

**PROCEEDINGS OF THE
TENNESSEE ACADEMY OF SCIENCE
FOR 1960**

JAMES L. WILSON, *Secretary*
Belmont College, Nashville, Tennessee

MEETINGS OF THE EXECUTIVE COMMITTEE
JANUARY MEETING

The Executive Committee of the Tennessee Academy of Science was called to order by President C. P. Keim at 7:45 p.m. in room 304 Joint University Library at Vanderbilt University on January 29, 1960. The members present were J. Gordon Carlson, C. P. Keim, G. H. Lundberg, M. S. McCay, G. B. Pennebaker, Helen L. Ward, and James L. Wilson. In addition, James L. Major, Director of the Tennessee Science Talent Search and Albert J. Myers, Sponsor of the Collegiate Division were present.

A copy of the December Executive Committee and Annual Business Meetings were given to each person present. It was moved, seconded, and passed that the minutes be approved.

The secretary brought up the following suggestions made at the December, 1958, Executive Committee meeting on which no action was taken at the time: (1) a committee should be created to study the function of the Journal; (2) there should be a business manager of the Academy who would be more active in raising funds for Academy operations; (3) there should be a permanent Executive Secretary of the Academy to further the continuity in the activities of the Academy. These suggestions were discussed as to advantages and disadvantages, but again no action was taken.

The secretary pointed out some changes that needed to be made before printing of any more "application for membership" blanks. To conform to the recent change in the Constitution, the first statement under "DUES:" was changed to read: The annual dues are: members \$4.00, except for teachers below the College level, whose dues are \$2.00, sustaining members \$10.00, life members \$75.00, supporting members \$25.00. It was felt that no motion was necessary since the change was made to comply with the recent change made in the Constitution.

A motion was made, seconded, and passed to change statement number 4 under "ACTIVITIES:" on the "application for membership" blank to read: Sponsorship of a Junior Academy of Science and a Collegiate Division.

A letter requesting research funds from Lowell P. Orr was handed to the secretary. The treasurer pointed out, however, that at present there were no funds available in the AAAS research grant. The secretary was requested to answer this letter and explain that no funds were available at present but that his request would be considered later after such funds were available.

A motion was made, seconded, and passed that the Committee on Research, to be appointed by the president, consider all applications for research funds received by March 15, 1960, for any funds in the AAAS research grant and other grants.

A motion was made, seconded, and passed that all four TJAS 1st prize winners names be submitted to the AAAS for the AAAS award, representing the 1st place boy and girl of the senior high division from the physical and biological science areas, but if the AAAS will pay for only two of these awards, as they have in the past, then the other two awards will be paid out of the regular Academy funds.

The meeting adjourned at 9:50 p.m. and met the next morning at 9:00 A.M. January 30, in room 128 Joint University Library. In addition to the members present the evening before, C. S. Chadwick, William G. Downs, Jr., Membership Committee Chairman, and Mr. Cord H. Link, Jr., Administrative Secretary of the TJAS, were present.

The secretary handed out copies of an up-to-date membership list to all members present.

A motion was made, seconded, and passed that it be recommended to members of the Academy at the 1960 Annual Business Meeting that the first sentence of Article IV, Section 1 of the Constitution be amended to read as follows:

"The officers of the Academy, the immediate past president, the sponsors of the Junior Academy and the Collegiate Division, and three other members shall constitute the Executive Committee of the Tennessee Academy of Science."

The secretary reported that because he had misplaced some records, he did not read 59 names to be recommended for membership at the 1959 Annual Business Meeting that had been received prior to his assuming secretaryship in September. He reported receiving 11 applications for membership since the Annual Business Meeting. A motion was made, seconded, and passed that these 70 people be elected new members in the Academy. The secretary reported that at least 75 of the 148 new members received during 1959 could be credited to Dr. Downs and his committee, who should be commended for a job well done. A total of 20 dropped membership, plus 3 deceased, during 1959. The editor stated that the complete membership of the Academy may be published in the July issue of the Journal.

The Treasurer's Report for 1959 was discussed and copies were given to the members present. By general agreement of the members present it was decided that the treasurer, Dr. McCay, and Dr. Smith resolve matters of reimbursement by the Academy or Treasurer in carrying out the STIC and Junior Academy programs.

The Editor stated that she had nothing to report at this time.

A discussion was held as to possible means of obtaining new library memberships. The president asked the editor to investigate the possibility of putting an advertisement in Science since it had such a wide circulation.

Dr. Downs, Membership Chairman, requested that those present and other Academy members associated with institutions help find the best "membership getter" in their institutions to serve on the membership committee.

A motion was made, seconded, and passed that a "Medical Sciences" section be formed, that the name "Medical Sciences" be added to the "application for membership" blank, and that the president appoint a temporary chairman of the section.

Dr. Albert L. Myers, new sponsor of the Collegiate Division, pointed out that since the fall meeting of the Academy does not give undergraduate students enough time to prepare papers, he thought they might try to have a spring meeting this year, possibly in April or May. A discussion was held on the AAAS Award as 1st prize for the best paper presented in the Collegiate Division. The discussion was prompted by the undue emphasis a young lady had placed upon being judged for the award at the 1959 annual meeting. She was given an opportunity to present her paper but

would not do so since it could not be judged against the papers that had been presented the previous afternoon. It was suggested that perhaps the award should be dropped. Dr. Myers said that he would bring the matter up at the Collegiate Division meeting.

Dr. McCay, sponsor of the Junior Academy, presented a report on the TJAS participation and attendance in the fall program, 1959. Although the record is not complete in detail, some regional registration lists are available, the numbers of award certificates written are known for most regionals, and attendance is known for the luncheon meeting at Nashville. From the available information, the approximate numbers are:

Total Students Participating	130
(Number of Merit Certificates issued)	
Total Non-Students Attending Regionals	50
(Teachers and Parents)	
Total Non-Participating Visiting Students	100
Participants Invited to Finals	79
Participants in Finals	70
Winners and Hon. Mentions in Finals	38
(Winners 24, H.M. 14)	
Non-Participating Visiting Students, Finals	100
Parents, Teachers, Officials, Finals	70

Dr. McCay pointed out that it was very difficult to obtain judges for the Junior Academy during or just preceding the meeting and that they really should be appointed a year ahead.

A motion was made, seconded, and passed that judges for the TJAS December meeting be paid and that this be retroactive to the December, 1959, meeting.

A copy of the proposed program of the Junior Academy for 1960-61 was given to each member present. Dr. McCay discussed some of the major points of the proposal. He pointed out that two new regions have been included, one at Lambuth College and Union College, Jackson, and one at Martin Junior College, Pulaski. The proposed budget for the regular program was increased from \$8,880 to \$10,000. He pointed out that the proposal includes a request to sponsor the annual Tennessee Mathematics Contest as a new activity of the TJAS. For the past three years, approximately 5,000 Tennessee high school students participated each year in this contest. To provide firm sponsorship, it has been recommended that the Tennessee Mathematics Contest be administered by the TJAS, and that three members of the Mathematics Section of the Tennessee Academy of Science serve as Mathematics Zone Advisers on the TJAS Central Committee. Previous general encouragement of interest in mathematics, the inclusion of mathematics papers in the TJAS meetings, would be intensified by the addition of this worthy program. The proposed budget of the expanded program includes \$10,000 for the traveling teacher program and \$2,500 for the mathematics contest program, bringing the total proposed budget for the Junior Academy to \$22,500.

A motion was made, seconded, and passed that permission be obtained from the National Science Foundation to use \$2,500 of the current Tennessee Junior Academy of Science grant to sponsor the 1960 Tennessee Mathematics Contest.

Dr. Arlo I. Smith, Director of the Short Term Area Institutes, was unable to attend the meeting, but his report was sent to the president and summarized by him. He reported that 496 teachers were reached in eight institutes this year as follows: Memphis 90, Martin 88, Clarksville 38, Murfreesboro 35, Tenn. A and I 40, Cookeville 55, Knoxville 86 and Johnson City 64. The proposed budget for 1960-61 was \$32,022.50. This included ten area institutes instead of the eight held this year. The NSF called Dr. Smith and requested that the budget be cut to \$15,000 to include only five area institutes, since the combined Junior Academy and Area Institutes budgets were just too much. Dr. Smith sent a revised budget of \$16,863 for five area institutes.

A motion was made, seconded, and passed that a letter of commendation be sent to Arlo I. Smith for recognition of his great labors in preparing the proposal sent to the NSF and for revising this proposal and that the Executive Committee go on record as approving his great labors with the Short Term Area Institutes.

James L. Major, director of the Tennessee Science Talent Search, reported that he had already received 25 replies from last year's Science Talent Search winners and that 15 of these have received scholarships they applied for. He stated that last year had been the most successful. He suggested that winners would treasure some kind of pin or medallion. He also proposed that the winners be taken on a trip to Oak Ridge for a meeting and program. A motion was made, seconded, and passed that Mr. Major and his committee make a definite proposal for a meeting of the Science Talent Search winners and submit this proposal to the Executive Committee.

A motion was made, seconded, and passed that the Executive Committee accept the offer of Dr. Carlson to hold the 1960 annual meeting of the Academy at the University of Tennessee, depending upon Dr. Carlson's obtaining a final approval.

A motion was made, seconded, and passed that the annual meeting be held on December 2nd and 3rd, if there were no serious conflicts, and that second choice could possibly be December 9th and 10th.

A motion was made, seconded, and passed that for the 1960 annual meeting the General Session would be held from 10:00 A.M. to 12:00 noon Friday, all Sectional meetings from 1:30 to 4:15 P.M. Friday, followed by the Annual Business Meeting, the Academy banquet be held Friday evening, and the Junior Academy and Collegiate Division meetings Saturday morning.

A motion was made, seconded, and passed that committee chairmen be reimbursed for travel to the Executive Committee meeting.

The meeting adjourned at 1:00 P.M.

DECEMBER MEETING

The Executive Committee of the Tennessee Academy of Sciences was called to order by President C. P. Keim at 7:30 P.M. in Room 217, University Center at The University of Tennessee on December 1, 1960.

The members present were C. L. Baker, J. G. Carlson, C. S. Chadwick, C. P. Keim, G. H. Lundberg, A. H. Nielsen, G. B. Pennebaker, H. L. Ward and J. L. Wilson. In addition, M. S. McCay, Sponsor of the Junior Academy, A. L. Myers, Sponsor of the Collegiate Division, A. I. Smith, Director of the Short Term Area Institute, and J. W. White, Chairman of the Local Committee were present.

A copy of the January Executive Committee Meeting was given to each person present, and it was moved, seconded, and passed that the minutes of this meeting be approved.

The secretary reported that 144 applications for memberships were received so far this year. There were 50 members dropped and 5 deceased, giving us a total gain, then, of 89. The membership now stands at 791. The new members for 1959 totaled 148, with 20 drops and 3 deceased, giving us a total gain of 125. The total gain for the past two years, then, is 214 new members.

A copy of the Treasurer's report was given to each member present. Dr. Lundberg discussed the report, and emphasized that the current fund totals \$1,226, plus \$290 that did not show on the report. Financially, we are in much better shape than we were at this time last year.

Dr. Keim reported that the Auditing Committee, Dr. M. G. Boyce and Dr. B. F. Bryant, would audit the books in January.

The Editor reported that the four numbers of Volume 35 (1960) consisted of 276 pages, which included 18 research or review papers of which nine were in zoology, three in botany, two in chemistry, two in geology, one in psychology, and one in engineering.

Dr. Baker reported that the Reelfoot Lake Biological Station is operating under a handicap. At present there is no access to the Station except by boat. There is a ditch across the road, and a bridge is needed. There is some question about the ownership of the land, and who is responsible for constructing a bridge. A further report will be published in the January issue of the Journal.

Dr. McCay gave to each member present a summary report, which was discussed, of the first year of an Experimental Program of the Junior Academy. He then passed out, and discussed, the materials sent to students in the Junior Academy concerning the Knoxville meeting. The programs listing the papers to be presented were given out and discussed. The students presenting papers and projects were winners from 12 sectional meetings. This included two new section meetings, one at Jackson and one at Pulaski. The program of a meeting June 25, 1960 entitled "Adventures in Science Achievement", held at Peabody Demonstration School in Nashville, was discussed. An outline of suggestions and considerations to be made by members of the evaluation committee concerning the program of the Tennessee Junior Academy of Science was distributed and discussed.

Dr. McCay pointed out the conflict of the Junior Academy meeting with the National Merits Scholarship Examination. It was suggested, to avoid this conflict next year, that perhaps the Junior Academy could have their meeting in the spring. However, it was pointed out that most of the Science Fairs meet in the spring. Dr. McCay suggested that the Junior Academy might meet Friday afternoon, instead of Saturday morning. Since most students come as a group, however, with most of them wanting to take Saturday tours, this would present a problem in transportation. It was suggested that this problem might be solved at the Junior Academy, and let them suggest the date for the meeting, which then could be considered at the January Executive Committee meeting.

Dr. Arlo Smith reported that the Science Teacher Improvement Program did not reach the expected 800 teachers, but reached only 500. Since the response was not as good as expected, only \$12,398.71 of the \$15,670 NSF Grant was used, with \$3,271.29 returned to NSF. A proposal for a third year was submitted to NSF prior to the August 15 deadline for the 1961-62 year. It will not be known until March if the proposal is approved. Dr. Smith commented that three years would be enough time to reach all interested science teachers. He made the observation that the STIC program appears to be a better investment since it reaches teachers who may continue to teach for many years, than the Visiting Scientists Program which would have to be repeated year after year in order to reach new students.

Dr. Chadwick of the Fellows Committee reported the following to be recommended as Fellows of the Academy: J. Gordon Carlson, Moffatt G. Boyce, Edward McCrady, Alexander Hollaender, and Ernest W. Goodpasture (posthumously). It was moved, seconded, and passed that the above names be submitted for approval at the Annual Business Meeting.

Dr. McCay reported that the nominations for Distinguished Teacher Awards were not complete. It would be given later.

Dr. Carlson, the Program Chairman, reported that 55 papers were to be given in the Senior Section meetings, four in the General Session and twelve in the Collegiate Division. Because of time some of the Zoology Section papers were shifted to the Medical Sciences Section and one to the General Session.

Dr. James W. White, Chairman of Local Arrangements, reported that reservations for 150 were made for the annual dinner Friday night, and 250 for the Junior Academy Luncheon Saturday. He pointed out that no transportation will be provided for the tours to and from Oak Ridge. Dr. Keim commented that an estimate of the number should be phoned to Oak Ridge, so that guides could be provided.

Dr. Keim read a letter to the group from Dr. A. W. Jones concerning an anti-evolution resolution. A copy of the Tennessee law prohibiting the teaching of evolution was given to each member present, and the resolution

read. A motion was made, seconded, and passed that we endorse Dr. Jones' resolution, as corrected.

Consideration for a permanent secretary for the Academy was discussed, but no action taken.

Dr. Keim received an invitation from the University of Tennessee Martin Branch expressing the desire for the Academy to meet there in 1961.

The meeting adjourned at 10:00 P.M.

THE SEVENTIETH MEETING

The seventieth annual meeting of the Tennessee Academy of Science was held December 2-3, 1960, at the University of Tennessee, Knoxville. James W. White, University of Tennessee, was Chairman of the Committee on Local Arrangements and J. Gordon Carlson, University of Tennessee was Program Chairman.

On Friday and Saturday, registration for all sections of the Academy was held in the lobby of the University Center. There were 295 persons registered Friday. The General Session was held Friday morning in the University Center. Two tours were open to members of the Collegiate Division and the Tennessee Junior Academy of Science. A tour of the Science Departments of the University of Tennessee started at 2:00 P.M. Friday from the Information Desk in the University Center. Tours of Oak Ridge National Laboratory began at the East Portal of the X-10 area of Oak Ridge National Laboratory at 2:00 P.M. on Friday and Saturday. In addition, the Museum of Atomic Energy at Oak Ridge was open Friday and Saturday from 9:30 to 5:00 P.M. for those who wished to attend.

On Friday afternoon, meetings of the Sections of the Senior Academy were held in various buildings on the campus. The Annual Business Meeting was held at 4:30 P.M. Friday in Room 203, Physics and Geology Building.

The Annual Dinner was held in the Ballroom of the University Center at 7:00 P.M. Friday. The cost of the ticket was \$1.85, and 154 tickets were sold. The speaker was Mr. Madison E. Pryor from the Department of Zoology and Entomology at the University of Tennessee. The subject of his talk was "International Research Programs in the Antarctic." A reception was given for the Tennessee Junior Academy of Science by the Knoxville Junior Academy of Science at 9:00 P.M. Friday in the University Center.

On Saturday morning, registration for the Collegiate Division was held in the Physics and Geology Building and for the Junior Academy in the Armory Field House. Following registration, meetings of the Collegiate Division and Junior Academy were held in the Physics and Geology Building and Armory Field House, respectively. A Junior Academy lecture was given at 11:00 A.M. in the University Center by Mr. William D. Gude

from the Biology Division of the Oak Ridge National Laboratory. The title of his lecture was "Some Biological Effects of Irradiation." Following the lecture, the Junior Academy retired to the Ballroom of the University Center 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 was called to order in Room 203 Physics and Geology Building at 4:30 P.M. by President C. P. Keim. The minutes of the business meeting of 1959 were not read since they had been published in the *Journal*. The contents of the January 29-30, 1960, meeting of the Executive Committee were summarized by the secretary. The minutes of the Executive Committee meeting of December 1-2, 1960, were read by the secretary. The minutes of the above meeting were approved.

The Treasurer presented an interim report which was approved.

Dr. Arlo I. Smith as chairman of STIC reported that they did not reach the expected 800 teachers, but reached only 500. He pointed out that only six areas were set up instead of the ten originally planned. The teachers in each area would meet for three or four Saturday sessions. Since the response was not as good as expected, only \$12,398.71 of the \$15,670 NSF Grant was used, with \$3,217.29 returned to NSF. A proposal for a third year, to include six areas, was submitted to NSF prior to the August 15 deadline for the 1961-62 year. It will not be known until March if the proposal is approved. Dr. Smith commented that three years would be enough time to reach all interested science teachers. He made the observation that the STIC program appears to be a better investment than the Visiting Scientists Program, since it reaches teachers who may continue to teach for many years, whereas the Visiting Scientists Program would have to be repeated year after year in order to reach new students.

Dr. McCay reported that the 1959-60 program of the Junior Academy consisted of the following activities: a. Regional Junior Science Day; b. State Junior Science Day; c. Science Achievement Day: "ADVENTURES IN SCIENCE ACHIEVEMENT"; d. Regional and Chapter Science Lectures. A Science Achievement Recognition Day for TJS: "ADVENTURES IN SCIENCE ACHIEVEMENT" was held on June 25, 1960 at Peabody Demonstration School in Nashville with 200-250 participants and 22 Junior Science "Winners" exhibiting projects.

The following is an outline of some of the 1960-61 activities of the Junior Academy as given by Dr. McCay:

- Number of Regional Meetings held — 12 (New regionals at Jackson and Pulaski)
- Number of Regional Program participants — Approximately 150
(NOTE: Regional and State participation reduced by conflict of TJS State Meeting with College Entrance Boards examinations for Talent Search)
- Total Regional meeting attendance — Above 300 (Unusual auditor interest)
- Number of Regional Representatives for State Meeting — 66
(Number reduced by College Entrance Board examinations conflict)
- Possible Number of Regional Representatives at State Meeting — 96
- Number of Sections to be judged at State Meeting — 8 (Boys and Girls separate)
- Number of Senior Academy members serving as judges — 24
(Including six members of Oak Ridge Chapter of RESA)

Number of winners to be selected by judges — 24; Honorable Mention: indefinite.

(Four Senior High "FIRSTS" to be recipients of AAAS awards)

Number of auditors and participants anticipated at State Meeting: 300 plus.

Dr. Myers, sponsor of the Collegiate Division, reported that spring meetings of the Collegiate Division have been held the past two years in west Tennessee. It will be proposed at the business meeting that spring meetings also be held in east Tennessee. He noted that one paper listed in the Collegiate Division program had been withdrawn. He also added that judges were needed for the Saturday morning meeting.

Mr. James L. Major, chairman of the Tennessee Science Talent Search Committee, reported that twenty-five boys and five girls from sixteen high schools were selected as the 1960 Honors Group of the Fifteenth Tennessee Science Talent Search. Five boys and one girl of this group received Honorable Mention in the National Science Talent Search.

Special recognition was given the Members of the Honors Group and their sponsoring teachers at Oak Ridge. They were guests of the Union Carbide Company and the Oak Ridge Atomic Laboratories. Their host was Dr. C. P. Keim, President of the Tennessee Academy of Science. After a day touring the laboratories, a banquet was given them. A program was given and the thirty members of the Honors Group were awarded pins. The speaker for this occasion was Dr. Alvin M. Weinberg, director of the laboratories. The scientists of the laboratory staff took students and teachers into their homes for the night. This is the first time such a program has been arranged for Tennessee Science Talent Search winners.

More than fifty colleges have been contacted and informed of the 1960 group. Articles about the fifteenth Tennessee Science Talent Search have appeared in the October issues of the Journal and the Tennessee Teacher. A survey was made of the members of the fourteen previous searches. Letters and questionnaires have recently been sent to three hundred forty previous winners. These data are now being compiled for the 1961 Science Talent Search. This material will be distributed by Science Service, Washington D.C.

Dr. Keim invited a motion, which was made by Dr. Chadwick, seconded, and passed that Drs. Smith, McCay, Myers, and Mr. Major be commended for an excellent job done.

Dr. Baker, representative to the Academy Conference and the Council of the AAAS, reported that much that was said and accomplished at the 1959 meeting of the AAAS in Chicago has been published in SCIENCE and disseminated to officers of the various academies. A detailed report will be presented to the Academy Executive Committee in the spring.

Each academy has been requested to write its history. Twenty-one have completed the project, with four in the process of writing it, and others, including Tennessee, have no plans for doing so.

Each academy receives small research funds each year equal to \$1.00 per academy member who also belongs to the AAAS. In 1959, Tennessee had 216 of the 651 members, which is 33%. Some academies, as Indiana, have 61%; Texas has 41%, and Minnesota has 16%. It has been recommended by AAAS that these funds be used by members of the Junior academies and collegiate members. A questionnaire sent out to academy officers gave some amazing replies. Several stated they were not aware of these grants. Another stated that the grants had not been used for the past three years due to an oversight. Individual grants range from \$1.75 for a study of "Stimuli of *Paramecium*" to \$300 for a "History of Academy." Several academies make grants of \$5, \$10, or \$20 to students working on Science Fair projects. Of 246 grants reported for the past three years over half were to high school students and more than half were in biology.

There was considerable discussion and planning for a national conference on junior academics, and, while the Washington, D.C. Academy received a NSF grant to underwrite such a meeting, complications prevented

it. Dr. McCay is a member of the Standing Committee on Junior Academies of the Academy Conference.

The following are items of interest reported at the Academy Conference: There is a handicap to developing collegiate academies since each science department usually has its own student organization and projects that are quite diverse, especially in large schools. The requisite is an interested group of senior academy members to work with unlimited patience and persistence. Alabama has a state coordinator for science fairs. Florida changed the meeting date to February to give members more time to prepare papers. They have established a new academy section called "Science Teaching Section." Mississippi sponsors a state science fair. They received from NSF \$38,000 for a Visiting Scientists Program. Many academies have a similar program. Nebraska received a private bequest of \$60,000 and has used it to establish a permanent gallery for outstanding science fair exhibits. Ohio had 713 registered at the last academy meeting. In the junior academy 6,000 exhibited projects in 8 districts with 500 schools represented. Texas has three NSF sponsored programs: Visiting Scientists, Collegiate Scientists Research Conference, and Visiting Mathematics Program. A report on how to stimulate attendance at academy meetings included the idea that a principal speaker is the main drawing card. To get members to come early and stay late the sectional meetings begin Friday 8:00 A.M. and are followed by an all-academy address and business meeting. Sectional meetings are held again on Saturday morning followed by a general meeting. New section chairmen meet with outgoing chairmen for continuity or else a brochure of suggestions is available for them. Personal contacts are made for papers, and the chairmen begin immediately after a meeting to look for interest type papers. Papers of general interest develop attendance. The interest of older members, who often come to see their friends and renew acquaintances rather than for the papers, should be reawakened.

Dr. Downs, Membership Committee chairman, reported that membership in the Academy increased about one-third over the last two-year period. As of November, 1960, there were over 700 paid-up members.

Approval by hand-clapping was given for recognition of the work well done by Dr. Downs and his committee.

The following names of teachers were read and recommended to receive Distinguished Teacher Awards:

Mr. James W. Shaw, Red Bank High School, Chattanooga
 Sister Mary James, Notre Dame High School, Chattanooga
 Miss Annie Davidson, Henderson High School, Henderson
 Mr. L. G. Vaughn, Ramey High School, Ramey
 Miss Grace Bandy, White County High School, Sparta
 Miss Dell Terry, Central High School, Cookeville
 Mr. Kenneth Stier, Greenwood Junior High School, Greenwood
 Mrs. C. P. Saine, Kingsbury High School, Memphis
 Father William Bevington, Catholic High School, Memphis
 Mrs. Milton Mayo, Milan Junior High School, Milan
 Mrs. Allie D. Pentecost, Union City High School, Union City
 Mrs. Vivian Finch, Huntington High School, Huntington
 Mrs. Shelton King, Jr., Hay Long High School, Mt. Pleasant

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

Dr. Chadwick, Chairman of the Fellows Committee, submitted the following names of members of the Academy for election as Fellows:

Dr. J. Gordon Carlson, University of Tennessee
 Dr. Moffatt G. Boyce, Vanderbilt University
 Dr. Edward McCrady, University of the South
 Dr. Alexander Hollaender, Oak Ridge
 Dr. Ernest W. Goodpasture, Nashville, Tenn. (posthumously)

It was moved, seconded, and unanimously passed to approve them as Fellows.

Dr. C. S. Shoup, Chairman of the Resolutions Committee, submitted two resolutions (printed separately following the minutes of this meeting).

It was moved, seconded, and passed to approve each of the two resolutions.

Dr. Keim, in the absence of Dr. Lagemann, Chairman of the Nominating Committee, read the proposed slate of officers:

President: J. Gordon Carlson, University of Tennessee, Knoxville.
President-Elect: Willard Jewell, Vanderbilt University, Nashville.
Secretary: James L. Wilson, Belmont College, Nashville.
Treasurer: William G. Downs, Jr., Tennessee Polytechnic Institute, Cookeville.

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.

Dr. Chadwick made a motion, which was seconded and passed, that the Academy make note of the passing, and of the great loss to the Academy and to Science, of Drs. Carl Seyfert, Sam L. Clark, and Ernest W. Goodpasture, and that the secretary write this expression of the Academy to the next of kin.

The meeting adjourned at 5:45 p.m.

REPORT OF THE RESOLUTIONS COMMITTEE OF
THE TENNESSEE ACADEMY OF SCIENCE
1960

I. Be it resolved, that Officers and Members of the Tennessee Academy of Science hereby urge the Legislators of the General Assembly of the State of Tennessee to repeal the Tennessee law which prohibits the teaching of Biological Evolution in the tax-supported schools and colleges, for the following reasons:

1. This law is, in the opinion of leading scientists and educators, a detriment to scientific training of Tennessee teachers and students, and is a deterrant in attracting scientists and science teachers to the State.
2. This law is, by its very nature, contrary to democratic practices and beliefs in that it is a law directed toward control of the thoughts of men.
3. The existence of this law is an embarrassment to the citizens of Tennessee and to the United States, and in fact to the free world inasmuch as it is aimed at suppression of free inquiry and has been used in propaganda against us.

As this Academy did 35 years ago, when, by appearing as *amicus curiae* in the Scopes case, it made known its concern for freedom of thought and inquiry, it again states its opposition to the antievolution law, and publicly invites other groups and individuals to join in urging repeal of this law.

II. WHEREAS, the Tennessee Academy of Science, including its Collegiate Division, and the Tennessee Junior Academy of Science, are enjoying a pleasant, informative, and well-organized meeting at the University of Tennessee, and
WHEREAS, this is the result of long-term planning and hard work on the part of the Committee on Local Arrangements, consisting of James W. White, Chairman, Robert E. McLaughlin, Fred H. Norris, W. W. Wyatt, and Royal E. Shanks, and to generous hospitality by the host institution, the University of Tennessee at Knoxville,

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

BE IT FURTHER RESOLVED, that these resolutions be recorded in the Minutes and published as a part of the Proceedings of this, the 70th Meeting of the Tennessee Academy of Science.

Respectfully submitted by the Resolutions Committee:

C. J. Chance
C. L. Baker
C. S. Shoup, Chairman

FIFTEENTH ANNUAL
TENNESSEE SCIENCE TALENT SEARCH — 1960

Sponsored and Financed by: Tennessee Academy of Science.

Director: Mr. James L. Major, Chairman, STS Committee; Physics Teacher, Clarksville High School, Clarksville.

NATIONAL HONORABLE MENTIONS

Richard D. Taylor, III, Dyersburg H. S., Dyersburg. Construction of Thermocouples.

Robert E. Greene, West H. S., Knoxville. Stretch Transformation.

Robert G. Loudon, Central H. S., Memphis. Original Therems.

Gretta H. Gupton, Treadwell H. S., Memphis. Laundering Fabrics.

Jerry L. Vaughan, Treadwell H. S., Memphis. Embryological Studies.

Charles P. Warr, White Station H. S., Memphis. Electrotherapy of Flora in Liquid Nutrient Medium.

WINNERS OF THE TENNESSEE SCIENCE TALENT SEARCH

Allen E. Erickson, Notre Dame H. S., Chattanooga. Chemical Reactions in Photography.

Diana M. von Werssowetz, Notre Dame H. S., Chattanooga. Blood Grouping and Testing.

Ronald A. Cole, Clarksville H. S., Clarksville. Effects of Heat on Transistors.

James T. Mann, Clarksville H. S., Clarksville. Penicillin, the Miracle Drug.

Larry D. Partain, Clarksville H. S., Clarksville. Experiment with Ions.

William R. Smithfield, Clarksville H. S., Clarksville. Column Chromatography in Separation of Carotinoids.

Samuel C. Fain, Jr., Jefferson H. S., Dyersburg. Design and Construction of an Eight-Tube Receiver.

Gipsie A. Bush, Dobyns-Bennett H. S., Kingsport. Organisms in Water.

Harry W. Coover, III, Dobyns-Bennett H. S., Kingsport. High Efficiency Transistors.

Robert W. Reynolds, Dobyns-Bennett H. S., Kingsport. Effects of X-ray on Penicillin.

Arthur G. Fraas, West H. S., Knoxville. Test Stand for a Model Rocket.

Ralph A. Smith, West H. S., Knoxville. Gibberellin on Algae.

Lewis J. Bledsoe, Young H. S., Knoxville. Analog Computer Applied to Ecosystem Study.

Betty J. Douglas, Madisonville H. S., Madisonville. Negative Factors which Influence High School Students' Work.

Billy W. Beyers, Jr., Central H. S., Memphis. Automatic Brine Shrimp Feeder.

Ronald L. Gilman, Christian Brothers H. S., Memphis. 144-Megacycle Radio Station.

George A. Loud, Christian Brothers H. S., Memphis. Stereo-Chemistry and Crystallography.

Mark F. Paris, Christian Brothers H. S., Memphis. Charting the Brain of a Mammal.

Wilfred J. Schwarz, Christian Brothers H. S., Memphis. Expansion-Type Cloud Chamber.

Daniel W. Weedman, Hillsboro H. S., Nashville. Ten-Inch Reflecting Telescope.

Robert M. Davidson, Isaac Litton H. S., Nashville. Photovoltaic Cells.

Karl M. Elsa, Oak Ridge H. S., Oak Ridge. Chromogenic Transformations in *Serratia marcescens*.

Robin E. Smith, Oak Ridge H. S., Oak Ridge. A Geotropic Experiment.

Forrest D. Stewart, Central H. S., Wartburg. Small-Tube Radio Receiver.

ANNUAL REPORT OF THE FAUNA COMMITTEE FOR 1960

The following studies of Tennessee fauna were conducted in 1960.

Fish

Population studies on large impoundments. Tennessee Game and Fish Commission.

A study of trout in the tailwaters below Norris Dam. Tennessee Game and Fish Commission.

Reptiles

Distribution of the canebrake and timber rattler. Mary Dunlap, Vanderbilt University.

Fence lizards of Middle Tennessee. Mary Dunlap, Vanderbilt University, Nashville.

Birds

A population and behavior study of the Paridae. J. C. Howell, University of Tennessee, Knoxville.

Migration studies of birds passing through Nashville at night. Mrs. F. C. Laskey, 1521 Graybar Lane, Nashville 12.

Blue bird nest-box studies concerning banding of young and brooding birds. Mrs. F. C. Laskey, Nashville.

Temperature effects on breeding and distribution of birds in the Great Smoky Mountains. J. T. Tanner, University of Tennessee, Knoxville.

Mammals

Population dynamics of the Central Peninsula deer herd. Tennessee Game and Fish Commission.

Invertebrates

Three new ostracods of the genus *Entocythere* from the Hiwassee Drainage System in Georgia and Tennessee. H. H. Hobbs and Margaret Walton, University of Virginia, Charlottesville. (*J. Tenn. Acad. Sci.* 35 (1):17-24).

The Kenkiidae of the Nashville area. Robert McRitchie, Vanderbilt University.

A limnological study of Stones River, Tennessee. John Parchment, Vanderbilt University.

Taxonomic studies on Tennessee helminths. A. W. Jones, University of Tennessee.

Studies of Tennessee Hydracarina. J. L. Wilson, Belmont College.

Taxonomic and distributional studies of the Protura of Tennessee. T. P. Copeland, East Tennessee State College.

An ecological study of some Collembola of the interior lowlands of Tennessee. Floyd Ford, Vanderbilt University.

The taxonomy and distribution of the Odonata of Tennessee. R. P. Trogon, Judson College, Marion, Alabama.

Respectfully submitted for the Committee,
Arthur C. Cole, Chairman

GENERAL SESSION

Friday, December 2, 10:00 A.M.
Room 112-115, University Center
C. P. Keim, Chairman

The Card Deck Text—An Aid to Confident Learning of Biological Information. C. S. Chadwick, George Peabody College.

Having tried unsuccessfully for 37 years to find a textbook suitable for an introductory text in biology — the author has finally solved the problem by preparing a CARD DECK TEXT for use in his freshman level course. The card deck consists of sequentially numbered 3 x 5 printed cards, each with a non-verbal presentation on the front and a verbal presentation on the back. Each card presents the minimum information about a biological concept one can have to be considered literate about it, plus a reference to original literature on that topic. These cards, carried in a shirt pocket or handbag, can be studied in snatches of time that otherwise might be wasted. Since a deck can be revised simply by adding a card, it is revised each quarter to keep abreast of advancing knowledge. Experimentation on three classes ranging in size from 15 to 120, shows that students using card decks raise their grades at least one full letter, and express themselves on being 100% in favor of card deck texts.

Opening of a Natural History Museum in Great Smoky Mountains National Park. Arthur Stupka, Great Smoky Mountains National Park.

Scientists as well as interested laymen are invited to pay a visit to the new Sugarlands Visitor Center in Great Smoky Mountains National Park. This building, dedicated on October 23, 1960, is located in the part, 1½ miles south of Gatlinburg, Tennessee, at the junction of US 441 and Tennessee 73. Of particular interest is its exhibit room where some three dozen exhibits pertaining to the park's natural history features are displayed. Of this number, 15 depict some of the botanical highlights, 12 refer to the zoology, 5 to geology, and 5 are of a general nature.

By next summer, all the park's study collections will be housed in the new building. These include an herbarium of some 6000 sheets plus specimens of insects, fish, amphibians, reptiles, birds, and mammals.

Predicting Satellite Passes. C. J. Craven, University of Tennessee.

Progress Report: Repealing the Tennessee Anti-evolution Law. Arthur W. Jones, University of Tennessee.

Problems of Research for Busy Teachers. A general discussion to be introduced by C. S. Chadwick, George Peabody College.

SECTION MEETINGS

Friday, December 2, 1:30 P.M.

BOTANY SECTION

Room 203, Physics and Geology Building

Gordon E. Hunt, Chairman

Gibberellin Action on Seedling Growth in the Absence of Photosynthesis. N. Jean Enochs, David Lipscomb College, and Alan H. Haber, Oak Ridge National Laboratory.

A major effect of gibberellic acid (GA) on growing seedlings is often an increased dry weight, especially in the shoots growing in light. It frequently has been suggested that this particular GA effect may be related to an increased photosynthetic carbon fixation.

Light-grown wheat seedlings treated with GA in darkness gave typical GA growth effects: the shoots always increased, the root systems always decreased, and the seedlings as a whole usually increased in dry weight. The differences in dry weights were accompanied by approximately proportionate changes in total carbon, soluble carbohydrate, total nitrogen, and protein contents. These effects pertained to seedling growth and could not be attributed to any acceleration of germination by GA. Since the only sources of nutrition after GA treatment were endosperm reserves and products derived from photosynthesis before exposure to GA, the typical gibberellin effects here studied could not be related to direct or indirect actions of GA on photosynthetic carbon fixation.

Uptake and Distribution of Radiophosphate in Coleus blumei (Benth.). William L. Carrier, Oak Ridge National Laboratory.

In order to study the relationship of radiophosphorus (P^{32}) accumulation to transpiration, *Coleus* plants were placed in water cultures containing P^{32} , and one leaf of each leaf-pair was treated with an anti-transpiration agent (Wilt-Pruf).

The decrease in P^{32} accumulation in the Wilt-Pruf treated leaves of a series of plants was compared with the decrease in water loss due to Wilt-Pruf of another series of plants run simultaneously.

In each experiment relating water loss to P^{32} accumulation the reduction of transpiration resulted in a reduction of P^{32} accumulation.

The P^{32} distribution pattern obtained in the leaves of *Coleus* during the short periods of experimentation was affected by the initial salt content, metabolic activity and transpiration. In low salt plants a higher relative concentration of P^{32} occurred in the regions of highest growth rate; i.e., the youngest leaves. High salt plants showed a relatively uniform distribution of P^{32} among all leaves regardless of the stage of maturation.

Dieback and Canker of Yellow-Poplar. Robert W. Powell, Jr., Memphis State University.

An apparently epiphytic dieback and canker disease of yellow-poplar saplings and young trees was investigated.

One-hundred and four suspects exhibiting symptoms were examined. Isolation techniques were employed to obtain possible causal agents from infected tissue at the margins of cankers or at the necrotic line of dieback portions. Twenty-three isolates (representing seven genera), five unidentified non-sporulating species, and two isolates furnished by other investigators were tested for pathogenicity. Fungi exhibiting a high degree of virulence included *Dothiorella gregaris* Saccardo, *Fusarium solani* (Martius) Appel and Wollenweber, *Phomopsis* sp., *Cephalosporium* sp., and one unidentified non-sporulating organism. *Pestalotia versicolor* Spegazzini, *Pestalotia* sp., *Cladosporium* sp., *Alternaria* sp., and three unidentified non-sporulating isolates showed varying lesser degrees of pathogenicity. Conclusive proof that the yellow-poplar dieback and canker disease is the result of invasion by a single organism was not found in this investigation. Of the pathogens, how-

ever, *Dothiorella gregaria* met more of the requirements of causal agent than did the other fungi.

Sharpi-Sporites and *Hunti-Sporites* from Lower Pennsylvanian. Narinder Chopra, University of Tennessee.

The maceration of black shale of lower pennsylvanian (Jellico Formation) yielded 25 spore types of *Apiculatisporites* (Ibr.) Pot. and Kr. (3 sp., 9.5%), *Granulatisporites* (Ibr.) Pot. and Kr. (3 sp., 10%), *Laevigatosporites* Ibr. (4 sp., 19.5%), *Lycospora* (S.W. and B) Pot. and Kr. (2 sp. 7%), *Setosisporites* (1 sp., 3%), *Sporonites* Ibr. (3 sp., 8.5%), *Triquitrites* (Wils. and Coe) Pot. and Kr. (4 sp. 13%) and two new genera *Sharpsporites* (1 sp. 6%) and *Huntisporites* (1 sp., 4%).

Cytology of some Members of the Fagaceae. Narinder Chopra and Royal E. Shanks, University of Tennessee.

Acorns of *Q. alba* L., *Q. Muehlenbergii* Engelm., *Q. prinus* L., *Q. stellata* Wang., *Q. macrocarpa* Michx. from various locations in Tennessee, and seeds of *Fagus grandifolia* Ehrh. representing three altitudinal populations in Great Smoky Mountain National Park were germinated in coarse sand. The time required for germination ranged from one week to three weeks. The root system was thoroughly cleaned before fixing the root tips in acetic-alcohol (1:3). Acetocarmine root tip smears were made within a week after fixation.

The somatic chromosome number in *Q. alba*, *Q. Muehlenbergii*, *Q. prinus*, *Q. stellata*, *Q. velutina* is 24 (diploid) while *Q. macrocarpa* has 48 and is tetraploid. Sax (1930) reported the number $2x=24$ in an Ohio population of *Q. macrocarpa*. The tetraploid population of *Q. macrocarpa* from Nashville Basin can be distinguished from the Ohio population in the size of the acorn, thick growth on the cup and the size and shape of the leaf. This is the second report of polyploidy in *Quercus*.

The collection representative of the Beech Gap (5,200 ft.) population of *Fagus grandifolia* has the somatic chromosome number 24, the collection from an elevation of 3,000 ft. has the number 16 while the collection from an elevation of 1,350 ft. has the number 20. On the basis of comparative study of their karyotypes, the collection with the chromosome number 20 appears to be a hybrid derivative of the two other populations.

Physiological and Morphological Variation in the Trisetum spicatum Complex. Edward E. C. Clebsh, University of Tennessee.

Trisetum spicatum is a very widely distributed arctic-alpine grass which also ranges in to the subantarctic. Plants of a number of local populations ranging from New Zealand to Pt. Barrow, Alaska, were studied in the field and under controlled conditions. Measurements were made of gross morphological characters of several physiological processes. Few clines of any kind were apparent. Arctic forms showed peak photosynthesis rates at lower temperatures than did alpine plants. Dark respiration rates of arctic plants were higher than those of alpine derivation at all temperatures. Simulated arctic regimes shifted peak photosynthesis rates of alpine plants to lower temperatures and increased the dark respiration rates thus indicating some phenotypic plasticity. No latitudinal photoperiodic pattern was apparent. Vernalization increased the growth rate and speeded up flowering. Arctic forms appeared to require light for seed germination but seeds from alpine sources germinated better in the dark.

The Effect of the Relative Humidity of the Atmosphere on the Thallus Size of Parmelia isidiosa (Mull. Arg Hale). Haskell C. Phillips, Austin Peay State College.

Organic Matter Accumulation in a Primary Succession. H. R. DeSelm and R. E. Shanks, University of Tennessee.

The winter of 1955, the White Oak Lake, a hold-up basin for low-level radioactive wastes on the Oak Ridge Reservation, was drained. Since that time two vegetation sampling programs have been pursued by the writers. One relates to mineral composition of the vegetation and radionuclide cycling; the other relates to composition and mass of the vegetation itself.

Annual amounts, relation of amounts to physical site factors, litter accumulation and decay in herbaceous communities are reported; as are increments of organic matter accumulation in willow thickets.

More (Notes) on the Golden Aster (Chrysopsis) of the Eastern Highland. (A Progress Report). Paul L. Hollister, Tennessee Polytechnic Institute.

Preliminary findings, reported last year, have been supplemented by additional work in Sept. 1959 and the summer of 1960. All of the main roads between Cookeville and Pickett County have been explored with findings similar to those of August, 1959. Sites along the Cumberland Plateau, near the Highland Rim, clear into Kentucky have been investigated.

The species (*C. pilosa*), reported in the previous paper have been found in abundance in most sites except in Pickett County and its environs. Here another species of the same genus has been found in very sparse stands.

Remarks on Tennessee Barrens. H. R. DeSelm, University of Tennessee.

The spring of 1807 several surveyors set out to lay survey lines through a portion of southern Middle Tennessee. The results of these transects, which run across the Highland Rim or from the Rim into the Basin, have been examined for the information they contain about the pre-settlement landscape. Clearly distinguishable are the forests of the Rim and inner basin. The dissected rim is best distinguished from the outer basin by the presence of chestnut in the former.

Nine locations of prairie or open barren are noted.

CHEMISTRY SECTION

Room 120, Perkins Hall

Mark M. Jones, Chairman

Studies of Unstable Transient Species Formed during Catalytic Reactions. C. E. Melton, Oak Ridge National Laboratory.

A new technique for studying catalytic reactions has been developed. By placing a solid catalyst within a research mass spectrometer, the complete course of catalytic reactions, including transient species, can be observed directly.

Pt

The reaction $D_2 + CO_2 \rightarrow D_2O + CO$ was studied as a function of pressure over the range 0.1 - 1 mm of Hg and as a function of temperature over the range 50 - 1100 C to demonstrate the applicability of the technique. Six transient species were observed during the course of the reaction.

Free radicals produced by the catalytic decomposition of 1-butene are compared to those known to occur from thermal decomposition at the same temperature. In the catalytic decomposition, the radicals C_4H_7 and C_3H_5 were found to be most abundant; in contrast, CH_3 and C_3H_5 are most abundant in the thermal decomposition.

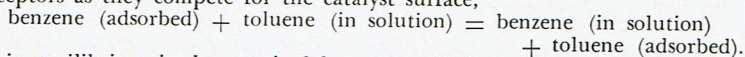
Positive Ion Intermediates in the Beta Particle Radiolysis of Ethylene. R. Baldock and T. W. Martin, Oak Ridge National Laboratory.

Positive ions induced in ethylene by beta particles have been identified and measured with a mass spectrometer. The relative porportion of the primary and secondary ions thus produced were compared with the ions induced by alpha particles and by 75 ev electrons under the same conditions. The results obtained for the secondary ions using all three ionizing sources are remarkably similar. However, the beta particles produce about 20% less parent ions than do alpha particles and correspondingly more fragment ions at a pressure equivalent to .01 mm of Hg.

Competitive Catalytic Hydrogenation of Benzene and Toluene. C. P. Rader and H. A. Smith, University of Tennessee.

The competitive catalytic hydrogenation of benzene and toluene has been carried out on platinum. Glacial acetic acid was employed as a solvent at 30°C. and pressures of 45-60 p.s.i.

Pressure-time data and spectrophotometric analyses of reaction mixtures indicate the presence of an adsorption equilibrium between the two hydrogen acceptors as they compete for the catalyst surface,



This equilibrium is characterized by an equilibrium constant, K_{BT} ,

$$K_{BT} = \frac{C_B \sigma_T}{C_T \sigma_B},$$

where C and O are concentration and fraction of catalyst covered, respectively. The experimental value of K_{BT} was 0.75.

The spectrophotometric data indicate that benzene is reduced somewhat preferentially to toluene. This preferential reduction is due to the faster intrinsic rate of hydrogenation of benzene and to its slight preferential adsorption on the catalyst surface.

The Oxidation of Gossypol with Hydrogen Peroxide. D. A. Shirley and P. W. Alley, University of Tennessee.

Gossypol is the principal pigment of cottonseed. Although large quantities of gossypol are potentially available at moderate cost, no uses for this compound have been developed. Oxidative breakdown of gossypol is probably involved in problems of highly colored cottonseed oil. We are studying the chemistry of the oxidative process attempting to isolate and characterize the compounds present at intermediate stages of the reaction. The paper will present evidence for the structure of certain intermediate compounds already isolated and propose a mechanistic path of oxidation.

Abnormal Benzoin Condensations. C. A. Buehler, L. A. Walker, and P. Garcia, University of Tennessee.

Although potassium cyanide and aromatic aldehydes give benzoin, many N-heterocyclic aldehydes give other products. Quinaldehyde, for example, gives the enediol while 4-quinaldehyde gives the glycol.

The attachment of an oxygen atom to the nitrogen atom in quinaldehyde does not prevent the formation of the corresponding enediol. At low concentrations of potassium cyanide it is formed as a red solid together with the isomeric quinaldoin. At higher concentrations of potassium cyanide the potassium salt of the enediol is formed either alone or with the quinaldoin. The enediol and quinaldoin are interconvertible and the potassium salt may be converted into the enediol or quinaldoin.

A *trans*-chelated, six- or seven-membered ring structure has been advanced for the enediol. In addition, an explanation has been proposed for the lack of color of its potassium salt.

ENGINEERING SECTION

Room 102, Perkins Hall

William A. Goodwin, Chairman

Modification and Repair of the Boiler of a Nuclear Fired Power Plant. Robert Blumberg, Oak Ridge National Laboratory.

As the result of operating an experimental, power producing, fluid fueled, nuclear reactor (the HRE-2) with certain nuclear-chemical instabilities, two holes were melted in the Zircaloy core vessel. Tools were designed and developed to repair the damage and effect the cure. This maintenance program was carried out successfully despite extreme physical limitations, and radiation hazard. This paper describes the tools, the development effort and the results obtained.

Computation of Antenna Radiation Patterns Using a Digital Computer. R. E. Bodenheimer and J. D. Tillman, University of Tennessee.

The usual way in which antenna patterns are calculated involves a summation process, which depends on the geometry of the array. The usual goal is an expression in some closed form, and this is useful only for the geometry for which it is obtained. This paper outlines a numerical method, which is valid for any geometry, and gives flow charts for using a digital computer to carry out the arithmetic. As examples, patterns of linear and circular arrays are calculated by standard methods, and with the computer, and the results are compared.

Mechanics of the Numerical Control Concept. Ronald V. Miskell, Union Carbide Nuclear Company.

Although Numerical Control is greatly publicized the details of this control concept are too often not adequately explained. Usually the problems of computer coding for continuous path systems, varying types and capabilities of machine control units, and diversified tape codes are completely glossed over or hidden between the lines. It is hoped that the paper presented will, besides giving a step by step summary of the mechanics of tape control, explain the importance of the aforementioned problems.

New Concept in Navigation Lock Design. James T. Price, University of Tennessee.

Ion Exchange Chromatography of Amino Acids Analysis of Mass Transfer Mechanisms. Donald C. Bogud, University of Tennessee.

An investigation of operating variables was made in the liquid chromatographic separation of nine amino acids. A theoretical treatment due to Lapidus and Amundson was used to analyze the results. This theory treats transient mass transfer in a packed bed and includes solid phase resistance, liquid phase resistance and axial diffusion. Good internal agreement of the data was found, leading to the conclusion that the major portion of the resistance is in the solid phase. The equations were rearranged to permit optimization of the operating variables. It is believed that the equations will be useful for liquid chromatography in general.

GEOLOGY-GEOGRAPHY SECTION

Room 302, Physics and Geology Building

Edward T. Luther, Chairman

A Recent Find of Jaguar Bones in a Tennessee Cave. (Read by R. E. McLaughlin.) Paul W. Parmalee, Illinois State Museum.

An important new discovery of Pleistocene jaguar has been made in Little Airplane Cave, approximately two miles northwest of Chattanooga. Skeletal remains of two individuals are assigned to *Panthera augusta*, a form intermediate between *P. atrox*, a contemporaneous, primarily western species, and *P. onca*, the modern jaguar.

One specimen is represented by teeth only but twenty-seven partial or completely preserved parts of a second specimen were recovered, including more diagnostic mandible and skull portions.

Although bobcat and puma were utilized by southeastern Indians as indicated by recovery from both historic and prehistoric midden deposits, jaguar bones have not been found in association with archaeological sites in eastern North America, suggesting an earlier extinction of the jaguar.

The Little Airplane Cave specimens, representing the fourth *P. augusta* record in the general area, support the conclusion that an established population of jaguars formerly existed in the Cumberland Plateau region.

Iron Ores in Ordovician Rocks, Southeastern Tennessee. Stuart W. Maher, Tennessee Division of Geology.

Mining of both hematite and limonite ores from rocks of Ordovician age in Blount, Monroe and McMinn counties has taken place from early times

to the present. Recent mining establishes that the hematites are oolitic sediments in the lower Athens shale. The limonites are the products of the oxidation of pyrite localized in the Kingsport formation.

Prospecting should be stratigraphically controlled.

Occurrences of Iron Ore Minerals in the Upper Knox Dolomite in Sullivan County, Tennessee. Berlen C. Moneymaker, Tennessee Valley Authority.

Some Aspects of Communist Geography. Milos Sebor, Tennessee Polytechnic Institute.

Principles of Soviet geography were formulated dogmatically by the 2nd Congress of the Geographical Society of the USSR in 1955. As a system of sciences, geography is physical and economic; the latter — by far the most important — replaces human geography. The approach is systematic or regional. The conception is dialectically materialistic.

However, there are still other ideas commonly accepted by the communist geographers, non codified but deductible from the Soviet and Satellite sources. Of importance seem to be the belief in unlimited potentialities of man as a geomorphic agent; speculative classification of geographic phenomena; and concentration on certain fields.

Classified by order of decreasing historical age and of increasing "changeability" are climate, petrography, relief, hydrography, flora and fauna, power resources, population, production, and communications. Different combinations of these factors are formed to produce physical, economic, and regional geography. Special emphasis is upon phenomena of "maximum unifying power," that is, hydrography in physical geography; communications in economic geography; and production in regional geography.

Observations of Present Day Carbonate Environments in the Bahama Islands. R. L. Wilson and R. E. Bergenback, University of Chattanooga.

Carbonate Rocks of Mississippian age crop out on Lookout Mountain near Chattanooga, Tenn. These rocks show marked lateral and vertical textural changes. In order to better understand these changes, a brief reconnaissance study was made of selected areas of recent carbonate accumulation in the Bahama Islands.

The environments studied include: (1) The lagoon, beach and river areas in the vicinity of Andros Town at the mouth of Fresh Creek on the eastern shore of Andros Island; (2) beach and lagoonal areas near Big Wood cay (middle bight) on the eastern coast of Andros Island; and (3) beach areas of North Cat cay located on the western margin of the Bahamian Platform.

These preliminary studies indicate that pronounced textural changes both within and among the various environments are largely the result of plant activity (algae and grasses), the nature of the organisms (skeletal debris) contributing to the sediments, and the configuration of the depositional surfaces.

Stratigraphy and Nomenclature of the Outcropping Cretaceous Beds in West Tennessee. Ernest E. Russell, Mississippi State University.

Structures Underlying Prominent Early and Middle Paleozoic Erosion Surfaces in the Southern Appalachian Valley. Helmuth Wedow, Jr., U.S. Geological Survey.

The southern Appalachian Valley was subjected at least twice to broad but strong epeirogenic warping with minor folding and faulting as suggested by unconformities beneath both basal Middle Ordovician and Mississippian rocks.

The unconformity beneath Middle Ordovician rocks exhibits a stratigraphic relief of less than 1,000 to more than 5,000 feet ranging from uppermost Lower Ordovician down into Upper Cambrian. Paleotopographic relief on this erosion surface may be several hundred or more, as shown by conglomerate-choked channels and filled sinkholes — the latter occurring in paleokarst areas where ancient solution-collapse phenomena appear to be structurally controlled by fractures associated with pre-Middle Ordovician

warping. Tectonically-induced angular discordance between Lower and Middle Ordovician strata cannot be observed in most outcrops but may reach 20 degrees locally. Pre-Middle Ordovician structural trends are poorly known; one group may be N-S and E-W and another NE-SW and NW-SE, but which of these are due to tensional or to shearing stress is highly conjectural.

A paleogeologic map of the pre-Mississippian erosion surface would show strata of many earlier epochs with outcrop patterns probably trending north or northeast as a result of broad warping, complicated by minor east-trending faults and folds. This surface was of low topographic relief compared to that below the Middle Ordovician.

The paleostructures underlying the two major erosion surfaces, in particular those below the Middle Ordovician, probably influenced considerably the emplacement and distribution of the base metal and barite-fluorite deposits of the southern Appalachian Valley.

MATHEMATICS SECTION
Room 211, Perkins Hall
Leland L. Scott, Chairman

A Comparison of Two Methods of Inverting the LaPlace Transform.
C. W. Peck, University of Tennessee, Martin Branch.

The purpose of the LaPlace transform is to change a given problem into one that is easier to solve. The LaPlace transform is applicable to a wide range of problems in physical science. After a transformation has been made and the image function reduced to its simplest form it must be "inverted" to get the answer to the original problem. Two methods for doing this are available. One method based on the assumption that the original function was in the field of real numbers is contrasted with another assuming the function was in the field of complex numbers.

The Random Variable Concept. William A. Small, Tennessee Polytechnic Institute.

The phrase "at random" is formalized as a statement equivalent to the *Axiom of Random Choice*; which axiom is as follows: If F is the domain of the probability measure P in the Borel probability field (W, F, P) , then there exists a *random choice function* g such that the domain of g is F , and if $B \in F$, then $g(W) \sum B$ with probability $P(B)$.

The relation of the *Axiom of Random Choice* to the *Axiom of Choice* is discussed briefly.

The Place of Probability and Statistics in the Mathematics Curriculum of the Secondary Schools, Horace E. Williams, Vanderbilt University.

In recent years there has been considerable discussion and experimentation concerning the teaching of probability and statistics in the Senior High School and Junior College. The majority of the discussion is pitched toward the 12th grade and the freshman or sophomore college years. Our society is most assuredly being influenced continually by statistics. Descriptive statistics confront the public daily in the form of polls, surveys and cross-sectional samplings appearing in the newspapers and magazines.

Graphic portrayal of economic and sociological statistics is commonplace. On a more sophisticated plane, educators, social scientists, physicists, biologists in industry have found wide spread uses and applications for statistics as the mathematicians have explored and exploited many new facets of this field. Statistical inference has achieved new-found claim as our best strategy for exploring the ramifications of mass data. At the present time, knowledge in this area is being largely transmitted outside of mathematics departments through introductory courses at the graduate level geared primarily to the needs of special disciplines. However, in the future, as the demand for statistically-trained personnel continues to increase we

shall undoubtedly see more probability and statistics being offered by the mathematics departments in the high schools and junior colleges.

A Problem in Hydrodynamics. Otto M. Carothers, Jr., Vanderbilt University.

Given a cylinder completely filled with fluid, the problem is to describe the motion of the fluid when the cylinder is given an angular velocity about its axis of symmetry. The Navier-Stokes equations of hydrodynamics are used to describe the fluid. These equations are reduced using certain initial and boundary conditions to a single partial differential equation. The purpose of this paper is to present a solution of this partial differential equation.

The Rim and Anticenter of a Group. Carol C. Oxley, Cumberland University.

MEDICAL SCIENCES SECTION

Room 114, Gymnasium

Robert P. Ball, Chairman

Evidence for Immunological Reactions by F₁ Hybrid Mice Against Parental Strain Tissues. Gustavo Cudkowicz, Oak Ridge National Laboratory.

Evidence for immunological reaction by F₁ hybrid cells against parental tissues has been obtained from two types of experiments. In the first, administration of (C57BL X 101)F₁ liver cell suspensions concomitantly with C57BL or 101 parental bone marrow reduced the protective effect of the marrow in lethally irradiated (C57BL X 101)F₁ recipients; similarly, (C57BL x 101)F₁ bone marrow cells administered concomitantly with C57BL or 101 liver cell suspensions inhibited the killing effect of the latter in sublethally irradiated (C57BL X 101)F₁ recipients. In the second series of experiments, preimmunization of F₁ hybrid recipient mice of this and other strain combinations against parental lymphoid tissue interfered with their subsequent postirradiation acceptance of grafted parental marrow or liver cells. These results suggest that parental histocompatibility genes are not necessarily expressed in the F₁ hybrid as codominants. The implications of this conclusion will be discussed.

Antibody-forming Capacity of Spleen Cells at Varying Times After X-irradiation. Martha A. Robinson, Oak Ridge National Laboratory.

That the immune mechanism of mice recovers from the destructive effects of sublethal doses of X-irradiation is an established fact. This recovery is owing to an extensive proliferation of hematopoietic cells. However, the relative rate of proliferation of the immunologically competent to that of the incompetent cells is not known. A problem to be resolved is: Do the immunologically competent cells proliferate (1) faster, (2) slower, or (3) at the same rate as immunologically incompetent cells? The *in vivo tissue culture* technique was used in an effort to establish the antibody-forming capacity of sensitized spleen cells at varying times following total-body X-irradiation to the donors. Pre-immunized mice were exposed to various doses of X-rays 6 weeks after primary sensitization with sheep RBC. Spleens were removed at weekly intervals after X-ray treatment. The cells were transferred intravenously into lethally irradiated, isologous recipients, our *in vivo* cultures. The secondary antigenic stimulus was given at this time. Five days later the recipients were sacrificed, and their antibody titers were determined. It was found that the antibody-forming activity of the cells (3×10^6 , 6×10^6 , 12×10^6 , and 24×10^6) from donors exposed to 150, 300, 400, and 500 r remained constant for 4 weeks. The spleens, however, showed an increase in total weight and cell number at the time intervals indicated. From our data it can be concluded that the competent cells proliferate at the same rate as do the incompetent hematopoietic cells after sublethal X-irradiation.

Changes in Population of Antibody-forming Cells in the Spleen After Primary Sensitization. William J. Peterson, Oak Ridge National Laboratory

The mechanism of antibody formation has been a biological puzzle plaguing the minds of many of us. The significance of cellular division, maturation stage and efficiency is still not known. Voluminous data on work done with intact animals have led us to suspect that cell number and division may play a dominant role in antibody formation. To resolve this phase of the problem systematically it was necessary first to establish the relation between antibody-forming activity and cell number. Our method was to determine the antibody response of varying number of spleen cells from normal and pre-immunized donors grown in heavily X-rayed, isologous mice, and *in vivo* cultures. A linear log₁₀ relation was noted, a relation which would be expected if cellular division played a major role in antibody formation. We then determined the activity of spleen cells at varying time intervals following primary sensitization in an attempt to establish: (1) the minimum time necessary for maximum antibody-forming activity of spleen cells, and (2) the relative rate of increase in activity during this period. Our preliminary data suggest that the activity of spleen cells 2-3 weeks after primary sensitization is almost comparable to that 6 weeks after primary sensitization, and that this increase of activity is almost 300-fold over that of normal control.

Observations on Mammalian Tumor Viruses. Donald F. Parsons, Oak Ridge National Laboratory.

The number and range of known viral tumors have increased considerably in recent years. The development of this field and its present status are reviewed with special reference to the leukemias of the mouse. The application of the techniques of cell-free transmission, electron microscopy, serial passage in newborn animals, tissue culture and a number of other biophysical methods are discussed. Some experiments are reviewed which indicate that X-rays can enhance the susceptibility of the host to tumor viruses. The described techniques are illustrated by a brief survey of recent work on viruses associated with plasma-cell tumors of the mouse and on a virus isolated in tissue culture from a radiation-induced myeloid leukemia in RF mice.

Inhibitory Mechanism of the Cingulate and Orbital Cortices. James W. Ward, Vanderbilt Medical School.

In chronic experiments in cats electrical stimulation of the cortex through permanently implanted electrodes was carried out. Motion pictures of the effects elicited from the cingulate cortex were made as permanent records. These were subsequently correlated with the location of the fixed electrodes demonstrated through histologic controls. Efforts were made to trace pathways from effective sites to lower centers having a similar function. This was done in acute experiments. Pathways from the orbital cortex by way of the internal capsule to extra-pyramidal centers in the diencephalon and adjacent telencephalon were demonstrated. Tracing of pathways was done by electrical stimulation of the effective fixed electrodes and records were obtained from variable position electrodes with display of nervous activity on the cathode ray oscilloscope. Histologic controls were again utilized. A brief discussion of the possible significance of the inhibitory activity will be presented.

Lesions in Irradiated Cattle. Larry P. Jones, UT-AEC Agricultural Research Laboratory.

Sixty cattle were exposed to a multi-source cobalt⁶⁰ unit. Dose rate was approximately 50r/hour and dose range was from 450 to 700r. The distribution was whole body.

Multiple disseminated hemorrhages occurred in all cattle and were seen most prominently and frequently in the heart, intestinal tract, splenic capsule, lungs and gall bladder.

Frank massive hemorrhage into the small and large intestinal lumina, pulmonary edema, and ulcers of the mucosa of the pharynx and gastrointestinal tract were the other most frequent and severe lesions.

The histopathological analysis correlated well with the gross observations. Hemorrhage, atrophy of lymphoid tissues and bone marrow, and superficial mucosal ulcerations in the gastrointestinal and pharyngeal regions were the major lesions. Bacterial colonies were numerous around the ulcerated areas as well as within many of the parenchymatous organs.

The correlation between clinical symptoms and observed lesions is good but there is no correlation between the extent or the severity of lesions and the dose or survival time.

Sensitivity of Oocytes of Young Mice to Acute and Chronic Gamma Rays. E. F. Oakberg, Oak Ridge National Laboratory.

Studies on the Biology of Hymenolepis microstoma (Dujardin, 1845). Establishment in the Definitive Host. James A. Dvorak, University of Tennessee.

In an attempt to understand the process of establishment of *H. microstoma* in the mouse, H. H. Kuhlman and I infected a group of mice with 100 cysticercooids. We then examined the intestine and bile duct of the animals at various time intervals. It was found that after excystment there is a random wandering of the cestodes in the upper 25% of the intestine for 24 hours with no measurable increase in size. By 48 hours, localization of the worms in the intestine with an increase in size of the worms became noticeable. By 96 hours the worms had begun to establish themselves in the bile duct of the host. Those worms which had not become established in the bile duct by 144 hours are apparently passed from the host.

Further investigations are in progress to determine both the stimulus for establishment in the bile duct and the nutritional interaction between host and parasite after establishment.

Coronary Vascular and Total Peripheral Resistance Changes in the Dog Treated with Endotoxin. Elmo S. Dooley, Edward D. Frohlich, and Jerry B. Scott, US Army Medical Research Laboratory, Fort Knox, Kentucky.

Despite the extensive literature on the hemodynamic alterations produced by endotoxin, study of its effect on the coronary vascular bed had received little attention. The effects of *Salmonella typhosa* endotoxin were studied on the coronary bed of the dog by shunting blood around the heart and lungs, clamping the aortic arch, and perfusing arterial blood at a constant flow rate into the ascending aorta. After a control period, 0.6 mg/kg of endotoxin was injected into the coronary perfusion circuit. Coronary and systemic arterial pressures were monitored for the next 40 minutes. Coronary artery pressure (CAP) fell in each of 7 experimental dogs with an average decrease of 32% at 40 minutes. There was a concomitant fall in systemic pressure of 29%. In 6 control dogs given injections of pyrogen-free water there was no reduction in CAP after 40 minutes. There was no change in myocardial utilization of sodium and potassium following endotoxin. There was no change in the hematocrit across the coronary vascular bed. The A-V difference for oxygen and carbon dioxide both increased slightly but neither increase was significant. Endotoxin shock was confirmed in all experimental animals by post-mortem examination. It is concluded that endotoxin does act on the coronary vascular and total peripheral resistance of the dog under the conditions of this experiment. The observed changes in resistance are produced by either local or remote mechanisms.

PHYSICS-ASTRONOMY SECTION

Room 212, Perkins Hall

Henry Allison, Chairman

A Mobile Infra-red Observatory. J. H. Taylor and J. J. Freymuth, Jr., Southwestern at Memphis.

The design and construction of a mobile infra-red observatory is described. The laboratory includes a ten inch diameter reflecting telescope, and a thirty-one inch diameter reflecting telescope. The ten inch telescope

is an $f/4.5$ system designed to feed a recording spectrometer. The thirty-one inch telescope is an $f/2$ system which can feed a filtered detector at the prime focus, or utilize a cassegrain secondary to feed an $f/4.5$ recording spectrometer.

The portable observatory is housed on a flat-bed trailer complete with electronic instrumentation and two mounts for the telescopes. The entire unit is designed to be water tight and may be used under any weather conditions.

The observatory was built under contract with the Geophysics Research Directorate of the Air Research and Development Command.

An Experimental Study of Cratering in Sand. Lemuel Hooper, Tennessee Polytechnic Institute.

Craters produced by .22 caliber long-rifle bullets fired into sand at velocities ranging from 300 to 550 meters per second were studied. It was found that the volume of the craters varied linearly with the momentum of the bullets. The deformation of the bullets was found to be independent of the velocity in the range studied. Relations between other parameters were also investigated. A mechanism of crater formation is suggested.

A Theoretical Study of Cratering in Sand. Frederick L. Culp, Tennessee Polytechnic Institute.

A one-dimensional model for cratering in sand induced by high-speed projectiles is presented. An analysis of this model yields predictions which appear to be in agreement with all the available data. Crater volume is shown to vary directly with the energy of the incident projectile in the case of low-energy projectiles and to vary linearly with the momentum of the incident projectile in the case of high-energy projectiles.

Calculation of Phenomenological Nuclear Potentials for O^{17} Jean H. Durfee, E. G. Corman, and J. L. Fowler, Oak Ridge National Laboratory.

For a neutron bound to O^{16} , the low-lying states of even angular momentum appear to arise from the interaction of the neutron with an average potential due to the O^{16} core. With the Woods-Saxon form of the potential.

$$V(r) = -V_0 \left[1 + \exp \frac{r-R}{A} \right]^{-1},$$

one can adjust the parameters so that the solution of the Schrodinger equation will yield the experimental information on O^{17} levels. By use of a high-speed computer the problem has been solved for two cases: (a) the depth of the potential, V_0 , is state dependent; (b) the velocity dependence was introduced with the reduced mass formalism, $m = m_0 [1 + K V(r)]^{-1}$. In the latter case, $A = 0.56 f$, $R = 2.228 f$, $V_0 = 150.11 \text{ Mev}$, and $K = 1.25/V_0 \text{ Mev}^{-1}$, with the constant multiplying the Thomas spin orbit term = 5.64.

Rotational Fine Structure in the Dimer Spectrum of HF. W. F. Herget, N. M. Gailar, R. J. Lovell, and A. H. Nielsen, University of Tennessee.

Recent re-examination of the intensities and line shapes of the monomer lines of HF, and further exploration between the lines, using a vacuum grating spectrometer, has revealed that bands observed by D. F. Smith and ascribed to the dimer of HF may be resolved into rotational fine structure. These observations, and the appearance of the bands will be discussed.

A North American's Experience with Physics Teaching at the University of Chile. E. W. Burke, Jr., King College.

A Fulbright Professor assigned to the Instituto de Fisicay Mathematica of the University of Chile in Santiago encounters a number of problems with the teaching of Physics which are very different from those met in the United States. The structure of the South American University and the economic structure of the country are very different from those of the United States. The resulting aversion to laboratory work, the non use of demonstration techniques of teaching, and the failure to use a textbook in teaching, probably point up these differences as strongly as anything could. Chile, an underdeveloped country, is struggling to establish a physics program in its University. The next ten years will be crucial ones in this struggle.

Report on the Physics Section of the Science Conference of Tennessee State Colleges and Universities. Sara Wood, Austin Peay State College.

ZOOLOGY SECTION

Room 324, Perkins Hall

William G. Downs, Chairman

Peripheral Leucocyte Profiles on Rats Irradiated with Varying Doses of Gamma Rays. David F. Fitzpatrick and James Leathers, Tennessee Polytechnic Institute.

Three groups of the "Tec" strain of hybrid albino rats were exposed to progressively increasing doses of whole body, single exposure radiation. The source of energy employed was Co⁶⁰, a high-level, gamma-emitter. Dosage levels were 800r, 900r, and 1,100r.

Plotting total and differential leucocyte counts at regular and frequent intervals against time, data were used to construct profiles. Animals were sacrificed at regular periods, and they, and those which died were autopsied, and endocrine and leucocytogenic organs studied histologically. Males and females of each group were compared.

Interesting differences in dosage results and in sex-response, were elected.

Paper-electrophoresis Studies on Effects of Stress on Blood-serum Protein Fractions as Compared with Differential and Total WBC in Rats. James R. Neely and Alta Faye Johnson, Tennessee Polytechnic Institute.

A comparison of the serum-proteins with the total and differential leucocyte count has been made. Varying dosages of insulin and 1,000r of gamma radiation have been used as stress agents.

Blood samples were taken immediately before insulin injection and hourly after injection during the period of decrease to maximum lymphopenia. For irradiation, blood samples were taken the day prior to, and immediately following irradiation, and then at daily intervals. Blood was taken at the same time for both the white blood cell count and for paper electrophoretic analysis of serum proteins.

Profiles of the total and differential leucocyte counts were compared with those of the percentages of serum protein fractions.

Population Indices of Certain Resident Species of Birds Over a Ten-year Period, as Determined by Roadside Counts. Joseph C. Howell, University of Tennessee.

A series of 20 roadside bird counts was made in Knox County, Tennessee, during May in each of the 10 years between 1950 and 1959. During each count a record was made of each individual bird with which a contact was made. The total number of individuals of a particular species counted during a year is used as a population index.

Population indices are used to show the changes in population which certain species have undergone. Comparisons are made between the population trends of related species and species with similar habits or ecological requirements.

Results of Limnological Investigation of Stones River, Tennessee. J. Gerald Parchment, Middle Tennessee State College.

The present report is based upon gross and microscopic studies of the plankton and bottom organisms of Stones River collected during the years 1955 and 1956 and preserved in formalin.

During the period of study the net-plankton population averaged 698.5 individuals per liter. The plankton was studied and analyzed with respect to the following: (1) Percentage distribution of major groups (2) Phytoplankton-zooplankton ration (3) Quantitative variations of dominant genera (4) Seasonal distribution.

During the period of study the Stones River bottom organisms averaged 62 individuals per square foot or 200 pounds per acre. When total collections from all stations are considered, the Mollusca were the most common organisms based on numbers per square foot (85.7%) with Insecta next in the

order of abundance (12.5%). Thirty-nine different genera of aquatic animals belonging to three phyla make up the bottom fauna.

Spermateleosis in Amphiuma tridactylum. C. L. Baker, Southwestern at Memphis.

A study of the cytoplasmic components in the metamorphosis of the spermatid to the spermatozoa in the Urodeles has been neglected despite the considerable attention to the process in many other groups.

The axial filament arises from the proximal centriole as a flagellum and later enlarges into a fin with dorsal and ventral bands. The proximal centriole enlarges considerably with nuclear elongation and, after an early division to produce the blepharoplast of the undulating membrane, remains as the neck piece of the mature sperm. The distal ring centriole forms a pessary-shaped look around the axial filament and extends posteriorly to encompass most of the middle piece. The cytoplasm precedes this pessary and marks the boundary of the middle piece.

A reaction of cytoplasmic particles to tetrazolium in the middle piece indicates the presence of mitochondria with its accompanying succinic dehydrogenase and adenosinetriphosphate.

The Stimuli for the Start of the Reproductive Season in Juncos. James T. Tanner, University of Tennessee.

Juncos, a common bird in the Great Smoky Mountains, nest later at higher, and colder, elevations. The "first egg" dates for a number of Junco nests at different elevations have been determined. Three hypotheses to explain the retardation of laying with higher altitudes are: (1) the delay in the rise of temperature at high elevations is the direct cause of the delay in laying; (2) the later appearance of the insect food of Juncos at higher elevations is the direct cause; (3) courtship and song are necessary stimuli for laying and these are delayed in colder weather. The first and third of these will be discussed. The evidence available does not support the third hypothesis.

Remarks on the Branchiobdellids (Oligochaeta, Branchiobdellidae) of Tennessee. Perry C. Holt, Virginia Polytechnic Institute.

The branchiobdellid fauna of Tennessee is incompletely known. Collections and studies made during the last three years have, however, added somewhat to our knowledge. Several newly discovered and as yet undescribed species raise interesting questions concerning the classification and distribution of the group. Additional genera must be erected to receive some of these species or the current system of classification revised with the suppression of some long established genera. The affinities of the branchiobdellid fauna of East Tennessee seem to lie with that of the Appalachian Region of which East Tennessee is a part; those of Middle Tennessee with the lands west of the Appalachians and east of the Mississippi River to the northwards; those of West Tennessee with the Gulf and Central Plains.

Autoradiographic Studies of Nucleic Acid Synthesis During Growth of Paramecium. R. F. Kimball and S. W. Perdue, Oak Ridge National Laboratory.

Tritiated thymidine and cytidine have been used to follow the synthesis of nucleic acids in relation to the cell cycle in *Paramecium aurelia*, syngen 4, stock 51. Dividing paramecia were picked out of log phase cultures and allowed to grow until the desired stage in the interdivision interval was reached. They were transferred then to medium with either tritiated thymidine or tritiated cytidine, allowed to remain in this medium 10 to 15 minutes, dried on slides, fixed, and prepared for autoradiography by the dipping method. The autoradiographic studies, in conjunction with earlier cytophotometric studies, show that macronuclear deoxyribonucleic acid (DNA) is synthesized entirely or almost entirely during the second half of the interdivision interval, undoubtedly the period of chromosome duplication. Macronuclear ribonucleic acid (RNA), on the other hand, is synthesized continuously but is transferred to the cytoplasm at such a rate that no net increase in the amount of RNA in the macronucleus occurs until chromosome duplication begins.

Evidence for Central Nervous System Involvement in the Leucocyte Response to Insulin. Bryant Benson, Vanderbilt Medical School.

Electrolytic coagulation lesions involving the region of anterior median eminence of the hypothalamus in rats decrease or completely inhibit the lymphopenia and eosinopenia that usually follows insulin injection. This was taken as evidence of central nervous system involvement in the leucocyte response to insulin. A variety of other lesions had little or no influence on the insulin-leucocyte picture. Animals with lesions coagulating the mammillary body show a marked lymphopenia after insulin. Preoptic lesions involving the diagonal bands of Broca and portions of the olfactory tubercles and septum decrease the animal's insulin sensitivity.

Electrical stimulation on electrodes permanently implanted in the anterior median eminence (arcuate nucleus) produces in the unanesthetized rat a leucocyte picture similar to the insulin response. An increase in electrical activity from the anterior hypothalamus has been observed with electroencephalographic recordings following insulin injection.

Interpretation of these results rests on interference by lesions or stimulation with insulin of neural control of the pituitary-adrenocortical axis, an integral mechanism intimately involved in the control of peripheral leucocytes with leucopoietic organs.

Uterine Hematocrits in Cycling and Estrogen-treated Spayed Rats. J. S. Davis, University of Tennessee Medical Unit, Memphis.

Plasma and red cell volume measurements were made on uteri of adult rats. Determinations were made at each stage of the estrus cycle and at various time intervals after administration of estrogen to spayed animals. Plasma and red cell volumes were combined to obtain uterine blood volumes from which uterine hematocrits were calculated.

In cycling animals the hematocrit was lowest just prior to stage one (13.8%) and highest in stage two (37.1%). The low value was due to a large expansion of plasma volume with no concomitant increase in red cell volume.

In spayed animals given a single injection of 2 ug estradiol-17-B uterine hematocrit was lowest (22.9%) three hours after injection and returned to the control value (35.0%) 12 hours after injection. The decline in hematocrit was due to a large expansion in plasma volume accompanied by a much smaller increase in red cell volume.

SECTION OFFICERS FOR THE YEAR 1961

BOTANY SECTION:

Chairman: Haskell C. Phillips, Austin Peay State College, Clarksville.
 Vice-Chairman: Robert B. Channell, Biology Dept., Vanderbilt Univ., Nashville.
 Secretary: Robert W. Powell, Jr., Biology Dept., Memphis State Univ., Memphis.
 Editor: Frank H. Barclay, East Tenn. State College, Johnson City.

CHEMISTRY SECTION:

Chairman: Mark M. Jones, Vanderbilt Univ., Nashville.
 Editor: Carl M. Hill, Tenn. A and I State Univ., Nashville.

ENGINEERING SECTION:

Chairman: J. D. Tillman, Ferris Hall, Univ. of Tenn., Knoxville.
 Editor: J. D. Womack, Berry Hall, Univ. of Tenn., Knoxville.

GEOLOGY-GEOGRAPHY SECTION:

Chairman: R. E. McLaughlin, Dept. of Geology-Geography, Univ. of Tenn., Knoxville.

Editor: Robert J. Floyd, G-5 State Office Building, Nashville.

MATHEMATICS SECTION:

Chairman: William A. Small, T. P. I., Cookeville.

Secretary: Robert L. Kammerud, Peabody Demonstration High School, Nashville.

Editor: Edgar D. Eaves, Univ., of Tenn., Knoxville.

MEDICAL SCIENCES SECTION:

Chairman: Robert P. Ball, Oak Ridge Hospital, Oak Ridge.

Vice-Chairman: James W. Ward, Vanderbilt Medical School, Nashville.

Editor: E. F. Oakberg, Oak Ridge National Laboratory, Oak Ridge.

PHYSICS-ASTRONOMY SECTION:

Chairman: Edward W. Burke, Jr., King College, Bristol.

Secretary: Sara Wood, Austin Peay State College, Clarksville.

Editor: J. J. Freymuth, Jr., Southwestern at Memphis, Memphis.

ZOOLOGY SECTION:

Chairman: John G. Parchment, Middle Tenn. State College, Murfreesboro.

Secretary: Richard Stevenson, East Tenn. State College, Johnson City.

Editor: James T. Tanner, Zoology Dept., Univ. of Tenn., Knoxville.

ELEVENTH ANNUAL MEETING

COLLEGIATE DIVISION OF
TENNESSEE ACADEMY OF SCIENCE

December 3, 1960 — University of Tennessee

President: Kenneth Barker

Sponsor: Albert L. Myers

Preparation of Styrylquinolines. David L. Green, Jr., Carson-Newman College.

Color Changes of Styrylquinoline Solutions. William S. Powell, Carson-Newman College.

The Dipole Moments of Some Organic Ethers. Carter Gordon, Carson-Newman College.

**Dimethylsulfoxide - An Anhydrous Solvent.* Clifford Dukes, University of Tennessee.

**Exclusion of Cu⁺⁺ from Silica Gel.* Ronnie Webb, David Lipscomb College.

Catalytic Isomerization and Disproportionation of the Ethyl and Methyl Benzenes. John Jacobus, Southwestern at Memphis.

The Preparation and Properties of Esters of Oxalic Acid. Robert Scindell, Memphis State University.

The Preparation of Diaryl Sulfoxides. Gerald Smith, Memphis State University.

Cultivation of the Parasite Macracanthorhynchus hirudinaceus in vitro. Rosemary Gaisser, Austin Peay State College.

**Basic Cause and Possible Preventions of Congenital Malformations.* Barbara Conway, University of Chattanooga.

A Study of the Variation in Sensitivity to Heat Shock of Embryonic Stages of Wasp Habrabracon. Rosilie Osterbind, Southwestern at Memphis.

*Outstanding papers.

OFFICERS OF COLLEGIATE DIVISION FOR 1961

President: John Jacobus, Southwestern at Memphis

Vice-President: Jo Breatitt, Lambuth College

Secy.-Treas.: Kay Jones, Carson-Newman College

Reporter: Robert Rye, Memphis State University

THE TENNESSEE JUNIOR ACADEMY OF SCIENCE

Affiliated with Science Clubs of America

Sponsor: M. S. McCay

PROGRAM OF THE NINETEENTH ANNUAL MEETING

University of Tennessee, Knoxville — December 3, 1960

Registration: 8:00 A.M. Saturday, December 3, Lobby of Armory Field House.

TJAS Sectional Programs: 9:00 A.M. Saturday.

TJAS Lecture: 11:00 A.M. Room 112-115, University Center.

TJAS Luncheon: 12:00 Noon, Ballroom, University Center.

Presentation of TJAS Awards: 12:30 P.M. Ballroom, University Center.

Grades 7-8-9

SEA SHELLS. Ann Emery, Pikeville.

VISUAL PERCEPTION AS RELATED TO VISUAL TRAINING. Valecia Ann Ingle, Knoxville.

PLANT GALLS. Shirley L. Schuele, Memphis.

PAPANICOLAOU'S THEORY APPLIED TO THE GUINEA. Patricia A. Stringer, Kingsport.

INSECTS OF MY NEIGHBORHOOD. Betty S. Wise, Nashville.

THE SKELETON OF A PIG. Becky Wynn, Tiptonville.

MY BODY AS THE HUMAN FACTORY AT WORK. Elizabeth Markham, Tiptonville.

TREE OF MATHEMATICS. Becky J. Akin, Pikeville.

HOMEMADE WEATHER STATION. Barbara J. Lesh, Jackson.

METAL IDENTIFICATION BY THE RING METHOD. Jean C. Peele, Knoxville.

ROCKS THAT GLOW. Nancy S. Reeder, Red Bank.

CHILD'S CO-ORDINATION. Carol I. Thompson, Trenton.

WINTER BUDS AND THEIR CELL STRUCTURE. Bobby E. Gant, Clarksville.

HEREDITY. Charles E. Gosnell, Greeneville.

DENTAL ANATOMY. Richard H. Hardaway, Trenton.

OXIDATION. Johnny Panter, Pikeville.

A STUDY OF THE MESOZOIC ERA. James M. Rayburn, Pulaski.

LATHYRISM. David Spray, Oak Ridge.

ANTIBIOTICS. Kenneth G. Tucker, Nashville.

INSIDE STORY OF THE HUMAN BODY. Logan E. Wentworth, Jackson.

EVOLUTION OF THE BOOK. Brian D. Baldwin, Chattanooga.

GEOLOGIC PERIODS OF MIDDLE TENNESSEE. Robert M. Bernard, Nashville.

ELECTROSCOPE. Michael Macy, Clarksville.

THERMOELECTRIC CONVERSION OF HEAT TO ELECTRICITY.
Charles W. McGill, Jackson.

PHOTO ELECTRIC COUNTER. James R. Roberts, Trenton.

DEMONSTRATION OF GAS FILLED TUBES AND TRAVELING. Jimmy
W. Trott, Tullahoma.

EXPONENTS AND RADICALS. Charles E. Wheeler, Jr., Pikeville.

VISCOSITY OF OILS. David R. White, Smithwood.

THE ELECTRONIC TUBE. Bill F. Wilhoit, Greeneville.

Grades 10-11-12

CRYSTALS. Stanley Adamson, Oak Ridge.

GROUND EFFECTS MACHINE. Robert L. Anderson, Kingsport.

TRANSISTOR RADIO. Barry P. Clouse, Cookeville.

THE CYCLOID AND FALLING BODIES. Mark E. Doub, Jr., Chattanooga.

AUTOMATIC MAGNETIC CRANE. Joe L. Gilbert, Jackson.

DIELECTRIC PUMP. A. G. Kasselberg, Memphis.

HOVERCRAFT. Ralph H. Shell, Tullahoma.

THE ESSENCE OF LIFE. William V. Thompson, Columbia.

ROCKS IN YOUR OWN BACK YARD. James A. Waters, Nashville.

SILICIFIED CORAL GEODES. Robert A. Whitecar, Clarksville.

HOW RADIO SIGNALS CAN BE PRODUCED. Gerald A. Anderson,
Dyersburg.

AMATEUR ROCKETRY. Danny M. Lockmon, Dyersburg.

STUDY OF UPPER CRETACIOUS FOSSILS. James R. Bishop, Adamsville.

THE EFFECTS OF RADIATION ON THE LIFE PROCESSES OF YEAST.
William M. Cohen, Nashville.

THE DIFFERENCES NUTRIENTS PRODUCE IN PLANTS. Harold J. W.
deWein, Clarksville.

A STUDY OF SPECIFIC EXERTIONS ON THE PULSE RATE. Larry W.
Eddleman, Mt. Pleasant.

FRESHWATER PLANTS. William A. Foster, Memphis.

IDENTIFICATION OF TREES BY LEAVES. William R. Haynes, Cookeville.

INSECTIVOROUS TERRARIUM. Robert B. Kite, Red Bank.

DEMONSTRATION CIRCULATION. James W. McLaughlin, Tullahoma.

PURITY OF SPRING WATER IN MY COMMUNITY. Patrick A. Porter,
Maryville.

HEREDITY IN CATTLE. Larry Reid, Kingsport.

CHART OF PLANT PHYLUMS. Ricky Sepulveda, Martin.

A STUDY OF ESSENTIAL GASES IN PHOTOSYNTHESIS. Marcus C.
Hale, Trenton.

IS YOUR MEMORY RELIABLE? Donna M. Bullock, Knoxville.

MUTATIONS, A PHASE OF HEREDITY. Frances A. Butler, Clarksville.

PHOTOSYNTHESIS. Carolyn Crane, Jackson.

STUDY OF COLORED LIGHT ON PLANT GROWTH. Mary E. Hocker,
Tullahoma.

TUBERCULOSIS. Nan E. Johnson, Mt. Pleasant.

THE EFFECT OF RADIATION ON CHICK EMBRYOS. Brenda W. Lisle,
Red Bank.

RESPIRATION IN THE HUMAN BODY. Willene McReynolds, Pikeville.

ALGAE, FOOD OF THE FUTURE. Edith K. Schuele, Memphis.

VAPOR PRESSURE, FACTORS INVOLVED IN THE CALCULATION.
Sara W. Hoffman, Memphis.

RADIATION PHOTOGRAPHY. Shirley A. Howard, Tyner.

CHEMICAL BONDING. Sara R. Rochelle, Mt. Pleasant.

$E = MC^2$. Sandra S. Sanders, Pikeville.

STEREOPHONIC SOUND. Blake Williams, Jr., Jackson.

AWARD WINNERS

JUNIOR HIGH DIVISION — GRADES 7-8-9

BIOLOGICAL SCIENCE SECTION

GIRLS:

- First Place: Becky Wynn, Tiptonville School, Tiptonville.
 Second Place: Patricia A. Stringer, Robinson Jr. High, Kingsport.
 Third Place: Shirley L. Schuele, Treadwell Jr. High, Memphis.
 Honorable Mention: Valecia A. Ingle, Smithwood School, Knoxville.
 Elizabeth Markham, Tiptonville High, Tiptonville.

BOYS:

- First Place: Kenneth G. Tucker, East Jr. High, Nashville.
 Second Place: Richard H. Hardaway, Peabody High, Trenton.
 Third Place: Bobby E. Gant, Greenwood Jr. High, Clarksville.
 Honorable Mention: David Spray, Jefferson Jr. High, Oak Ridge.
 Johnny Panter, Mt. Crest, Pikeville.
 Charles E. Gosnell, Jr. High, Greeneville.
 Logan E. Wentworth, Jackson Jr. High, Jackson.

PHYSICAL SCIENCE SECTION

GIRLS:

- First Place: Jean C. Peele, Smithwood School, Knoxville.
 Second Place: Barbara J. Lesh, I. B. Tigrett School, Jackson.
 Third Place: None given.
 Honorable Mention: Becky J. Akin, Pikeville Elementary, Pikeville.
 Nancy S. Reeder, Red Bank Jr. High, Red Bank.
 Carol I. Thompson, Peabody High, Trenton.

BOYS:

- First Place: Jimmy W. Trott, East Jr. High, Tullahoma.
 Second Place: Robert M. Bernard, Hillsboro High, Nashville.
 Third Place: James R. Roberts, Peabody High, Trenton.
 Honorable Mention: Michael Macy, Greenwood Jr. High, Clarksville.
 Charles W. McGill, I. B. Tigrett School, Jackson.
 David R. White, Smithwood School, Knoxville.
 Bill F. Wilhoit, Jr. High, Greeneville.

SENIOR HIGH DIVISION — GRADES 10-11-12

BIOLOGICAL SCIENCE SECTION

GIRLS:

- First Place: Edith K. Schuele, Treadwell High, Memphis.
 Second Place: Brenda W. Lisle, Red Bank High, Red Bank.
 Third Place: Mary E. Hocker, Tullahoma High, Tullahoma.
 Honorable Mention: Carolyn Crane, Jackson High, Jackson.
 Nan E. Johnson, Hay Long School, Mt. Pleasant.

BOYS:

- First Place: William M. Cohen, Hillsboro High, Nashville.
 Second Place: Marcus C. Hale, Peabody High, Trenton.
 Third Place: James R. Bishop, Adamsville High, Adamsville.
 Honorable Mention: Larry W. Eddleman, Hay Long High, Mt. Pleasant.
 Robert B. Kite, Bed Bank High, Red Bank.
 Patrick A. Porter, W. J. Hale School, Maryville.

PHYSICAL SCIENCE SECTION

GIRLS:

- First Place: Shirley A. Howard, Tyner High, Tyner.
 Second Place: Sara W. Hoffman, East High, Memphis.
 Third Place: Saundra S. Sanders, Bledsoe Co. High, Pikeville.

BOYS:

- First Place: William V. Thompson, Central High, Columbia.
 Second Place: A. G. Kasselberg, East High, Memphis.
 Third Place: Stanley Adamson, Oak Ridge High, Oak Ridge.

NEW MEMBERS
TENNESSEE ACADEMY OF SCIENCE
FOR 1960

- Adrian, M. Sister, R.S.M., Immaculate Conception H.S., 1682 York Ave.,
Memphis.
- Akin, Dr. Edgar D., Wartburg.
- Avery, Gleason G., 7520 John Henry, Chattanooga 11.
- Barnes, Robert Howell, 2614 Essex Pl., Nashville.
- Bass, James Louis, III, Box 881, UTMB, Martin.
- Bass, Kathyryn Foster, Box 881, UTMB, Martin.
- Behan, Thomas Joseph, Route 1, Fall Branch.
- Bell, Mrs. Nannie Jean, Route 2, Friendship.
- Bernadette, Sister Mary, R.S.M., Immaculate Conception H.S., 1682 York Ave.,
Memphis 4.
- Bevington, The Rev. Wm. S., Catholic H.S. for Boys, 61 North McLean,
Memphis 4.
- Billings, Dr. F. Tremaine, Jr., 420 Medical Arts Bldg., Nashville.
- Bisson, Dr. W. A., 2312 Park Ave., Memphis.
- Boehm, Dr. Walter E., 540 McCallie Ave., Chattanooga.
- Boepple, Emil J., Messick High School, Memphis.
- Boles, Dr. James H., P. O. Box 705, Kingsport.
- Bowes, Dr. Roy R., 829 Gallatin Rd., Madison.
- Branch, Mrs. Lydia Joan, Route 2, Camden.
- Brannon, Marvin H., Route 15, Joe Hinton Rd., Knoxville.
- Brown, Dr. Daniel Grover, 215 S. Purdue Ave., Oak Ridge.
- Bryant, Dr. Billy F., 1905 Glen Echo Rd., Nashville 12.
- Campbell, Thomas H., Dept. of Botany, Univ. of Tenn., Knoxville.
- Carlen, William B., Jr., 502 N. Jefferson, Cookeville.
- Carrier, Hubert Lester, Bluff City.
- Casey, Fred, 202 N. Auburndale, Memphis.
- Chance, Dr. Donald P., 1437 E. Center St., Kingsport.
- Chapin, Edward Young, IV, Rock City Trail, Lookout Mtn.
- Chester, Mary Ann, P. O. Box 851, TPI, Cookeville.
- Church, Thomas D., 945 Rogers, Clarkston, Georgia
- Clark, Portia W., 3403 Benham Ave., Nashville.
- Cole, Billy Dean, Austin Peay State College, Clarksville.
- Colvin, John McRae, Jr., 206 31st Ave., North, Nashville.
- Cosgrove, Gerald Edward, Jr., ORNL, P.O. Box Y, Oak Ridge.
- Cress, Edgar A., ORINS-Med. Div., P. O. Box 117, Oak Ridge.
- Cross, James T., The Univ. of the South, Sewanee.
- Daniel, Dr. Rollin A., Jr., 410 Medical Arts Bldg., Nashville.
- Davis, Dr. James Sherman, Division of Anatomy—61 S. Dunlap St.,
Memphis 3.
- Dickerson, Marvin H., Box 2336, ETSC, Johnson City.
- Dishmon, Guinn H., Forbas.
- Dixon, Dr. W. C., 216 Doctors Bldg., Nashville.
- Doherty, David G., Biology Division-ORNL, P. O. Box Y, Oak Ridge.
- Dougherty, Dr. John H., Sr., 517 W. Cumberland, Knoxville.
- Elliott, Dr. James C., Jr., Charlotte.
- Empson, Billy H., 1011 Iverson Ave., Nashville.
- Finch, Mrs. Vivian, Huntingdon High School, Huntingdon.
- Finlayson, Carroll Pratt, 1905 Wintergreen Rd., Knoxville 21.
- Fitzpatrick, David F., 570 E. 10th St., Cookeville.
- Fletcher, Dr. Lewis A., Univ. of Chattanooga, Chattanooga 3.
- Foree, Dr. William Edwin, Athens.
- Frances, Sister Jane, O.P., Catholic High School, 61 N. McLean, Memphis.
- Frye, Dr. W. K. 722½ Tenn. Ave., Etowah.
- George, Brother J., Christian Brothers College, 650 E. Parkway S., Memphis 4.
- Goodge, Dr. Bayard D., Concord.

- Green, Miss Dorothy Fisher, 3670 Shirlwood Ave., Memphis 12.
Griffith, Dr. John W., Jr., 1808 Hayes St., Nashville 4.
Guenther, Dr. William B., Assoc. Prof. of Chem., Univ. of the South, Sewanee.
Hadden, James E., 126-C Taliwa Court, Knoxville.
Hall, Dr. James Smith, 333 Cullom St., Clinton.
Halliburton, William Harry, Route 1, Clarksville.
Hampton, Dr. Foster, Jr., 101 Interstate Bldg., Chattanooga.
Harris, Ada Elizabeth, 605 Douglas St., Cookeville.
Hefferlin, Dr. Ray Alden, Box 2073, Collegedale.
Hemmerly, Thomas E., 1409 Stainback Ave., Nashville 7.
Hillman, Dr. J. William, Vanderbilt Hosp., Nashville.
Hooper, Hyman Lemuel, Box 518, TPI, Cookeville.
Hutcherson, Dr. W. Powell, 744 McCallie Ave., Chattanooga.
Hutchinson, Mrs. Martha L., Box 276, Waynesboro, Tenn.
James, Mrs. Mildred Emily, 873 Biggs, Memphis.
Jenks, Glenn H., 4501, X-10, ORNL, Oak Ridge.
Johnson, Faye, P. O. Box 542, TPI, Cookeville.
Jones, Dr. Larry Phillip, Box 1067, UT-AEC-ARL, Oak Ridge.
Kavlak, A. R., Head, Science Dept., York Junior College, York, Pennsylvania.
Kidd, James Everett, Route 1, Ripley.
Kile, Dr. James Cecil, Jr., Route 3, Clinton.
Killeffer, Dr. Louis Alexander, 506 Clinton St., Harriman.
Kimball, R. F., Biology Division, ORNL, Oak Ridge.
Kindernay, Miss Barbara Lee, 733 W. Maple St., Johnson City.
Kintner, Dr. Elgin P., Box 89, Maryville.
Kraus, Dr. Alfred P., 42 N. Dunlap St., Memphis 3.
Lamb, Dr. Hugh L., Box 550, Athens.
Langa, Dr. Ambrose M., 502 N. Garden St., Columbia.
Leathers, James E., 416 Cedar Ave., Cookeville.
Leddicotte, George W., Bldg. 4500, X-10, ORNL, Oak Ridge.
Liggett, Mrs. Margaret Maris, 3440 Farmville, Memphis 12.
Liles, Dr. James Neil, 4 Brookvale Lane, Knoxville.
Livingston, Robert S., 9 Fairlane Dr., Powell.
London, Dr. Frank, 501 Medical Arts Bldg., Knoxville 2.
Lounsbury, Richard Edwin, Route 2, Brentwood.
Love, Leon O., 9731, Y-12, ORNL, Oak Ridge
Lovelace, Mrs. Zora Belle, 214 Hannings Lane, Martin.
Manly, W. D., Metallurgy Div., ORNL, Oak Ridge.
Marcher, Melvin, G-5 State Office Bldg., Nashville.
Marolla, Dr. Michael M., 842 Jefferson, Memphis 3.
Mayo, Mrs. Lois C., Route 3, Milan.
McCormick, M. Y., 1595 Linden, Memphis 4.
McCutchen, Roberta L., 103 Palmer Rd., Oak Ridge.
McDuffie, H. F., 9733-2, Y-12, ORNL, Oak Ridge.
Meneely, Dr. George Rodney, Vanderbilt Univ., Nashville.
Meyer, Dr. Alphonse H., Jr., 20 S. Dudley, Memphis.
Miller, Edward C., 8115 Chesterfield Dr., Knoxville 19.
Moore, Dr. John T., Algood.
Neely, James Robert, Clarkrange.
Newell, Dr. Cecil E., 407 East Fifth St., Chattanooga 3.
Oakberg, E. F., Bldg. 9210, Y-12, ORNL, Oak Ridge.
Oaks, James B., 895 N. Birgham, Memphis.
Orr, Lowell Preston, Dept. of Zoology & Entomology, U-T, Knoxville.
Peck, Charles W., Box 820, UTMB, Martin.
Peirce, Dr. E. Converse II, 514 West Church Avenue, Knoxville.
Pentecost, Allie D., Box 341, Union City.
Plog, Dr. Gerald S., Martin.
Powell, Billy R., 200 Meadow Cir., Clarksville.
Reding, Joseph D., 1029 Stonewall, Memphis.
Reisman, Dr. Edward E., Jr., 1017 Provident Bldg., Chattanooga.
Riley, Dr. John F., 141 Arkansas Ave., Oak Ridge.

- Roe, Brother L. Charles, Christian Bros. Col., 650 E. Parkway So., Memphis 4.
Rogers, Jannice A., Bethel Springs.
Rolfe, Dr. D. T., 2007 Murphy Ave., Nashville.
Rossett, Dr. N. Edward, 1639 Madison, Memphis.
Sadler, Lee Gore, Citizens Bank, Cookeville.
Saine, Mrs. Evelyn M., 4105 Faxon Ave., Memphis.
Scandlyn, Bobbie Joyce, P.O. Box 926, TPI, Cookeville.
Seymour, David M., Conchas Dam, New Mexico.
Shepherd, John, 715 Cypress, Cookeville.
Shoulders, Dr. H. H., 2315 Woodmont Blvd., Nashville 12.
Sistler, Jack K., Dept. of Physics, Belmont College, Nashville.
Speas, Dr. C. J., Dental Health Center, Oak Ridge.
Spray, Dr. Paul, 507 Delaware Ave., Oak Ridge.
Susano, C. D., 7116 Wellington Dr., Knoxville 19.
Swann, Dr. Nat H., 412 Brady Pt. Rd., Signal Mt.
Swindoll, Mrs. Hannah Elizabeth, 4318 Spriggs St., Chattanooga.
Taylor, George O., Jr., Univ. of Chattanooga, Chattanooga.
Thompson, John M., 919 Roane St., Harriman.
Thorpe, Dr. Emmet J., 1831 Clinch Ave., Knoxville.
Tolbert, Charles Ray, Box 278, Vanderbilt Univ., Nashville.
Trauger, Donald B., ORNL (Physics), Oak Ridge.
Walker, Dr. Lillie Cutlar, Div. of Preventive Medicine, Univ. of Tenn.,
Medical College, 62 South Dunlap St., Memphis 3.
Warmbrod, Dan Herman, Belvidere.
Warren, Dr. John Rush, Tenn. Poly. Inst., Cookeville.
Werner, John B., Jr., 425 Crescent Dr., Rockwood.
White, James C., 4801 Summit Dr., Knoxville 19.
Winebrenner, Dr. John D., 1209 Euclid Ave., Knoxville 21.
Wood, Dr. R. B., 3604 Lakecrest, Knoxville.
Wood, Saralue, Austin Peay State College, Clarksville.
Woodall, Jesse Clement, Jr., 2820 22nd Ave., S., Nashville.
York, Larry Burton, 218 Boxwood Ave., Alcoa.

ERRATA

NOTES ON *TRILLIUM LUTEUM* (MUHL.) *HARBISON IN TENNESSEE*

By Jesse M. Shaver, Jour. Tenn. Acad. Science, 36, page 21, Jan., 1961.

Unfortunately, a major error was printed in the above article on page 21 lines 20 to 21 (approximately). The Journal gives it "... a typical flower of *T. luteum* is maroon or purple." It should have been printed "... a typical flower of *T. luteum* is 'buttercup' yellow and the color of a typical flower of *T. cuneatum* is maroon or purple."

The error came about apparently by the omission of one complete line of the manuscript. The omitted portion came after *T. luteum* and was "... is 'buttercup' yellow and the flower of *T. cuneatum* is maroon or purple".

In the list of officers inside of the front cover of the January, 1961, issue, the following change should be made:

J. Gordon Carlson, *President*
W. B. Jewell, *President-Elect*