrence is 4¼ miles north of the village of Valley Head and ½ mile west of U. S. Highway 11.

An abnormally high concentration of radiation is present here with readings up to 1.0 MR/HR being recorded in a local area. The shale in the area of highest radio-activity is strongly weathered, contorted and pyritic. A composite sample obtained from a hand auger hole ten feet in depth contained about .2% uranium and other nearby holes show similar concentrations over lesser thicknesses of shale. This unusually high uranium concentration is believed to occur chiefly as torbernite or metatorbernite which is found in thin veinlets and streaks in the weathered shale. It is believed that this is the first occurrence of identifiable uranium minerals in the Chattanooga shale.

The shale at and near the surface is apparently out of equilibrium, but beneath this zone equivalent uranium values agree closely with actual uranium content.

Because of the strongly weathered nature of the shale it is suggested that this unusual uranium concentration is due to enrichment of Chattanooga shale having a normal uranium content, but it is possible that this occurrence is due to the weathering of abnormally rich uranium lenses which are known to exist in fresh Chattanooga shale in other areas.

SUB-SURFACE FACIES CHANGES IN THE NASHVILLE AND MAYSVILLE GROUPS BENEATH THE NORTHWESTERN HIGHLAND RIM OF TENNESSEE. Robert A. Miller, *Tennessee Division of Geology*, Nashville.

MATHEMATICS SECTION

Saturday, November 23, 8:00 A. M. — Room 100, Palmer

Jack U. Russell, Chairman

A Numerical Solution of a Problem in Differential Equations. G. H. Lundberg, *Vanderbilt University,* Nashville.

A Report on the 1957 Institute on Mathematics in the Social Sciences. L. L. Scott, *Southwestern at Memphis,* Memphis.

Computation With Detached Coefficients. F. Lynwood Wren, *George Peabody College for Teachers,* Nashville.

Methods of computing with detached coefficients will be applied to the solution of equations, rank of matrices, the Euclidean logarithm, and the determination of common roots of two or more equations.

An Exponential Diophantine Equation. David T. Walker, *Memphis State University,* Memphis.

PHYSICS-ASTRONOMY SECTION

Saturday, November 23, 8:00 A. M., Room 203, Science Building

Wendell G. Holladay, Chairman

A Report on the Connecticut Conference on Laboratory Instruction in General College Physics. M. S. McCay, *University of Chattanooga,* Chattanooga.

The objectivity of physical science, it has been said, is the envy of all other disciplines. The laboratory perhaps has unique responsibility for maintaining this objectivity, and for imparting the sense of it to the students who seek experience in this area of thought and experience. The particular objectives of the laboratory of physics have been characterized as "knowing" and "feeling" the phenomena and relationships of this branch of physical science. Too often careless or inadequate attention to the opportunities afforded in the laboratory lead to misunderstanding and disinterest. Ways and means for improving and distinguishing the basic physics laboratory programs were extensively reviewed at the AAPT-NSF Conference at Storrs, Connecticut, in June, 1957. Some of the techniques and plans by which we may "Stimulate the desire for scientific careers in our youth" will be outlined in this review of the Storrs Conference, with the belief that "The insight into scientific work afforded by the laboratory . . . justifies increased academic support of this aspect of instruction."

An Application of an Absolute Theory of Solid State Luminescence to Mn-- ions In $CaCO_3$. R. T. Arnold and W. L. Medlin, *Magnolia Petrolium Company,* Dallas, Texas.

An effort has been made to apply an absolute theory of solid state luminescence as developed by Williams to the change in lattice energy of calcite when a calcium ion is replaced by a manganese ion. The energy change was analyzed by choosing a single coordinate in the crystalline lattice to give readily computable results. An outline of the lattice theory will be given and arguments for and against its application to calcite will be presented. The numerical results have not yet been obtained, but the numerical evaluation is in process of being completed on the Datatron at Magnolia.

Field Sensitive Control Circuit for the Vanderbilt Iron-Free, Double-Focusing, Beta-Ray Spectrometer. Julian C. Nall, *Vanderbilt University,* Nashville.

Two main topics will be discussed in the paper.

First, the method used to reduce the output ripple of the DC generator will be presented. This was accomplished by incorporating the generator into the output stage of a high gain DC amplifier with negative feedback. The high electrical inertia of the generator is removed by use of a high

frequency by-pass circuit. The Nyquist stability criterion is discussed for the combined circuit.

Second, the system used to make the control circuit field sensitive rather than just current sensitive will be discussed. This was carried out by placing two coils on opposite ends of a 14 foor rotating shaft. One coil rotates in the field of the spectrometer, while the other rotates in the field of a thermostatically controlled permanent magnet. The two AC voltages are added out of phase after the permanent magnet part is divided by the controlling potentiometer. The AC error signal is the input to the electronics which produces the DC signal which feeds the system discussed in part one.

A short discussion of a general nature of the spectrometer as a whole will be given, if this should be desired.

PULSE HEIGHT ANALYSIS BY FREQUENCY DEVIATION, S. H. Pearsall, *Vanderbilt University,* Nashville.

The general types of pulse height analyzers are briefly discussed. A method of pulse height analysis by frequency deviation proportional to pulse height is introduced. This is a multi-channel system with excellent inter-channel stability which is relatively economical to build. Various methods of achieving frequency deviation are discussed. The method selected uses a high frequency ferrite saturable reactor. Pulse stretching and gating circuits are included to provide directly a differential count. Because of the necessary pulse stretching the system is at present limited to count rates below 600 counts per second.

SOME FLUORESCENCE YIELD AT LOW ENERGIES. W. F. Frey and John I. Hopkins, *Vanderbilt University,* Nashville.

The K-series fluorescence yield of manganese-55 due to the electron capture decay of the radioisotope iron-55 has been measured by using a proportional counter spectrometer. Also, the K-series fluorescence yield of naturally occurring neon gas due to the excitation of the gas by the 5.9 kev characteristic K x-ray of manganese has been measured by using the same experimental apparatus. The counter source used in each measurement was a thin preparation of the radionuclide iron-55. The analysis of the spectra and the preparation of thin sources will be discussed, and comparisons will be made between these measurements and the theoretical results.

ZOOLOGY SECTION

Saturday, November 23, 8:00 A. M. — Adult Education Center,
Burrow Library
John A. Patten, Chairman

ACHONDROPLASIA IN BEEF CATTLE. William G. Downs, Jr., *Tennessee Polytechnic Institute,* Cookeville.

While sporadic studies on this subject have been published from time to time over a period of perhaps fifty years, it is felt that new approaches to both the genetic and endocrine angles justify some re-examination.

The present report is based upon careful gross and microscopic studies of more than twelve dwarfs of varying degree, with generally complete information on their hereditary.

Conclusions are tentative only, but it is suggested that the genetic character is more than a "simple" recessive. The wide variation in intensity indicates as a very minimum that while the *basic* character may be a single recessive, a number of modifying and/or inhibiting characters must be considered.

While the endocrine picture is extremely complex, it is suggested that a chromophobe adenoma of the anterior hypophysis is the outstanding feature, with marked changes in other glands and organs.

GROUP STUDY: A METHOD OF TEACHING PARASITOLOGY. Arthur W. Jones, *University of Tennessee,* Knoxville.

Helminth parasitology can be studied by an organized group, which divides the work of fact-gathering (using a good textbook plus current literature), then discusses main divisions of the subject. The teacher (or "moderator") then edits the reports submitted, providing each member with a mimeographed record and bibliography. Disadvantages of the method are rather loose organization, excessive time needed to "cover" subject-matter, and the difficulty with which the average teacher surrenders his role of authoritarian leader for a less exalted function. Advantages are the extraordinary enthusiasm for learning that soon develops, the emergence of fertile ideas (many new to the teacher himself!), a progressively friendlier relationship among the members and much better retention (understanding?) of information than would be expected of students in an ordinary course. One principle of behavior involved here may be the proposition that responsibility to others is more challenging than responsibility to self. Teachers, who usually behave as if this were true, themselves, too rarely trust students to show the same altruism.

RECENT WORKSHOPS FOR COLLEGE PHYSIOLOGY TEACHERS AT STORRS AND GUILFORD COLLEGE. Samuel R. Tipton, *University of Tennessee,* Knoxville.

The author has had an active role in workshops for physiology teachers under the sponsorship of the American Physiological Society and the National Science Foundation. The first one in Connecticut in August, 1955, had members from all regions of the country, whereas the Guilford College one in September included only the Southeast. Some background will be given and possible consequence for Tennessee colleges will be considered.

Physiological concepts and mechanisms of function should have equal treatment with morphology in an undergraduate course in Biology. Here is the ideal meeting place for physics, chemistry, mathematics and biology.

A catalog survey has indicated that biology courses in our colleges still lean heavily toward anatomy and thus is not reflecting the modern trend toward functional biology. Some of the reasons for this will be explored and suggestions for changing emphases will be given.

GENERAL ASPECTS OF BIRD DISTRIBUTION IN EASTERN AND SOUTHERN MEXICO. Mrs. Ben B. Coffey, Jr., *Tennessee Ornithological Society,* Memphis.

SOME ASPECTS OF A LIMNOLOGICAL STUDY OF STONES RIVER, TENNESSEE. J. Gerald Parchment, *Middle Tennessee State College,* Murfreesboro.

Particular attention will be given to the bottom fauna of Stones River — a prominent tributary of the Cumberland River in middle Tennessee, and a typical larger stream of the area.

Some consideration will be given to the chemical and physical conditions of the East fork, West fork, and common channel of the river. Also the bottom fauna will be considered as a possible index of pollution.

The samples were collected during the years 1955 and 1956. The chemical determinations were made in the field, or immediately after returning to the laboratory. The bottom organisms were preserved in formalin, and identified at a later date.

SECTION OFFICERS FOR THE YEAR 1958

Botany Section:

Chairman: P. C. Hollister, Tennessee Polytechnic Institute, Cookeville.
Vice-Chairman: H. O'Dell, East Tennessee State College, Johnson City.
Secretary: G. E. Hunt, University of Tennessee, Knoxville.

Chemistry Section:

Chairman: Albert L. Myers, Carson-Newman College, Jefferson City.
Vice-Chairman and Editor: Carl M. Hill, Tennessee State, Nashville.

Engineering Section:
Chairman: C. H. Weaver, Department of Electrical Engineering, University of Tennessee, Knoxville.
Vice-Chairman and Secretary: J. D. Tillman, University of Tennessee Knoxville.
Editor: J. S. Brown, Tennessee Polytechnic Institute, Cookeville.

Geology-Geography Section:
Chairman: B. C. Moneymaker, TVA Geological Branch, Knoxville.
Editor: W. B. Jewell, Vanderbilt University, Nashville.

Mathematics Section:
Chairman: A. R. Sloan, Carson-Newman College, Jefferson City.
Secretary: Gustave H. Lundberg, Vanderbilt University, Nashville.
Editor: Edgar D. Eaves, University of Tennessee, Knoxville.

Physics-Astronomy Section:
Chairman: Edward Burke, Jr., King College, Bristol.
Secretary: Henry C. Allison, University of Tennessee, Martin Branch, Martin.

Zoology Section:
Chairman: Ronald C. Fraser, University of Tennessee, Knoxville.
Secretary: John G. Parchment, Middle Tennessee State College, Murfreesboro.

COLLEGIATE DIVISION OF THE TENNESSEE ACADEMY OF SCIENCE

Eighth Annual Meeting

Saturday, November 23, 8:30 A. M. — Room 101, Science Building

Stanley Von Hagen, Carson-Newman College, President

THE THEORY AND DESIGN CONSIDERATION FOR RADIO FREQUENCY OSCILLATORS AS APPLIED TO THE ULTRA-HIGH FREQUENCIES. John Thomas Young, Christian Brothers College.

THE METHODS OF FORMATION AND THE STRUCTURES OF SOME COMMON CRYSTALS. H. Bernie Orr, Carson-Newman College.

SPECTROPHOTOMETRIC STUDIES OF A METAL COMPLEX. Robert L. Trouy. Christian Brothers College.

ROULETTE GENERATOR. John Burton, Carson-Newman College.

MENGER'S NOTATION FOR THE CALCULUS. James M. Dolan, Christian Brothers College.

THE DETERMINATION OF THE FORMULA AND THE STABILITY CONSTANT OF A CHELATE BY THE POLOROGRAPH. Kenneth James Oswald, Christian Brothers College.

A SUN BATTERY LIGHT INTEGRATOR. Paul Haigh, W. J. Cloyd, and B. E. Craddock.

EXHIBIT

NUCLEAR DETECTION STUDIES (THE CLOUD CHAMBER). Jerry Corvin, Clarksville.

PRIZE WINNERS

First Place and AAAS Award: Kenneth James Oswald, Christian Brothers College.
Second Place: H. Bernie Orr, Carson-Newman College.
Third Place: Robert L. Trouy, Christian Brothers College.

OFFICERS OF COLLEGIATE SECTION FOR 1958

President: Oakley Crawford, Carson-Newman College.
Vice-President: Rose Sawyer, Memphis State University.
Sec.-Treas.: Peggy Cardwell, Morristown College.
Editor: John Burton, Carson-Newman College.
Sponsor: E. D. Watts, Middle Tennessee State College.

TENNESSEE JUNIOR ACADEMY OF SCIENCE

Sixteenth Annual Meeting

Saturday, November 23, 10:00 A. M. — Neely Mallory Memorial Gymnasium

General Chairmen: John T. Johnson, Young High School, Knoxville, and Charles M. Bridges, University of Tennessee, Knoxville.

Sponsor: W. W. Wyatt, University of Tennessee, Knoxville.

Sponsors of Projects

Miss Esther Ayres, Mrs. A. C. Bailey, Miss Nora Bernard, Mrs. Blanche Blanton, Mrs. J. E. Brown, Mrs. M. A. Caballero, Mrs. John Cathey, Mr. Paul D. Green, Mr. Hendrix, Mr. J. T. Johnson, Mr. H. H. Kroll, Mrs. H. H. Kroll, Miss Rachel Miller, Mr. John Netterville, Mrs. Ruth Ray, Mr. Shaw, Miss Lula Shipe, Sister Hyacinth, Mrs. K. B. Stanton, Miss Anna Weigel, Mrs. Frances Wild.

Welcome: Dr. Arlo I. Smith, President, Tennessee Academy of Science, 1958

Grades 7-8-9

FABRIC PROPERTIES. Gail Dianna Cureton, Fountain City.
ELECTRO-OSMOSIS. Edward Ernest Evans, Fountain City.
COSMIC RAY DETECTION. Robert L. Hardison, Chattanooga.
MARINE (SHELL) EXHIBIT. Edward J. Harris, Chattanooga.
WIND TUNNELL. Robert Edgar Howell, Chattanooga.
AMATEUR RADIOTELEGRAPH STATION. Malcolm P. Keawn, Chattanooga.
EPIC OF ROCKETS (ENGINEERING FIELD). Nelda Jean Lane, Chattanooga.
DEVELOPMENT OF A CHICKEN, Marion Kathryn Leming, Knoxville.
DENTAL HEALTH. Steve McKee Lynch, Chattanooga.
PALEOGEOGRAPHICAL MAPS OF NORTH AMERICA. Robert H. Martin, Knoxville.
ELECTRONIC BRAIN. William H. Murray, Chattanooga.
R.M.X.—1A. Rodger H. Pattison, Memphis.
THE EFFECT OF ULTRAVIOLET LIGHT ON PARAMECIA. Janice Carol Perkins, Knoxville.
ELECTRIC BRAIN. Tom Privette, Knoxville
FOSSIL EXHIBITION. Mack Robert Rhea, Knoxville.
A STUDY IN HYPNOSIS. Dannie Roddy, Knoxville.
WATER. John R. Semmer, Chattanooga.
MEET THE ATOM. Parke Darnall Sprague, Memphis.
TVA WATER POWER. John Harris Whittaker, Chattanooga.
MOLECULAR COMPOSITION OF SIX SOLID PLASTICS. Linda Helen Wilson, Memphis.
UTILIZATION OF WASTE PRODUCTS. Lisle Brenda Wright, Chattanooga.

Grades 10-11-12

A SIMPLE ROCKET ENGINE FOR THE AMATEUR. Henry E. Ahler, Powell.
THE DEVELOPMENT OF ROCKETS. Albert C. Harrington, Knoxville.
NUMBERS AND COUNTING. Clifford W. Allen, Jr., Memphis.
TREES. Willa Margaret Alley, Crossville.
HISTORY OF CONSTELLATION. Norma Jean Ayers, Knoxville.
COMPARISON OF MAMMALIAN HEART RATE—INFANT V. ADULT. John D. Babeley, Knoxville.
PARTS OF THE HUMAN BODY. Barry Lee Hall, Chattanooga.
THE ORIGIN OF SUBMARINE CANYONS. Leonard Belitz, Knoxville.
THEORY OF RADIO COMMUNICATION. Charles W. Billingsley, Chattanooga.
METHOD USED BY SIR ERNEST RUTHERFORD TO DETECT THE THREE TYPES OF RAYS EMITTED BY RADIUM. Lewis J. Bledsoe, Jr., Knoxville.
LIGHT TRANSMITTER AND RECEIVER. George D. Bond, Chattanooga.
HUMAN HEART AND HUMAN EYE. Jimmy Boyette, Memphis.
RAM JET ENGINE. James Bryan, Chattanooga.
THE IMPOSSIBILITY THEORY. Anthony R. Buhl, Powell.
AIRPLANES. Kenneth *Ca*user and James Rodney Kirk, Shelbyville.
THE BEAUTY OF GEOMETRY. Catherine Ann Christnacht, Chattanooga.

SKELETON OF A DOG. Jackie Clark, Memphis.
LEAF STRUCTURE. Sandy Clark, Memphis.
A FURTHER STUDY OF REGENERATION IN EARTHWORMS. Elizabeth Ann Compton, Knoxville.
STRESS: BASIC ORIGIN OF DISEASE. Barbara Ann Conway, Chattanooga.
ELECTROLUMINESCENCE, THE LIGHT OF TOMORROW. Pierce Stephen Corden, Chattanooga.
CONTACT PROCESS FOR THE MANUFACTURING OF SULFURIC ACID. John Donelson, Chattanooga.
A MODEL CAR. Larry Douglas, Memphis.
TAXIDERMY. Alfred Burton English, Shelbyville.
ELECTRONIC SAXOPHONE FEATURING ECONOMY. Harold P. Erickson, Chattanooga.
PROTOPLASM: BASIS OF LIFE. June Marie Evans, Memphis.
THE CURVATURE OF SPACE. Hallam Neal Fain, Knoxville.
ELECTRIC FURNACE. Waldemar Michael Fien, Chattanooga.
SOLAR HEATED HOUSES. Raymond A. Finney, Jr., Knoxville.
HUMIDITY AND ITS EFFECTS UPON TRANSPIRATION. Anthony G. Fonseca, Chattanooga.
INTERNAL COMBUSTION ENGINE. Jerry Fox, Knoxville.
HIGH VOLTAGE GENERATOR. Joe E. Gaddas, Nashville.
CLASSIFICATION OF SEA SHELLS. Jerry F. Harris, Chattanooga.
HUMAN EYE. Annette Hawks, Memphis.
MINERAL COLLECTION. John D. Hudson, Chattanooga.
THE PSYCHO-ANALYSIS OF A CAT. Francis Richard Ireland, Memphis.
SOLAR ENERGY. Evander Eugene Jenkins, Chattanooga.
APPLICATION OF BINARY COUNTER IN MEASURING REACTION TIMES. Allen W. Johnson, Knoxville.
PURIFICATION BY ZONE MELTING. Charles Edward Johnson, Knoxville.
METEOR RADIANTS. Earnest George Kelly, Memphis.
THE UNITED STATES AND I. G. Y. Bob Alfred Kettel, Chattanooga.
PITUITARY DIABETES. Elizabeth Ann Kirkpatrick, Fountain City.
STRUCTURE AND REPRODUCTION OF PLANTS. Joy Nelle Lott, Memphis.
ARTIFICIAL EARTH SATTELITES. Hugh Richard Loveday, Knoxville.
THE FIBONACCI SEQUENCE. Daniel Lee McCord, Knoxville.
CHROMATOGRAPHIC ADSORPTION ANALYSIS. James Kelly Mallett, Chattanooga.
THEREMIN. Mose Mallette, Chattanooga.
OUR FRIEND THE ATMOSPHERE. Wright Manley, Nashville.
APPLIED ELECTRONICS AND MEDICINE JOIN HANDS TO HELP THE ARTHRITIC SUFFERER. Daniel Massey, Chattanooga.
THE REFLECTING TELESCOPE. James Y. Mayo, Memphis.
ELECTROPLATING THEORY AND PRACTICE. Robert Clark Mitchell, Knoxville.
THE MATHEMATICAL SYSTEM OF THE ANCIENT MAYAS. Arthur A. Moore, Knoxville.
FETAL CIRCULATION. Don Howard Nicholson, Memphis.
CONSTRUCTION AND OPERATION OF A CUPOLA. Michael Francis Nolan, Chattanooga.
OSMOSIS. Gail Noonan, Memphis.
ACONICAL 28 MEGACYCLE BEAM. Don Gene Prater, Memphis.
A PRACTICAL BINARY COUNTER. Louis M. Puster, Jr., Knoxville.
ELECTROLYSIS OF USED PHOTOGRAPHIC FIXED. Steven Alen Radlein, Chattanooga.
THE PLANETS, THEIR GRAVITIES, AND THEIR EFFECT ON THE ELEMENTS. James Avery Reagan, Knoxville.
TAXIDERMY. Ottie Charles Renegar, Shelbyville.
AN ELECTRONIC STUDY OF AN ORIGINAL FORMULA FOR DISCORD. Alvin J. Sanders, Knoxville.
WIND AND SMOKE TUNNEL. Donald L. Seagle, Chattanooga.
ANCIENT TRADE ROUTES. Jennie Lou Sharp, Knoxville.
UNIVERSAL DISTRIBUTION OF PARASITES. William Dixon Shipe, Knoxville.
FACTS AND FALLACIES ABOUT SNAKES. Judith Anne Singer, Memphis.
ELECTRONIC BRAIN. Richie M. Swingle, Chattanooga.
ANIMAL MODELS. James L. Tanner, Chattanooga.

MICRO-PROJECTOR. Jimmy Thompson, Memphis.
THE EFFECT OF X-RAYS ON GERMINATING SEEDS. John Van Voorhees, Knoxville.
SCATTERING OF ALPHA PARTICLES BY GOLD FOIL. John Albert Walker, Knoxville.
ARTIFICIAL INDUCTION OF BREEDING IN FROGS. Thomas L. West, Memphis.
ELECTRICAL DEVICES. Shirley D. Wyatt, Crossville.
MINIATURE EXPLOSIONS. Deaver Kenneth Yearwood, Nashville.

AWARD WINNERS

Grades 7-8-9

Girls:
First Place: Marion Kathryn Leming, Knoxville.
Second Place: Lisle Brenda Wright, Chattanooga.
Third Place: Gail Diana Cureton, Knoxville.

Boys:
First Place: Malcolm P. Keown, Chattanooga.
Second Place: Edward Ernest Evans, Knoxville.
Third Place: Mack Robert Rhea, Nashville.

Grades 10-11-12

Girls:
First Place and AAAS Award: Barbara Ann Conway, Chattanooga.
Second Place: Elizabeth Ann Compton, Knoxville.
Third Place: Catherine Ann Christnacht, Chattanooga.

Boys:
First Place and AAAS Award: Deaver Kenneth Yearwood, Nashville.
Second Place: Don Howard Nicholson, Memphis.
Third Place: Charles Edward Johnson, Knoxville.

Honorable Mention:
Anthony R. Buhl, Powell, Harold P. Erickson, Chattanooga, Joe E. Gaddas, Nashville, Daniel Leonard Massey, Chattanooga, Gail Noonan, Memphis, Don Gene Prater, Knoxville.

NEW MEMBERS, TENNESSEE ACADEMY OF SCIENCE FOR 1957

Benson, Bryant, 2500-F Forde Avenue, Nashville.
Bowles, Joseph E., 128 W. Arrowwood, Oak Ridge.
Claypool, Dr. Don P., 296 Eastland Drive, Memphis 11.
Cushman, L. P., Superintendent of Public Schools, Oak Ridge.
Deutsch, Dr. Richard, 20 N. Larchmont, Memphis.
Downs, William G., Jr., 799 Wall Avenue, Cookeville.
Evans, E. Earl, Volunteer Portland Cement Company, Knoxville.
Fredricks, Romance Lorentz, Dept. of Botany, University of Tennessee, Knoxville.
Fuson, Ralph E., Box 72 A, Tenn. Polytechnic Inst., Cookeville.
Gorin, S. R., General Shoe Corporation, Nashville 3.
Greever, Clarence E., Box 704, Middle Tenn. State College, Murfreesboro.
Jones, Dr. Mark M., 2508 Forde Avenue, Nashville 12.
Kinsolving, Clyde R., Box 1032, Sta. B., Vanderbilt University, Nashville.
Koelling, Alfred C., Botany Dept., University of Tennessee, Knoxville.
Latimer, Paul, Dept. of Physics, Vanderbilt University, Nashville.
Leech, Betty Rye, 111 5th Street, Clarksville.
Love, Theodore A., Dept. of Mathematics, Fisk University, Nashville.
McGaw, Samuel M., P. O. Box 472, Mt. Pleasant, Tennessee.
Metcalf, Vernon, Box 128, Rte. 1, Del Rio.
Merriman, Paul H., 518 Young Avenue, Chattanooga.

Miller, Robert A., 3619 Rolland Road, Nashville 5.
Minor, Joe Parker, 1000 Hillview Drive, Clarksville.
Peters, George W., The Mead Corporation, Kingsport.
Prather, Ralph A., 117 Bussell Street, Livingston.
Puckette, Stephen E., University of the South, Sewanee.
Riddick, Danny Jo, 1200 Parkview Circle, Nashville.
Schipper, Arthur Louis, University Relations Div., ORINS, Oak Ridge.
Scott, Leland L., Dept. of Mathematics, Southwestern at Memphis, Memphis.
Sharp, John Oliver, 415 High Avenue, Jefferson City.
Sipe, H. Craig, George Peabody College, Nashville.
Steinhice, Francis C., 3523 Martin Road, Chattanooga.
Thompson, Johnny, 807 Trenton Street, Harriman.
Tolar, M. B., Mathematics Dept., Maryville College, Maryville.
Trogdon, Richard Page, 3108 McCalla Avenue, Knoxville 14.
Williston, D. A., 1122 Fairmont Street, Washington, D. C.
Woodward, Carl S., 2839 W. Walnut, Johnson City.
College of William and Mary, Williamsburg, Virginia.
The University of Chicago Libraries, Periodical Dept., Chicago, Illinois.
Library, Georgia State College, 33 Gilmer Street, S.E., Atlanta, Georgia.
Albert R. Mann Library, Acquisition Division, Ithaca, N. Y.

REPORT OF THE TREASURER OF THE TENNESSEE ACADEMY OF SCIENCE FOR THE CALENDAR YEAR, 1957

HARRIS J. DARK
Middle Tennessee State College, Murfreesboro

Cash Balances, Dec. 31, 1956

Current Fund, First Amer. Nat'l Bank, Nashville	$1,262,79	
Current Fund, Home Fed. Savings & Loan, Knoxville	1,102.06	
Life Membership Fund, Fid. Fed., Nashville	626.96	
Endowment Fund, Third Nat'l Bank, Nashville	378.13	
Total		3,369.94

Income

Academy Income:

One half of membership dues	737.50	
Interest on current fund	33.30	
Gift (G. M. Goethe)	50.00	
Miscellaneous	22.30	
Total		843.10

Journal Income:

One half of membership dues	737.50	
Subscriptions	450.50	
Journal sold	7.50	
Gift to Journal (Peabody)	100.00	
Advertising	314.75	
Total		1,610.25

Life Membership and Endowment Fund Income		
Interest on Endowment Fund	10.93	
Interest on Life Membership Fund	20.54	
Total		31.47
GRAND TOTAL		5,854.76

Disbursements

Academy Expenses:		
Postage and telephone	103.07	
Printing and supplies	82.13	
Travel	195.64	
Junior Academy Expenses	125.13	
Checks returned	4.50	
Contribution to Junior Academy travel	424.00	
Seal	48.41	
Programs for Annual meeting	118.00	
AAAS for Academy Conference	6.00	
Total		1,106.88
Journal Expenses:		
Printing and Engraving	2,327.84	
Mailing, wrapping, and postage	123.25	
Other Printing	15.19	
Checks returned	4.50	
Total		2,470.78

Cash Balance, Dec. 31, 1957

Current Fund, 1st American National, Nashville	105.18	
Current Fund, Home Fed. Savings & Loan, Knoxville	1,135.36	
Life Membership Fund, Fid. Fed. Sav. & Loan, Nashville	647.50	
Endowment Fund, Third Nat'l Bank, Nashville	389.06	
Total		2,277.10
GRAND TOTAL		5,854.76

Respectfully submitted,
HARRIS J. DARK, *Treasurer*

The Auditing Committee of the Tennessee Academy of Science has examined the books of Harris J. Dark, Treasurer, and found them to be correct and in order for the year 1957.
Date: Feb. 7, 1958.

Ernest A. Jones, Carl M. Hill, *Auditing Committee*