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PROCEEDINGS OF THE TENNESSEE ACADEMY OF SCIENCE FOR 1958

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

MEETINGS OF THE EXECUTIVE COMMITTEE

January Meeting

The Executive Committee of the Tennessee Academy of Science was called to order by President A. I. Smith in Room 205, Payne Hall, Peabody College, January 31, 1958 at 7:45 P.M. The members present were, C. L. Baker, C. S. Chadwick, H. J. Dark, W. G. Holladay, R. T. Lagemann, A. I. Smith, I. H. Tipton, H. L. Ward, E. D. Watts, F. T. Wolf and W. W. Wyatt. In addition, N. D. Lee, who was expected to be elected to the Executive Committee on the following morning, E. B. Eller, W. E. Turner and R. R. Vance of the Tennessee State Department of Education and F. Lynwood Wren of Peabody College, were present. After the introduction of visitors and new members, President Smith stated that the purpose of the meeting was to discuss the problem of improving science and mathematics teaching in the state of Tennessee. Because of the special nature of the meeting the usual order of business was not followed, since the regular business of the Executive Committee was to be handled at the session on the following morning. Indeed, President Smith announced that, henceforth, double sessions of the Executive Committee Meeting would probably be necessary. He expressed his delight at this opportunity for the Tennessee Academy of Science to get together with the State Department of Education to discuss this problem. He said that many organizations had talked about the need for improving science and mathematics teaching in the state, but this was the first time, as far as he knew, that any such meeting with the state public school officials had taken place for the express purpose of doing something about it.

W. E. Turner, speaking for the members from the Department of Education, then said that the Department was very grateful to the Tennessee Academy of Science for its interest in this problem, and that the Department would give its fullest cooperation toward its resolution. He emphasized that the problem was indeed a real one — that some science teachers have not had the scientific training and experience that they would like to have. The teachers themselves would like to have consultants to help formulate plans for interesting and instructing the children in science. They would like to enhance their own knowledge through institutes, work-shops, etc. which so far, for science the Department of Education has not sponsored. The Department thinks that the Tennessee

Academy of Science could perform a real service by providing programs through which the teachers could renew their interest and knowledge in science.

Professor Wren reviewed the contents of his proposal (appended to the minutes of the Annual Business Meeting, 1957). He emphasized that the key to the entire program was cooperation — cooperation between the Academy and the State Department of Education, cooperation between the research scientists, college teachers and the elementary and high school teachers of the state. In clarification of Section I-5, he envisioned that in the three meetings in the Fall, Winter and Spring, there were to be meetings of the teachers in workshops, institutes, etc. in each of the seven areas of the state. An alternative suggestion for holding these meetings was discussed which involved having six sessions per year in each of the three major divisions (biological, mathematical, and physical) of science on alternate Saturday afternoons in each of the seven areas of the state. Some skepticism was expressed, especially by the members of the Department of Education and by Professor Wren, of the possibility of large numbers of teachers being able to participate in such a program. They felt that three all-day sessions per year, in the seven areas of the state, would be more practical from the teachers' point of view. The question was discussed of whether any means should be provided for limiting the number of teachers involved in these programs. The Education Department members felt there should not be, whereas some Committee members expressed the view that a much better instructional job could be done with small groups. It was decided that these details could best be worked out between the Science Teaching Improvement Committee (to be appointed by the President) and the Department of Education.

The problem of relating the Science Teacher Improvement program, as well as other scientific activities of the teacher to the so-called in-service training program of the teacher was discussed. The state law requires 10 days of in-service training per year for each teacher. What this training consists of is left entirely to the discretion of each local school board. Each board has to inform the State Department of Education each year as to the nature of its program. It appeared, therefore, that the list of possible activities for in-service training prepared by President Smith (1. Sponsor of Science Clubs; 2. Sponsors of students in Science Fairs, National Science Talent Search, Junior Academy of Science; 3. Attendance at State and National meetings of professional organizations; 4. Field trips and 5. Attendance at symposia, workshops, institutes, seminars, special lectures, etc.) could be utilized only as a list of recommendations for the local school boards of the state. Professor Wren emphasized the importance of a science teacher improvement even though it might not be related to the in-service program.

It was proposed that something like $6000 per year would be very helpful in getting the Science Teacher Improvement Program started. This money could be used as honoraria for the conductors of the seminars and institutes, for the transportation of the teachers to the institutes, the travel expenses of the Academy STIC members, and for printing and mailing. Professor Wren warned against over-financing the program initially and emphasized the need for financial arrangements that would reflect the long-range, permanent character of the job to be undertaken.

C. L. Baker, then, informed the Committee that the AAAS may be able to obtain support for the sort of program under consideration. They are requesting that State Academies prepare proposals, send them to an Academy Conference Committee for screening, who in turn will send the best ones to the AAAS, who will thereupon attempt to obtain financial support for them from the National Science Foundation, the Carnegie Foundation, and similar groups. He felt that the NSF wants to upgrade the cooperation between colleges and high schools, and would be very willing

to support a program of the type being considered. It was recommended that the Academy submit a proposal to the AAAS incorporating the general features of the Wren proposal. Among other things, this proposal should point out explicitly that high school and elementary teachers would be involved in the program and that the State Department of Education was enthusiastically cooperating in the program.

If these monies could be obtained for a year or two and the program proved successful, the question was asked if the State Department of Education might be able to assume the financial support of the program. The reply was that it would be quite difficult to do this only for the sciences to the exclusion of the other academic areas for which the Department is responsible.

Prospective members of the Science Teaching Improvement Committee in each of the seven areas of the state was discussed. It was felt desirable to have three Academy members, one each in the biological, mathematical and physical sciences in each of the seven areas associated with the program. One of these would be the official member of the STIC for that area. R. T. Lagemann was nominated and elected to be Chairman of this STI Committee. President Smith then appointed a Steering Committee consisting of himself, Mr. Lagemann, and Mr. Turner to coordinate the work involved in the program.

Mr. Lagemann pointed out the great amount of work and dedication that would be required on the part of the STIC Members and the Supervisors of Instruction in the seven geographical areas of the state to insure the success of the program. Mr. Turner concurred and said that if the TAS would set up the program, the Department of Education would take the necessary steps of informing and encouraging the teachers to attend them. With reciprocal expressions of appreciation between Mr. Smith and Mr. Turner for the cooperative attitude of the State Department of Education on the one hand and the Tennessee Academic of Science on the other, the meeting adjourned at 10:50 P.M. and resumed on the morning of February 1, in the same location. Members present were C. L. Baker, H. J. Dark, W. G. Holladay, A. I. Smith, I. H. Tipton, H. L. Ward, F. T. Woif, and W. W. Wyatt. In addition, Dr. Norman D. Lee of the University of Tennessee Medical School at Memphis and Dr. Myron S. McCay of the University of Chattanooga, who were both, later in the meeting, elected to the Executive meeting, were present. Because of pressing business and illness Drs. Lagemann and Chadwick were unable to attend.

The sponsor of the Junior Academy reported a substantial increase in the Junior Academy entries at the 1957 meeting over the previous year. He reported that these showed a good deal of geographical concentration and that it would be desirable to have more uniform participation from all over the state. He wondered whether we should continue to support the transportation cost of the Junior Academy members to the meetings as was done in 1957. As a final proposal, he pointed out the need for an Executive Secretary who would be compensated for his duties to carry on the work of Sponsor of the Junior Academy. He said that some foundations are interested in providing this sort of support to the Junior Academies of the nation. Dr. Wyatt had submitted his resignation as Sponsor as of January 1, 1958; he was warmly thanked by the President for attending this meeting. The Executive Committee unanimously passed a resolution expressing their gratitude to Dr. Wyatt for his work as sponsor of the Junior Academy and their regret that he has resigned this post.

The sponsor of the Collegiate Section reported the quality of the papers at the last meeting was good, but that attendance was down slightly. The participants in the Collegiate Section also show a concentrated geographical distribution. He said that the timing of the meeting in the fall is unfortunate from the standpoint of the Collegiate Section since the projects

of the participants have to be prepared the previous year. The problem of obtaining judges for the Collegiate Section was discussed. It was decided to leave this matter to the discretion of the sponsor with the recommendation that they be obtained far enough ahead of time to appear on the program of the meeting.

The Editor of the Journal reported the four numbers of Volume XXXII (1957) consist of 324 pages. This includes 21 research papers of which eleven are in Zoology, four in Geology, three in Botany, one in Bacteriology, one in Chemistry, and one in Engineering. The entire October issue consists of only one article, "The Birds of Knox County, Tennessee", by Joseph C. Howell and Muriel B. Monroe. Reprints of this article are being sold by the Public Relations department of the University of Tennessee for one dollar each.

There are 22 manuscripts for future publication in the editor's office. These are in the following fields: seven in Zoology, seven in Geology, four in Botany, one in Bacteriology, one in Chemistry, and two others.

The director of the Reelfoot Lake Biological Station reported that the only thing that has happened there since the last meeting is that it has rained.

The Treasurer reported that the Academy spent about $1100 more last year than it took in. About $250 of this was suffered within the Academy fund and about $850 in the Journal fund. A lengthy discussion thereupon ensued, and several suggestions were made as to how this problem should be met. Some of these suggestions were (1) increase the amount and rate of advertising, (2) send letters to institutions whose members publish with a request for assistance in publication, (3) and the editor said she could be more careful about charging authors for the cost of illustrations. To look further into these and other possibilities, the President appointed a committee composed of F. T. Wolf, Chairman C. S. Chadwick, and I. H. Tipton.

In the course of this discussion, the Editor said that sometimes the author or his institution pays the cost for publication but more frequently the Journal does It was recommended with the concurrence of the editor that a footnote appear on those papers whose publication cost is paid by the author or his institution.

The Secretary reported that $216.00 was available from the AAAS for the support of Junior Academy activities. He further reported that a total of 317 registered at the last meeting of which 104 were in the Senior Academy, 52 in the Collegiate Section, and 161 in the Junior Academy. It was pointed out that the certificates for the Distinguished Service Teacher Awards should be obtained, a task which was assigned to C. L. Baker.

The past president reported that the financing of the transportation of the Junior Academy Members from the Knox County area to the 1957 meeting was bearing significant fruit, in that a very active and enthusiastic Junior Academy of Science organization in the Knox County area composed of 200 members, had been formed.

The president expressed his deep appreciation to her for her work as president of the Academy.

The representative to the AAAS Academy Conference reported that we are one of 279 affiliates of the AAAS. He said that the Academy Conference desires to develop a National Junior Academy Conference, and that one will be held this year. He further reported the AAAS was interested in supporting programs that would develop the Junior Academies of the state. These proposals will be screened by the AAAS Academy Conference Committee who will turn them over to the AAAS, who will then seek Foundation support for them. The Committee urged him and President Smith to work on such a proposal.

The president reported that the local committee for the 1958 meeting which will be held at Oak Ridge has been appointed and consists of C. S. Shoup, Chairman, L. P. Cushman, C. P. Keim and Arthur Schipper. R. T. Lagemann as the President-Elect is program Chairman.

The Executive Committee voted to hold the annual meeting on December 5-6, 1958.

It was suggested that the Junior Academy program for this meeting be prepared so that their activities will not be too prolonged on Saturday, the final day of the meeting, even if this involves Friday afternoon sessions of the Junior Academy.

Dr. N. D. Lee was appointed and approved as a member of the Executive Committee to complete the two year unexpired term of Dr. Lagemann. The expiration dates of the three appointed members of the Committee are as follows: F. T. Wolf, 1958; N. D. Lee, 1959; C. S. Chadwick, 1960; these being the last years of service.

Dr. M. S. McCay was appointed and approved as Sponsor of the Junior Academy.

Dr. C. L. Baker was appointed and approved as Academy Conference Representative.

It was moved and passed that as a general policy, the Academy would pay the expenses of the Executive Committee members to the Executive meetings. Room and board and transportation costs at 6 cents per mile per car would be covered. These costs should appear in the Treasurer's Annual report to the Academy.

The possibility of the Academy sponsoring some television programs was discussed and a Committee composed of M. S. McCay, I. H. Tipton, and C. K. Seyfert with N. D. Lee as Chairman was appointed to investigate the problem. In particular, it was pointed out that youth guidance programs could be kinescoped and sent to rural schools to inform the students of the nature of science and scientists. It was suggested that a request for funds for this project be included in the proposal to the AAAS for developing state Junior Academies.

The meeting adjourned at 11:40.

December Meeting

The Executive Committee of the Tennessee Academy of Science was called to order by President Arlo I. Smith at 8:45 P.M. in the principal's office of Oak Ridge High School, December 4, 1958. Members present were H. J. Dark, W. G. Holladay, R. T. Lagemann, M. S. McCay, A. I. Smith, I. H. Tipton, H. L. Ward, E. D. Watts, and F. T. Wolf.

M. S. McCay passed out the program of the Oak Ridge meeting of the Junior Academy. There were 137 papers on the program. Problems relating to the presentation and judging of such a large quantity of papers were discussed. One proposal of particular interest concerned the possibility of having regional contests in the state prior to the annual meeting with the winners then presenting their projects at the annual meeting. The need for additional funds for the support of the Junior Academy was emphasized by Mr. McCay and he passed out a copy of solicitation to friends of the Junior Academy designed to obtain such funds.

It was reported that chapters of the Junior Academy have been formed in Knoxville, Memphis, Chattanooga, and Crossville. The president, who has been very active in behalf of the Memphis chapter, thought this notable start should be strongly encouraged to continue.

The treasurer presented an interim report which indicated a slightly improved financial condition over last year. He estimated that about 50%

of the members have so far paid their dues this year. There are now 20 sustaining members of the Academy and one industrial member. The president strongly emphasized the need for more such members.

It was moved, seconded, and passed that the Chattanooga Nylon Division of Dupont, whose $25.00 contribution to the Academy was in hand, be elected to industrial membership.

Since the University of the South had made a $25.00 contribution and since this institution would hardly qualify for industrial membership, it was moved, seconded, and passed that the Executive Committee recommend that Section 7, Article II of the Constitution which concerns industrial members be amended to read:

> Supporting members: Any person, institution, or business organization may be elected by the Executive Committee to supporting membership. The annual dues for such membership are $25.00.

By Article IX of the constitution, this proposed amendment could not be acted on at this meeting.

It was moved, seconded, and passed that the Journal not be sent to members after one year in arrears on dues. The decision on the policy of sending the Journal to subscribers in arrears was postponed until the January meeting.

The question arose as to whether contributions to the Academy are deductible for tax purposes and the Treasurer informed the Committee that the Academy could secure classification from the Department of Internal Revenue to receive tax-exempt contributions. The Secretary was instructed to secure such classification. The meeting was temporarily adjourned at 10:15 P.M. and resumed at 9:45 A.M. on Friday the 5th at the same location (with Dr. Dark absent, his presence being needed at the registration desk). The sponsor of the Collegiate Section reported about 8 papers on the Collegiate Section program. He said that student interest in the Collegiate Section leaves something to be desired and that perhaps the way to attack the problem is by working through the faculty members. The President said that the Academy as a whole has been too negligent of the Collegiate Section but indicated that more participation in the Collegiate Section might be brought about through the encouragement of participation of undergraduates receiving NSF Research Grants for which funds have recently been allocated. The question of a spring meeting was again raised but no action was taken on it.

The editor of the Journal presented a report outlining the costs of the Journal which experiences an annual deficit of about $800. She suggested among other things an increase in the annual dues, so a motion was made, seconded, and passed with one dissent, to recommend that Article 9, Section II of Constitution dealing with dues be amended to read "The annual dues of the members and fellows are $4.00". Because of Article IX, the amendment could not go into effect until after the annual meeting next year. The question was then raised as to whether transient items such as dues should be in the by-laws than as an integral part of the constitution so it was moved, seconded, and passed that Article II be reconsidered relative to transferring those parts dealing with dues to the By-laws.

The editor then continued with her report, pointing out that "offset" printing would substantially reduce printing costs, but technical questions such as the quality of reproduction of graphs and photographs and the time of delay in printing were raised, which the editor was instructed to investigate and report on at the winter Executive Committee meeting. The president then emphasized his desire to see the Journal more nearly reflect the total interest of the Academy rather than being almost entirely a Journal in which research papers are published. He thought that the Journal would be a much more effective instrument of the Academy if it were

more closely associated with the teaching profession, by printing material that teachers can use. He suggested that a committee to study the function of the Journal should be created. He further suggested that there should be a business manager of the Academy who would be more active in raising funds for Academy operations. To further the continuity in the activities of the Academy, he indicated his belief in the necessity of there being a permanent Executive Secretary of the Academy. No action was taken on these proposals.

Because of circumstances beyond his control, the director of the Reelfoot Lake Biological Station was unable to attend, but a report from him was in hand relative to a proposal that he had made through the Academy to National Science Foundation for a request of $10,000.00 for support of a Research participation program in teacher training to be held during a 6-week period in the summer of 1959 for 10 teachers.

The secretary reported 65 applications had been submitted for membership. It was moved, seconded, and passed that these applicants together with all others who have applied for membership during this annual meeting be presented to the annual business meeting of the Academy for approval as members. The secretary reported that several of these new members had been secured through the efforts of Dr. W. G. Downs of TPI, who had worked with the teachers in an NSF summer institute at TPI, and he felt that there might be others who could follow a similar procedure.

The secretary was charged with the task of procuring and sending appropriate cards expressing the gratitude of the Academy to sustaining members, and for procuring certificates appropriate for framing to be sent to industrial or supporting members. He was further charged to work with the treasurer for the purpose of procuring three types of membership cards reflecting these three types of members. The dues notices should be redesigned also with this thought in mind.

The secretary further pointed out that $324.00 was available from the AAAS preferably to encourage scientific research among high school students, although grants to undergraduate and graduate research workers could be made. Applications for these funds were as follows:

Harry S. Sherman, Botany Department, U-T	$75.00
Gail Noonan, Treadwell High School	98.40
Joe Ferrell, Baxter Seminary	9.00
Geraldine Stewart, Baxter Seminary	3.00
Ophelia Kirklin, Baxter Seminary	10.00
Jackson B. White IV, Father Ryan H. S., Nashville	14.74

These proposals had been appropriately recommended and endorsed and they were approved by the Executive Committee.

The program chairman reported that he had no report; this report was accepted with commendation.

The report of the Fellows Committee was in hand and will be given at the business meeting.

The president reappointed the auditing committee composed of Dr. Ernest Jones and Dr. Carl M. Hill.

The chairman of the STIC reported that this committee held a meeting in the spring in Nashville for the purpose of formulating future plans and a specific proposal to the NSF. He will speak more fully on this matter at the business meeting. He expressed a feeling that there should perhaps be two proposals from the Academy, one to support the STIC and one to support the Junior Academy activities. The president instructed Mr. McCay to draw up a proposal for Junior Academy funds.

The report of the Academy Conference representation was not given but will be fully published in the Journal.

Mr. Wolf reporting for the committee on temporary Journal Funds said that their effort to raise funds for the Journal had met with no success. The president expressed his appreciation to him for his efforts.

The Distinguished Service Awards to teachers was discussed and nominations for these awards will be made at the business meeting. The task of procuring appropriate certificates for the winners of these awards was assigned to Isabel H. Tipton.

The president expressed himself in favor of holding the meeting next year somewhere in the middle of the state, for the purpose of encouraging participation of the new local chapters of the Junior Academy.

The president expressed his appreciation for the past services of Dr. Wolf and Dr. Tipton whose terms on the Executive Committee were expiring. They in turn expressed their appreciation for having been granted the opportunity to work in the Academy.

The meeting adjourned at 12:00 noon.

THE SIXTY-EIGHTH MEETING

The sixty-eighth annual meeting of the Tennessee Academy of Science was held on December 5-6, 1958, at the Oak Ridge High School, Oak Ridge, Tennessee. There were 528 persons registered, 148 being in the Senior Academy, 360 in the Junior Academy, and 20 in the Collegiate Section. C. S. Shoup of the local AEC office was chairman of the Local Arrangements Committee and Robert T. Lagemann of Vanderbilt University was Program Chairman. The meeting was jointly sponsored by the U. S. Atomic Energy Commission, Oak Ridge National Laboratory operated by Union Carbide Corporation, the Oak Ridge Institute of Nuclear Studies, the Oak Ridge Public Schools, and the University of Tennessee AEC Agricultural Research Laboratory.

On Friday and Saturday, registration for all sections of the Academy was held in the auditorium lobby of the Oak Ridge High School. The General Session was held Friday afternoon in the high school auditorium in which there followed the annual business meeting. Bus transportation was provided for a tour of the X-10 area of ORNL Friday morning. A similar tour for the Junior Academy took place in the afternoon. On Saturday afternoon, a bus tour of the University AEC Agricultural Research Laboratory was available.

The annual dinner was held in the ball room of the Oak Terrace Restaurant at 7:00 P.M., Friday. The cost of the ticket was $2.00. There were 138 people present. The speaker was Dr. Robert A. Charpie, Assistant Director, Oak Ridge National Laboratory. The title of his talk was "The Scientific Threat—An Appraisal."

At the dinner a report was made by the committee on Resolutions, a copy of which follows the minutes of the annual meeting.

On Saturday morning, meetings of the several Sections of the Senior Academy, of the Collegiate, and the Junior Academy were held in various rooms of the Oak Ridge High School building. These sessions were well attended. Following the meetings, the Junior Academy retired to the ball room of the Oak Terrace Restaurant for luncheon where the awards were made to the winners in the Junior Academy competition.

Annual Business Meeting of the Academy

The Business Meeting of the Academy met at 4:15 P.M. in the auditorium of the Oak Ridge High School, with Arlo I. Smith presiding. The minutes of the business meeting of 1957 were not read since they had been published in the Journal. Copies of the minutes of the Executive Committee meeting of January 31 - February 1, 1958, were distributed and their contents summarized by the secretary. The minutes of the Executive Committee meeting

of December 4-5, 1958, were read and approved. The president announced that such approval would automatically put into effect those recommendations contained therein which could legally be enacted by this meeting.

R. T. Lagemann, speaking as chairman of the STIC, reported that the Committee had held a meeting in Nashville in the spring with members of the State Department of Education. President Smith had obtained $300.00 from the AAAS to support this meeting. The committee had decided that the success of a program of the type contained in the Wren proposal would require financing to reimburse the teachers and scientists participating in the program. A definite proposal to the NSF was then worked out. The deadline for such proposals to the NSF is February 15, 1959, so despite the efforts of the STIC, the program cannot go into effect until the fall of 1959.

M. S. McCay as sponsor of the Junior Academy announced that the NSF and American Institute of Physics are planning a program to help junior scientists by sending outstanding speakers to high schools. He felt that the formulation of Junior Academy Chapters would facilitate that program. He further suggested that the possibility of holding regional meetings in East, Middle, and West Tennessee is worthy of our consideration.

E. D. Watts, as sponsor of the Collegiate Section, said that unlike the Junior Academy, the growth of his group was by no means explosive. He urged all the members present to submit their projects at the annual meeting.

I. H. Tipton read the following names of those teachers who had been recommended by the Executive Committee to receive Distinguished Service Awards:

Conrad Bates, City High School, Chattanooga
Thelma Boynton, Bledsoe County High, Pikeville
C. A. Browning, East High, Knoxville
C. C. Haun, Cumberland County High, Crossville
Sister Hyacinth, Notre Dame High, Chattanooga
Bro. I. John, Christian Brothers, Memphis
John Netterville, David Lipscomb, Nashville
Angie N. Perry, Oak Ridge High, Oak Ridge
Mary Alice Phillips, Treadwell High, Memphis
Margaret Sullivan, Cohn High, Nashville

It was moved, seconded, and unanimously passed to approve them for Distinguished Service Awards.

Carl T. Bahner, speaking for the Necrology Committee, read the following names of the recently deceased members of the Academy:

Mrs. Bonnie H. Brown
Dr. Frances H. Bottum
Mrs. Sigfred Petersen

President Smith said that the loss of all these members, especially Dr. Bottum, who was a past president, would be keenly felt by the Academy.

James L. Major, Chairman of Tennessee Science Talent Search Committee, presented a report on the participants in the Tennessee Science Talent. Those parts that were not published in last year's proceedings are appended to these minutes. Mr. Major pointed out that the names of state winners and those who receive honorable mention are then sent to about 45 colleges and universities, mainly for scholarship purposes. The Tennessee Science Talent Search is the mechanism by which Tennessee students enter the Westinghouse Science Talent Search.

Dr. M. L. MacQueen of the Fellows Committee moved that the following members of the Academy be elected Fellows:

Dr. Frances Bottum, Peabody College (posthumously)
Dr. C. S. Chadwick, Peabody College
Dr. C. M. Hill, Tennessee A & I
Dr. R. T. Lagemann, Vanderbilt
Dr. M. S. McCay, University of Chattanooga
Dr. C. K. Seyfert, Vanderbilt
Dr. Royal E. Shanks, University of Tennessee
Dr. Isabel H. Tipton, University of Tennessee
Dr. Helen L. Ward, University of Tennessee
Dr. Frederick T. Wolf, Vanderbilt
Dr. W. W. Wyatt, University of Tennessee

This motion was seconded and unanimously passed.

The Nominating Committee composed of S. R. Tipton, Chairman, F. L. Wren, and Dewey Large proposed the following slate of new officers:

President-Elect: C. P. Keim, Director of the Technical Information Division, Oak Ridge National Laboratory

Treasurer: G. H. Lundberg, School of Engineering, Vanderbilt

Since there were no nominations from the floor, with the unanimous consent of the members present, the Secretary was instructed to cast one ballot representing the unanimous vote of the members present.

To the outgoing treasurer, Harris J. Dark, the president expressed the appreciation of the Academy for his conscientious and capable service.

With respect to the changing of dues as mentioned in the Executive Committee minutes, Dr. Sharp suggested that dues be changed from $3 to $5 rather than from $3 to $4. The president replied that this suggestion should be carried over to the meeting next year, as the Constitution forbids this meeting to take any action on the matter.

In view of the limited time for open discussion, President Smith then called upon all members present to write him on any ideas they had concerning the operations and philosophy of the Tennessee Academy of Science.

The meeting adjourned at 5:15 P.M.

RESOLUTIONS OF THE TENNESSEE ACADEMY OF SCIENCE

WHEREAS, the Tennessee Academy of Science, including the Collegiate Division and Junior Academy of Science are enjoying a most pleasant, profitable, and well-organized meeting at Oak Ridge, and

WHEREAS, this is the result of the diligent and long-time planning of the Committee for Local Arrangements, consisting of C. S. Shoup, Chairman, C. P. Keim, Arthur Schipper, and James E. Thomas, and to the hospitality of our hosts—Dr. S. R. Sapirie, Manager of Oak Ridge Operations, U. S. Atomic Energy Commission; Dr. R. A. Charpie, Assistant Laboratory Director, Oak Ridge National Laboratory; Dr. W. G. Pollard, Executive Director, Oak Ridge Institute for Nuclear Studies; Dr. L. P. Cushman, Superintendent, Oak Ridge Public Schools; and the University of Tennessee—A.E.C. Agricultural Research Laboratory.

THEREFORE BE IT RESOLVED that the Academy express its gratitude and sincere appreciation to all those who have in any way contributed to the unprecedented success of this meeting, and

BE IT FURTHER RESOLVED that these resolutions be spread upon the minutes and published as a part of the Proceedings of this meeting.

Respectfully submitted by the Resolutions Committee:
Arthur C. Cole, Chairman
James J. Friauf
Isabel H. Tipton

TWELFTH ANNUAL TENNESSEE SCIENCE TALENT SEARCH—1958

Sponsored by: Tennessee Academy of Science
Financed by: Tennessee Academy of Science
Director: Mr. James L. Major, Chairman, STS Committee; 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; Eleventh (1957) 32; Twelfth (1958) 25.

NATIONAL HONORABLE MENTIONS

Arthur William Bushore, 17, Bristol H. S.,
Designing and Building Plasma Jets.

Vincent de Paul Mallette, Jr., The McCallie School, Chattanooga,
An Electrical Combination Lock.

Harold Paul Erickson, 18, Notre Dame H. S., Chattanooga,
Design and Construction of an Electronic Saxophone.

Charles Edward Johnson, 17, Central H. S., Knoxville,
Purification of an Organic Compound.

Hans P. Schroeder, 17, Alcoa H. S., Vapor Pressures in Trinary Solutions.

Robert L. Thomas, 16, McMinn County H. S., Athens,
Moisture Expansivity of Paper.

Albert W. Cowan, 18, Bristol H. S., The Absorption of Radioactive Calcium.

Sarah Wadley Salter, 16, Chattanooga H. S.,
The Chloramine's Characteristics.

James A. Bryan, 17, The McCallie School, Chattanooga,
A Ram Jet Engine Designed to Operate at Low Subsonic Speeds.

Jimmy S. Davis, 17, Clarksville H. S., Solar Distillation.

Thomas B. Markham, 16, Clarksville H. S., Model of Nuclear Power Plant.

Fred R. Clayton, Jr., 17, Central H. S., Knoxville,
How Concentration Affects the Conductivity of Solutions.

John T. Murphy, 17, East H.S., Knoxville,
A Method for the Detection of Neutrons in a Cloud Chamber.

Donald A. Martin, 16, Young H. S., Knoxville, The Nature of Dimension.

Don Howard Nicholson, 17, Central H. S., Memphis, Fetal Circulation.

Richard E. Barfield, 17, Treadwell H. S., Memphis,
Mars in Opposition — 1900-1957.

Richard G. Brown, 17, Treadwell H. S., Memphis, Silicon Solar Battery.

Leslie H. Palmer, 16, Treadwell H. S., Memphis, Quantum Mechanics.

Sue Edney, 17, Cumberland H. S., Nashville, Wildflowers of Tennessee.

Randolph P. Pickell, 17, Hillsboro H. S., Nashville,
Liquid Fuel Rocket Engine.

Jerry C. Collins, 16, David Lipscomb H. S., Nashville,
Observations on the Behavior of White Rats.

Marcus T. Cohn, 17, Oak Ridge H. S., Radiation Protection Compounds.

Adrian Russell Lawler, 17, Oak Ridge H. S., Household Insect Pests.

Raymond E. Patterson, 17, Giles County H. S., Pulaski,
Basic Magnetic-Energy Relations (Theoretical Assumptions).

J. Harvey Bailey, 17, Whitehaven H. S., Infrared Radiation in Commerce.

Awards: A Certificate of Award was presented to each of the 25 members of the Honors Group. Forty-five colleges and universities were furnished with lists of this group so that they will be considered for scholarships.

Judges: James L. Major, Chairman, Judging Committee
Dr. Calvin A. Buehler, Head, Chem. Dept., U. of Tenn., Knoxville.
James F. Key, Instructor, Science Education, Peabody College, Nashville
Miss Katherine Matthews, Head, Science Dept., West End High School, Nashville
Dr. J. H. Wood, Professor of Chemistry, U. of Tenn., Knoxville
Dr. Hanor A. Webb, Retired Professor of Chemistry, Peabody College, Knoxville

Entertainment: None

Publicity: Articles in state newspapers, Tennessee Teacher, and Tennessee Academy of Science Journal.

Plans for the Future: Same as in the past.

Progress of Previous Winners: Two winners in the earlier searches have earned PhD's; two are MD's; and one a DDS (the last three being in military service). Many have earned a Master's Degree and a Bachelor's degree has been earned by all who have had time to finish it. A gratifying number of these Bachelors are continuing in graduate study. Others are in college positions in biology, forestry, mechanical engineering, as instructors. Many more are in industrial employment in such fields as architecture; chemistry—control and research; engineering of all kinds—aeronautical, chemical, civil, electrical, electronic, mechanical, sales; geology; zoology. Several are in testing laboratories of large firms; some are employed by the Atomic Eenergy Commission.

ANNUAL REPORT OF THE FAUNA COMMITTEE OF THE TENNESSEE ACADEMY OF SCIENCE FOR 1957

The following projects have been completed or are in progress:

Birds.

1. Field studies of bird distribution in the mid-south with emphasis on the incursions of plains species each winter, the extension southward of the breeding range of northern species, species having the periphery of their range in the mid-south, and the wintering of the chimney swift as determined thorugh the recovery of birds banded in the mid-south. Ben B. Coffee, Jr., Memphis.
2. Eighth annual roadside census of the birds of Knox County (during May). J. C. Howell, University of Tennessee.
3. A summer study of the relative abundance of the birds of the Melton Valley. J. C. Howell, University of Tennessee.
4. Bluebird nesting studies. Mrs. F. C. Laskey, Nashville.
5. A study of birds killed at a television tower during migration. Mrs. F. C. Laskey, Nashville.
6. The relation of temperature to reproduction of the slate-colored Junco in the Great Smoky Mountains National Park. J. T. Tanner, University of Tennessee.

Fish.

7. Observations on the influence of the new Johnsonville steam plant on fish and plankton populations. William Dreyer and N. G. Benson, Tennessee Game and Fish Commission.

8. Investigations to determine depth distribution of fish by seasons in main stream reservoirs. Glenn Gentry, Tennessee Game and Fish Commission.

Reptiles and Amphibians.

9. General studies of amphibians and reptiles of Tennessee. A considerable amount of data has been collected on the life history of the salamander, *Ambystoma opacum*. Glenn Gentry, Tennessee Game and Fish Commission.
10. An annotated check list of the amphibians and reptiles of Tennessee. Glenn Gentry, Tennessee Game and Fish Commission.
11. Taxonomic and zoogeographic studies of the reptiles and amphibians of Tennessee. Ralph Sinclair, Tennessee Game and Fish Commission.
12. Distribution and ecology of *Acris in Tennessee*. Ralph Sinclair, Tennessee Game and Fish Commission.

Invertebrates.

13. A study of the eastern fence lizard in Middle Tennessee. Mary Dunlap, Vanderbilt University.
14. Taxonomic studies of Tennessee helminths. A. W. Jones, University of Tennessee.
15. Life cycles of salamander cestodes. A. W. Jones, University of Tennessee.
16. Studies of effects of radiation on cestodes and their hosts. A. W. Jones and Kathleen Wyant, University of Tennessee.
17. Taxonomic studies of the Tendipedidae. Ralph Sinclair. Tennessee Game and Fish Commission.
18. A taxonomic and distributional study of Collembola. Thomas Copeland, East Tennessee State College.
19. A study of the ant genus Aphaenogaster. W. J. Cloyd, Carson-Newman College.
20. Clarification of the genus Dendrotettix. J. J. Friauf, Vanderbilt University.
21. A study of the water mite genus Arrenurus. James Wilson, Vanderbilt University.
22. The armyworm and its natural enemies in Tennessee. S. L. Breeland, University of Tennessee.
23. The dragonflies of Tennessee. R. P. Trogdon, University of Tennessee.

General.

24. The cave fauna of the Central Lowlands of Tennessee. Thomas Barr, Vanderbilt University.
25. Limnological studies of Stone's River, Tennessee. J. G. Parchment, Middle Tennessee State College.

For the Committee respectfully submitted,
Arthur C. Cole, Chairman

REPORT OF THE FAUNA COMMITTEE OF THE TENNESSEE ACADEMY OF SCIENCE, FOR 1958

The following faunistic projects were in progress or were completed:

Invertebrates

Thomas C. Barr, Jr.: Studies on the cave invertebrates of the interior lowlands and Cumberland Plateau.

S. L. Breeland, University of Tennessee: Studies of the distribution and biology of the armyworm in Tennessee.

Will John Cloyd, Carson-Newman College: A systematic study of the ant genus Aphaenogaster Mayr.

Margaret Cole, Vanderbilt University: The Ostracoda of central Tennessee.

Floyd Ford, Vanderbilt University: The Collembola of the interior lowlands of Tennessee.

J. J. Friauf, Vanderbilt University: Clarification of the species in the genus Dendrotettix (Orthoptera: Acrididae, Cyrtacanthacrinae).

J. L. Hawkins and J. K. Grimm, University of Tennessee: Systematic and Distributional Studies of the Heliidae of Eastern Tennessee.

A. W. Jones, University of Tennessee: Taxonomic Studies of Tennessee Helminths; Life Cycles of Salamander Cestodes.

Han Zin Park, Vanderbilt University: The Fresh-water Gastrotricha of the Nashville area.

Robert McRitchie, Vanderbilt University: Cave Planarians of the Family Kenkiidae in the Nashville area.

Tennessee Game and Fish Commission: A study of mussels of the Tennessee River and its tributaries.

Fish

Tennessee Game and Fish Commission: Tagging studies at Reelfoot Lake, Kentucky, and Cherokee reservoirs; a limnological study of Kentucky Lake to determine the suitability of this lake for the introduction of rockfish (salt-water striped bass).

Birds

J. C. Howell, University of Tennessee: Ninth annual roadside census of birds of Knox County.

Mrs. F. C. Laskey, Nashville: A nesting study of species and population fluctuations of the bluebird.

J. T. Tanner, University of Tennessee: The effect of temperature on the distribution and time of reproduction of birds.

Mammals

Health-Physics Division, Oak Ridge National Laboratory: Field studies of mammals of Melton Valley.

Respectfully submitted for the Committee
ARTHUR C. COLE, Chairman

GENERAL SESSION

Friday, Dec. 5, 1:30 P.M.—Auditorium, Oak Ridge High School

Arlo I. Smith, Chairman

TRENDS IN THE PROTECTION OF SCIENTIFIC WORKERS AGAINST THE EFFECTS OF RADIATION. Myron Fair, Health Physics Division, Oak Ridge National Laboratory.

Intermission

RECENT DEVELOPMENTS IN THE DISPOSAL OF RADIO ACTIVE WASTE. E. G. Struxness, Health Physics Division, Oak Ridge National Laboratories.

HIGH ENERGY INJECTION — A PROMISING APPROACH TO THERMONUCLEAR PLASMA IGNITION. Robert J. Mackin, Jr., Oak Ridge National Laboratory.

Business meeting of the Section.

SECTION MEETINGS
Oak Ridge High School
Saturday, December 6, 9:00 A.M.

BOTANY SECTION
Room 205-206
P. L. Hollister, Chairman

THE SPRUCE-FIR FOREST OF THE SOUTHERN APPALACHIANS. George S. Ramseur, *The Univ. of the South,* Sewanee.

In the Southern Appalachian Mountains, the spruce-fir forest is confined to eight areas, all of these extending to elevations above 5500 feet. The vascular plant communities of these areas, as well as the other areas above 5500 feet, were studied. The geographical elements which make up the high mountain flora will be discussed, and *Abies fraseri* will be discussed in terms of its possible relationship to the more northern *Abies.*

A COMPARISON OF THE FLORISTICS OF TWO GORGES OF THE CUMBERLAND PLATEAU. Harry L. Sherman, *University of Tennessee.*

The Fall Creek Falls system of gorges (Van Buren County, Tennessee) and Little River Canyon (DeKalb-Cherokee Counties, Alabama) are two of the most extensive gorge systems in the Cumberland Plateau. A comparison of the two gorges reveals that the Fall Creek system contains a relatively high percentage of northern species (7.7 per cent of the total woody flora as compared with 1.2 per cent for Little River Canyon), whereas Little River has a high percentage of Coastal Plain and Piedmont species (10.9 per cent as compared with none for Fall Creek).

HIGH SCHOOL STUDENTS IN COLLEGE BOTANY. Fred H. Norris, Department of Botany, *University of Tennessee.*

One section of the beginning course in Botany was offered on an experimental basis to selected high school students during the second term of the 1957 summer quarter. Applicants were asked to have a 3.0 grade average, senior standing, and to have completed at least two courses in science, including Biology. Seventeen students were accepted and successfully completed the course with final grades as follows: A (7), B (8), C (1), D (1). The course was the standard first quarter offering in all aspects and carried the usual 4 hours of college credit.

EXTENSION OF KNOWN RANGES OF SOME MOSSES IN THE SOUTHEASTERN UNITED STATES. Ronald A. Pursell.

Distributional notes were presented for the following species of mosses collected mainly in north Florida: *Sphagnum warnstorfianum, Grimmia laevigata, Hedwigia ciliata, Ptychomitrium incurvum, Mnium orthorhynchum, Molendoa sendtneriana, Splacnobyrum obtusum,* and *solmseilla kurzii.*

MIELICHHOFERIA, MIELICHHOFERIONA IN TENNESSEE, A. J. Sharp, *University of Tennessee.*

In the fall of 1949, a small scrap of moss which appeared to be *Mielichhoferia* was collected under Myrtle Point on Mt. Le Conte. It was never determined as to species because of size and sterility. On October 4, 1958, accompanied by Doctor Ronald Pursell and Mr. Dan Norris, I found ample quantities of *M. mielichhoferiana* on the shaded cliffs of the Jump-off in the Smoky Mountains. Some sporophytes were collected. This moss is a member of Bryaceae and has not been reported in the literature south of the Michigan shore of Lake Superior. Thus, it appears to be another of the relict species which are to be found in the cool recesses of the Southern Appalachians.

THE CHLOROPHYLL CONTENT OF TEA. Frederick T. Wolf, *Vanderbilt University,* Nashville.

Analyses of 75 samples of tea, including black, oolong and green teas, for chlorophyll *a* and chlorophyll *b* have been made by a spectrophotometric method. The total chlorophyll content is greatest in green teas. intermediate in black teas, and least in the oolong teas studied. The highest percentages of chlorophyll *a* are to be found in green teas, followed by oolong teas, with the least relative amounts in black teas. The significance of these findings is discurred.

PHYSIOLOGY OF SEED GERMINATION. Alan H. Haber, Biology Division, *Oak Ridge National Laboratory,* Oak Ridge, Tennessee.

Germination of certain varieties of lettuce seeds can be stimulated by exposure to red light, or by treatment with either of the growth-regulating chemicals, kinetin or gibberellic acid. For these reasons we have explored the early metabilosm of such seeds durinig germination and we have studied the actions of the three aforementioned germination-promoting agents.

Dry seeds were allowed to imbibe water containing C^{14}-bicarbonate, P^{32}-phosphate, or S^{25}-sulfate tracers. After short periods of imbibition, the seed were extracted and the soluble compounds separated by paper chromatography. The Krebs cycle, transamination mechanisms, phosphate esterification, and sulfate reduction all appeared to function soon after the beginning of moistening the seeds, but long before radicle protrusion and the beginning of seedling growth.

The germination-promoting effects of red light, gibberellic acid, and kinetin could be experimentally separated from one another by various temperature treatments. We concluded that gibberellic acid and kinetin do not exert their effects on germination by affecting the same basic mechanisms regulating germination; and that the effect of red light can not be explained in terms of regulating the production of endogenous gibberellin-like or kinetin-like substances.

ARCTIC – ALASKAN EXPLORATION II. John J. Koranda and Royal E. Shanks, Dept. of Botany, *University of Tennessee.*

This film was made in Northern Alaska this past summer as part of field studies concerned with the ecology of the Alaskan tundra. The vegetation of the tundra is the main subject of the film but there are also included scenes showing the animals of the tundra and general operations of the field party.

The majority of the footage was exposed in Franklin Bluff's area where cooperative pedological, and botanical studies were conducted during the past summer. The Franklin Bluffs are located in eastern portion of the Arctic Coastal Plain and are composed of Tertiary sediments whereas the adjacent coastal plain is more recent. The bluffs are approximately 200 to 300 feet above the surrounding tundra and have many erosional features that are unique in this region.

There are many closeups of the *tundra* plants in the film and views of the various vegetation types to be found in this area. Some species which are shown in the closeups are as follows: *Silene acaulis, Dryas, integrifolia,*

Cassiope tetragona, Salix reticulata, S. rotundifolia, S. alaxensis, Parrya nudicaulis, Lupinus arcticus, Boykinia richardsonii, and others. The animals seen in the film are the rough-legged hawk, peregrine falcon, redpoll, black-bellied plover, caribou, and arctic ground squirrel.

At the end of the film, there is a short sequence showing one phase of the productivity studies which were conducted near Pt. Barrow. The clipping of the vegetation in the control areas and in exclosures is shown. The vegetation is eaten mainly by the brown lemming.

CHEMISTRY SECTION

Room 242

ALBERT L. MYERS, Chairman

THE USE OF JOB'S METHOD WITH SOME SPECIAL TYPES OF REACTIONS. Mark M. Jones, *Vanderbilt University,* Nashville.

The use of Job's method for studying complexes in solution is examined. In the reactions considered, reactants or products other than those which participate in the formation of the complex may be present. The cases considered are (a) a reaction in which the complex is formed with the liberation of a stoichiometric quantity of hydrogen ion, (b) a reaction in which the complex is formed with the concurrent production of an arbitrary number of other constituent all in stoichiometric proportions, (c) a reaction in which the complex produced is a weak menobasic acid, and (d) a reaction in which one of the reactants is a weak menobasic acid. In each of these cases the use of Job's method may be justified provided certain restrictions are met.

THE KINETICS OF ESTERIFICATION OF THE CYCLOHEXANE-DICARBOXYLIC ACIDS WITH DIPHENYLDIAZOMETHANE. Paul P. Hunt, Dept. of Chem., *University of Tennessee* (H. A. Smith, co-author).

EFFECT OF ELECTROLYTIC POLARIZATION ON CATALYTIC ACTIVITY. Clyde D. Alley, *University of Tennessee,* Knoxville.

The effect of electrolytic polarization on the activity of smooth and platinized platinum catalysts in the hydrogenation of allyl alcohol and oxygen in solution has been studied. A system was constructed such that reactions could be studied for unlimited lengths of time. It was completely automatic, and very slow reactions could be followed. The potential of the catalyst with respect to a reference electrode was also measured.

The catalytic activity of the platinum electrodes was observed to be enhanced by the following means: (1) alternating polarization; (2) stopping anodic polarization of platinized-platinum catalysts; (3) direct polarization of smooth platinum electrodes in the hydrogen-oxygen reaction. In the latter example, a periodic reaction was observed. In each of these cases, the anode's potential decreased sharply prior to the rise in catalytic activity.

Two possible explanations for the observed results are offered. One attributes the enhanced activity to active hydrogen and oxygen formed electrochemically. The other postulates the formation of active oxides on the anode.

USES OF RADIOISOTOPES AT HOME AND ABROAD. Ralph T. Overman, *Oak Ridge Institute of Nuclear Studies.*

MINUTES
CHEMISTRY SECTION, TENNESSEE ACADEMY OF SCIENCE
December 6, 1958

Dr. Albert L. Myers, *Carson-Newman College,* was reelected chairman of the Chemistry Section for next year.

There was an extended discussion of the possibility of having the Chemistry Section combine its meeting each year with the appropriate local section of the American Chemical Society. Following this discussion, it was moved, seconded, and passed that we would attempt to secure the cooperation of the appropriate section of the American Chemical Society but that we would continue as an independent organization.

ENGINEERING SECTION
Room 208

C. H. WEAVER, Chairman

INVESTIGATIONS CONCERNING THE MECHANISMS OF SOLID STATE TRANSFORMATIONS IN STEELS. Charlie R. Brooks, *University of Tennessee.*

SPECIAL STATISTICAL METHODS FOR THE EVALUATION OF IMPRECISE INSTRUMENTS. R. C. Ritter and W. G. S. Fort, ORGDP.

SOME EFFECTS OF FEEDBACK ON THE STEADY-STATE OPERATING CHARACTERISTICS OF AMPLIFIERS. F. M. McClelland, *University of Tennessee.*

A TECHNIQUE OR ELECTRICAL HEAT TRANSFER ANALYSIS. Dillard Jacobs and W. R. Baker, Vanderbilt University.

THE IMPEDANCE OF FOLDED MONOPOLES USED IN CIRCULAR ANTENNA ARRAYS, J. E. Brittain, University of Tennessee.

RECENT ADVANCES IN GAS ABSORPTION APPARATUS IN RUS SIA. Justin T, Long, Oak Ridge National Laboratory.

THERMAL DIFFUSION AS A MATERIAL PURIFICATION METHOD OF CHEMICAL ENGINEERING. Gerald T. Fisher, University of Tennessee.

A NEW ESTIMATION OF AIR POLLUTION GROUND CONCENTRATIONS. Eugene A. Zwenig, University of Chattanooga.
Business meeting of the Section.

GEOLOGY-GEOGRAPHY SECTION
Room 243

B. C. MONEYMAKER, Chairman

THE SETTLEMENT PATTERN OF THE CUMBERLAND PLATEAU. George W. Webb, *East Tenn. State College,* Johnson City, Tennessee.

The settlement pattern on the Cumberland Plateau appears to be different from that of many other parts of the United States. The purpose of this study is to inquire into the following questions: What is the settlement pattern like? How does it differ from that of other regions? What is the organization of the social groups? How are the family units related

to each other? What are the factors to which such an arrangement seem to be related?

The principal findings were: The topographic, geologic, and soil conditions of the region have encouraged such land uses as have produced only a relatively sparse population. The limited number of people have not developed urban characteristics. The drainage pattern which is dendritic in general has molded a road pattern and a pattern of settlement which are similar. Both the people and the roads are in the valleys of the maturely eroded and structurally controlled areas, but they are on the divides of the youthful area. The people are not disseminated evenly over the land, but tend rather to be agglomerated into rural neighborhoods and communities of varying sizes and degrees of independence, for purposes of their social, economic, and other common activities. These rural agglomerations have focal points usually at crossroads where there is located a school, church, or some other vital service, yet both the neighborhoods and communities have a spatial concept such that boundaries can be drawn placing the member families in the neighborhood and/or community to which they have a definite feeling of belonging.

STRUCTURAL GEOLOGY OF THE SEQUATCHIE VALLEY. Robert C. Milici, *Tennessee Division of Geology*.

OCCURRENCE OF GAS AND SALINE WATER AT WILSON LOCK, ALABAMA. Robert W. Allen, Geologic Branch, TVA.

A PRELIMINARY STUDY OF THE BASAL CHEPULTEPEC SAND STONE (CAMBRIAN-ORDOVICIAN BOUNDARY) IN THE RIDGE AND VALLEY PROVINCE OF TENNESSEE. David Cummings.

Samples from the basal Chepultepec sandstone (Cambrian-Ordovician boundary) in the Ridge and Valley province of Tennessee were collected for the purpose of determining provenance and mineral composition.

The variance in thickness of the well-sorted orthoquartzite has been ascribed to irregularities on the geosynclinal floor.

A general decrease of size distribution (arithmetic quartile deviation) to the south and southeast is apparent.

Characteristic mineral suites from the three fundamental types of source rocks are represented in the sandstone. The diagnostic minerals identified are: for igneous rocks; anatase and ilmenite (both basic igneous minerals), albite, apatite, fluorite, hornblende, microline, quartz (igneous type), sphene, topaz, tourmaline (representing acid igneous and pegmatite minerals); for metamorphic rocks; epidote, sillimanite, zoisite; for reworked sediments; rounded chert, glauconite, leucoxene, rutile, tourmaline, zircon.

The distribution of these characteristic mineral suites suggests a north and northwest source. As far as determinable, no marked amount of detritus was brought in from the south and southeast.

Further work along these lines may furnish sufficient data to construct a palinspastic map of the region during the deposition of sandstone, thereby reconstructing the configuration of the Cambrian-Ordovician sea.

THE MARBLE INDUSTRY OF EAST TENNESSEE. Joe Parks Walters, Tennessee Industrial and Agricultural Development Commission.

OCCURRENCE OF KNOX DOLOMITE IN THE FLYNN CREEK STRUCTURE, JACKSON COUNTY, TENN. C. W. Wilson, Jr., and Stuart W. Maher, Tennessee Division of Geology.

RECENT SUBSURFACE INVESTIGATIONS IN THE WELLS CREEK STRUCTURE, STEWART COUNTY, TENNESSE. John M. Kellberg, Geologic Branch, TVA.

DEEP SUBRIVER SOLUTION CAVITIES AT HALES BAR — TENNESSEE RIVER MILE 431.1. Berlen C. Moneymaker, Geologic Branch, TVA.

CONTROL BY THE CINCINNATI ARCH OF DEPOSITION OF THE ORDOVICIAN HERMITAGE AND BIGBY-CANNON FORMATIONS. C. W. Wilson, Jr., Tennessee Division of Geology and Vanderbilt University.

LITHOFACIES OF THE FORT PAYNE FORMATION ON THE N. W. HIGHLAND RIM. Melvin B. Marcher, U. S. Geological Survey.

MATHEMATICS

Room 207

G. H. LUNDBERG, Chairman

A REPORT OF THE INTERNATIONAL CONGRESS OF MATHEMATICS AT EDINBURG. M. G. Boyce, *Vanderbilt University.*

COMMISSIONS AT WORK ON THE MATHEMATICAL CURRICULUM. F. Lynwood Wren, *George Peabody College for Teachers.*

THE APPLICATION OF ELEMENTARY STATISTICS IN ANALYSIS OF DATA BY SELECTED SECONDARY SCHOOL STUDENTS — A RESEARCH PROGRESS REPORT. Charles M. Bridges, Jr., *University of Tenn.* Statistics Department, College of Business Administration.

SOME METHODS OF SOLVING SIMULTANEOUS LINEAR EQUATIONS. A. S. Householder, *Oak Ridge National Laboratory.*

A REPORT OF A SUMMER SCHOOL EXPERIMENT IN THE TEACHING OF HIGH SCHOOL MATHEMATICS. J. Houston Banks, *George Peabody College for Teachers.*

PHYSICS - ASTRONOMY SECTION

Room 244

EDWARD W. BURKE, Chairman

RECENT DEVELOPMENTS AT THE UNIVERSITY OF TENNESSEE SPECTROSCOPY LABORATORY. Wilson Whitehead, *University of Tenn.,* Physics Dept., Knoxville, and Isabel H. Tipton, *University of Tenn.,* Physics Dept., Knoxville, *Oak Ridge National Laboratory.* Oak Ridge, Tenn.

In addition to the analyses of normal human tissue previously reported, determinations of the concentrations of certain elements in samples from a control diet used at the Rockefeller Medical Institute have recently been made. The samples were ashed in a muffle oven at 450° C and then diluted in a ratio of 1 : 2 with tissue matrix. The matrix was added in order to bring the major constituents to approximately the same values as those in tissue ash. This allowed the use of the laboratory's standard curves for tissue determinations. The amounts of elements present at very low concentrations were approximated using the undiluted ash.

Similar tests were also performed on samples of snake venom.

A SPECTROSCOPIC SOURCE STABILIZER. W. E. Deeds, *University of Tennessee.*

A VACUUM GRATING SPECTROGRAPH FOR THE INFRARED. John A. Herndon and A. H. Nielsen, University of Tennessee.

BETA EMITTER IDENTIFICATION BY SCINTILLATION SPECTROMETRY. David L. Coffey, *Oak Ridge National Laboratory,* and Larry K. Akers, *Oak Ridge Institute of Nuclear Studies.*

The rapid identification of beta emitting isotopes is accomplished by the use of a split crystal anthracene scintillation spectrometer. Both the end point energies and the shape of the spectra are available from the data. Results are given for some common beta emitters individually and in mixtures. Some problems of the method and some applications will be discussed.

MESON PRODUCTION IN p-p COLLISION AT 2-74 BEV. William M. Bugg, *Univ. of Tenn.*

NEW EQUIPMENT FOR SOUND ABSORPTION MEASUREMENTS IN GASES. F. Douglas Shields and James Cummins, *Middle Tennessee State College.*

EVALUATION OF COLLEGE PARTICIPATION IN THE MOONWATCH PROJECT. B. A. Barrington, Jr., and E. W. Burke, Jr., *King College,* Bristol, Tenn.

In the early fall of 1957, a Moonwatch team, sponsored by King College, became a registered member of the Visual Satellite Tracking Program administered by the Smithsonian Astrophysical Obesrvatory, Cambridge, Massachusteest, as a part of their IGY program. After having participated in this program for a year, it is concluded that college participation has been worthwhile. The college invested less than a thousand dollars in this project of which about half was for instruments which will also be used in the teaching of Astronomy. Increased interest in, and appreciation of, this area of scientific endeavor is indicated among students and local citizens. Also, the college has benefited from the publicity associated with the program.

CO-OP STUDENTS IN NUCLEAR RESEARCH. J. L. Fowler, *Oak Ridge National Laboratory,* Oak Ridge, Tennessee.

During the last year the Physics Division of the Oak Ridge National Laboratory has been using Co-op Nuclear Engineering students as research technical assistants. In this Co-op program, students alternate between three months of work and study at the Laboratory and three months at school, so that two men fill a full time job. The men assigned to the Physics Division have come from the University of Tennessee, where students are eligible for the program at about the end of their freshman year. In assisting in the performance of experiments in nuclear research and in carrying out the routine calculations involved, these co-ops have proved to be highly satisfactory. Examples of their work will be discussed. A more widespread adoption of this type of program is urged, not only as a means of supporting worthy undergraduate students of engineering and science, but also for providing intelligent, alert, and ambitious technical assistants for scientific research.

THE VISITING SCIENTISTS PROGRAM OF THE AMERICAN INSTITUTE OF PHYSICS. M. S. McCay, *University of Chattanooga,* Chattanooga 3, Tennessee.

The American Institute of Physics, through its Education Division under the direction of Dr. W. C. Kelly, is currently organizing a program of visitation by leading physicists to high schools, and groups of high schools. The purpose of this NSF-sponsored plan is to provide opportunity for leading physicists to visit high schools in selected areas and with interested student groups, and to offer:

a. Lectures on basic and modern Physics
b. Advice to interested students
c. Advice to science teachers and high school principals.

In Tennessee the prospect for the organization of a number of urban and county "chapters" of the TJAS, following the example of the Knoxville Chapter of the Junior Academy of Science in 1957, makes it particularly appropriate to offer a proposal to the American Institute of Physics.

The AIP purposes correspond quite closely to the objectives of the TJAS Chapters, namely:

1. To bring together local high school students — from various schools — who are interested in science education;
2. To promote discussion of scientific subjects;
3. To increase communication between young scientists;
4. To stimulate wholesome interest in science generally.

ZOOLOGY SECTION

Room 245-246

RONALD C. FRASER, Chairman

THE ROLE OF INDUCTION IN SOMITE FORMATION IN THE CHICK EMBRYO. Ronald C. Fraser, *University of Tennessee,* Dept. of Zoology and Entomology.

Numerous types of experiments involving chemical and microsurgical manipulations have revealed that the formation of somites in the early chick explant is regulated to a large degree by interaction with axial tissue laid down during node regression. The experiments described lend support to the conclusion that nervous tissue, in its early stage of differentiation, is primarily responsible for the molding of somites. Several forms of experiments in which embryos, or fragments of embryos, have been allowed to develop in cluture without the benefit of either the nervous system or notochord have demonstrated that somite genesis normally re quires the presence of nervous tissue, but not notochord.

THE VARIABLE ULTRAVIOLET SENSITIVITY OF THE DEVELOPING HABROBRACON EMBRYO. Robert I. Amy, *Southwestern at Memphis,* Memphis 12, Tennessee.

Embryos of the parasitic wasp *Habrobracon juglandis* were exposed to light from a G. E. 15-watt germicidal lamp in an effort to determine their sensitivity to ultraviolet radiation. Specimens representing 12 different developmental stages of the 29 hour embryonic period were irradiated in the present study with the following results: Sensitivity increases from the time of oviposition to 3 years of age (stage of maximum sensitivity), decreases until 15 hours of age, and then gradually increases to its next most sensitive stage at 23 hours. After 23 hours, sensitivity decreases slowly for the next hour then drops sharply to its lowest level at 26 hours. Variations in response are discussed and correlated with morphological changes occurring in the embryo at each of the ages tested.

Supported by a research grant (C-3320) from the National Institutes of Health, U. S. Public Health Service.

THE EFFECT OF TEMPERATURE ON THE EGG-LAYING DATE OF BIRDS. James T. Tanner, *University of Tennessee,* Department of Zoology.

The time of reproduction of birds, as determined by the date on which each female lays its first egg of the season, is affected by temperature. Previous studies have pointed this out, but none has successfully defined the temperature factor. A study of *Junco hyemalis* in the Great Smoky Mountains has shown that the most consistent results are obtained by summing temperatures above a certain threshold and weighting the sums of different periods, indicating that the birds have a changing sensitivity to temperature. Altho many experiments have shown that lengthening days are a stimulus for initiating sexual development, the data here presented indicate that temperature independent of day-length determines the actual first-egg date.

CAVE INVERTEBRATES OF THE INTERIOR LOWLANDS AND CUMBERLAND PLATEAU. Thomas C. Barr, Jr., *Tenn Polytechnic Institute,* Dept. of Biology, Cookeville, Tenn.

Invertebrates were collected from 249 caves in the Interior Lowlands and Cumberland Plateau — 13 in Alabama (28 in Indiana, 58 in Kentucky, and 150 in Tennessee. Approximately 300 species and subspecies have been identified, about half of these previously undescribed. These forms are distributed as follows: Turbellaria 2, Oligochaeta 2, Gastropoda 27, Isopoda 5, Amphipoda 5, Decapoda 8, Chelognethi 4, Opiliones 4, Araneida 19, Acarina 4, Chilopoda 6, Diplopoda 50 (est.), Symphyla 2, Collembola 16, Diplura 7, Orthoptera 9, Corrodentia 1, Coleoptera 135 (est.), Diptera 11. Additional material was collected but has not yet been determined. About 165 forms are troglobites, i.e., obligatory cavernicoles.

Some elements of the present invertebrate troglobite fauna may have colonized caves in the Interior Lowlands and Cumberland Plateau in the mid-Tertiary, for large cavern systems have probably existed since that time. However, comparison of the present distribution of certain troglobites with known patterns of glaciation in southern Indiana indicates that they entered the present caves in Sangamon (Illinois-Wisconsin interglacial) time. Certain caves of the Eastern Highland Rim in Tennessee show stages of development corresponding to (a) the Pliocene mature stage of the Cumberland River, and (b) the Pleistocene entrenchment of the Cumberland. These caves, which are today well populated by terrestrial troglobites, were probably not available for colonization until the early or middle Pleistocene.

EFFECTS OF PHYSIOLOGICAL STRESS ON LABORATORY ANIMALS AS REVEALED BY TOTAL AND DIFFERENTIAL RESPONSE OF LEUCOCYTES. Wm. G. Downs, Jr., Bryant Benson, and G. B. Pennebaker, *Tennessee Polytechnic Institute* and *Vanderbilt University*.

Total white cell counts and differentials were done on normal and dwarf cattle, normal and dwarf mice, colored and albino rats, mice and rabbits, and black and "yellow lethal" mice, using Insulin and ACTH as the agents of stress, and the propylene glycol-phloxine method in a counting chamber. Variations between "normals" and "dwarfs" were distinctive and very similar as regards species studied. There are indications that there are distinctive response on the part of different strains of the species studied and that "yellow lethals" are different from all other types studied. Charts shown for each type are based on a sufficient number of animals to give a reliable index.

STUDIES ON MITOCHONDRIA OF RAT BRAIN. Marilyn A. Zirk and Samuel R. Tipton, *University of Tennessee,* Dept. of Zoology and Entomology.

Brain mitochondria were isolated from normal albino rats by differential centrifugation. Optical density changes were measured by placing mitochondria in a spectrophotometer. On the basis of reports in the literature on liver mitochondria, decreasing optical density was assumed to indicate mitochondria swelling. Brain mitochondria swelled in sucrose solutions of 0.1 M and below and also in 10^{-4} M thyroxine.

Phosphorus to oxygen ratios were higher in mitochondria treated with thyroxine than were those in untreated mitochondria.

Since high concentrations of thyroxine were necessary to produce swelling, it appears that brain mitochondria may not be refractory to thyroxine but may have a high threshold. The evidence presented indicates that thyroxine administered in sufficient concentrations may induce structural changes in brain mitochondria.

THE GENETIC ORGANIZATION OF THE MALE FERTILITY FACTORS ON THE Y CHROMOSOME OF *DROSOPHILA*. George E. Brosseau, Jr.

Few specific genetic effects have been associated with the heterochromatic Y chromosome in *Drosophila melanogaster*. The only genes that have been found on the Y are the male fertility genes and the wild type allele of a gene that causes short bristles, *bobbed*. In order to study the fertility genes further, sterile Y chromosomes were produced by irradiation. Complementation studies were carried out with these sterile Y's to determine the number of genes in each complex and their genetic organization. The results of these studies indicate that there are at least two genes on the short arm of the Y and at least seven genes on the long arm. These heterochromatic genes are ordered in a linear sequence similar to euchromatic genes. Studies of spermiogenesis have failed to reveal any difference in the phenotypes of the sterile Y's. In each case no motile sperm are produced.

STUDIES ON THE MECHANISM OF LEUKEMOGENESIS BY IONIZING RADIATION. A. C. Upton, Biology Division, *Oak Ridge National Laboratory,* Oak Ridge, Tennessee.

Susceptibility to the induction of granulocytic leukemia and lymphoma in mice of the RF strain is influenced by the age of the mice at irradiation, sex, gonadectomy, thymectomy, splenectomy, radiation dose rate, fraction of body exposed, injection of turpentine before or after irradiation, and inoculation of cell-free filtrates of leukemic tissue. The action of many of these variables on the induction of granulocytic leukemia differs significantly from their action on the induction of lymphoma. The diverse effects of these factors and their mechanisms of action will be discussed.

SECTION OFFICERS FOR THE YEAR 1959

BOTANY SECTION:
Chairman: Herman O'Dell, *East Tenn. State College,* Johnson City.
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NINTH ANNUAL MEETING
COLLEGIATE DIVISION OF
TENNESSEE ACADEMY OF SCIENCE

December 6, 1958
Oak Ridge High School
Oakley Crawford, Carson-Newman College, Chairman

STUDIES ON GENETIC FACTORS IN HOMEOSTASIS. Allen Ashburn, David Fitzpatrick, *Tennessee Polytechnic.*

THE PROBLEM OF CRAWFISH WITH ROCKS IN THEIR HEADS. Bernie Orr, *Carson-Newman.*

FACTORS IN ADDITION TO EXPERIMENTAL "STRESS AGENTS" INFLUENCING THE LEUCOCYTE-COUNT IN ALBINO RATS. Howard Klausner, John Shepherd, Winfred L. Smith, *Tennessee Polytechnic.*

EFFECT OF COLD PERIPHERAL LEUCOCYTE-COUNT IN DWARF-CARRIER MICE. John Werner, *Tennessee Polytechnic.*

SYNTHESIS OF VARIOUS 1,8-NAPHTHYRIDINES. Stanley Von Hagen, *Carson-Newman.*

EFFECTS OF INSULIN ON BLACK MICE CROSSED WITH THE YELLOW-LETHAL STRAIN. Lake H. Johnson, *Tennessee Polytechnic.*

OPERATION OF GENETIC FACTORS IN GROWTH AND DEVELOPMENT OF MICE. Mel Bowling, *Tennessee Polytechnic.*

First Place and AAAS Award: Bernie Orr, *Carson-Newman College.*
Second Place: John Werner, *Tennessee Polytechnic Institute.*
Third Place: Stanley von Hagen, *Carson-Newman College.*

PRIZE WINNERS
OFFICERS OF COLLEGIATE DIVISION FOR 1959

President: Landon Smith, *T.P.I.*
Vice-President: David Fitzpatrick, *T.P.I.*
Sec.-Treas.: Lane Burdick, *Peabody College, Box* 285.
Reporter: Marion D. Hassell, *Memphis State.*

THE TENNESSEE JUNIOR ACADEMY OF SCIENCE
Affiliated with Science Clubs of America
PROGRAM OF THE SEVENTEENTH MEETING
Oak Ridge High School
December 5, 6, 1958

General Chairman: Mrs. M. A. Caballero, Red Bank High School, Chattanooga.

Registration: 8:00-9:00 A.M. Saturday, December 6, Foyer of the Oak Ridge High School.

General Session: 9:00 A.M., Saturday, Oak Ridge High School Cafeteria.

Presentation of Project Reports: 9:15 A.M., Saturday.

Five simultaneous sessions, 137 Science project reports were held in rooms adjacent to the Auditorium.

TJAS Luncheon: 12:00 Noon, Oak Terrace Ballroom.

Presentation of Awards: 12:30 P.M., Oak Terrace Ballroom.

Report of Knoxville Chapter, TJAS: 1:00 P.M., Oak Terrace Ballroom.

PROJECT SPONSORS

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Grades 7-8-9

NUCLEAR REACTOR, Barbara McMurry Andrews, Fountain City.
THE SOLAR SYSTEM. James Cecil Angel, Pikeville.
HOW DOES A LEVER WORK. Merrill Denton Austin. Pikeville.
ROCK COLLECTION. Robert Marcus Bernard, Nashville.
CAR DRIVEN RIPPLE GENERATOR. Robert Coleman Bland, Memphis.
NATURE'S CHEMICAL INDICATIONS. Beverly Bishop, Knoxville.
LEOPARD FROG. Betty Lou Barnett, Crossville.
SHRINKAGE OF CLOTH. Jean Boogher, Knoxville.
ELECTRO MAGNETS — THE MODERN WORK HOUSE. Johnny Alden Boynton, Pikeville.
VACCINATION REPORT SURVEY — COMMUNITY STUDY. Jessie Caroline Burgess, Crossville.
HEALTH SURVEYS. Linda Gail Burgess, Crossville.
POND LIFE. James Ralph Cannon, Crossville.
THE STAR BETELGEUSE. Ernest Authur Childs, Fountain City.
SCIENCE EXPERIMENTS. Lillian Gail Davis, Crossville.
TRANSISTORS. Ed Ernest Evans, Fountain City.
STUDY OF ROCKS. David Dysart, Fountain City.
THE DIGESTIVE SYSTEM. Martha Ann Farmer, Pikeville.
SHELLS. Robert Piper Boyce, Crossville.
CHEMICULTURE — Donald Edwin Gass, Chattanooga.
TEMPERATURE EFFECTS ON VISCOSITY OF LIQUIDS, Gwendolyn Sue Griffin, Oak Ridge.
GERMINATION OF SEEDS. Sylvia Gryder, Fountain City.
UTILIZATION OF SOLAR ENERGY. Robert Lindon Hardison, Chattanooga.
THE BODY. Elizabeth Ann Hodnett, Oak Ridge.
FLOWERS. Carolyn Louise Honeycutt, Crossville.
SEA SHELLS OF FLORIDA. Tommy Hughes, Tyner.
INSECT COLLECTION. Patricia Diane Jessel, Knoxville.
SWIMMING POOL REACTOR. Dougles Hugh Jones, Knoxville.
FOSSILS. James Runyon Lockert, Nashville.
MY ATOMIC PARTICLE TRACKING PROJECT: A CONTINUOUS TYPE CLOUD CHAMBER. Charles Ernest McLean III, Trenton.
LIFE IN OUR POND. Shirley Faye Melton, Pikeville.
PLANETS. Terry Davidson Miller, Chattanooga.
INSECT COLLECTION. J. Talmage Morell, Mascot.
THE FUNCTION O FTHE HEART. Gladys Christine Myers, Pikeville.
WOOD. Roberta Neely, Crossville.

THE TONGUE. Ruth Marie Newman, Pikeville.
MAKING AND USING ISOTOPES. Vicki Ann Oldham, Oak Ridge.
GROWTH OF TREES. William Creighton Panter, Pikeville.
GENETICS EXPERIMENTS WITH THE DROSOPHILLA FRUIT FLY. Dolores Parton, Tyner.
R. M. S. — 3. Rodger Nelson Pattison, Memphis.
MOTOR CAR. Dennis Victor Patton, Jr., Crossville.
TESLA COIL. Brent Ramey, Kingsport.
WILSON CLOUD CHAMBER. Charles William Reip, Memphis.
USES OF COTTON AND WOOL. Betty Gayle Rigsby, Pikeville.
WILD FLOWER QUIZ. Charles Roe, Pikeville.
THERMAL PROPERTIES OF TEXTILES. Helen Dianne Ruh, Smithwood.
THE ANATOMY OF THE EYE. Roger Owen Rupp, Oak Ridge.
CLOUD CHAMBER CAMERA. Richard Sawyer, Fountain City.
SOLAR FURNACE. Edware Paul Sakrison, Knoxville.
STROBOSCOPE AND FAN (ELECTRIC FAN). Richard Alan Silverman, Memphis.
ANATOMY OF THE HORSE. Ann Lynn Skaggs, Fountain City.
ROCKS AND MINERALS. Garry Duane Speich, Crossville.
MENTAL HEALTH. Margaret Strom, Knoxville.
VACCINATION SURVEY — COMMUNITY STUDY. Mabel Janet Strunk, Crossville.
OLD FASHIONED SOAP. Margaret Virginia Swafford, Pikeville.
SCIENCE QUIZ. James Donald Tate, Memphis.
HOW A V-2 ROCKET WORKS. Herschel Wayne Sulfridge, Knoxville.
THE EYE. Judith Louise Thomas, Pikeville.
EQUATORIAL STAR FINDER. Mary Jane Taylor, Pikeville.
STEPS IN THE MANUFACTURING OF HOMKO. Gail Lucille Van Valkenburg, Memphis.
HUMAN HEART. Dayna May Weaver, Crossville.
ANIMAL LIFE. David Chester Welch, Crossville.
JACOB'S LADDER. Richard M. White, Memphis.
HEALTH SURVEYS. Carlene Rose Wood, Crossville.
POLARIS' SERVICE TO HUMANITY. Dallas Keith Roberson, Pikeville.
SIMPLE MACHINES. Marjorie Ann Sites, Oak Ridge.

Grades 10-11-12

GROWTH OF TREES. Willa Margaret Alley, Crossville.
RADIATION. Jimmy Annis, Pikeville.
PROCESSION COTTON. Russell Edward Barnett, Chattanooga.
EDISONS DEVELOPMENTS. Buddy Beach, Pikeville
FLOWING GOLD. James Ralph Boynton, Pikeville.
HEMATOLOGY. Robert M. Carroll, Crossville.
TIME THROUGH THE AGES. Carolyn Marie Chisam, Pikeville.
THE EFFECT OF IODINE ON THE METAMORPHOSIS OF A BULFROG. Elizabeth Ann Compton, Knoxville.
CONVERSION OF A CAR RADIO FROM D.C. TO A.C. Victor Conatser, Crossville.
EXPERIMENTAL TERATOLOGY. Barbara Ann Conway, Chattanooga.
TALKING COILS. Ruby Cothan, Chattanooga.
HIGH VOLTAGE RAVELING ARC. James Cox, Chattanooga.
HEMATOLOGY. Ranfro Beatrice Custred, Crossville.
MOTION STOPPING STROBOSCOPE. Robert Days, Chattanooga.
BACTERIAL RECOMBINATION. Charles C. Dollins, Oak Ridge.
A NEW METHOD FOR PRODUCING SULFURIC ACID. John Donelson III, Chattanooga.
TESTING ROCKET FUELS WITH HOMEMADE TEST EQUIPMENT. Joe Ed Gaddes, Nashville.
AET-TOXICITY STUDY ON THE FROG. Perry R. Grace, Memphis.
A MICROPORECTOR. David Lynn Gray, Memphis.

LAUNDERING CLOTHES. Gretta Holt Guyton, Memphis.
COLOR AND ENVIRONMENT OF MICE. Barbara Louise Harrington, Knoxville.
THE EFFECT OF GRAVITY ON HIGH SPEED FLIGHT. Albert Clarence Garrington, Knoxville.
LIQUID FUEL ROCKET ENGINE. Carl Sanfrio Helrich, Oak Ridge.
WHAT ELEMENTS AFFECT WHAT PROCESSES OF RADISHES. Blanchard Hobbs, Nashville.
STUDY OF A CROSS SECTION OF EPITHELIAL TISSUE. Sara Witherow Hoffman, Memphis.
THE EFFECTS OF ELECTRICAL DISCHARGE IN A GAS DISCHARGE TUBE ON THE GERMINATION OF SEEDS. Robert Louis Houlder, Memphis.
ROCKETS. Marsha Mabel Kennedy. Pikeville.
AMATEUR RADIO STATION. Malcolm Price Keown, Chattanooga.
A STUDY OF CHEMICAL DIFFERENCE IN THE ASPECT OF AMION AND NUCLEIC ACIDS IN RELATION TO GENETIC SPECIFICITY. Elizabeth Ann Kirkpatrick, Knoxville.
RADIATION EFFECTS AND POSSIBLE PREVENTION. Robin Howard Lawrence, Memphis.
MOTHER NATURES DYEPOT. Frances Ann Laycock, Oak Ridge.
THE RELATIONSHIP BETWEEN PLANT FAMILIES AND THEIR ANCESTORS. June Marie Ligon and John David Kavich.
TIN NITRATE. Robert Gary Loudon, Memphis.
PARTITION CHROMATOGRAPHY: A MODERN TOOL OF RESEARCH. James K. Mallet, Chattanooga.
JV-1. John Allen Miller, Memphis.
ALLOXAN DIABETES IN RATS. Shirley A. Miller, Oak Ridge.
HOME-MADE TRANSIT FOR MEASURING VERTICAL AND HORIZONTAL ANGLES. Evelyn Montgomery, Chattanooga.
THE EARTHWORM. Pat Ann Newman, Pikeville.
CORONA WIND: DEMONSTRATIONS AND APPLICATION. Michael Francis Nolan, Chattanooga.
STRUCTURE OF BONES. Lynda Lee Noland, Crossville.
YOUR NERVES AND SPINAL CORD AT WORK. Gail Joann Noonan, Memphis.
REPULSION COILS. Patricia O'Neal, Chattanooga.
ROCKETS AND SATELLITES. Kenneth Courtland Owings, Memphis.
PROTEIN-SYNTHESIS. Ralph Henry Plumb, Crossville.
BOOLEAN ALGEBRA OF SETS. Frank Hall Pollard, Oak Ridge.
OBSERVING THE WEATHER. Billy Fee Redmond, Pikeville.
THE SMIT SERIES OF ZINC-SULFUR ROCKETS. Bill Roger Roark, Tazewell.
MIRACLE FIBERS FOR A MODERN MISS. Marilyn Blake Roberson, Pikeville.
INTERPLANETARY LIFE. Sandra Sue Sanders, Pikeville.
THE PHYSICS OF THE AIRPLANE. James William Scoggin, Pikeville.
PLANT AND ANIMAL CELLS. Linda Dail Singleton, Crossville.
150,000 OR 250,000 VOLT VAN DE GRAFF. ELECTRO STATIC GENERATOR. Andrew Smith, Chattanooga.
ROCKS AND GEMSTONES. Charles Laird Smith, Crossville.
WATER SYSTEMS AND HOW THEY WORK. Wayne Standerfer, Pikeville.
THE EFFECTS OF RADIATION ON MICE. James Richard Stelling and Ray Bruce Bridges.
HEMATOLOGY. Glenda Stultz, Crossville.
RADIATION AND REPRODUCTION. Judy R. Tenpenny, Nashville.
SLIDE LIBRARY OF BLOOD DISEASES. Charlotte McClung Thomas, Crossville.
SLIDE LIBRARY OF BLOOD DISEASE. Sara Cynthia Thurman, Crossville.
NATURE'S DYES. Alinda Carole Turpin, Memphis.
GEOLOGY OF TENNESSEE. Sam Bayless Upchurch, Nashville.

ELECTROTHERAPY OF FLORA IN LIQUID NUTRIENT-MEDIA. Charles Paul Warr, Memphis.

RADIATION IN MODERN MEDICINE. Rita Weeks, Germantown.

X-RAY AND ITS EFFECTS ON THE CHICKEN EMBRYO. Thomas La-Follette West, Memphis.

HIRUDIN: THE NEGLECTED ANTI-COAGULANT. Sandra Diane Whitten, Oak Ridge.

TRANSFORMER. Dennis Lyle Williams, Crossville.

PRODUCTION OF ELECTRICITY WITH NUCLEAR ENERGY. Frank Woods, Chattanooga.

WOOD COLLECTION. Donald Curtis Wyatt, Crossville.

SURGERY AND MEDICINE. Verna Rebecca Lawson, Crossville.

LEUKEMIA'S RESPONSE TO MEDICATION. Barbara Lee Neal, Knoxville.

ELECTRICAL RESISTANCE AT LOW TEMPERATURE. Arnold Schwarzbart, Knoxville.

AWARD WINNERS

JUNIOR HIGH DIVISION—GRADES 7-8-9

GIRLS: First Place: Gwendolyn Sue Griffin, Jefferson Jr. High School, Oak Ridge

Second Place: Dolores Parton, Tyner Jr. High School, Tyner.

Third Place: Beverly Bishop, Smithwood Jr. High School, Knoxville.

Honorable Mention: Helen Diane Ruh, Smithwood Jr. High School, Knoxville.
Margaret Strom, Smithwood Jr. High School, Knoxville.

BOYS: First Place: Charles Ernest McLean, III, Peabody Jr. High School, Trenton.

Second Place: Robert Coleman Bland, East Jr. High School, Memphis.

Third Place: Robert Marcus Bernard, Julia Green School, Nashville.

Honorable Mention: Tommy Hughes, Tyner Jr. High School, Tyner.
Richard Alan Silverman, East Jr. High School, Memphis.

SENIOR HIGH DIVISION — GRADES 10-11-12

GIRLS: First Place & AAAS Award: Barbara Ann Conway, Notre Dame High, Chattanooga.

Second Place: Gail Joann Noonan, Treadwell High School, Memphis.

Third Place: Gretta Holt Guyton, Treadwell High School, Memphis.

Honorable Mention: Frances Ann Laycock, Oak Ridge High School, Oak Ridge.
Elizabeth Ann Compton, Young High School, Knoxville.
Sandra Diane Whitten, Oak Ridge High School, Oak Ridge.

BOYS: First Place: John Donelson, III, McCallie School, Chattanooga.

Second Place: Joe Ed Gaddes, David Lipscomb High School, Nashville.

Third Place: Sam Bayless Upchurch, Peabody Demonstration School, Nashville.

Honorable Mention: James K. Mallett, Notre Dame High School, Chattanooga.
Thomas LaFollette West, Central High School, Memphis
Charles C. Dollins, Oak Ridge High School, Oak Ridge
Bill Roger Roark, Claiborne County High, Tazewell.

NEW MEMBERS, TENNESSEE ACADEMY OF SCIENCE FOR 1958

Amy Robert L., Department of Biology, Southwestern at Memphis, Memphis.
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Bair, Joe Keagy, 200 W. Fairview, Oak Ridge. Tenn.
Barrett, Mrs. Gordon, Peabody High School, Trenton, Tenn.
Bennett, Stelmon Emerson, 1532 Holman Drive, Knoxville, Tenn.
Bernard, Miss Norma Lee, 3920 Wallace Ave., Nashville 12, Tenn.
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Bunting, Kenneth Wayne, Box 2584, George Peabody College, Nashville, Tenn.
Callihan, Phares William, Federal Housing Administration, 3676 Oakley Ave., Memphis, Tenn.
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Conner, Katherine Teresina, 2813 Dudley Avenue, Nashville, Tenn.
Dickison, Raymond K., Oak Ridge National Laboratory, P. O. Box X, Oak Ridge, Tenn.
Dickson, Robert R., U. S. Weather Bureau, Airport Station, Nashville, Tenn.
Dooley, Mrs. Evelyn. Route 5, Columbia, Tenn.
Ervin, Barbara Ann, Rt. 1, Weaver Road, Knoxville, Tenn.
Finucane, Thomas W., 1434 Watauga Street, Kingsport, Tenn.
Folden, Dewey B., Jr., Memphis State University, Memphis, Tenn.
Fowler, Dr. Joseph L., Oak Ridge Nat'l. Lab., P. O. Box X, Oak Ridge, Tenn.
Freymouth, Joseph F., Jr., 2387 Faxon Ave., Memphis 12, Tenn.
Garland, Miss Nell, RFD 3, Knoxville, Tenn.
Gaskins, Miss Henrianne, Dept. of Zoology and Entomology, Univ. of Tenn., Knoxville, Tenn.
Grimm, James K., Apt. 97, Sutherland Village, Knoxville, Tenn.
Grundset, Edgar Oluf, Box 1115, Collegedale, Tenn.
Herrin, Eric, Box 866, East Tenn. State College, Johsnn City, Tenn.
Hoover, Mrs. Cleo Wheeler, 201 Hobson Ave., Shelbyville, Tenn.
Huang, Charles, Repartment of Physics, Carson-Newman College, Jefferson City, Tenn.
Jackson, Melba Ann, Caryville, Tenn.
Johnston, David O., 1803 Leaf Ave., Murfreesboro, Tenn.
Kellberg, John M., Geologic Branch, TVA, 510 Union Bldg., Knoxville, Tenn.
Kelly, Ratus L., RFD 1, Clinton, Tenn.
Kisner, Raymond Louis, Dept. of Zoology and Entomology, Univ. of Tenn., Knoxville, Tenn.
Kitchen, Delmas K., Brayten Pharm. Co., Chattanooga, Tenn.
Kopp, Otto Charles, Dept. of Geology, Univ. of Tenn., Knoxville, Tenn.
Lamphere, Richard, Oak Ridge Nat'l. Lab., P. O. Box X, Oak Ridge, Tenn.
Little, Mrs. Harry, 422 W. Main Street, Greeneville, Tenn.
Long, Justin T., 116 Marquette Road, Oak Ridge, Tenn.
Lundberg, Mrs. G. H., 2310 Highland Ave., Nashville 12, Tenn.
MacQueen, Leigh W., 2441 Union Ave., Apt. #4, Memphis 12, Tenn.
Marcovitch, Simon, Univ. of Tenn., Agricultural Exp. Station, Knoxville,

McClary, J. B., Jr., 3927 Briargott, Knoxville, Tenn.
Mark, Mrs. Irma G., 1308 Bonnie Drive, Memphis 16, Tenn.
Martin, Thomas W., Chemistry Dept., Vanderbilt Univ., Nashville, Tenn.
Mayberry, H. Edward, 3015 Brightwood Ave., Nashville, Tenn.
Miller, Mrs. F. C., Jr., 920 Highland, Memphis, Tenn.
Miller, Tony Jasper, King College, Bristol, Tenn.
Moorman, Dr. R. H., Tenn. Polytechnic Institute, Cookeville, Tenn.
Moose, M. F., Southwestern, Memphis 12, Tenn.
Mullins, Archie Giles, Head, Dept. of Physics, Carson-Newman College, Jefferson City, Tenn.
Neese, John Thomas, UTMB, Martin, Tenn.
Nichols, Burrus, North Side Jackson High School, Jackson, Tenn.
Nicholls, J. C., Jr., Murphy, N. C.
Patton, Robert D., Clarksville High School, Clarksville, Tenn.
Qualls, Mrs. Loretta H., Route 3, Livingston, Tenn.
Ramseur, George S., Biology Dept., University of the South, Sewanee, Tenn.
Ruch, John W., 447 E. Drive, Oak Ridge, Tenn.
Rudolph, Phillip S., 106 E. Damascus, Road, Oak Ridge, Tenn.
Saylors, William Fred, Route 6, Crossville, Tenn.
Shelton, Wayne D., 18 Sutherland Village, Knoxville, Tenn.
Shoup, Frances C., 192 N. Purdue Avenue, Oak Ridge, Tenn.
Spear, Frank Allen, 3717 Richland Avenue, Nashville, Tenn.
Standefer, Mrs. Paul, Box 143, Pikeville, Tenn.
Strobel, Eugene F., Box 902, MTSC, Murfreesboro, Tenn.
Swann, Mildred, Box 880, UTMB, Martin, Tenn.
Tallant, Phanoy E., 2716 — 13th Ave., Chattanooga, Tenn.
Taylor, Jack Howard, Assoc. Prof. of Physics, Southwestern at Memphis, Memphis, Tenn.,
Wath, John R. (Dr.), Lambuth College, Jackson, Tenn.
Wellford, Walker Lewis, Jr., 135 St. Albans, Memphis 11, Tenn.
Whitehead, Thomas W., Jr., Route 8, Johnson City, Tenn.
Wild, Frances B., 1545 Hope Street, Memphis, Tenn.
Wilkinson, Michael Kennerly, 107 Delmar Circle, Oak Ridge, Tenn.
Willard, Harvey B., 314 E. Drive, Oak Ridge, Tenn.
Williams, Donald B., Division of Science-Bioloby, Maryville College, Maryville, Tenn.
Wilson, Wingate, Thoy State College, Troy, Alabama.
Wing, M. W., Dept. of Science, MTSC, Murfreesboro, Tenn.
Zirk, Marilyn Ann, Dept. of Zoology and Entomology, Univ. of Tenn., Knoxville, Tenn.