SPECIAL ISSUE CONTAINING REPORTS OF THE FIFTH BOSTON MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

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THE BOSTON MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

Edited by Dr. HENRY B. WARD

PERMANENT SECRETARY

GENERAL FEATURES

THE fifth Boston meeting was the ninety-third meeting of the association. It extended from Wednesday, December 27, 1933, to Tuesday, January 2, 1934, inclusive. Owing to circumstances practically all the events were scheduled in the first four days, with the result that the program was unusually crowded. Nevertheless, it was, according to many, one of the most successful events in the record of the association.

Although technically this is listed as the fifth Boston meeting, it may properly be regarded as the sixth, since the second meeting of the association was held in Cambridge, Massachusetts, in 1849. This seems to have been regarded at the time as a joint enterprise, since the local committee which provided for the Cambridge meeting had seven out of twelve members listed as from Boston. The occasion designated in the old list as the first Boston meeting was the twenty-ninth meeting of the association, held in 1880. The second Boston meeting, held in 1898, was the forty-seventh meeting of the association; like all meetings preceding, it was held in the summer. The third Boston meeting, or the sixty-first of the association, was held in 1909, and the fourth, the seventy-sixth in the association record, in 1922. Both the third and the fourth Boston meetings, like the fifth just closed, were held in midwinter.

The association was greeted on the opening day of the meeting by a sample of old-fashioned New England winter, which by night had piled snow high in the streets and in the following days provided record-

making low temperatures. The conditions recalled strikingly the last Boston meeting and of course presented difficulties in carrying out the programs. But, despite all obstacles, the sessions were well attended and members commented generally on the interest manifested and the high quality of the programs presented.

The attendance on the meeting was evidently good. Nearly every meeting room was occupied by an audience that equalled the preliminary estimate of the secretaries. Some rooms were crowded, despite the trying conditions of the weather. No doubt those conditions were responsible for the moderate total of the official registration, which reached only 2,351. Data given by the secretaries' records in some affiliated societies, which maintain private lists of members in attendance, indicate that at least 3,200 were present, apart from visitors, who were much in evidence at certain sessions.

Of the number officially registered, 539 came from Metropolitan Boston and 216 others from other points in Massachusetts. New York contributed 475 to the list, Pennsylvania 131, Connecticut 129, New Jersey 109, Maine 76, New Hampshire 54, Ohio 51, Maryland 46, Rhode Island 45, Illinois 38, Michigan and Virginia 31 each, and Iowa 25. All told, 41 states were represented. In addition, 88 were registered from the District of Columbia, 53 from Canada and 11 from various foreign countries.

The local committee provided most effectively for the needs of the occasion. Dr. A. Lawrence Lowell, emeritus president of Harvard University, was honorary chairman, and President Karl T. Compton, of the Massachusetts Institute of Technology, honorary vice-chairman. Professor S. C. Prescott served as chairman. Those who attended the fourth Boston meeting in 1922 will recall how well organized were the plans for the occasion; the same perfection of arrangements characterized this meeting and lightened the burdens of all involved in carrying out the program. All the colleges and universities in the area of Metropolitan Boston joined in welcoming the association. These were Harvard University, the Massachusetts Institute of Technology, Simmons College, Boston University, Boston College, Northeastern University, Tufts College, Wellesley College and Weston College. All these extended courtesies to visiting scientists which were greatly enjoyed and duly appreciated.

Meeting places for the sections and affiliated societies were well provided for at Harvard and Tech. Fortunately, related organizations could all be adequately cared for in buildings close together and even the unusual weather conditions did not interfere seriously with movements of individuals from one meeting to another.

The use of Memorial Hall at Harvard for general purposes elicited wide-spread praise as the best plan yet perfected for bringing together in fashion convenient for members features often unfortunately separated. Just inside the entrance to the room was located the series of registration desks. Flanking these and filling the remainder of the main floor were the booths with exhibits, of which a description is given in a later section. The arched windows, the portraits of ancient worthies on the walls and the vaulted ceiling imparted an impressive character to the grouping. Just off the main floor had been established a comfortable lounge in which members, visitors and exhibitors gathered for social intercourse and afternoon tea. These features added materially to the effect of the exhibition, under the direction of Dr. F. C. Brown, which was unmistakably the best that the association has ever held.

The General Program was an attractive book of 190 pages, compiled and edited by Sam Woodley, executive assistant, with the assistance of the executive officers in the local committee. The size of recent numbers was distinctly reduced, with evident advantage to users and without loss of value in contents. The book contained well-organized general information, special programs, a useful summary of events, the index and maps. The cover was decorated with cuts reproducing the seals of the ten cooperating educational institutions. Copies of the program will be mailed on receipt of requests addressed to the office of the association, Smithsonian Institution Building, Washington, D. C.

In the program of the meeting are listed the general sessions, special conferences, meetings of sections and of associated societies. All the fifteen sections of the association were active, and 34 societies also held meetings in collaboration with the association. On Wednesday, just before the formal opening of the association programs, the Academy Conference held its sessions, in which 21 state academies participated through delegated representations. On Sunday the secretaries of sections and of affiliated societies gathered for the annual session of the Secretaries' Conference. Both of these conferences are the subject of special reports elsewhere in this record of the Boston meeting.

Professor Henry Norris Russell, of Princeton University, was president for the Boston meeting. His researches in astronomy and astrophysics have made him a leader in this field, and his publications are widely known. At the Atlantic City meeting Professor Russell gave the first Hector Maiben lecture on "The Constitution of the Stars." In Boston he presided at the opening general session, which was held in the Grand Ballroom of the Hotel Statler on Wednesday evening. On the stage behind the speakers

were seated officers of the association, representatives of the educational institutions cooperating in the meeting and members of the local committee.

A large audience greeted President Russell as he opened the session and introduced President Karl T. Compton, of the Massachusetts Institute of Technology, who spoke for the institutions serving as hosts in welcoming the association and associated societies to Boston. Dean S. C. Prescott, of the Massachusetts Institute of Technology, was called upon as chairman of the local committee to add detailed information regarding arrangements. President Russell then introduced Professor Harlow Shapley, of Harvard University, who spoke for the scientists of the Boston Metropolitan District and extended on their behalf a hearty welcome to visiting members of the association. President Russell responded gracefully to the welcome.

The retiring president, Dr. John Jacob Abel, of the Johns Hopkins University, delivered the address of the evening. He spoke on "Poisons and Disease," bringing together in brief general form the researches of many years on this topic; his presentation proved of great interest to his hearers. At the close of the program a general reception, tendered to officers and members of the association and invited guests by the local committee, acting in behalf of the cooperative institutions, was held in the foyer of the Grand Ballroom of the Statler.

The Hector Maiben lecture was given on Thursday afternoon by Dr. William Morris Davis, professor of geology, emeritus, Harvard University, and lecturer on geomorphology, California Institute of Technology. Dr. Davis spoke on "The Faith of Reverent Science." This was the second annual lecture provided for by the bequest of the late Hector Maiben of Nebraska.

The Sigma Xi address constituted the Thursday evening general session. It was delivered by Dr. Henry E. Sigerist, professor of the history of medicine and director of the Institute of the History of Medicine at the Johns Hopkins University. The topic chosen was "The Foundation of Human Anatomy in the Renaissance."

The Sedgwick Memorial lecture was programmed for Friday afternoon in the Central Lecture Hall of the Massachusetts Institute of Technology. This was the eleventh in the series established by the biological faculty of that institute in honor of the late Professor William T. Sedgwick. Professor Henry Fairfield Osborn was the speaker on the topic, "Aristogenesis, the Creative Principle in the Origin of Species." The address was printed in SCIENCE, January 19; as delivered, it was magnificently illustrated by lantern slides.

The general session on Friday evening, arranged by the sections on Engineering (M), Social and Economic Sciences (K), and Agriculture (O), was one of the outstanding events of the meeting. The Honorable Henry Agard Wallace, Secretary of Agriculture, Washington, D. C., delivered the address on "What Can Engineering Do for Agriculture?" The event is discussed later in the record of the Section on Engineering. This address was published in SCIENCE for January 5.

On Saturday evening the American Academy of Arts and Sciences met jointly with the association and presented the Rumford Medal for distinguished research in physics to Professor Harlow Shapley, director of the Harvard Observatory. Following the presentation Dr. Shapley delivered an address on "The Anatomy of a Disordered Universe."

The special programs were particularly strong. In all, over 1,500 papers were listed and brief records of the most important are given under special headings in a later part of this report. Even the casual reader of the printed program was impressed by the large number of joint sessions and symposia which had been arranged. Scarcely a single organization presented a program without one or more such meetings, and one group at least, the Section on Medical Sciences, had arranged an entire three-day program under specific topics. These events are further described in a later part of this article. As members are well aware, the association does not undertake any responsibility for the publication of papers presented at its meetings. All arrangements involved in printing such papers are made by authors and editors of the journals concerned.

Among the privileges provided for the association the most highly appreciated feature was a complimentary concert given by the Boston Symphony Orchestra on Wednesday afternoon. This was provided through the courtesy of the conductor, Dr. Serge Koussevitzky, and the directors. It was attended by a large and appreciative audience, who thoroughly enjoyed the artistic rendition accorded to the fine program by Dr. Koussevitzky and the members of the orchestra.

Inspection trips, excursions to nearby institutions and places of interest and social features planned for visiting ladies were carried out so far as feasible under the unusual weather conditions which obtained at the time and were duly enjoyed. The usual number of dinners for special societies were held during the meeting and were well attended. Summing up impressions and contacts, one may say with assurance that the fifth Boston meeting was successful in every way.

The record of the Boston meeting would not be complete without some mention of an event which was not on the official program but was sponsored by

leaders in the work of the association. On Wednesday evening, before the opening general session, 130 scientific workers and friends of Dr. J. McKeen Cattell, distinguished psychologist, former president of the association and still active in its service, and editor of important scientific books and magazines, came together at a dinner planned to evidence their appreciation of his services to science and education and to the association. Dr. Karl T. Compton presided, and after brief mention of Dr. Cattell's work introduced as speaker of the occasion Professor John Dewey, of Columbia University, who addressed the group on "The Supreme Intellectual Obligation." At the close of the address Dr. Cattell was called on and expressed briefly his thanks to his friends. It is expected that Professor Dewey's address will be published.

The summer meeting in 1934 is to be held in Berkeley, California, from June 18 to 23, as a joint meeting with the Pacific Division of the association. The next annual meeting will be held in Pittsburgh, Pa., from December 27, 1934, to January 2, 1935. Arrangements for both meetings are well advanced and will be reported to secretaries and to the members at early dates.

NEWLY ELECTED OFFICERS OF THE ASSOCIATION

At Boston the council elected the officers, whose names are listed below, for the year 1934 or such other term as is indicated in the particular case. This list has already been published in SCIENCE for January 5, 1934.

President, Edward L. Thorndike, Teachers College, Columbia University.

Vice-presidents and chairmen of sections:

Mathematics (*A*), R. D. Carmichael, University of Illinois.

Physics (*B*), Henry G. Gale, University of Chicago.

Chemistry (*C*), Joel H. Hildebrand, University of California.

Astronomy (*D*), Frederick Slocum, Wesleyan University.

Geology and Geography (*E*), James B. Macelwane, St. Louis University.

Zoological Sciences (*F*), George L. Streeter, Carnegie Institution.

Botanical Sciences (*G*) Bernard O. Dodge, New York Botanical Garden.

Anthropology (*H*), Melville J. Herskovits, Northwestern University.

Psychology (*I*), John E. Anderson, University of Minnesota.

Social and Economic Sciences (*K*), Carl Snyder, Federal Reserve Bank, New York.

Historical and Philological Sciences (*L*), Solon J. Buck, University of Pittsburgh.

Engineering (*M*), C. E. Skinner, Westinghouse Electric and Manufacturing Company, East Pittsburgh.

Medical Sciences (*N*), Cyrus C. Sturgis, University of Michigan.

Agriculture (*O*), Jacob G. Lipman, Rutgers University.

Education (*Q*), Guy Thomas Buswell, University of Chicago.

Elected members of the council (for term ending 1937):

F. K. Richtmyer, Cornell University.

John C. Merriam, Carnegie Institution.

Members of the Executive Committee (for term ending 1937):

Karl T. Compton, Massachusetts Institute of Technology.

Edwin G. Conklin, Princeton University.

Trustee of Science Service (for term ending April, 1937):

J. McKeen Cattell.

Secretaries of sections (for term ending 1936):

Psychology (*I*), John A. McGeoch, University of Missouri.

Medical Sciences (*N*), Earl Baldwin McKinley, George Washington University Medical School.

EDWARD LEE THORNDIKE—PRESIDENT-ELECT OF THE ASSOCIATION

(*By Professor Arthur I. Gates*)

EDWARD LEE THORNDIKE, elected president of the American Association for the Advancement of Science, has been a member of the staff of Teachers College, Columbia University, since 1899. Trained in psychology, first by William James at Harvard and later by James McKeen Cattell at Columbia, Thorndike was selected by James E. Russell, newly appointed dean of Teachers College, as the man who gave most promise of employing scientific methods fruitfully in the study of education. To this purpose Thorndike applied himself with such vigor and ingenuity that within a few years he had not only established experimental study as the most respected method in education, but had also built up a body of concepts which formed the basis for a new educational practise. The history of scientific work and of psychological theory in education is outlined almost completely in a chronological list of Thorndike's published researches.

Although Thorndike's work has played a dominant rôle in education, it is far from limited to this field. Indeed, there is some justification for claiming that his influence has been equally important in other areas. That his doctor's dissertation was the beginning of animal psychology as a scientific study is a fact so widely accepted as to be a convention of the elementary text-book in psychology. His "Mental and Social Measurements" (1904), the first treatise of its kind, became the bible of a rapidly growing

group of investigators of human and social phenomena. Applications of his own principles made him a leader in the so-called "testing" movement, which became widely known during the world war. His apt dictum—"Anything that exists, exists in some amount"—became the slogan of a large and influential group of investigators bent on using objective and quantitative methods in appraising various types of learnings, skills, intelligence, mechanical and artistic talents, and temperamental, volitional and other personality traits. Various professional practises, such as psychological testing of individual abilities, educational surveys, diagnosis of difficulties in school subjects, examination of industrial and vocational competence and promise, vocational and educational guidance in schools, and other types of personnel work originated in or were greatly influenced by his work.

Thorndike developed early a marked interest in biology, which is shown by the fact that his first study was concerned with the evolution of intelligence. This interest led to writings and researches which have profoundly affected the social sciences. Various studies of human and animal characteristics—instincts, reflexes, tendencies, intellectual operations, emotions, etc.—culminating in his volume, "The Original Nature of Man," established closer relations between the students of social and biological phenomena and produced marked changes in points of view and methods of study in both fields. To the study of the problems of heredity and environment, Thorndike made many significant contributions, such as ingenious statistical devices and the use of twins as means of distinguishing the influence of the two factors. His work on the "original nature of man" has been instrumental in directing the attention of psychologists and others from almost preoccupation with mental processes and consciousness to a primary interest in man as a biological organism engaged in adjustment to its environment. That this point of view has come to dominate education, the social sciences generally and even ethics is in no small measure the result of Thorndike's influence.

Many psychologists and educators will hail Thorndike's studies of the processes of learning as his outstanding contribution. Beginning with investigations of the learning of animals, from which his well-known laws of "exercise" and "effect" were derived, he has studied the fundamentals of learning among animals from the earthworm to the ape and among human beings from infants in the cradle to men nearly ready for the grave. One of his earlier studies, in collaboration with his colleague, Woodworth, was directed at the then widely accepted theory of formal discipline. The result of this study probably had a more profound and wide-spread effect upon education than the outcome of any investigation ever made. It upset completely the cornerstone of the educational theory prevalent at the time. It led the way, moreover, to the basal conceptions underlying the most far-reaching reforms in education during the past twenty-five years. One of his latest series of studies has been concerned with the learning abilities of adults. The startling results of these investigations have provided the incentives for journalists to write such books as "Life Begins at Forty," which have been joyfully read by those of us heretofore considered too old to learn. Thorndike's findings in stimulating the development of programs of adult education and forcing a reconsideration of the factor of age in policies of employment became the basis of social changes of profound significance.

Thorndike has been and is enormously productive. His bibliography is approaching four hundred titles, of which more than thirty are books and most of the others are reports of researches. The range of his interests is equally striking; there is scarcely a major topic in education or psychology which his investigations have not illuminated. Despite the magnitude and range of his work, hosts of students and colleagues will declare that Thorndike's personal influence as a teacher and councilor has been of first importance. There can be no doubt that admiration for the man and enthusiasm for his purposes, which are the natural results of personal contacts with Thorndike, have greatly extended the use of his methods and ideas in the social sciences.

THE ELEVENTH AWARD OF THE ASSOCIATION PRIZE

For the last ten years an annual prize of one thousand dollars has been made to the author of a noteworthy paper on the program. This award is made through the generosity of a friend, who stipulated that his name be held in confidence and not given to the public. Under the conditions, as established and published in the annual programs for several years, all papers listed are automatically eligible, save presidential and vice-presidential addresses and invited papers given at general sessions. The committee on awards is not assigned the impossible task of selecting "the best" paper but only a noteworthy contribution to science which has not been previously published. It was the expressed desire of the donor to assist and stimulate younger men rather than to bestow further honors on older workers.

The eleventh award of the prize was made at Boston by the unanimous report of the committee to Dr. Reuben L. Kahn, of the University of Michigan, for his paper entitled "Tissue Reactions in Immunity:

The Specific Reacting Capacities of Different Tissues of an Immunized Animal."

DR. REUBEN L. KAHN AND HIS WORK

The rise of Reuben L. Kahn in the world of science is the story of making dreams come true by devotion to an ideal. Dr. Kahn would not admit this. He would insist that his contributions are the result of the educational opportunities opened up to him in America, where he was brought by his parents from Kovno, Lithuania, when twelve years old. From his childhood he dreamed of being a great physician, but after completing the first two years of medical studies at Valparaiso University, in Indiana, from 1907 to 1909, he decided that his life work was in the field of the basic medical sciences. After obtaining his B.Sc. degree at Valparaiso in 1911, he spent two years in Mendel's laboratory at Yale University, where he learned the mechanics of research. On receiving his M.S. degree in physiological chemistry from Yale in 1913, he accepted a position as serologist in the New York City Health Department. His work in that department attracted him to bacteriology. In 1915–16 we find him a graduate student with Dr. William H. Park. His doctor's thesis was based on complement fixation with protein fractions. He was awarded the degree of doctor of science from New York University in 1916. It should be mentioned in this connection that during his student days many of his friends, who saw promise in him, suggested that he go to laboratories abroad for further study. His reply was that because of his indebtedness to America for the opportunities it opened to him, it was his duty to contribute what he might to the development of American science. He was convinced that equally great opportunities existed in this country and that it was no longer necessary to go abroad to seek them.

During 1917–19, we find Dr. Kahn as first lieutenant and captain, respectively, in the Sanitary Corps of the U. S. Army. He published several papers during that period, dealing with the detection of *Bacillus coli* in water. But his more significant studies began to come from the laboratories of the Michigan Department of Health, organized soon after the world war, where he accepted, in January, 1920, a position as chief of the serologic laboratory. After publishing a number of articles on the phenomenon of complement fixation, he turned his attention to the phenomenon of precipitation, with special reference to the serodiagnosis of syphilis. This work led to the development of the Kahn test. These studies form the basis of a number of other precipitation tests for syphilis which followed. In 1928, Dr. Kahn was invited to become director of laboratories of the university hospital and assistant professor of bacteriology at the University of Michigan.

The interest of the League of Nations Health Committee in the Kahn test can be readily understood. A function of that committee is to advise nations as to the knowledge available in the field of public health. Dr. Kahn attended, as the sole American representative, the competitive serologic conferences at Copenhagen (1928) and Montevideo (1930) at the invitation of that committee. He was kept in Europe more than three months in order to demonstrate his test in various medical centers. After the Montevideo conference he gave a special course in serology at the invitation of the Uruguayan government.

Dr. Kahn's interest in the reactions of the fixed tissues in immunized animals has its beginning in his failure to perfect a diagnostic blood test for tuberculosis. This led him to investigate tissue reactions in tuberculosis and more especially the nature of the tuberculin test. The marked divergence of opinion as to the mechanism of this test forced him to the conclusion that insufficient fundamental work had been done in the realm of tissue reactions in infected animals.

The first series of studies appeared in March, 1933, in the *Proceedings* of the Society for Experimental Biology and Medicine, under the general heading of "Studies on Sensitization." The second series of papers, to which the entire October, 1933, issue of the *Journal of Immunology* was devoted, appeared under the general heading of "Tissue Reactions in Immunity." Space does not permit a summary of these studies, but their significance is widely acknowledged. Dr. Kahn recently had occasion to present these studies, as well as "The New Serology of Syphilis," before the immunologic sessions of the Volta Foundation at the invitation of the Royal Academy of Italy.

In his paper before the Section on Medical Sciences (N) he described a method for measuring the specific reacting capacities of different tissues of an immunized animal *in vivo* and the quantitative results given by the skin, muscle, brain and peritoneal tissues, as well as by the blood plasma. This paper will soon appear in SCIENCE.

It was the writer's pleasure to invite Dr. Kahn to appear on the program of Section N. The widespread satisfaction in his being presented with the award has been manifested by the numerous congratulatory messages he has received from colleagues in his field. His friends know that much worthy work will yet come from his laboratory.—*Walter M. Simpson.*

OFFICIAL DELEGATES AT MEETING

In accordance with the established custom, letters were sent to the foreign societies of a character similar to the American Association, inviting them to send

delegates to the Boston meeting. Many of them responded, expressing appreciation of the invitation, and some named delegates. The following foreign associations were represented at the Boston meeting by the persons named:

British Association for the Advancement of Science: Arthur Edwin Kennelly (Harvard University), and Francis Ernest Lloyd (McGill University).

French Academy of Sciences: William Morris Davis (Harvard University).

Bohemian Royal Society of Science: Henry Baldwin Ward (University of Illinois).

Many American institutions also named official delegates, while others expressed regrets at their inability to participate under existing conditions.

RESOLUTIONS ADOPTED AT BOSTON

Wide-spread interest was naturally manifested in the meetings of sections and societies convened at Boston, as well as in private discussions, concerning national and international questions confronting the country at the present time. Many communications and even formal resolutions, on such subjects, were presented for the consideration of the council. In accordance with the rules of procedure, these were subjected to careful study by the executive committee and were later considered by the council. Two resolutions approved for publication were unanimously adopted by the council in the following form:

UNEMPLOYMENT AMONG SCIENTIFIC MEN

WHEREAS, experience has shown that it is sound economic policy to accompany or, if possible, precede any large planning and construction program by scientific investigations dealing both with the general principles involved and the particular and local conditions of the problem; and,

WHEREAS, a large number of competent scientists and engineers, particularly among younger men, are at present unemployed; and,

WHEREAS, the scientific and technical skill acquired by these men through years of costly training constitutes a vital national asset which is in danger of dissipation by their diversion into other pursuits; and,

WHEREAS, the incidence of unemployment upon the technically skilled and especially upon the rising generation among them is of very great severity; therefore be it

Resolved, That the American Association for the Advancement of Science respectfully urges upon those in responsible charge of recovery and reconstruction funds, public and private, and especially upon those legislative and administrative bodies who determine the general conditions of such work, that provision be made for adequate scientific and technical cooperation in the planning and execution of these projects.

It was further voted that the officers of the association be authorized to cooperate with public and private agencies in promoting the objects of the foregoing resolution.

A DECLARATION OF INTELLECTUAL FREEDOM

The American Association for the Advancement of Science feels grave concern over persistent and threatening inroads upon intellectual freedom which have been made in recent times in many parts of the world.

Our existing liberties have been won through ages of struggle and at enormous cost. If these are lost or seriously impaired there can be no hope of continued progress in science, of justice in government, of international or domestic peace; or even of lasting material well-being.

We regard the suppression of independent thought and of its free expression as a major crime against civilization itself. Yet oppression of this sort has been inflicted upon investigators, scholars, teachers and professional men in many ways, whether by governmental action, administrative coercion, or extra-legal violence. We feel it our duty to denounce all such actions as intolerable forms of tyranny.

There can be no compromise on this issue, for even the commonwealth of learning can not endure "half slave and half free."

By our life and training as scientists and by our heritage as Americans we must stand for freedom.

BUSINESS SESSIONS

The executive committee met in Boston on Tuesday afternoon and evening and Wednesday morning, in preparation for the first session of the council. The committee also met on Thursday, Friday and Saturday mornings on adjournment of the council. The chairman, Dr. J. McKeen Cattell, presided at all sessions. The council met at three on Wednesday afternoon for a short session and on Thursday, Friday and Saturday mornings. President Russell occupied the chair at each session of the council. The items of business recorded in the minutes of the council included the consideration of the resolutions already referred to and also the following items:

1. The audited reports of the treasurer and the permanent secretary for the fiscal year ending September 30, 1933, were accepted, also the report of the permanent secretary on the membership for the corresponding period. A summary of these reports is to be found in the following section of this record of the meeting.

2. Budgets of the treasurer and permanent secretary for the fiscal year closing September 30, 1934, were presented and approved.

3. The council voted to appropriate $400 to maintain membership of the association in the Union of American Biological Societies, with the proviso that this sum should cover all obligations to the close of the year 1934.

4. The annual report of the committee on source books in the history of science, showing progress made

in completing the series, was presented and placed on file.

5. The permanent secretary reported on the symposium on nationalism held at Chicago, and was authorized to proceed to the publication of the same as provided for in the arrangement made with Dr. Duren J. H. Ward, of Denver.

6. The application of the Louisiana State Academy of Science for affiliation with the association was discussed and unanimously approved.

7. Three members of the class of 1880, recommended by the standing committee on life membership, were elected life members under the terms of the Jane M. Smith bequest, namely, Erlon R. Chadbourn (M80), Edwin Herbert Hall (M80F81), and Charles Mellen Knight (M80F04).

8. Dr. A. E. Kennelly, chairman of the committee on mathematical symbols, presented a signed report from the committee recommending "the limiting of the scope of the sectional committee in the future to the standardizing of symbols, equations and signs for formulae, leaving graphical symbols such as are used in engineering drawings to the custody of such a committee as may be set up for this purpose." The recommendation was adopted and the committee continued.

9. The permanent secretary reported the plan for printing by The Science Press of a series of occasional publications, including to date two items accepted by the executive committee, *viz.*, the report of a special committee on "The Protection by Patents of Scientific Discoveries" and the symposium on "Physical and Chemical Changes in Nerve During Activity." The plan was approved.

10. The committee on calendar reform, through the chairman, Dr. A. E. Kennelly, submitted a report which was accepted and placed on file.

11. After extended discussion it was voted to rescind the action taken on December 28, 1929, in regard to a thirteen-month calendar and to refrain at the present time from advocating any particular plan of calendar reform.

12. The permanent secretary read a communication reporting the membership of the committee on conservation and land utilization, authorized at the Chicago meeting, to consist of T. N. Carver (Harvard University), chairman, Arthur E. Morgan (Antioch College), O. E. Baker (U. S. Bureau of Agricultural Economics), Ellsworth Huntington (Yale University), and R. M. Harper (University of Alabama). The chairman was authorized to add other members as the plans were perfected.

13. Officers of the association were elected to replace those whose terms expired at this meeting. (The list is given on a preceding page.)

14. The following resolutions relative to the meeting were adopted:

Be it *resolved*, that the council of the American Association for the Advancement of Science, on the occasion of its adjournment at the fifth Boston meeting, express, on behalf of the association and of its affiliated and associated societies, its sincere appreciation and its hearty thanks to the faculties and administrative officers of the ten host institutions, Harvard University, Massachusetts Institute of Technology, Boston College, Boston University, Northeastern University, Radcliffe College, Simmons College, Tufts College, Wellesley College and Weston College, for the generous arrangements which they have made to facilitate the presentation of the large scientific program of the association and to furnish a variety of gracious hospitality; be it further

Resolved, that the council express its special gratitude to Dean S. C. Prescott, *chairman*, and to the other members of the local committee for their notable contribution in carrying through the many operations necessary to the success of the meeting; be it further

Resolved, that the council recognizes its peculiar indebtedness to Dr. Serge Koussevitzky and the Boston Symphony Orchestra for the testimonial concert which they so generously offered to us; be it further

Resolved, that the council express its thanks and appreciation to various press services which have so promptly disseminated the news of the meeting, and to the Boston Chamber of Commerce and the Hotel Statler for special facilities provided toward the efficient conduct of the meeting; be it further

Resolved, that copies of these resolutions be sent to the organizations and individuals concerned.

FINANCIAL AND MEMBERSHIP REPORT

The audited report of the treasurer, for the fiscal year ending September 30, 1933, reported endowment funds amounting to $203,374.83, according to cost or appraised values of the securities when acquired. Invested funds of the association produced 4.25 per cent. on its total investment for the fiscal year ending September 30. Despite these trying times, the association is in a comfortable position so far as income from its endowment is concerned.

The treasurer's reserve fund was increased $3,617.15 and at the end of the fiscal year amounted to $19,597.96. This sum represents unappropriated accumulations of previous years. In addition, the treasurer had on hand the prize fund of $3,000 (reserved for three annual prizes, including the Boston prize). There is also in the treasurer's hands funds of the permanent secretary's office amounting to $15,668.78. These funds are partially invested in securities that can be quickly liquidated in order to meet emergencies if they should arise in the work of the Washington office.

The office of the permanent secretary completed the year with a balance of $157.47 of current income over current expenses. The audited report of the permanent secretary shows receipts of dues and entrance fees for the current year amounting to $75,864.07. Delayed payments of dues for earlier years and advance payments amounted to $1,634.71. During the year $2,000 in life-membership fees were collected and turned over to the treasurer for the endowment fund, and $1,539 was received from the treasurer for journal subscriptions for life members. The total amount paid to the publishers of SCIENCE for members' journal subscriptions was $47,902.09. Division allowances and allowances to affiliated state academies to the amount of $3,600.50 were paid. General ex-

penses of the Washington office were $18,021.44. Income from the Atlantic City meeting was $4,405.81, and expenses of the meeting paid out of current income was $7,058.03. These expenses were in addition to local expenses paid out of funds raised locally, amounting to about $4,000. Corresponding income and expenses for the Chicago meeting were $2,194 and $4,168.20, respectively.

The appropriable funds of the association on September 30 were as follows:

Treasurer's office:		
Accumulated available funds		$19,597.96
Treasurer's income, 1932–33		8,835.82
Prize fund		3,000.00
		$31,433.78
Permanent Secretary's office:		
Accumulated available funds	$15,006.97	
Funds for specific purposes	4,034.79	
		19,041.76
Total appropriable funds		**$50,475.54**

Appropriations made subsequent to September 30 are as follows:

Three emeritus life memberships (income from Jane M. Smith fund)	$300.00
Three emeritus annual memberships (income from Luella A. Owen fund)	15.00
Life membership journal subscriptions	1,536.00
Treasurer's safe-deposit box (including tax)	22.00
Boston prize	1,000.00
Union of American Biological Societies	400.00

The following table will show the status of membership on September 30 of 1932 and 1933:

	Sept. 30 1932	Sept. 30 1933
Sustaining members	1	1
Life members	512	511
Annual members, paid up	16,931	15,216
Total in good standing	**17,444**	**15,728**
Members in arrears for one year	1,432	1,644
Members in arrears for two years	789	1,177
Total enrolment	**19,665**	**18,549**

During the fiscal year 1933, 823 members were added to the membership list, while 1,939 were removed on account of resignations and deaths. (S. W.)

FINANCIAL REPORTS

OFFICE OF THE TREASURER

BALANCE SHEET
September 30, 1933

Assets

Investments		
Securities		$230,737.83
Cash		
Income account	$8,836.07	
Reserve for current needs	11,051.49	19,887.56
		$250,625.39

Liabilities

Endowment and Other Funds		
W. Hudson Stephens	$4,381.21	
Richard T. Colburn	85,586.45	
Michael P. Rich	10,000.00	
Hector E. Maiben	31,448.17	
Luella A. Owen	500.00	
Friends of Association	3,559.00	
Sustaining Membership Fees	7,000.00	
Life-Membership Fees	53,200.00	
Jane M. Smith	7,700.00	
Reserve Fund	19,597.96	
Emergency Reserve Fund	15,668.78	**238,641.57**
Grants		
Frederick T. Lord		148.00
Prize fund		3,000.00
Accumulated income unappropriated		8,835.82
		$250,625.39

CASH STATEMENT
October 1, 1932, to September 30, 1933

Receipts

Balance from last report		$32,255.18
Life-membership fees	$2,100.00	
Estate of Luella A. Owen	500.00	
Ben Maiben mortgage curtailment	2,000.00	
Interest on investments and bank balance	10,154.08	
Purchased interest on bonds	248.60	15,002.68
		$47,257.86

Disbursements

Investments:		
$5,000 New York Edison Co. Series C 5s, 1951	$5,300.00	
$5,000 Brooklyn Edison Co. General Mortgage 5s, 1952	5,275.00	
$5,000 Consolidated Gas of New York 5s, 1957	5,062.50	
$5,000 Brooklyn Union Gas Co. Deb. 5s, 1950	5,100.00	
	$20,737.50	
Interest purchased	248.60	**$20,986.10**
Grants allotted by Council:		
C. F. Roos	1,000.00	
Henry B. Ward	800.00	
H. T. Stetson	500.00	**2,300.00**
Honorarium—Philip Fox, secretary of the Committee on Foreign Guests, Chicago meeting		1,000.00
Prize fund, Henry Eyring		1,000.00
Jane M. Smith, three emeritus life memberships		300.00
Life-membership subscriptions to SCIENCE		1,539.00
Safe deposit box, collection charge, and U. S. tax on checks		27.20
Maiben lecture, Henry N. Russell		218.00
		$27,370.30
Cash on hand		19,887.56
		$47,257.86

To the Executive Committee of the Council of the American Association for the Advancement of Science:

This is to certify that I have examined the accounts of the Treasurer of the American Association for the Advancement of Science for the year ending September 30, 1933, and have verified the list of securities representing the investments of the Association and have satisfied myself that the income therefrom has been duly credited.

The financial statements accompanying the Treasurer's report correctly summarize his accounts and are in accord with the books of the Association.

W. J. HUMPHREYS,
Auditor.

DECEMBER 8, 1933.

RECEIPTS AND DISBURSEMENTS OF THE PERMANENT SECRETARY'S OFFICE
FOR THE FISCAL YEAR 1932–33
(October 1, 1932, to September 30, 1933)

Dr.

To balance from last account:		
Publication fund	$4,280.88	
Available for general purposes	5,568.62	
Emergency fund	5,000.00	
Special fund for Committee on Place of Science in Education	2,091.10	
Special fund for Committee on Popular Science Reading Lists	2,667.91	
Special fund for Joint Committee for Promotion of Research in Colleges	34.47	**$19,642.98**
To receipts from membership dues and fees:		
Annual dues, previous to 1932	31.50	

Annual dues for 1932	738.50	
Annual dues for 1933	75,664.07	
Advance payment for dues, etc.	864.71	
Entrance fees	200.00	
Life-membership fees	2,000.00	**$79,498.78**
To other general receipts:		
Life-membership journal subscriptions (from Treasurer)	1,539.00	
Interest on bank accounts	992.20	
Sales of Proceedings Volumes	34.00	
Sales of Booklists	55.43	
Miscellaneous Receipts	44.00	
Overpayments	24.00	
Committee of One Hundred (from Treasurer)	99.86	**2,788.49**
To special journal subscriptions:		
SCIENCE and *Scientific Monthly*	2,459.50	
Science News Letter	564.00	**3,023.50**
To sales of Stabilization of Employment		653.50
To Atlantic City meeting:		
Registration fees	1,961.00	
Exhibition-receipts from exhibitors	2,444.81	**4,405.81**
To Chicago meeting:		
Registration fees	1,151.00	
Sales of dinner tickets	543.00	
Gift for "National" symposium	500.00	**2,194.00**
To Boston meeting:		
Registration fee	1.00	
Exhibition-receipts from exhibitors	490.00	**491.00**
		$112,698.06

Cr.		
By subscriptions to official journal, including foreign postage		$47,902.09
By Division and Academy allowances:		
Divisions	$2,001.00	
Affiliated academies	1,599.50	**3,600.50**
By expenses, Washington office:		
Salaries	13,672.52	
Office and addressograph supplies	325.70	
Printing and stationery	1,512.98	
Telephone and telegraph	117.98	
Postage	1,928.97	
Exchange	57.99	
Express, freight and drayage	14.60	
Office furniture and equipment	152.87	
Miscellaneous expense	237.83	**18,021.44**
By circularization, inviting new members		3,884.20
By miscellaneous expenditures:		
Life-membership fees to Treasurer	2,200.00	
Refunds of overpayments	24.00	
Atlantic City meeting:		
General expenses	$2,384.44	
Travel expenses, Executive Committee	600.68	
Travel expenses, Section Secretaries	1,061.96	
Miscellaneous expenses. Section Secretaries	526.66	
Exhibition	2,018.27	
Press Service	466.02	**7,058.03**
Chicago meeting:		
General expenses	2,345.09	
"National" symposium	132.61	
Travel expenses, Executive Committee	260.52	
Travel expenses, Section Secretaries	692.92	
Miscellaneous expenses. Section Secretaries	227.88	
Press Service	509.18	**4,168.20**
Boston meeting:		
General expenses	292.49	
Exhibition	901.91	**1,194.40**
Appropriation to Syracuse local committee		317.03
Other travel expenses		677.19
General Secretary's office		27.00 **15,665.85**
By printing Stabilization of Employment, including advertising		713.56
By expenses, Committee on Place of Science in Education		188.07
By expenses, Committee on Popular Science Reading Lists		644.09
By special journal subscriptions:		
SCIENCE and *Scientific Monthly*	2,465.50	
Science News Letter	571.00	**3,036.50**
		93,656.30
By new cash balances:		
Publication fund	4,280.88	
Available for general purposes	5,726.09	
Emergency fund	5,000.00	
Special fund for Committee on Place of Science in Education	1,903.03	
Special fund for Committee on Popular Science Reading Lists	2,131.76	**19,041.76**
		$112,698.06
Cash in banks:		
American Security and Trust Co. (Checking account)		286.21
American Security and Trust Co. (Savings account)		1,187.02
Riggs National Bank (Savings account)		1,899.75
Reserve in Treasurer's hands		15,668.78
		$19,041.76

Dr. Henry B. Ward, Permanent Secretary,
American Association for the Advancement of Science,
Smithsonian Institution Building,
Washington, D. C.

DEAR DOCTOR WARD:

At my request, Mr. R. L. Reyman, accountant for the Interstate Commerce Commission, has examined the books and accounts of the permanent Secretary's office for the year ending September 30, 1933. His report is as follows:

"This is to certify that I have examined the records of the receipts and disbursements of the American Association for the Advancement of Science for the twelve months ending September 30, 1933, and have found such records to have been correctly kept.

"Proper vouchers were shown for all disbursements."

I have every reason to believe that Mr. Reyman's certificate reflects the true condition of the accounts of the Permanent Secretary's office.

Yours very truly,

W. J. HUMPHREYS,
Auditor.

SESSIONS OF THE SECRETARIES' CONFERENCE AND THE ACADEMY CONFERENCE

The Academy Conference, which acts as a standing committee of the association devoted to the 28 regional academies of science that are affiliated with the association and to their relations with the latter, held its annual session at the Hotel Statler on Wednesday morning and afternoon. The session, which included the regular academy luncheon, was well attended by academy representatives and several important matters were discussed. Dr. S. W. Bilsing (Texas A. and M. College) is secretary.

The Secretaries' Conference, which also acts as a standing committee of the association, held its annual session on Sunday at the Hotel Statler. This conference comprises the 11 members of the association's

executive committee and the 15 secretaries of its sections, as well as the 74 secretaries of the scientific societies that are affiliated with it. The conference furnishes additional facilities for the informal discussion of topics concerning the relations between the societies and the larger organization, and its discussions have proved very helpful to the association's executive committee. Dr. Mark H. Ingraham (University of Wisconsin) is secretary of this conference. The Boston session was exceptionally well attended, although most of those present were obliged to delay their departure from Boston longer on this account than would otherwise have been necessary. The association greatly appreciates the helpful interest and cooperative spirit so clearly shown by the secretaries. The session was opened in the forenoon and was adjourned for the annual secretaries' dinner, after which it was continued until the middle of the afternoon. (B. E. L.)

MEETING OF TEACHERS OF SCIENCE

As instructed by vote of the council of the American Association for the Advancement of Science, the Committee on The Place of Science in Education organized a day's program in the interests of science teachers. The topics discussed were: Experiments in teaching scientific method, the science teacher's scholarship, experiment with science clubs and the work of organizations of science teachers. These topics were discussed by representatives of at least fifteen science teachers' organizations of wide geographic distribution. At the luncheon conference Dr. John C. Merriam spoke on "Some Reactions of Science upon Those Who Study It." This conference was attended by more than one hundred teachers of science, with Professors J. McKeen Cattell, E. G. Conklin, Kirtley F. Mather, A. H. Compton and E. L. Thorndike as guests.

By vote of those attending, the association committee was requested to prepare another one-day program for next year's meetings at Pittsburgh. Also a committee was appointed, including Drs. H. A. Carpenter and W. L. Eikenberry, with others to be added, to cooperate regarding the Pittsburgh program. The Committee on The Place of Science in Education consists of O. W. Caldwell, *chairman,* Jerome Isenbarger, Burton E. Livingston and Morris Meister.

THE ANNUAL SCIENCE EXHIBITION

(By F. C. Brown, director of exhibits, and W. R. Miles, Yale University)

The annual science exhibition was held in Memorial Hall, Harvard University, from Wednesday to Saturday evening and was distinctive in many ways. For the first time in many years the applications for space exceeded the supply available. Also the association had the unusual experience of an exhibition that was self-supporting.

In general the outstanding universities and research laboratories participated. There was no complete presentation of a field of work comparable to the presentation of cosmic rays at Atlantic City; nevertheless, the exhibits attracted great interest. The character of the displays and demonstrations from industrial laboratories and commercial institutions probably excelled that of any previous exhibition. The exhibition floor was fairly comfortable and uniformly filled from the opening until the closing hour, and there was disturbing congestion only a few times.

The lounge was also a happy innovation. It was a designated meeting place for members of the association and was attractive generally. The Science Library contained practically all the science books and periodicals of the year. The catalog of the 1933 science books was distributed on demand. Besides these service functions the registration and information department was always busy and helped greatly to insure the success of the exhibition. The value of a common meeting place for the workers and teachers in science with those who furnish the materials, accessories and publications was well demonstrated this year. It looks as though the time was approaching when the science exhibition will be the leading common attraction at the annual meetings.

Among the unique features were the displays of the Student Science Clubs of America, the New England Association of Mathematics Teachers and the New England Biological Association. The working research laboratory in psychology was continually filled and overflowing.

One item which commended especial attention was the work carried on as part of Dr. Miles' Later Maturity Study, a series of psychological tests calculated to measure the verbal, reasoning and mathematical abilities, with visual apparatus for examining some features of creative imagination. Certain interests and attitudes, especially those which comprise the personality constellation known as introversion and extroversion, were sampled by these tests, as was also sensitiveness to annoyances in the form of certain common types of sensory experience. The purpose of the tests was the further accumulation of responses from representative individuals in the various decades and half decades of adult life. About 300 members of the association and others in attendance at the Boston meeting availed themselves of this opportunity to contribute to this scientific appraisal of human abilities throughout the life span and to secure for themselves relative ratings of their own responses based on norms derived from a rather large population examined during the last five years.

SCIENTIFIC SESSIONS

SECTION ON MATHEMATICS (A)

(Report from E. R. Hedrick)

The meetings of Section A were held in conjunction with those of the American Mathematical Society and the Mathematical Association of America. The American Mathematical Society held daily meetings from Tuesday evening until Friday morning. The meeting on Thursday afternoon and the annual dinner of all the mathematical organizations on Thursday evening were held at the Massachusetts Institute of Technology; the other meetings were held in Longfellow Hall of Radcliffe College. In point of attendance and in number of papers presented the meeting was second only to the Christmas meeting of 1928 in New York City. At the general sessions of the society on Tuesday, Wednesday and Thursday, ninety-five short papers were presented by their authors, in addition to the longer papers presented by invitation, which are described below. Abstracts of these will be printed in the January issue of the *Bulletin* of the society, and a general account of the meeting of the society will appear in the March issue. On Wednesday morning one session of the society was devoted to analysis and one to a symposium of invited papers on the topic of "Probability"; at the latter the American Physical Society and Section B of the association were guests. Professor D. J. Struik presided, and four invited papers were presented as follows: "Remarks on Causality and Probability," by Professor Eberhard Hopf (Massachusetts Institute of Technology); "Foundations of Probability in the Natural Sciences," by Professor Felix Bernstein (Columbia University); "The Probability of Position in a Canonical Ensemble," by Professor G. E. Uhlenbeck (University of Michigan); and "The Brownian Motion," by Professor Norbert Wiener (Massachusetts Institute of Technology). On account of the illness of the author, Dr. Borge Jessen, the fifth paper, "Some Analytical Problems Relating to Probability," was omitted. The attendance at this meeting was large, and there was lively discussion of the papers. On Thursday morning occurred the annual business meeting and election of officers of the society, followed by a presentation of the Bôcher Memorial Prize, which was divided between Professors Marston Morse and Norbert Wiener. The recipients gave brief accounts of the papers on which the awards were based—the memoir of the former, entitled "The Foundations of a Theory of the Calculus of Variations in the Large in m-Way Space," published in volume 32 of the *Transactions* of the society; and that of the latter, entitled "Tauberian Theorems," published in volume 33 of the *Annals of Mathematics*. Following this presentation, and at the request of the program committee, Professor Georges Valiron (University of Paris, now exchange professor at Harvard University) delivered an address entitled "Schwarz's Lemma; its Extensions and Applications."

The officers of the society elected for the ensuing year at this meeting are: *Vice-presidents,* Professors Marston Morse and H. S. Vandiver; *secretary,* Dean R. G. D. Richardson; *treasurer,* Professor G. W. Mullins; *associate secretaries,* Professor M. H. Ingraham and T. M. Putnam; *member editorial committee of the Bulletin,* Professor E. R. Hedrick; *member editorial committee of the Transactions,* Professor R. D. Carmichael; *member editorial board of the American Journal of Mathematics,* Professor E. T. Bell; *member editorial committee of the Colloquium Publications,* Professor E. T. Bell; *members of council,* Mr. J. R. Carson, Professors L. R. Ford, R. L. Jeffery and Oystein Ore and Dr. Warren Weaver, to serve three years, and Professor L. E. Dickson, to serve one year. The terms of President A. B. Coble, Associate Secretary J. R. Kline, various members of the committees on publication, the trustees and various members of the council continue without change throughout the year 1934.

An important feature of the meetings was the symposium on "General Analysis," held on Thursday afternoon, at which three papers were presented by invitation of the program committee: "On E. H. Moore's General Analysis: The First Theory," by Professor T. H. Hildebrandt; "On E. H. Moore's General Analysis: The Second Theory," by Professor R. W. Barnard; and "A Comparative Survey of Modern Theories of Functional Analysis," by Professor M. H. Stone. On Friday morning, at the joint session with Section A of the A. A. A. S. and the Mathematical Association of America, Professor H. H. Mitchell, as retiring vice-president of the A. A. A. S. and chairman of Section A, spoke on "Linear Groups and Finite Geometries," and Professor J. L. Coolidge, representing the Mathematical Association, spoke on "The Rise and Fall of Projective Geometry."

Professor R. E. Langer was elected *member of the section committee.* Other members of the Section Committee and the secretary of the section hold over during 1934, as previously announced. The executive committee of the section was announced, and consists of the chairman and secretary *ex-officio* and Professor Marston Morse.

The Mathematical Association of America held separate sessions on Friday afternoon and on Saturday morning. At the first session the following papers were presented by invitation: "The Study of the History of Mathematics," by Professor George Sarton (Harvard University); "Conformal Mapping with Applications to Aerofoil Theory," by Dr. J. G. Estes (Massachusetts Institute of Technology); and

"The Euclidean Process in Quadratic Fields," by Professor H. W. Brinkman (Swarthmore College). The second session was devoted to mathematical logic and was attended by many who are prominent in that field; papers were presented by invitation as follows: "Logical Definitions of Extension, Class and Number," by Professor A. N. Whitehead (Harvard University); "The Richard Paradox," by Professor Alonzo Church (Princeton University); and "The Present Situation in the Foundations of Mathematics," by Dr. Kurt Gödel (Institute for Advanced Study, Princeton). At the annual business meeting and election on Friday afternoon Professor H. E. Slaught was made honorary president for life, in recognition of his unique services to the Mathematical Association; Professors A. A. Bennett and E. P. Lane were elected vice-presidents for the year 1934; and Professors R. W. Brink, D. R. Curtiss, H. L. Rietz and J. L. Walsh were elected members of the board of trustees for a three-year term. On Saturday noon, representatives of the trustees and members of the Commission on the Training and Utilization of Advanced Students in Mathematics met with members of the National Council of Teachers of Mathematics to discuss informally questions of common interest.

The annual dinner of the mathematical organizations, with more than three hundred in attendance, was held in the Walker Memorial Building of the Massachusetts Institute of Technology on Thursday evening. Professor J. L. Coolidge presided, and President K. T. Compton of the institute gave an address of welcome. Speeches were made by Presidents A. B. Coble, of the society, and Arnold Dresden, of the association, and by Professors Archibald Henderson and Helen A. Merrill. At the invitation of Professor and Mrs. J. L. Coolidge, the mathematicians were entertained at tea in Lowell House on Wednesday afternoon. There were also many other entertainments, including a visit to the Isabella Stewart Gardner Museum on Thursday and a tea given by courtesy of President Ada L. Comstock, of Radcliffe College, at the Agassiz House. After the session on Thursday afternoon, there was an exhibition of the important machines, charts, and electrical integraph owned by the Massachusetts Institute of Technology.

SECTION ON PHYSICS (B)

(Reports from Henry A. Barton, Charles F. Brooks, M. N. States)

Section B held a joint session with the American Physical Society on December 29, with Dr. C. J. Davisson, vice-president and chairman of the section, presiding. Dr. Paul D. Foote (Gulf Research and Development Corporation) delivered his address as retiring president of the American Physical Society. He spoke effectively about the need for physics and physicists to give closer attention to the industrial field than they have in the past, pointing out that employment for physicists and funds for their research are directly or ultimately made available through industrially important and profitable applications of the science. His address was followed by that of Professor D. L. Webster (Stanford University) as retiring vice-president of the section, who spoke on "Current Progress in X-ray Physics." The third and final address of the session was delivered by Professor James Franck (formerly of the University of Göttingen, at present guest lecturer at Harvard University and the Massachusetts Institute of Technology), who spoke on his new work on "Hydrogen Solution in Palladium."

The meetings of the American Physical Society, an affiliate of the association, began on the morning of December 28 and ended on the afternoon of December 30. About sixty-five papers were delivered, including the three previously mentioned addresses and the three invited papers of a "Symposium on Nuclear Physics," held on Thursday afternoon. This symposium was the outstanding feature of the meeting and was devoted mainly to those aspects of nuclear physics concerned with the newly discovered positive electron or "positron." The great importance and far-reaching effect of this discovery was signalized by the careful development accorded the subject by the three authors. The theoretical background contained in the prophetic theory of Dirac was presented by Professor G. E. Uhlenbeck (University of Michigan). The experimental aspects of the discovery and of greatly extended original work were presented by Dr. Carl D. Anderson (California Institute of Technology), his paper being illustrated by many remarkable slides obtained with the use of cloud chambers. Professor J. R. Oppenheimer (University of California), speaking on "The Theory of the Electron and Positive," disclosed original theoretical advances starting from the theory of Dirac, and discussed known and predicted experimental confirmation of this extended theory. A list of the remaining papers may be found in a forthcoming issue of *The Physical Review*. They dealt with many problems in research technique; one session was devoted mainly to papers on atomic spectra, another to molecular spectra, and a third to x-rays and their use in researches on matter in the solid state. Special mention should be made of a series of important papers on cosmic rays which revealed a rapidly growing fund of experimentally well-established facts, giving hope that a generally acceptable interpretation may not be far removed. The society held a dinner jointly with the American Association of Physics Teachers on the evening of December 29.

The American Meteorological Society held three sessions, with 20 papers and an ultra-high-frequency radio rebroadcast demonstration, in the mornings of December 28 to 29, and four informal excursions to meteorological points of interest. Professor C. G. Rossby (Massachusetts Institute of Technology), opened the program with a paper, "On the Formation of Solenoids in the Atmosphere," a theoretical discussion of general wave motions. Dr. J. Bjerknes (Bergen, Norway), followed with a theoretical paper on "Atmospheric Convection," in which adjusted and unadjusted convections were compared. Dr. Bernhard Haurwitz (Harvard University) then presented "Daytime radiation at Blue Hill in 1933," showing a close correlation between the total radiation and the simple duration of bright sunshine. Dr. H. H. Kimball (Harvard University) presented another radiation paper, showing that the changes in atmospheric temperature during the eclipse of August 31, 1932, were strictly in accordance with the changes in radiation received at the earth's surface, both in the clear and the cloudy areas. A paper by Eleanor S. Brooks showed graphically the effect of the eclipse on air temperatures throughout the United States, based on reports from nearly 300 stations—Weather Bureau and others—sent to Blue Hill Observatory. Where the eclipse was total or nearly so the temperature change ascribable to the eclipse was found to range from 9° or 10° F. where the sky was clear, to one degree or less in regions of dense cloudiness, on cloudy mountains and at sea. The eclipse effect was definitely recognizable as far as the zone of 30 per cent. obscuration.

In a progress report on the Mt. Washington Observatory, Mr. S. Pagliuca described the special meteorological apparatus used to meet the extraordinarily severe weather there, and presented a summary of the weather in 1933. The maximum wind velocity measured was 164 miles per hour, a wind not too strong, however, to prevent outdoor work!

President K. T. Compton (Massachusetts Institute of Technology), presented the main features of a recent committee report on the work of the U. S. Weather Bureau (published in full in SCIENCE for December 22 and 29, 1933). These interesting recommendations, which a letter from Chief C. F. Marvin indicated were heartily endorsed by the Weather Bureau, were discussed at length by the society.

A group of three papers dealt with broad features of weather changes. Dr. Dean A. Pack showed that variations in rainfall from decade to decade were greater than could be expected by chance. Mr. Homer W. Clough indicated that the warm and dry phase of several cycles would culminate in this century almost simultaneously, and that excessive droughtiness and major migrations of peoples in marginal areas could be expected. Mr. H. Helm Clayton showed the close relation between variations in sunspot numbers or solar constant values and coincident fluctuations of weather the world over, though with different expressions in different regions and at different periods of years at the same stations. The interesting reminiscences of an official weather man in an agricultural-industrial region of upstate New York were presented on behalf of Mr. T. E. Reed. The use of a combination map for winds and cloud movements at different levels in the atmosphere was urged by Dr. I. M. Cline (U. S. Weather Bureau, New Orleans) as more advantageous than a number of separate maps. Photographs of noctilucent clouds were shown by Mr. E. H. Vestine (Canadian Meterological Service), who explained that these clouds of around 80 km height, formerly thought to be due to volcanic dust, are clouds of meteoric dust which reflect the sunlight long after general twilight has ended. Mr. Evans S. Schmelling (University of Michigan) gave an account of the meteorological work of the Michigan-Pan-American Airways expedition. At lower levels the downslope winds blow out from the very cold interior, of the ice cap, near zero F. even in summer, and at higher levels there is an inflowing compensatory circulation. Mr. Greenleaf W. Pickard (Harvard University) showed that some of the large variations in strength of ultra-high-frequency radio transmission between a network of high and low stations in New England, including one on Mt. Washington, were apparently related to the weather. Inversions of temperature and the presence of thunder-storms appeared to favor the transmission, due possibly to refraction in the former and to reflection from highly electrified upper cloud shelves in the latter. Some aspects of aerology on Mt. Washington were presented by S. P. Fergusson and Irving I. Schell (Harvard University). Mr. Fergusson flew meteorological kites from the top of the mountain and discovered that the effect of the mountain on air temperature was limited to a layer of only some 50 meters above the mountain. Meterological airplane ascents with apparatus loaned by M. I. T. extended the data obtainable by kites. Mr. Schell, besides operating the airplane meteorograph, made a special study of mountain and valley winds near Mt. Washington, using pilot balloons to aid. He found support for the theory that these local breezes are closed circulations due to the air on the mountain slope being cooler at night and warmer by day than the free air at the same level. Dr. K. O. Lange (Massachusetts Institute of Technology) described the various kinds of ice that form on aircraft and explained how ice can form at humidities below 100 per cent. and at air temperatures above the freezing point. He suggested the use of both temperature and humidity indicators to warn the pilot in flight.

The society adopted resolutions heartily approving the report of the committee of the Science Advisory Board on the U. S. Weather Bureau and emphasizing particularly the desirability of keeping the Weather Bureau as an independent unified organization for handling all governmental matters in connection with meteorology, weather and weather forecasting. The society also emphasized the importance of research toward improvement in short-range forecasting, particularly the introduction of air-mass analysis, and the critical investigation of all means of making long-range weather predictions. An increase in the number of weather maps made daily and an extension of the published map to include the entire northern hemisphere were favored. The polar front and air-mass analysis work of the Massachusetts Institute of Technology was highly commended, and great interest was expressed in the work of the Mt. Washington Observatory and of the Greenland expeditions, with the hope that this work can be continued. The society resolved to exert every effort to promote systematic meteorological instruction and research in our American institutions. The following officers were elected: *President,* Isaac M. Cline (U. S. Weather Bureau, New Orleans, La.); *vice-president,* Edward L. Wells (U. S. Weather Bureau, Portland, Ore.); *secretary,* Charles F. Brooks (Harvard University); *treasurer,* Willis Ray Gregg (U. S. Weather Bureau, Washington, D. C.); *councilors* (3 years), S. P. Fergusson (Harvard University), John A. Fleming (Carnegie Institution of Washington), J. C. Gomez (Mexican Weather Service, Tacubaya), W. J. Humphreys (U. S. Weather Bureau, Washington, D. C.), Andrew Thomson (Canadian Meteorological Service, Toronto).

The Boston meeting of the American Association of Physics Teachers was a happy climax to a most successful year, the third of the association. The work of the committee on tests, under the leadership of Professor C. J. Lapp (University of Iowa), was an outstanding achievement of the year, and its report was an important and significant feature of the meetings. Twenty-two colleges and universities cooperated with the committee by giving standards tests prepared by the committee to their students. The result of these preliminary examinations was so satisfactory that already 130 colleges and universities have consented to cooperate with the committee during the present school year. Demonstration lectures by Professors N. Henry Black and G. W. Pierce (Harvard University), Professor Hans Mueller (Massachusetts Institute of Technology) and Professor D. C. Miller (Case School of Applied Science) both delighted and instructed members of the association. The attendance at these special programs was in excess of two hundred. The wealth of material presented and the technique illustrated by the speakers themselves were extremely helpful to those interested in the teaching of college physics. Papers presented by other members of the association on a variety of subjects contributed to the success of the meeting. *The American Physics Teacher,* the official journal of the American Association of Physics Teachers, closed its first year with a highly satisfactory record and will present next year material of increasing importance to the teachers of college physics; this is largely responsible for the continued interest in the association which now has a membership of 438 in good standing. Efforts will be made during the coming year to increase this number so that the work may be made of value to a larger group.

SECTION ON CHEMISTRY (C)

(Report from J. H. Simons)

The meeting of Section C began with a symposium on "The Chemical Revolution," held at a joint session with Section K. The papers presented stressed the economic significance of chemistry and chemical research and showed their importance in international trade, in our social structure and, in reference to particular industries, to our material and economic advancement. Professor Wallace B. Donham (Harvard Graduate School of Business Administration) presided and gave the first paper. In this he compared chemistry to a great conqueror, with the entire world as the conquered, pointing out the privileges and power of it as such, but stressing as well its responsibilities. He emphasized that great effort should be placed upon the increase and improvement of products to supplement the improvement of processes. Professor G. B. Roorbach discussed the repercussions in international trade brought about by chemical change. Four papers dealing with the economic readjustment due to changes in the chemical industry were given. Dr. Arthur D. Little discussed plastics; Dr. George D. Kratz, rubber; Dr. Chaplin Tyler, nitrogen; and Dr. Samuel L. Hoyt, in a paper read by title, metals. Dr. Hoyt's paper pointed out in a very clear manner the importance of chemical research for our material welfare. He showed that the products of chemical research had placed the automobile, electric lighting, etc., economically within reach of the majority of the people. He also pointed out the false economy of the present stopping of research in such places as the Bureau of Mines, the Bureau of Standards, etc., showing how research operated to establish great new industries and thus place many men in permanent employment.

At a session for contributed papers held on Friday morning, five excellent papers were presented. Joseph M. Looney and Roy G. Hoskins reported on "The Effect of Dinitrophenol on the Metabolism as Seen in Schizophrenic Patients." This was a careful

study on a number of patients in which blood and urine analyses, metabolic rate, blood pressure, pulse, temperature and body weight were followed. Allan Winter Rowe gave a paper on "The Energy Exchange in Pituitary Dwarfs and Giants." Burnham S. Walker and Elisabeth W. Walker reported on "Rapid Estimation of Alkaloids in Body Fluids." An extensive study of a filtrable virus was reported by C. G. Vinson in his paper on "Chemical Work on a Virus Disease (Tobacco Mosaic)." H. Gershinowitz and O. K. Rice gave a paper entitled "On the Activation Energy of Unimolecular Reactions." Illness, coupled with the extremely cold weather, prevented the presentation of a paper by I. Newton Kugelmass on "Accelerating the Growth of Children." The address of the retiring vice-president, Frank C. Whitmore, on "Some General Aspects of the Polymerization and Depolymerization of Olefins" was given in a session on Friday afternoon. By a careful application of the electronic concept of valence, Dr. Whitmore showed how new and important results in organic chemistry could be obtained. Later in the afternoon the section was entertained at tea at the John Winthrop House and an opportunity given for the inspection of this new development in American college life. Tea was also served at Radcliffe College and the new laboratories there were open for inspection. With the cooperation of the Northeastern Section of the American Chemical Society a dinner and evening session were held. Dr. Allan Winter Rowe served as toastmaster at the dinner and entertained in a delightful manner the large group assembled. Lafayette B. Mendel gave the address of the evening, "The Challenge of Nutrition to the Chemist." In this address Dr. Mendel pointed out the importance of the work which has been done in this field, but emphasized in particular the need and great value of more research. He showed the opportunity for service to humanity for research workers entering this field.

SECTION ON ASTRONOMY (D)

(Report from Harlan T. Stetson)

The astronomical interests at the Boston meeting of the association were represented by the combined meetings of Section D with the American Astronomical Society, and by the program of Saturday evening, when the joint meeting of the American Association with that of the American Academy of Arts and Sciences was the occasion of the presentation of the Rumford Medal to Dr. Harlow Shapley (director of the Harvard Observatory). Section D and the Astronomical Society held four sessions for the presentation of technical papers, which were representative of the wide variety of astronomical research in progress in the United States and Canada. Two outstanding papers, dealing with galactic structure, deserve special mention as features of the opening and closing sessions of the section. The first of these was "The Distance and Direction to the Galactic Center from the Rotational Constants of the Class B Stars," by J. S. Plaskett and J. A. Pearce (Dominion Astrophysical Observatory). From an extensive study of radial motions of this class of stars, supplementing that reported to the association at the Cleveland meeting by Dr. Plaskett in his retiring vice-presidential address in 1930, the authors find from their observations remarkable confirmation of a rotation of our entire galaxy about a center substantially coincident with that located by Dr. Shapley from his photometric surveys to lie in the direction of the constellation Sagittarius and distant about 33,000 light years. The second paper was by Harlow Shapley, entitled "Notes on the Diameters of Galaxies." Dr. Shapley exhibited the results of recent studies of plates made at the new Oak Ridge station of the Harvard Observatory, which showed that the measurable diameter of many spirals had been extended 100 per cent., and in some cases more, by means of new lenses of short focus and wide angular aperture. Tracings with the microphotometer extended beyond eye estimates in studies of the new photographs. The diameter of the great nebula in Andromeda has now been found from the Harvard plates to confirm that recently determined by Stebbins, using the sensitive photoelectric cell in conjunction with the 100-inch telescope at the Mount Wilson Observatory in California. Dr. Stebbins' paper on "The Diameter of the Andromeda Nebula" appeared on another part of the program, with A. E. Whitford as joint author. A paper on "The Solar Corona," by J. C. Boyce, A. McKellar and D. H. Menzel, was presented by Dr. Menzel (Harvard Observatory) and gave the technical basis for the recent announcement of the discovery of certain of the "coronium" lines in the spectrum of the eclipsed sun as due to a particular transitional state in the ionized atoms of oxygen and nitrogen. A brief account of the Cornell Expedition to the Lowell Observatory, to secure ultraviolet spectra of stars with aluminum-coated mirrors, was presented by Dr. S. L. Boothroyd, head of the expedition, and attracted much interest among other papers presented at the Friday morning session. The address of the retiring vice-president of Section D, Dr. Paul W. Merrill (Mount Wilson Observatory), was a conspicuous feature of the session held on Friday afternoon. As Dr. Merrill unfortunately could not be present, his address on "Invisible Starlight" was read by Professor J. C. Duncan (Whitin Observatory, Wellesley College). Dr. V. M. Slipher, vice-president of the section, presented two papers

from the Lowell Observatory. The first, by E. C. Slipher, exhibited remarkable photographs of Saturn made during the summer of 1933, showing the extraordinary white spot which occurred at that time. The second was a paper by V. M. Slipher, summarizing the results of his recent photographic observations on the spectrum of the night sky.

The program, consisting of forty papers altogether, was brought to a close at the end of the Saturday morning session. An invitation was extended by Dr. Duncan to visit the Whitin Observatory at Wellesley, and by Dr. Shapley to visit the new Oak Ridge station of the Harvard Observatory, the new observing station being located in the town of Harvard, Mass. Those who visited Oak Ridge had the opportunity of seeing the new sixty-one inch telescope recently erected, the essential parts of the mounting being practically completed. The society dinner was held on Friday evening at the Faculty Club at Harvard University. At a meeting of the council of the American Astronomical Society, Dr. Albert Einstein was elected an honorary member of the society. The society voted to hold its summer meeting at Connecticut College, New London, Connecticut. The next winter meeting will be held at the Franklin Institute in Philadelphia.

SECTION ON GEOLOGY AND GEOGRAPHY (E)

(Report from Kirtley F. Mather)

Although the Geological Society of America and the Association of American Geographers were meeting in Chicago and Evanston during Convocation Week, Section E held three, well-attended and unusually interesting sessions on Wednesday and Thursday. In the absence of Rollin T. Chamberlin, vice-president and chairman of the section, Professor Alfred C. Lane (Tufts College) presided; D. H. Chapman served as assistant to the secretary. Abstracts of all papers presented will be published in the February issue of the *Bulletin of the Geological Society of America.*

The address of the retiring vice-president, Professor W. H. Hobbs (University of Michigan), dealt with the differences between the dynamics of glaciers in mountains and those of continental ice-sheets. Several other papers were descriptive of glacial features in New England and the northern Mississippi Valley. Professor Edward H. Perkins (Colby College) considered the origin of the Maine eskers; Irving B. Crosby described an extension of the Bethlehem, N. H., moraine; Thomas C. Brown presented the evidence of stagnant ice in glacial Lakes Hadley and Montague in the Connecticut Valley; Ernst Antevs commented on the climaxes of the last glaciation in North America; and Professor George H. White (University of New Hampshire) described the peripheral zone of stagnation of the last ice-sheet in northeast central Ohio. Considerable interest was shown in the discussion of a paper by H. T. U. Smith and H. J. Fraser concerning loessial soils in the vicinity of Boston, and in the presentation by Richard P. Goldthwait of the evidence of coastal stability secured during a study of the shell heaps near Damariscotta, Maine. Professor Harlan T. Stetson (Ohio Wesleyan University) challenged the geological students of the earth's interior to explain the changes in geographic position of points on the earth's surface, which he has correlated with the change in hour angle of the moon. Professor Frederick K. Morris (Massachusetts Institute of Technology) announced his conclusion concerning the Cretaceous age of the dinosaur eggs found in Mongolia. William C. Darrah presented a revision of the late Paleozoic time scale for North America with special reference to the Stephanian. A resolution was adopted recommending that the attention of those who supply and purchase materials for use in physics and chemistry be directed toward the importance of knowing the geological sources of such materials. Lead, calcium and other elements displaying various atomic weights are now being secured or produced in considerable quantities. It may well be that the geological source is of great significance in determining the character of such elements, and records of sources should be kept.

SECTION ON ZOOLOGICAL SCIENCES (F)

(Reports by George R. La Rue, William H. Cole, H. B. Hungerford, A. I. Bourne, Horace W. Stunkard)

Section F met jointly with the American Society of Zoologists and affiliated societies from Thursday to Saturday. At the annual dinner of the zoologists, Dr. A. S. Pearse (Duke University) gave the vice-presidential address for Section F, on the subject "Ecological Segregation." He stated: "Ecological segregation is one factor which has been associated with the production of new species which are perhaps at times produced by competitive struggling selection and at times by groups of animals which by becoming adapted to peculiar and previously unoccupied niches in environment are able to escape competition." The complete address will be published in SCIENCE.

The American Society of Zoologists held its thirty-first annual meeting from December 28 to 30. The two special features of the meetings were: (1) Inspection and demonstration of equipment and of research in progress in the new biological laboratories of Harvard University on Friday morning. Forty-seven special demonstrations in zoology and general

physiology were presented by the Harvard staff. A complete tour of inspection of the new building was also conducted on Friday morning. During the afternoon demonstrations by members of the society were successfully presented with the excellent facilities of the Harvard laboratories. (2) A symposium on "Development and Growth of the Nervous System," led by S. R. Detwiler, on Thursday afternoon, attended by about 230 persons, at which the following invitational papers were given: "Factors Influencing the Development and Segmentation of Spinal Ganglia," by S. R. Detwiler; "The Origin and Development of Cranial Ganglia Based upon Experimental Studies in Amphibia," by L. S. Stone; "The Effects of the Peripheral Fields upon Spinal Cord Development," by Victor Hamburger; and "The Growth of the Spinal Cord and Ganglia in Relation to the Functional Development of the Hind Leg in Amblystoma," by G. E. Coghill. Discussion of the papers was led by R. G. Harrison, G. H. Parker and R. L. Carpenter.

On Saturday afternoon the zoologists joined the American Society of Naturalists in their joint symposium with the geneticists and botanists, on "Biology and Society." Papers were presented as follows: "Animal Societies," by W. M. Wheeler; "Primitive Human Societies," by E. A. Hooton; and "Development of Modern Social Organizations," by F. H. Hankins. Over 300 were in attendance. On Thursday and Saturday mornings sessions were held for the reading of papers. The complete lists of titles and the abstracts will be found in the November, 1933, and the January, 1934, *Supplements* to the *Anatomical Record*. At the biologists' smoker at the Hotel Statler on Thursday evening about 600 biologists were present, and 172 attended the zoologists' dinner on Friday evening. Dr. A. S. Pearse, retiring vice-president of Section F, delivered the dinner address on "Ecological Segregation."

The following were elected officers of the American Society of Zoologists: *President,* A. H. Sturtevant; *vice-president,* H. W. Rand; *secretary,* H. B. Goodrich; *treasurer,* B. H. Willier.

The Entomological Society of America held its twenty-eighth annual meeting on Thursday and Friday. Thirty-five papers, dealing with various fields of entomological research, were presented. Among the longer papers was one given by Nathan Banks (Harvard University), dealing with entomology at the Museum of Comparative Zoology, which included many interesting points concerning the history of systematic entomology in America. Another by Dr. James G. Needham (Cornell University) presented the problems of wing venation of insects, and another, by C. M. McCay (Cornell University), discussed the use of the cockroach as a test animal for vitamin B fractions and for the quality of proteins. According to Dr. McCay, these insects may be used in the place of rats for such an assay of foods, with a saving of $300 in money and a reduction from three months to one month in securing results.

At a symposium on "Biological Control" the following papers were presented: "The Utilization of Native Parasites and Predators in Biological Control," by C. P. Claussen (U. S. Bureau of Entomology); "Methods and Results of an Experiment in Biological Control," by D. M. Daniel (New York Experiment Station, Geneva); "Non-economic Insects as Intermediate Hosts of Parasites of Economic Insects: Oriental Fruit Moth," by B. B. Pepper and B. F. Driggers (New Jersey Experiment Station); "Rearing of Native Larvae for the Recovery of Introduced Parasites," J. V. Schaffner, Jr. (Melrose Highlands, Mass.); "Recently Introduced Parasites of Three Important Forest Insects," by P. B. Dowden (Melrose Highlands, Mass.); "Biological Control Courses and Investigations in our Universities," by Alvah Peterson (Ohio State University). The annual address was given by Dr. Frank E. Lutz (American Museum of Natural History), following the entomologists' dinner, and was entitled "What's the Use?" After asking this question concerning many activities of man, especially of entomologists, the speaker proceeded to ask the same question concerning certain existing facts of nature relating to the insects and their relatives. For example, it has been stated that certain yellow crab spiders await their prey in yellow flowers. To the human eye the spiders are inconspicuous and have been assumed to be the same to the insect flower visitors upon which the spiders feed. Recent research has shown, however, that the flowers have ultra-violet patterns, while the spiders do not. Insects, on the other hand, can perceive ultra-violet, which should make the spider conspicuous; so, "what's the use?" During the past summer Dr. Lutz studied the response of certain flies to 2,537 ångstroms radiation. These waves are shorter than the ultra-violet rays of sunlight, which can reach the earth's surface and so do not occur in nature. Nevertheless, the flies responded positively to such stimuli; but, "what's the use?"

The entomological exhibits were unusually interesting and displayed fossil insects, wasp nests, ultra-violet vision of insects, exotic insects and methods of museum technique. The presiding officer at the Boston meeting was President R. E. Snodgrass. Officers elected for 1934 are: *President,* C. L. Metcalf; *first vice-president,* C. P. Van Duzee; *second vice-president,* J. McDunnough; *secretary-treasurer,* H. B. Hungerford.

The American Association of Economic Entomolo-

gists opened its program on Wednesday afternoon with the meeting of its section on plant quarantine and inspection and that on apiculture, continuing through an evening session for those sections and in addition the program of the extension entomologists. Papers of timely interest were presented and discussed, notably on the subject of the spread of the dreaded Dutch elm disease through insect carriers, and its control. The association opened its general program on Thursday with a business session, committee reports and the address, "Some Achievements in Entomology," by the president, Dr. W. E. Hinds. The afternoon program for reading of papers was run in two sections, grouping papers on field, forage and cereal insects in Section A, and shade and fruit insects in Section B. This allowed the program to be cleared for the discussion by the entire association of the papers on insecticides, and the culmination of the program in a symposium on the spray residue problem, conducted by Professor P. J. Parrott (N. Y. Experiment Station, Geneva).

The attendance at all the sessions was remarkably good, considering the inclemency of the weather, averaging 100 to 120, and at the special symposium on spray materials, 150. Approximately 30 were added to the membership and about 50 advanced to active membership. The association was found to be in sound financial condition, despite the continued financial depression.

Dr. E. F. Phillips (Cornell University) was elected *president;* Dr. F. C. Bishopp (U. S. Bureau of Entomology) *first vice-president;* and Mr. A. F. Burgess (U. S. Bureau of Entomology) *member of the executive committee.*

The American Society of Parasitologists held its ninth annual meeting on Thursday, Friday and Saturday, under the presidency of Dr. William H. Taliaferro (University of Chicago). The program contained 80 titles, and 37 of these papers were presented, either orally or by demonstration. The first three sessions were devoted to papers of general and biological interest, arranged according to subject, protozoology, helminthology and entomology. Researches on the morphology, life history, physiology and control of these parasites were reported. Several of the papers dealt with susceptibiltiy and resistance to animal parasites. Friday noon 67 members of the society met for luncheon at the Harvard Faculty Club, and the annual business meeting of the society was held after the luncheon. Friday afternoon was reserved for the annual demonstration program, an outstanding feature of the meeting which has received increased attention in recent years. The demonstrations consisted of charts, photographs and both living and mounted specimens. Dr. Strong presented his recent studies on *Oncocerca,* and Dr. Alicata a new method for sex differentiation in certain larval nematodes. The structure and developmental stages of various other parasitic worms were shown. Among the *Entamoeba* demonstrations, one by Dr. Stabler of a species parasitic in the ciliate *Zelleriella* attracted much attention. The Saturday program was devoted to medical parasitology and was held jointly with the Section on Medical Sciences (N) of the association. The morning session closed with the presidential address on "Some Cellular Bases for Immunological Processes in Parasitic Infections." Dr. Taliaferro presented an incisive analysis of immunological reactions and the results of his recent studies on malaria in birds and monkeys. It is interesting to note that his paper touched on the same subject as the one which received the association prize and that his conclusions are in substantial agreement with those of Dr. R. L. Kahn. The Saturday afternoon session was devoted to a symposium on the typhus group of organisms. Invited papers dealing with different aspects of the subject were presented by Drs. Zinsser, Pinkerton, Wolbach and Hertig (Harvard Medical School), and a paper by Dr. R. R. Parker (Rocky Mountain Spotted Fever Laboratory, U. S. Public Health Service) was read by Dr. Wolbach. Dr. Tyzzer opened the discussion after the presentation of the invited papers. At the annual business meeting the following officers were elected for 1934: *President,* E. E. Tyzzer; *vice-president,* J. E. Ackert; *council members for four years,* Eloise B. Cram and W. A. Sawyer. The *secretary,* H. W. Stunkard, and *treasurer,* Justin Andrews, elected a year ago for two-year terms continue in office next year.

SECTION ON BOTANICAL SCIENCES (G)

(Reports from S. F. Trelease, A. S. Foster, E. F. Hopkins, K. M. Wiegand, L. C. Petry, F. C. Meier, H. R. Kraybill, H. M. Fitzpatrick, Elsie G. Whitney)

Section G met in joint session with associated societies on Thursday afternoon. Dr. H. L. Shantz delivered the retiring vice-presidential address for Section G, on the general subject of botanical research. This address was followed by a program of invitation papers. Dr. M. L. Fernald discussed some beginnings of specific differentiation in plants. Dr. R. B. Thomson spoke on the organization of the young vascular plant. Dr. A. J. Eames discussed present viewpoints and tendencies in the morphology and classification of vascular plants.

The Botanical Society of America held a successful and well-attended meeting on Thursday, Friday and Saturday. The forenoons of the three days were occupied by sessions for the reading of papers before the three sections of the society. On Thursday afternoon the society met jointly with Section G. On

Friday afternoon a similar joint session was held with the Ecological Society of America. On Saturday afternoon the society met with the American Society of Naturalists, the American Society of Zoologists and the Genetics Society of America, the program consisting of a symposium on "Biology and Society." A large and unusually varied series of papers was presented at the meetings of the general section. The Thursday morning program included reports on several topics of morphological and anatomical interest, including the floral anatomy and sex reversal of hemp, the morphology of the ament in the Betulaceae, the organization and development of tissues in grass stems and the occurrence of plasmodesma in the stem and leaf tissues of Angiosperms. Other papers on this program dealt with such morphogenetic problems as the structure and fundamental nature of the cell wall of the cambium and its derivative tracheary elements, a comparison of the plant vacuole and the animal Golgi zone, the histogenetic aspects and significance of bud-scale and foliage-leaf development in Carya, and the artificial culture of the embryo of Prunus and of the embryo and endosperm of maize. The Friday morning program was largely devoted to papers dealing with cytological and cytogenetical problems and included reports on the so-called sex chromosomes of *Rumex,* the cytology of *Equisetum* and certain hybrids in this genus, meiosis in *Polygonum, Agrostis* and *Acacia,* parthenogenesis in *Erigeron, Taraxacum, Hieracium* and *Orobanche,* an experimental study of the spireme in the tentacular cells of certain insectivorous plants, and a new mutation in *Oenothera,* resulting in a structural change in the gynoecium. A paper of particular cytological and taxonomic interest dealt with the number and morphology of chromosomes in the endosperm cells of conifers and its relation to generic and specific differentiation. Other papers were presented dealing with the color of pollen grains in *Petunia,* the pollen differences in pure lines of *Cucurbita pepo,* and a quantitative analysis of morphological problems with particular reference to *Uvularia* and the Betulaceae. The program of Saturday morning included papers dealing with a wide range of botanical problems. Two papers of cytological interest were presented, one treating of the cytology of a hybrid between *Allium cepa* and *Allium fistulosum,* the other with an improved technique for obtaining root-tip smears. Other reports dealt with the wood structure of *Monopteryx uaucu,* a reconnaissance of wood structure in the *Flacourtiaceae,* an experimental study of seed germination in *Potamogeton,* a taxonomic and morphological study of certain fossil, lime-secreting marine algae, a theory dealing with petroleum oil penetration into plant tissue and protoplasm, the tissue hyperplasia induced by painting injured regions of stems and petioles with the carcinogenic agents of animals and a study of the seeds and spikes of caulescent species of *Plantago.* The following officers of the general section for the ensuing year were elected: *Chairman,* Wm. H. Eyster; *secretary,* A. S. Foster.

At the three morning meetings of the physiological section twenty-six papers were presented and discussed. Abstracts of the papers were published as usual in the December number of the *American Journal of Botany.* At the Thursday morning session several papers concerned, directly or indirectly, with the rest period of plants were used. Studies were reported on the effect of chemicals on the respiration of potato tubers and on the breaking of the rest period of plants and seeds by temperature and chemical treatments. The effect of ethylene chlorhydrin on the acid-base metabolism of potato tubers was also discussed. The session was concluded with two papers, one of which gave the results of studies indicating that the toxic action of soil treated with illuminating gas is due to hydrocyanic acid, while the other described a method for determining the relative humidity in the intercellular spaces of plant tissue. The Friday morning session was taken up principally with toxicity and nutritional phases of plant physiology. The first paper gave the results of experiments on injury to plants caused by vapors of mercury. This was followed by a report on the method for starch determinations with takadiastase. Two papers were presented on the physiological effects of deuterium or the heavy hydrogen isotope, one concerned with yeast and the other dealing with *Spirogyra.* Other papers given at this session reported studies on the location and concentration of the virus of tobacco mosaic within the cells, the effect of boron on the availability of iron, the results of investigations on the use of certain amino-acids by green plants, the effect of small amounts of copper on *Chlorella* and *Lemna,* the stimulating effect of Bordeaux mixture on potato plants and results of yarovization experiments on winter oats and barleys. The Saturday morning program was given over principally to cytological phases of physiology and to the effect of radiations on plants. The opening paper considered wetting properties of certain latex particles. This was followed by a discussion of the formation of cellulose membranes by microscopic particles. Other topics considered were the composition of the so-called middle lamella in the cambium, the nature and distribution of plasmodesma in the tobacco plant and the orientation of parenchyma. The last three papers dealt with the effect of radiations on plants; one reported an increase in ash content of plants due to radiation from a quartz mercury arc, another showed that a certain range of wave-lengths of visible light are effective in stimulating reproductive growth in *Marchantia,* and the third

described the peculiar development of fern prothalli caused by exposing the spores to x-rays. Officers elected at this meeting are: *Chairman,* Charles F. Hottes; *vice-chairman,* Sophia H. Eckerson; *member of the physiological board,* B. M. Duggar.

The first session of the systematic section, on Thursday forenoon, was devoted to a symposium on "New Approaches to the Taxonomy of the Vascular Plants." M. L. Fernald emphasized the usefulness of certain morphological characters not commonly employed in the making of specific distinctions. R. P. Wodehouse outlined the evolution of the pollen grain and its application to the determination of relationships of Angiosperm groups. The usefulness of wood structures in the delimitation of plant groups was discussed by S. J. Record. Recent advances in cytogenetics and their bearing upon problems of identification of hybrids, varieties and species were discussed by Edgar Anderson. The session of Friday forenoon was devoted to the reading of papers. The work of the committee on nomenclature directed toward the compilation of a list of locations of type specimens was described. Revisionary studies of *Arabis, Antennaria* and *Lechea* were reported. Some interesting cytogenetical results in a study of North American orchids were described. The use of electrophoresis of latex as a taxonomic method of special applicability to the Euphorbiaceae was explained in detail. Three papers dealing with geographical distribution were presented; one concerned with the evolution of the Bromeliaceae in relation to distribution, the others with the present flora of the Kentucky-Tennessee region. The first part of Saturday forenoon was given over to inspection of an exhibit of unusual specimens and old books at the Gray Herbarium. This was followed by the reading of a paper on the influence of introduced plants upon native floras by Fr. Marie-Victorin. Other papers dealt with studies of the *Batrachium* section of *Ranunculus,* and branching forms of *Polygonatum.* The afternoon session was devoted to the examination of exhibits of books and specimens at the Arnold Arboretum and the showing of motion pictures of the Atkins Institution in Cuba. At the business meeting of the section O. E. Jennings was elected chairman for the year 1934.

The annual dinner for all botanists was held on Friday evening with an attendance of 212. President E. J. Kraus, presiding, introduced Dr. J. C. Arthur, president of the society in 1919 and the senior botanist present, who spoke briefly. The retiring president, Dr. G. J. Peirce, delivered an interesting address on "Sap Hydraulics," in which a significant modification of the explanation of the mechanism of water movement in plants was suggested and supported. Election of the following new officers of the Botanical Society for 1934 was announced: *President,* E. D. Merrill; *vice-president,* H. L. Shantz.

The twenty-fifth annual meeting of the American Phytopathological Society was held from December 28 to 30. Approximately 150 members were present and 67 papers were presented at 7 sessions. There were joint sessions with Section G, with the Mycological Society of America and the Potato Association of America. The following officers were elected: N. E. Stevens, *president;* G. W. Keitt, *vice-president;* F. D. Heald, *councilor.* F. C. Meier, *secretary-treasurer,* and H. B. Humphrey, *editor-in-chief of Phytopathology,* continue. Twenty-six new members were elected, bringing the total membership of the society to 774. The contributions presented at this meeting may be classified according to subject as follows: taxonomy, 11 papers; virus diseases, 9 papers; diseases of vegetables, tobacco, cotton and other crops, 13 papers; diseases of fruits, 9 papers; diseases of cereals and forage crops, 8 papers; diseases of ornamental and forest trees, 9 papers; and potato diseases, 8 papers. The annual conference of extension work in plant pathology, held on December 28 under the chairmanship of Charles Chupp, was devoted to a discussion of the following subjects: (1) New seed disinfectants and fungicides, (2) commercial seed treatment, its advantages and limitations, (3) seed treatment and other service work in the counties, (4) emergency-garden relief work, (5) new points on illustrative material and its use.

A session on pathological activities in emergency and recovery programs, under the chairmanship of A. F. Woods, brought to light the important part that plant pathologists are at present taking in the national recovery programs and called attention to opportunities for plant pathologists to render service under present economic conditions.

On December 28 was held the annual dinner, entertainment being supplied by W. H. Weston (Harvard University), W. L. Doran (Massachusetts State College of Agriculture), F. A. Wolf (Duke University) and Fred Sparrow (Dartmouth University). Abstracts of the papers on the program of this meeting are printed in the January number of *Phytopathology.*

The tenth annual meeting of the American Society of Plant Physiologists, under the presidency of Dr. C. O. Appleman, held five regular sessions and one joint session with the American Society for Horticultural Science. Forty-two papers were presented at the regular sessions and eight papers at the joint session. At the Plant Physiologists' dinner on Thursday evening, Dr. H. B. Vickery gave the Stephen Hales address on "What the Organic Chemist Can Do for Plant Physiology," Dr. C. A. Shull spoke on "An Appreciation of 'Horse Hoeing Husbandry by Jethro Tull,'" and President C. O. Appleman spoke on "Philosophic Attitude in Biological Research." Dr. T. G. Phillips announced that Dr. J. B. Overton was

elected a Charles Reid Barnes life member of the society.

At the first session Z. I. Kertesz, J. G. Horsfall and A. H. Rouse reported that diseased peas contain much less sugar and much more starch, fiber and other undesirable constituents than healthy peas. O. E. Street found that field peas grown in nutrient solutions were high in potassium and low in calcium and magnesium with light exposures of 10 hours, intermediate with exposures of 13 hours, and low in potassium and highest in calcium and magnesium with exposures of 17 hours. W. E. Loomis and C. G. Barr showed that sucrose is the important sugar of the corn leaf and one which fluctuates with changes in rate of photosynthesis or translocation. L. E. Horat and H. R. Kraybill reported that lack of continued accumulation of starch in phosphorus deficient plants, as contrasted with continued accumulation of starch in nitrogen deficient plants, is not due to lack of amylase content. R. H. Roberts and J. E. Kraus found that rate of carbon dioxide assimilation in young potted apple trees was not related to leaf area. F. B. Lincoln reported that the proliferating meristematic tissue of the pear tree has two sources of nitrogenous compounds, the protoplast of the tree and the soil, and that the tree's tissues older than one season are related to the meristematic tissue as the cotyledon is related to the embryo of a seed. W. A. DeLong described a modification of the ferricyanide method for determining reducing sugars in large amounts, which is rapid, simple of operation and has a satisfactory degree of accuracy. G. S. Avery, Jr., and R. C. Foster concluded that the precipitation reaction is becoming of increasingly doubtful value as a taxonomic yardstick. H. L. Colby found that dwarfing of the scion in cases where Malling 9 root stalk is used is a result of low phosphorous concentration in the top shoots, poor conduction in the Malling 9 tissue, early cessation of seasonal terminal root growth, and early cessation of active mineral absorption from the soil. At the Thursday afternoon session, O. C. Magistad presented data on the carotene and xanthophyll contents of various parts of the pineapple plant, including the fruit flesh. R. G. Brown and C. O. Appleman found that certain classes of I/N ratios support the idea of a connection between anaerobic and oxygen respiration, while others neither support nor contradict such a connection. The latter results may be explained if it is assumed that intermediate products may be resynthesized into sugars and to starch. E. S. Miller and G. O. Burr report that in a closed system all plants come to a balance of respiration and photosynthesis when the carbon dioxide content of the air reaches 0.01 per cent. G. Krotkov found two respiratory substances, sugar and non-sugar, in the detached wheat leaves. Sugars are the main substrate for the first 24 hours, while after 24 hours the non-sugar becomes the main substrate. B. E. Livingston found that Q10 for carbon dioxide production shows a pattern variation. G. R. Burns found that trees grown in red light are able to use longer wave-lengths of light in photosynthesis than those grown in daylight or in blue violet light. H. F. Rosene found a relation between the output of electrical energy by polar tissues and the mechanism of cell oxidation.

At the joint session with the American Society for Horticultural Science, T. G. Phillips, T. O. Smith and R. B. Dearborn reported that potassium-deficient tomato plants were low in ash, very low in potassium and high in calcium, magnesium and phosphorus. W. E. Loomis found that sections of plants showing dominant primary growth were relatively high in soluble organic nitrogen compounds, while those showing cambial growth were relatively high in sugars. A. E. Murneek presented data showing a higher concentration of carbohydrates (primarily starch), more nitrogen and larger quantities of carotin and xanthophyll in reproductive (short-day) than vegetative (long-day) plants. Conspicuously small amounts of nitrate nitrogen were found in tips of stems of plants exposed to a relatively long photoperiod. E. P. Christopher reports that in general too little air has been used in the study of photosynthetic activity by means of apparatus recently described by Heinicke and Hoffmann (SCIENCE, 77: pp. 55–58, 1933).

At the Friday afternoon session H. E. Clark and J. W. Shive found that the rate of absorption of ammonia nitrogen was greater from solutions of high pH than from those of low pH, but that the rate of absorption of nitrate nitrogen was greater from solutions of low pH than from solutions of high pH when the tomato plants were 38 and 41 days old. When the plants were 52 days old the pH did not exert this dominating influence on the rate of absorption of nitrate nitrogen. The rate of absorption of ammonia nitrogen decreased with the increasing age of the plants, while that of nitrate nitrogen increased. P. R. White reported that excised tomato root tips had been grown in a simple liquid medium of known constitution for over a year in continuous active growth. D. R. Hoagland and T. C. Broyer find that even though oxygen is essential for the process, accumulation of inorganic ions can take place very rapidly in an oxygen-nitrogen mixture containing as low as 8 per cent. oxygen.

At the Saturday morning session H. B. Vickery showed that detached tobacco leaves insulated in water and also detached tobacco leaves during the early process of curing are able to synthesize nitrate nitrogen. A. E. Murneek presented a review of the

rôle of asparagin in the nitrogen metabolism of plants. J. B. Smith found that the nitrate nitrogen content of beets was the best index to growth response, even when the source of nitrogen to the plant consisted of both ammonia and nitrate. E. M. Emmert described a rapid method of determining nitrogen in plant tissues, based on the oxidation of nitrogen to nitric acid. H. R. Kraybill presented a review of the literature on protein synthesis by plants. At the Saturday afternoon session H. F. Bergmann and R. B. Withrow each described methods for determining leaf area by means of the photoelectric cell. G. A. Greathouse and M. W. Parker described an improved dilatometer for plant materials. R. B. Withrow described various light filters prepared by impregnating regenerated cellulose with inorganic and organic dyes. B. E. Livingston described apparatus for controlling irrigators for potted plants.

The Mycological Society of America held its second annual meeting from December 28 to 30, with President C. L. Shear in the chair. At the business meeting reports presented by the secretary-treasurer and managing editor of *Mycologia* showed the society and its journal to be in a sound financial condition. The membership is growing slowly, and the meeting was well attended. New officers elected for 1934 are: Herbert S. Jackson, *president;* Bernard O. Dodge, *vice-president;* and Lee O. Overholts, *councilor.* Several minor amendments to the constitution were adopted. One of these empowers the council to name a society historian. At the regular sessions papers on the phenomena of sexuality in the fungi, on Phycomycetes and in the field of medical mycology were prominent. The president's address to the society stressed the need for a conservative scientific attitude toward our research problems. Joint sessions were held with Section G and with the American Phytopathological Society. Saturday afternoon was set aside for the explanation of exhibits and the making of demonstrations of research materials by members.

Friday afternoon, in the absence of President W. R. Maxon, Mr. C. H. Knowlton extended a welcome to about forty members of the American Fern Society and their guests. The session was devoted to six papers chiefly on the distribution and habitats of ferns and fern allies. Mr. J. J. Quinn's "Hunting for New England Ferns" was illustrated by mounted specimens of most of the New England species, as well as some from beyond the borders of that area. Spore characteristics, including size and markings, as constant and reliable criteria for distinguishing species of *Lycopodium* were illustrated with slides from the investigations of Mr. L. R. Wilson. Fern habitats of the Ozark Mountains and factors limiting distribution were described by Mr. E. J. Palmer, and Dr. H. K. Svenson discussed the ferns of the Galapagos Islands and Cocos Island. Both of these presentations were illustrated with excellent slides. During a report on unusual forms of some species of *Equisetum* Dr. J. H. Schaffner passed around mounted specimens for inspection. Dr. E. T. Wherry discussed his recent fern discoveries in the Appalachian region, and noted stations that extend the known range of some of our less common species.

PROGRAMS RELATED TO BOTH BOTANICAL AND ZOOLOGICAL SCIENCES (F AND G)

(Reports from E. W. Lindstrom, P. W. Whiting, J. E. Ackert, E. B. Powers)

The biologists' smoker, sponsored by the American Society of Naturalists in conjunction with the Botanical Society, the Society of Zoologists, the Genetics Society and the Phytopathological Society, was held on Thursday evening, with some four hundred or more biologists present. This year was the semi-centennial anniversary of the founding of the American Society of Naturalists, and a special program was arranged at the annual symposium and the annual dinner. The joint symposium on "Biology and Society" took place on Saturday afternoon, with at least 300 in attendance. Dr. S. H. Gage (Cornell University), one of the few living original members, presided. Three papers were read. Professor W. M. Wheeler (Harvard University), speaking on "Animal Societies," gave a characteristically keen, humorous and satirical account of animal organizations, which was not always flattering to human society. Professors E. A. Hooton (Harvard University) and F. H. Hankins (Smith College) discussed human problems of society, the former on the subject of "Primitive Human Societies," and the latter on "Development of Modern Social Organizations." The themes centered on the general genetic aspects of such problems, with particular reference to the operations of natural selection under primitive and modern societies. It is hoped that a semi-centennial celebration volume will be published to include these three papers.

At the business meeting of the society the constitution and by-laws were revised in accordance with the report of the committee on policy. The 50-year object of the society was revised to read as follows: "The object of this society shall be the association of working naturalists for the advancement and diffusion of knowledge basic to an understanding of life and life processes, including problems of organic evolution, broadly conceived. In these days of extreme specialization the society should serve to correlate the various biological sciences making for a common philosophy of biology." Sixteen new members and the following officers were elected: *President,* Dr. A. F. Shull (University of Michigan); *vice-president,* Dr. E. B. Babcock (University of Califor-

nia). It was voted to meet at Pittsburgh next year. The annual Naturalists' dinner was held on Saturday evening at the Hotel Statler, with 80 in attendance. The anniversary tone of the dinner was stimulated by the presence of three original members of the society, Dr. W. B. Scott (emeritus professor, Princeton University), S. H. Gage (emeritus professor, Cornell University), and Dr. H. F. Osborn (American Museum of Natural History). The latter acted as toastmaster. A historical address by Dr. E. G. Conklin, on "Fifty Years of the American Society of Naturalists," given in a delightful, clear manner, outlined the major contributions of the society to biology in the last fifty years and pointed out the increasing need for such a society in coordinating the specialized trends of modern times. The retiring president, Dr. B. E. Livingston, gave his address on "Environments," a scholarly treatment of the complexities and interrelations of the micro- and macro-environment of organisms. Professor W. B. Scott, on behalf of the charter members, gave a brief and humorous series of reminiscences of the early naturalists. An added feature of the Naturalists' program was the Sedgwick Memorial Lecture by Dr. H. F. Osborn, on "Aristogenesis, the Creative Principle in the Origin of Species." Since Dr. W. T. Sedgwick (formerly at the Massachusetts Institute of Technology) was an original member of the Naturalists, and the speaker, Dr. H. F. Osborn, is one of the seven surviving original members, it was particularly appropriate that this lecture fell on the anniversary of the Naturalists.

The Ecological Society of America's program was held from December 28 to 30, with Professor Edwin B. Powers as president. Thursday morning: Professor R. F. Griggs found that arctic vegetation is still far from adjustment following glaciation. Nicholas Polunin's studies indicated a climatic climax of open birch forest for the Norwegian Lapland. Dr. Ellsworth Huntington pointed out that the laws of limits are borne out both by crops and man. Dr. Burton E. Livingston has worked out a porous-porcelain cone mercury manometer to measure the moisture condition of soil. A paper on forest succession was given by Professor W. Elmer Ekblaw. Professor Ada Hayden reported on the viability of the Canadian thistle. Professor H. J. Lutz found not tenable the hypothesis for the origin and present distribution of the New Jersey pine barren vegetation, based upon a geological explanation. Thursday afternoon: Curtis L. Newcombe brought out that predators determine the extent of *Mytilus edulis* communities in the St. Andrews region (not read by the author). Professor W. C. Allee had observed definite social orders among sex-segregated flocks of chickens and mated pigeons determined by peck dominance. Dr. G. K. Noble reported aggregation responses among snakes. Professor W. H. Longley concluded that the nature of error in taxonomic records throws light upon processes of evolution. Dr. V. E. Shelford pointed out the uncertainty of various causes given by authors of animals to produce large populations. Dr. A. S. Pearse found that in the arid Yucatan country the number of species and complexity increase from caves to young jug-shaped cenotes to old cenotes. At the dinner on Thursday evening Dr. Edwin B. Powers pointed out various factors of the external environment that affect the blood of fishes. The following officers were elected at the business session on Friday morning: Professor George D. Fuller, *president;* Professor Paul S. Welch, *vice-president;* Professor Arthur G. Vestal, *secretary-treasurer.* On Friday afternoon there was a joint session with the Botanical Society of America, which is reported by that society. At a symposium on oceanography, on Saturday morning Dr. T. Wayland Vaughan traced the history of the various factors from which has resulted the present attitude of students of the interrelation between various organisms and their environment. Dr. Selman A. Waksman treated the topic "The Distribution of Bacteria in the Sea and Conditions of Their Existence" and concluded that the conditions were primarily responsible for the development of bacteria in the sea—(1) the supply of available nutrients and (2) the environmental condition. Dr. George L. Clarke reported on what he considered the primary factors affecting the vertical distribution of copepods: those causing mechanical translocation and those influencing swimming movements. Dr. W. C. Allee, in discussing coastal marine communities, summarized thus: The marine coastal community is a sort of superorganismic unity not alone between plants and animals to form biotic communities but also between the biota and the environment, a geo-bio-ecology concept. Professor Erik G. Moberg summarized his work on the biochemistry of sea water. At the Saturday afternoon general session papers by Dr. W. J. Hamilton, Arthur Paul Jacot, Clark L. Stevens, M. Y. Pillor and Dr. Herbert C. Hanson were read by title or the manuscripts were read by the secretary. Dr. E. S. Hathaway reported on fluctuation of water levels and salinity in Louisiana marshes. Grace E. Howard described the distribution of lichens in the State of Washington. Dr. Raymond Kienholz found after a five-year interval that in a 30 to 50 year old mixed hardwoods stand 12 per cent. of the original trees had died and 3 per cent. new trees had come in. There was little change in percentage distribution in size classes. The attendance at the meeting was on the whole gratifying.

The Genetics Society of America held its second meeting from December 28 to 30, with papers presented on nuclear content, chromosome number and cell size; intersexes, sex differentiation, sex determina-

tion and selective fertilization; mutation as affected by x-radiation, aging of seed and high temperatures; somatic segregation, crossing-over and gene deficiencies as cell lethals; and chromosome fragmentation, chiasmata and translocations. In addition to the demonstrations by visiting geneticists given at the Biological Laboratories in Cambridge, an expedition was made to the Bussey Institution, where material was on exhibit by members of the staff of Harvard University and the Arnold Arboretum.

The American Microscopical Society held its fifty-second annual meeting on Friday. The following officers were elected for 1934: *President,* Professor L. H. Tiffany; *first vice-president,* Professor H. W. Stunkard; *second vice-president,* Professor A. M. Reese; *secretary* (3 years), Professor J. E. Ackert; *elective member of executive committee* (3 years), Dr. E. R. Becker. L. H. Tiffany and J. E. Ackert were named to represent the society in the council of the American Association at the Pittsburgh meeting in 1934. Among the items of business the society voted to cooperate with *Biological Abstracts* in securing authors' abstracts of the papers published in the *Transactions of the American Microscopical Society.*

SECTION ON ANTHROPOLOGY (H)

(*Report by Wilton Marion Krogman*)

Section H held its meetings from Thursday to Saturday. The meetings centered about the theme of the organization of anthropology as a research technique and its relation to modern culture. In pursuance of this plan each session was devoted to a specific phase of the central theme. At the Thursday morning session Professor E. A. Hooton and his students demonstrated the purpose and results of the Harvard Anthropometric Laboratory. Dr. Hooton discussed briefly the statistical set-up of such a laboratory. Mr. G. T. Bowles, in his report on the Eastern Tibetan and Szechuan peoples, discussed the study of racial types by three methods—by linguistic areas, by the arbitrary selection of certain anthropometric criteria and according to "impressional types." Dr. Carl Seltzer outlined the racial affinities of medieval Icelanders. He concluded that modern Icelanders represent the survival and dominance of an early "rounder-headed" Norse element, characterized by him as a "Cro-Magnon" type. Mr. C. W. Dupertuis gave a preliminary account of the work of the Harvard Anthropometric Laboratory at the Century of Progress Exposition and reported great popular interest. Mr. H. L. Movius, Jr., discussed the exhumation of four skeletons and the cremated remains of 39 individuals from a Bronze Age cairn in Ireland, demonstrating two different physical types. Mr. W. W. Howells presented evidence to show that in blood-grouping and anthropometric measurements the Fijian is a Polynesian-Melanesian hybrid. Mr. John Gillin gave an account of the culture and physical type of the Caribs of British Guiana, the social structure of which people, being loosely held together, raises the problem of cultural degeneracy. Mr. Robert W. Ehrich, in a preliminary report on the anthropometry of the Montenegrins, suggested an Armenoid origin for the Dinaric type as a group selected by the Romans on the basis of stature and brought by them to the present Dinaric area. Mr. Frederick Johnson ended the session with an account of the distribution of peoples in Western Panama in the sixteenth and seventeenth centuries, concluding that the present material culture is almost identical with that pictured by the Conquistadores. On Thursday afternoon Dr. W. K. Gregory discussed the relation of polyisomerism to anthropogeny. He emphasized the reduction of metamerism in the evolution leading up to man. The theme was extended by Dr. M. Russell Stein in the application of polyisomerism to the human dentition, especially as seen in the trilobulation of the labial surfaces of the anterior teeth and the cusps of the posterior teeth. Dr. Milo Hellman, on the basis of a new restoration of the palate of the Talgai youth, concluded that it is primitively human, closely corresponding to the palate form of Neanderthal man. Dr. M. F. Ashley-Montagu presented as a unique feature in his study of the premaxilla in the Primates the almost entire overgrowth of the premaxilla by the maxilla in man. Dr. R. L. Watkins gave a historical account of the concept of microzymas as a constituent of all cells. Dr. T. H. Evans outlined his method for qualitative typing of hands and feet as demonstrated by photostatic copies of typical hand and feet bones.

Friday morning was devoted to a symposium on "Anthropology and the Child." Dr. A. W. Rowe discussed the influence of abnormal sitting height indices on weight prediction and offered a corrective factor to apply to groups with highly abnormal indices. Dr. C. B. Davenport, in his paper upon the problem of incremental and differential growth during postnatal development, presented in detail the thesis that the infant does not merely "grow," but develops into a man. Dr. H. Bakwin, discussing the influence of retarded growth in the body build of infants, held that the growth retardation caused by undernutrition in the first year of life gives rise to profound changes, not only in configuration of external body, but also in internal organs. Dr. W. F. Dearborn then outlined the results of his study on the relation of physical development and mental expansion with the suggestion that individual variation is in most instances merely a difference in time-pattern. Dr. H. C. Stuart emphasized the necessity of a thorough and sympathetic understanding between the anthropologist and clinician, in the investigation and interpretation of long-term studies in the growth of children.

On Friday afternoon, in a discussion of "Anthro-

pology and History," the first paper was read by Dr. G. von Bonin, on a Magdalenian skeleton from Cap Blanc now in the possession of the Field Museum. Dr. von Bonin concluded from a comparative study that the Upper Paleolithic Period was peopled by a single physical type during the several thousand years covered by the period. Dr. H. J. Spinden gave a comprehensive discussion of Maya astronomy, with special reference to Professor Ludendorff's chronology. It was shown that the archeologist and the astronomer may work together in problems of Mayan chronology. Mr. G. Woodbury then outlined the results of the excavation of a prehistoric ruin at Un Shagi, New Mexico. He reported that the pueblo was not inhabited for much over 100 years, and that its average population did not exceed 100 persons. Dr. F. K. Morris stated that geology had given to anthropology a much more accurate time scale in recent years and that the anthropologist must allow five million years for the Pleistocene and be prepared to recognize true Homo in the Pliocene. Dr. E. B. Renaud discussed New and Old World cultures on the basis of archeology and offered the statement that the autochthonous pre-Columbian culture of the New World was comparable in its development to the chalcolithic and Early Bronze of the Old World.

On Friday evening Section H held its annual dinner, at which the retiring vice-president, Dr. C. H. Danforth, gave the address on "Genetics and Anthropology." He discussed in detail the rôle of genetics in race crossing, racial differentiation, inter-racial distribution of physical traits and general human morphology.

The Saturday morning session centered upon "Anthropology and the Community." The entire program developed the theme of the relation of anthropology to modern society and social problems. Dr. H. H. Mitchell spoke on the relation of socio-economic factors to certain measured physical signs of nutritional status. He reported that children of higher social and economic levels are, on the average, taller and heavier than under-privileged children, but stated that the difference may be referred to nature as well as nurture. Dr. A. E. Treloar presented data on the length and weight of 11,000 newborn infants, gathered from various nationalities over a period of 30 years. He found significant weight and length differences between nationalities and between sexes within national groups. Dr. D. B. Dill then reported his studies in the efficiency of human effort, with specific reference to the nature of the fuels used in muscular effort, the factors limiting individual capacity for work and the nature of fatigue. Dr. Arthur MacDonald discussed "Legislative Anthropology," in which he emphasized the necessity of studying the successful person as well as the problem type. Dr. William Healy outlined the changing texture of our social fabric with its effect upon "anti-social" patterns and the legal interpretation of crime. Dr. T. Wingate Todd then discussed the problem of anthropological norms of developmental growth. He showed that samples of growing children from different geographic areas, socio-economic levels or national origins reveal differences in growth and maturity levels for successive years in childhood without necessarily exhibiting either divergences in nutritional or developmental status.

The chairman, Dr. Todd, summarized the section meetings by pointing out that the program had revolved around anthropological techniques and problems of modern culture which culminate in an unparalleled opportunity for the scientific study of a modern population and its forbears under the Tennessee Valley Authority. The following resolution was unanimously adopted by the committee and members present: "Appreciating the unique opportunity offered by the Tennessee Valley Authority project for an accurate and detailed study of an important section of the American people together with their immediate forerunners, the Section on Anthropology of the American Association for the Advancement of Science urges that full advantage be taken of this opportunity and, to this end, authorizes the chairman, Dr. T. Wingate Todd, to convey to the Tennessee Valley Authority and to other interested parties the readiness of the Section on Anthropology to facilitate such an investigation by every means in its power, and further to take such action as may promote this endeavor."

SECTION ON PSYCHOLOGY (I)

(Report from John E. Anderson)

The sessions of Section I were held from Thursday to Saturday. At the first session, S. S. Stevens reported subjective dimensions of tones to be functions both of stimulus frequency and energy. C. C. Pratt, studying bi-tonal combinations, found that tonal intervals can not be aligned with respect to a dimension of fusion. Hallowell Davis and A. J. Derbyshire, investigating the cat's auditory mechanism with the cathode ray oscillograph, discovered that many phases of auditory activity follow different laws above and below 800 cycles. E. W. Josephson found increased acuity of hearing with continued stimulation in the normal person and decreased acuity in deafened subjects. F. A. Gibbs and W. G. Lennox showed that loss of consciousness sometimes occurs with diminished cerebral blood flow and sometimes without, pointing to a basic neurological factor. A. L. Winsor and E. I. Strongin found that simultaneous administration of coffee and alcohol increases motor skill and glandular secretion for a time, due to the facilitating effect of

the coffee, after which the inhibition due to the alcohol appears.

On Thursday afternoon C. H. Graham and R. J. Beitel reported that the summation evoked by subliminal stimulation in the peripheral retina is a nervous process with a locus in the synaptic layers of the retina. N. E. Cohen read a paper on "Equivalence of Brightnesses across Modalities," comparing tones, odors and grays. J. P. Nafe found sensitivity to cold and warmth dependent upon sensory patterns of discharge set up by the movements of smooth muscles. Hudson Hoagland reported that judgments of short-time intervals vary with bodily temperature and seem to fit the Arrhenius equation. According to J. Volkmann, the degree of certainty is inherent in the process of judgment, and is not an accessory phenomenon. M. Sherif found uniformly significant correlations between predilections for authors and ratings of their alleged writings, except when the authors' names were eliminated. After this session Dr. Stanley Cobb and his associates of the Boston City Hospital gave an interesting demonstration of methods of studying cerebral circulation. On Friday morning W. A. Hunt reported an experiment on normal and psychotic subjects, showing the extreme lack of reliability in galvanic reactions. C. L. Hull found positive evidence for the irradiation of both excitatory and inhibitory conditioned tendencies. J. G. Yoshioka found that the chimpanzee can form a temporal habit of choosing, independent of sensory cues. B. F. Skinner, studying the discriminative process in the white rat, compared curves obtained during reinforcement and extinction. C. A. Dickinson presented motion pictures of the development of right leg dominance in a young child. Irving Lorge reported that irrelevant and incidental rewards are of significance in learning. R. T. Rock found that, although greater rewards and punishments exert somewhat more influence than lesser ones, the differences are slight and not dependable. On Friday afternoon Mildred B. Mitchell showed that women have a tendency to report their weight in whole numbers divisible by 5 and nearer known standards for age and height than they actually are. Elinor J. Barnes reported on the interests of college women in the movies. Hadley Cantril described a series of studies of the radio, in which judgments of voice and personality over a loud speaker were compared with actual presence and in which radio and oral or visual presentations were compared. Esther McGinnis showed the extent to which the attitudes of parents are modified by study group attendance. J. P. Porter and associates found the work limit method of giving tests superior to the time limit method. G. Feingold reported improvement in high-school methods over a ten-year period because of homogenous grouping, despite a progressive drop in mean intelligence level. On Friday evening the joint dinner of the Sections on Psychology and Education was held at the Hotel Commander in Cambridge. Professor Walter S. Hunter (Clark University), retiring vice-president for Section I, gave an address entitled "The Stimulus Control of Behavior during and after Learning," discussing the errors arising in interpretation, due to the preoccupation of scientists with the views that in learning attention shifts from some phases of the stimuli presented to others and that as learning progresses responses become more automatic and less conscious. S. A. Courtis (University of Michigan), retiring vice-president of Section Q, gave an address on "Differential Testing as a Method of Psychological Analysis." He pointed out the value of the method of differential testing for scientific purposes and explained the use of the isochron technique in the analysis of learning and growth phenomena.

The Saturday morning meeting was opened by H. Meltzer, who found over-expressiveness characteristic of stuttering when compared with non-stuttering children. S. E. Katz reported that the scores of psychotic patients on the Bernreuter Personality Inventory were not representative of the patients' problems. Joseph Zubin, analyzing three personality inventories, found absence of discrimination between normal and neurotic subjects. Maxwell J. Papurt, in a tentative psychological theory of epilepsy, emphasized the functional aspect. M. N. Chappell and associates reported that recovery was more marked in an experimental group of peptic ulcer cases given lectures on the physiology of the stomach and taught to employ self-suggestion and a simple distraction technique in addition to medication than in a control group given medication alone. On Saturday afternoon E. A. Kirkpatrick emphasized the importance of scientists assuming the task of constructing ethical codes for modern society. L. A. Averill pointed out the significance of various environmental factors that lead to delinquency. Milton Harrington discussed the psychological approach to problems of abnormal behavior, stressing the mechanistic point of view. The final paper, given by C. A. S. Dwight, emphasized the study of language in any analysis of human behavior and pointed out the linguistic difficulties so characteristic of modern complex life.

SECTION ON SOCIAL AND ECONOMIC SCIENCES (K)

(Reports from James Ford, C. F. Roos, A. E. Kennelly)

The demolition and rebuilding of slum areas was the general subject of discussion at the Wednesday morning session, over which Mr. Henry James (New York City) presided. Methods of urban analysis as conducted by the Regional Plan of New York were outlined by Lawrence M. Orton (general secretary of the Regional Plan Association). A vivid picture of

current misconceptions with regard to improved housing was given by George Gove (Secretary of the New York State Housing Board) in a paper entitled "Economic Aspects of Slum Demolition and Rebuilding." He showed that slum clearance was a problem of public finance and that under the New York State Board of Housing only 1.73 per cent. of total construction between the years of 1927 and 1930 was conducted by limited dividend companies under the direction of that board. He stated that the major means of bringing rentals down within the reach of unskilled labor are to be found not so much in the reduction of capital costs as in the reduction of current expenses, particularly through government aid, at not over 4 per cent. interest, and through subsidies. Mr. Frederick L. Ackerman (Division of Housing, U. S. Public Works Administration) in his paper on "Controlling Factors—Slum Clearance and Low-Cost Housing" stated that the facts as to declining rentals, accumulating vacancies, trends of migration and declining birth rates would seem to point clearly to the need of confining housing activity launched in the interests of recovery to definite brackets with respect to rentals so as not to increase vacancies; and that by confining the work of the Emergency Housing Corporation at the present time to the clearance of slums and the production of a like number of low-cost units, limited as to rentals and restricted as to occupancy to the low-income groups, the administration can stimulate one of the basic industries without encroaching upon its field of future opportunity. Mr. Arthur Holden presented a series of stereopticon slides of maps prepared by the Land Utilization Committee of the New York Building Congress, of which he is secretary. His paper was particularly useful in showing the movements of population and of industry, trends of construction and the process by which areas become blighted. The session was closed by John Ihlder (executive secretary of the Boston Housing Association) with a paper on "Obstacles to Slum Reconstruction and How They Can Be Overcome."

On Wednesday afternoon a joint session was held with Section L, Dr. Wesley C. Mitchell presiding. Professor William F. Ogburn (Chicago University) discussed "Recent Trends in the Social Sciences," and Waldo G. Leland spoke on "Recent Trends in the Humanities." These were the addresses of the retiring vice-presidents of Section K and L.

On Thursday morning Professor Pitirin A. Sorokin, with the use of lantern slides, outlined the history of war for Ancient Greece, the Western Roman Empire and eight other European countries, from 500 B. C. to 1925 A. D. In this study Professor Sorokin had the collaboration of Lieutenant-General N. M. Golovin. Numerical values were assigned to such factors as size of armies, proportion of losses, numbers of nations involved and duration of conflicts. Index numbers were prepared and it was demonstrated that the wars of the present century were vastly more serious than all preceding wars. Professor Sorokin stated that his findings refuted the theory that war tends to disappear with the progress of civilization. He noted also that there was no marked trend or periodicity in the occurrence of European wars, with the possible exception of Germany, Italy and Russia, and that it seems likely that this trendless oscillation in the occurrence and intensity of war will continue indefinitely. Professor E. B. Wilson presided at this session, and the discussion was led by Professor C. H. Taylor and Mr. Thomas H. Thomas. The chemical revolution was the subject of the joint session of Sections C and K on Thursday afternoon. Dean Wallace B. Donham presided and presented a paper, "Science in the World It Changes." Dean Donham discussed the power revolution and electric revolution as precursors of the chemical revolution and stated that in America the chemical revolution, though hardly fifteen years out of its infancy, introduces new policies and products into our industrial system on a scale which may soon enlarge the material options of mankind faster than either the power or electric revolutions. This was followed by a paper read for Professor G. B. Roorbach (Harvard Graduate School of Business Administration) on "Repercussions in International Trade Brought about by Chemical Change," and by a series of brief papers on economic readjustments due to the chemical industry.

On Friday morning Section K met with the Committee on Conservation and Land Utilization, of which Dr. Thomas Nixon Carver is chairman. Dr. Carver presided and discussed subsistence farming, showing that this type of farming is justifiable only where people are desperate or where there are other sources of income. In either case, it means a cheap or inexpensive standard of living. Professor W. R. Woolrich (Tennessee Valley Authority) discussed "The Relations of Industry to Land Utilization," and indicated that new enterprises may change marginal land to efficient use. Since fewer workers are needed in agriculture, the solution would seem to be to give industrial work to agricultural workers as a source of money income, with the possibility that they may revert to farming when they reach forty-five years of age. Dr. H. H. Bennett (U. S. Department of the Interior) discussed "Soil Erosion," showing that thirty-five million acres were already actually destroyed. He stated that the Public Works Administration has established a ten million dollar fund for the Soil Erosion Service in the Department of the Interior, to demonstrate for complete water sheds the practical measures for erosion-prevention that farmers can adopt. The use of trees, alfalfa, terracing, etc., will be tried out. The symposium on

national economic policy and its relation to our international policy was presided over by Wesley C. Mitchell and opened with a paper on "Trends in International Economic Policy," by Alvin H. Hansen (University of Minnesota). Trends both toward and away from national self-sufficiency were discussed at some length. It was noted that profound changes in national policies with respect to international economic relations in the post-war period have forced revolutionary adjustments in the structure of the world economy. Yet international trade, in spite of artificial trade barriers, exhibits astounding vitality. The physical volume of world trade declined only 27 per cent., while world industrial production declined some 35 per cent. It was shown that the United States undertook an international rôle with inadequate experience, background, training and traditions and in an opportunist manner without a consistent program and without accurate knowledge of the implications. The relative merits of the future nationalistic and isolationist program were considered and contrasted with the alternative of a constantly developing program of international cooperation in our economic relations, involving willingness to reduce tariff schedules and the deliberate fostering of a sound development of foreign investment in productive enterprises and an international monetary system with fixed exchange ratios. Professor Hansen ended with the statement, "A program needs to be projected which is not based on sterile theory or unguided practise, but which charts a comprehensive policy that can actually be followed." The paper was discussed by Professors E. F. Gay and E. B. Wilson (Harvard University). The symposium was particularly enlivened by the discussion of financial policy, in which James P. Warburg (New York) raised many questions for consideration and in which there was a lively and keen give-and-take between Mr. Warburg and Professor Hansen, thus fully achieving the original purpose of the symposium. On Saturday joint sessions of Section K were held with the Econometric Society, on "Probability and Statistics" and with Sections M and O on the subject covered by the Friday evening session of Section M, which was addressed by the Secretary of Agriculture. The Econometric Society held a session on Saturday, devoted to probability and statistics, at which four papers were presented to a small but select audience. Other sessions of the society were held at Philadelphia with the social science societies. A comprehensive report of the meetings will be published in *Econometrica* for April, 1934.

The meeting of the Metric Association was held on December 27. Reports on various phases of the use and progress of the metric system were made by President A. E. Kennelly, and by the secretary and treasurer, as well as by Professors C. A. Adams, C. L. Dawes, G. M. Fair and L. G. Johnson (Harvard University) and Professor W. I. Slichter (Columbia University). Communications were read from T. H. Miller, W. J. Schieffelin and A. C. Gilbert. A draft metric code for the N. R. A. use, proposed by Captain Manley Gibson (Fort Banks, Mass.) was read and approved.

SECTION ON HISTORICAL AND PHILOLOGICAL SCIENCES (L)

(Reports from Joseph Mayer, Martha G. Turner, Frederick E. Brasch)

The first session of Section L, held Wednesday morning, dealt with the New England dialect, and presented the results of an intensive study conducted over a period of three years. The program consisted of: a paper on dialects of New England as studied for the Linguistic Atlas of the United States and Canada, presented by Professor Hans Kurath (Brown University), director of the Linguistic Atlas of the American Council of Learned Societies; a paper by Bernard Bloch (University of Vermont) describing methods of interviewing in connection with securing data for the Linguistic Atlas; the rendition of a considerable number of phonographic records of dialect, secured in different parts of New England, by Miles L. Hanley (Harvard University), associate director of the Linguistic Atlas; and a demonstration of the use of mechanical recording in securing language and music records in New England and other parts of the country, by Walter C. Garwick, maker of recording instruments for the Linguistic Atlas and the Byrd Antarctic Expedition. The second session, held on Wednesday afternoon, was a joint meeting with Section K, at which the retiring vice-presidential addresses for Sections K and L were given, namely, "Recent Trends in the Social Sciences," by Vice-president William F. Ogburn (University of Chicago), and "Recent Trends in the Humanities," by Vice-president Waldo G. Leland (American Council of Learned Societies). The next session (also jointly with K) was held on Thursday morning as a symposium on "War-Peace," the principal paper being presented by Professor Pitirim A. Sorokin (Harvard University). The details of this interesting meeting are given elsewhere.

A session on a national policy for historic sites and monuments was held on Thursday afternoon, with Dr. John C. Merriam (Carnegie Institution of Washington) presiding. A paper was presented on "Historic Sites and Monuments, as Administered by the National Government," by Mr. Verne E. Chatelain (U. S. Parks Service), who illustrated his address with views of cliff dwellers and pueblo sites in the Southwest, and of Yorktown, Williamsburg, Jamestown,

Wakefield, Mount Vernon and Morristown. An animated discussion followed the paper, as an introduction to which Dr. Merriam stated that history must deal with realities and that historic sites and monuments have a high degree of value in emphasizing these realities. Mr. Hermon C. Bumpus (National Parks service) felt that historic sites and monuments serve an important purpose as illustrating the story of how our country came to be what it is. Dr. Laurence V. Coleman (American Association of Museums) observed that historic houses should be treated as museums or as museum material. A historic house is in itself an assembly of historical data; it may also have associations, but the chief value of these associations lies in their power to stimulate the preservation of the data. Mr. George Francis Dow (Association for the Preservation of New England Antiquities) stressed the importance of the monument rather than the site, and suggested that the national government could render a most useful service in conducting a survey of historic monuments and in listing those worthy of preservation.

The History of Science Society held two sessions as a symposium on "Colonial Culture." The president, Dr. J. Playfair McMurrich, called the first session together on Friday morning with some introductory remarks relating to the development of history of science teaching in the United States and the activities of the society. The first paper was by Dr. S. E. Morison (Harvard University), who spoke on the development of astronomy in the latter part of the seventeenth century at Harvard; astronomy was the first science taught at Harvard; its tutors early recognized the Copernican system of astronomy; Harvard had the first telescope in the American Colonies. Dr. Lao G. Simons (Hunter College) traced the history of astronomy and mathematics during the whole of the eighteenth century as developed at Harvard, but more particularly throughout the colonies, as far south as William and Mary College; the principal scholars in astronomy and mathematics of this period were Professor John Winthrop of Harvard, Thomas Robie, David Rittenhouse and Cadwallader Colden; they early recognized the Newtonian philosophy and taught fluxions and the "Principia." As for early chemistry and chemical industry, Dr. C. A. Browne (U. S. Bureau of Chemistry and Soils) traced the aboriginal influence upon the Colonial development, and showed how the use of many minerals, medical plants, etc., were carried over from the Indians to the Colonists and even to England.

In the Friday afternoon session, Dr. Henry R. Viets (Boston) introduced new facts relating to the early history of medicine in Massachusetts; medicine was promulgated for the first hundred years in the Colonies by three types of individuals, namely, governors, churchmen and educators; crude as this medicine was, more particularly when mixed with religious bigotry, it seemed to serve the people well; the outstanding medical practitioner of the eighteenth century was Zabdiel Boylston of Boston; he introduced the first treatment of inoculation against smallpox. Geological studies in the Colonies were not recognized, due to the slow development of the science; however, Dr. Frederick K. Morris (Massachusetts Institute of Technology) gave illustrations of the pioneer work of Professor John Winthrop, of Harvard College, who showed that earth tremors or movements were of the nature of wave motion or vibration and gave correct interpretations of the causes of earthquakes; it was not until the nineteenth century that geology as a science became free of theological implications. The final paper was a joint contribution from Dr. Austin H. Clark and Leila Forbes Clark (Smithsonian Institution); the history of the American Association for the Advancement of Science was indicated as having been patterned after the British Association, and its origin was traced back as far as 1847, when it was first organized as the Geological Association; the first meeting was in Philadelphia, with the association becoming more fully developed in Cambridge around 1849.

SECTION ON ENGINEERING (M)

(Report from Vannevar Bush)

In the light of contemporary interest in solution of national agricultural problems, the joint session of the Section on Engineering, with the Sections on Social and Economic Sciences and Agriculture was particularly significant. The Honorable Henry A. Wallace (Secretary of Agriculture) addressed a general session of the association on Friday evening, and his paper on "What Can Engineering Do for Agriculture?" was the keynote for the joint session held at the Massachusetts Institute of Technology the following morning. In calling for closer cooperative efforts in the solution of the vital problems of the day, Secretary Wallace suggested that scientists and engineers direct their efforts toward a program of social planning commensurate with their progress in mechanical and economic fields. He was accepted by the audience as a scientist speaking to scientists, with a philosophy which held his listeners' close attention. Lack of scientific social planning, he declared, is responsible in a large measure for the present state of affairs, and the present social order has made a mockery of the handiwork of the men who developed labor-saving machinery. The power made possible through the discoveries of scientists and engineers, Secretary Wallace said, has been applied by a race of men who developed a concentrated will power and an extraordinary thriftiness which was the result of several generations of pioneer agricultural training

and Protestant church-going. In time, he added, human power of high spiritual order, but debased by the sophistication of the "devil take the hindmost" school of economics, took command in exploiting the discoveries of scientists and inventors. Referring to the true spirit of science, the speaker said that research workers have an intense kind of religion of their own, standards to which they remain true, while others exploit the social and economic power derived from their discoveries. To-day science has enough within its grasp or just around the corner to double the total productive power of the world within 30 years. In conclusion, he said that "the quantitative answers produced by the science of the past hundred years are not enough. They merely increase the speed of life without increasing the quality. Would that we had some one with the imagination of Sir Isaac Newton to develop the higher calculus of the engineering life which is so necessary if our increased productive power is to increase total human happiness.

Dr. Charles F. Kettering (General Motors Corporation), chairman of Section M, presided at the joint session. Professor Dugald C. Jackson (Massachusetts Institute of Technology) presented his paper on "The Origins of Engineering," as retiring vice-president of Section M. He traced the gradual development of scientific discovery and invention and their influence upon social organization. From the beginning of agriculture in the Neolithic Age, he described the slow development of mechanical aids in farming, commenting upon the far-reaching influence of agricultural progress on the material and social well-being of peoples. The paper on "Raising the Farm Standard of Living," presented by Mr. Ralph E. Flanders (Jones and Lamson Machine Company, Springfield, Vt.) emphasized the need of an effective plan for a closer relationship between stable agriculture and productive industry to unite and preserve the good qualities of each. It was his belief that a high scale of living and a reasonable stability of that scale are the twin objectives of our social and economic exploration. Speaking from the view-point of a utility operator, Mr. H. P. Liversidge (Philadelphia Electric Company) addressed himself to the subject of "The Relationship between the Electric Utility and the Farm." After surveying the vast field for future application of electrical energy to agricultural tasks, he warned against a too rapid electrification of the rural districts. Of more than 6,000,000 farms in the United States in 1932, he said, approximately 1,000,000 were electrified. Healthy development in the future would be gauged, he thought, by the ability of the consumer in the rural districts to reap the benefit of the power placed at his disposal. The problem of extension of electric power in rural districts in an economic manner requires for its solution that areas be treated as a unit, for farm loads can not generally be economically supplied except in conjunction with the balance of the rural load in villages and isolated industrial plants. In a paper on "The Historical Relationship between Engineering and Changing Land Use in Massachusetts," Dr. H. P. Baker (Massachusetts State College) emphasized the need for cooperation between the engineer, the farmer and the forester in solving problems of transportation and communication; water power and power distribution; drainage, irrigation and water conservation; and farm sanitation and housing.

At the meeting of the Institute of Radio Engineers, held on December 28, the results of several research projects at Harvard University, the Massachusetts Institute of Technology, the Westinghouse Company and General Radio Company were presented in a series of short talks. Three papers relating to sound measurements were read. W. M. Hall (Massachusetts Institute of Technology) reported on measurements in the vicinity of a source of intense sound, indicating a substantial change in wave form a short distance from the source. E. A. Johnson (Massachusetts Institute of Technology) described thermocouples he has developed by which the temperature changes accompanying sound waves can be measured. These thermocouples are sufficiently small and sensitive to be effective into the supersonic range. The application of model theory to the study of horns, using miniature horns and supersonic frequencies to determine directional properties, with interesting results, was described by S. Goldman (Harvard University). A paper by E. L. Chaffee and C. N. Kimball (Harvard University), presented by Professor Chaffee, who also presided at the session, described a method of designing radio frequency power oscillators by measuring operating characteristics at 60 cycles, plotting the designed relations and applying the theory of models to reproduce the conditions at radio frequency. This was followed by a paper by H. R. Mimno (Harvard University) describing a method of classifying vacuum tubes now in use in some foreign countries, by locating them as points on a chart showing amplification factor, plate resistance, etc. W. L. Barrow (Massachusetts Institute of Technology) described the results of some recent mathematical and experimental studies of an oscillating circuit containing a periodically varying capacitance, showing the effects of such non-linearity in the circuit. In the experimental determination of thermal agitation voltages in resistances, the frequency and resistance range covered has been greatly extended. C. Neitzert (Massachusetts Institute of Technology) presented results verifying the generally accepted relations among resistance, frequency and voltage. This was followed by an excellent demonstration by F. V. Hunt (Harvard University) of fluctuation phenomena. A group of four papers on recent developments in radio was read by

engineers from the Westinghouse Electric Company. These papers formed an excellent résumé of the problems, practise and present trends in their respective fields. J. K. Clapp (General Radio Company), who is responsible to a large degree for the development of crystal-controlled standard frequency equipment, described several recent commercial developments, particularly of methods of setting and reading clocks to a fraction of a millisecond and of transmitting time signals with extremely high precision. L. B. Arguimbau described the quartz crystal coupling used as a selective element in a new General Radio harmonic analyzer, giving an equivalent circuit of the crystal used as a three-terminal net-work.

SECTION ON MEDICAL SCIENCES (N)

(Reports from Walter M. Simpson and Albert L. Midgley)

The program of Section N consisted of four symposia and five joint sessions: with the American College of Dentists, the American Pharmaceutical Association and the American Society of Parasitologists. On Wednesday morning Reuben L. Kahn (University of Michigan) gave a concise and convincing presentation of his researches on "Tissue Reactions in Immunity." Dr. Kahn presented evidence that the accepted theories of immunity against bacteria and foreign protein substances are inadequate. Studies of immunity have been largely centered upon the blood and other body fluids. Dr. Kahn is convinced that the fixed tissues, particularly the skin and peritoneum, acquire an even greater resistance to disease than the blood. The association award for 1933 was given to Dr. Kahn for his outstanding presentation. The rest of the morning session was given over to a symposium on appendicitis. Irving J. Walker (Boston City Hospital) discussed "Why the Increasing Mortality in Appendicitis?" Dr. Walker presented evidence that while the mortality rate in appendicitis based upon vital statistics has been gradually rising, the actual mortality rate based upon operations for appendicitis has been gradually falling; the determination of mortality rate in appendicitis based upon vital statistics is not a fair method of determining true mortality. Surgical statistics provide a much better method of determining accurate mortality. Herbert L. Lombard, of the Massachusetts Department of Health, presented a paper, "The Results of an Appendicitis Campaign." Dr. Lombard presented records from seventy-four hospitals in Massachusetts showing that the use of laxatives was closely associated with peritonitis in cases of acute appendicitis. Since nearly all the deaths were from peritonitis, the discontinuance of the common practise of taking laxatives in the presence of acute abdominal pain would greatly reduce the death rate. A symposium on pneumonia was the feature of the Wednesday afternoon session. Dr. Lloyd D. Felton (Harvard Medical School), who has developed the valuable anti-pneumococcus serum, presented evidence that pneumococcus antibodies are protein in nature. Dr. W. F. Wells (Harvard School of Public Health) talked on "Viability of Bacteria in Air." Dr. Wilson G. Smillie (Harvard School of Public Health) presented the results of his recent studies in the epidemiology of pneumonia. Dr. Frederick T. Lord (Massachusetts General Hospital) discussed the recent advances in the serum treatment of pneumonia.

The Thursday morning session was devoted to a symposium on sociology and medicine. Dr. Henry E. Sigerist (the Johns Hopkins University) discussed "Inter-Relationship of Medicine and Culture." Henry Dennison (Framingham, Mass.) talked on "Medicine and the Social Trend." Mr. Dennison indicated that the experiences of the last forty years in organizing the economic fields of production and distribution hold valuable material for the student of organization of medical practise. Douglas V. Brown (Harvard Medical School) discussed "Some Economic Aspects of Medicine." Ida M. Cannon (Massachusetts General Hospital) spoke on the value of teaching social implications of sickness to medical students. Dr. George R. Minot (Boston City Hospital) discussed "Social Medical Practise." Dr. Minot presented evidence that the social clinic of a hospital improves the work of all clinics and should be on the same plan as the other clinics. He stated that modern medical practise makes it imperative that the medical school curriculum should become permeated with training in the social aspects of medicine. A symposium on tuberculosis was presented at the Thursday afternoon session. Dr. William Charles White (National Tuberculosis Association) spoke on "The Biology of the Tubercle Bacillus." Dr. Henry D. Chadwick (Massachusetts Department of Public Health) spoke on "The Incidence of Tuberculosis." Dr. E. D. Churchill (Massachusetts General Hospital) told of the important advances in the surgical management of certain forms of tuberculosis.

On Friday morning Section N met with the American Pharmaceutical Association and the American College of Dentists in a joint session. Dr. Harold S. Smith and Dr. Samuel M. Gordon (American Dental Association) told of therapeutic progress in pharmacy and dentistry. Heber W. Youngken (Massachusetts College of Pharmacy) revealed the results of his investigation of the "Viburnums and Their Medical Aspects." E. Fullerton Cook (chairman of the committee on revision of the United States Pharmacopoeia) told of the important service rendered by the Pharmacopoeia in the standardization of medicines. Dr. Milan A. Logan (Forsyth Dental Infirmary for Children and Harvard Medical School) discussed methods for the determination of magnesium by

alkalimetric titration. On Friday afternoon the joint session of Section N with the American College of Dentists was presided over by Dr. Leroy M. S. Miner (Harvard University), who arranged the following outstanding program. Dr. James C. Healy (Tufts College) discussed "The Relation of Vascular Degeneration to the Dental Problem." Dr. Isaac Schour (University of Illinois) spoke on "The Rat Incisor as an Index of Calcium Metabolism." Dr. George B. Wislocki and Dr. Reed Hunt (Harvard Medical School) and Dr. Henry George and Dr. Lawrence W. Baker (Harvard University Dental School) reported the results of their preliminary researches on "A Modern Application of Madder Feeding to the Study of Living Bone." Dr. Lester S. King (Harvard Medical School) discussed the vital staining methods in cytological studies of the teeth. Dr. Walter V. MacGilvra (Harvard University Dental School) presented a preliminary report of the effects of recall acid as a means of recovery and restoration to sensibility. The name "Palinaesthesia" has been applied to the means of quickly reversing deep unconsciousness caused by ether and other anesthetics. Cases of extreme alcoholic intoxication, asphyxiation, near drowning, severe electric shocks and over-anesthesia are apparently overcome by injections of weak hydrochloric acid. Janet M. Rioch discussed "Studies on the Neural Mechanism of Chewing." Dr. William J. Macdonald talked on the "Rôle of the Physicist in Relation to Certain Oral Lesions." On Friday evening a dinner meeting of the American College of Dentists and Section N was held at Hotel Kenmore, with Dr. Bissell B. Palmer (American College of Dentists) presiding. Dr. Theodore Beust (University of Louisville) talked on the microorganisms of the materia alba of the teeth (organisms of tooth slime). Dr. J. S. Oartel and Dr. E. Alfred Wolf (University of Pittsburgh) told of their researches on "The Effects of Short Electric Waves upon Streptococci from Infected Teeth." Dr. Russell A. Dixon (Howard University) described "The Histopathological Changes in Pulp and Dentine under Different Filling Materials." Dr. Frederic James (Temple University) discussed "The Etiology, Symptomatology, Pathology and Treatment in Periodontal Disease." Dr. Francis H. Daley (Tufts College) presented the final report of a six-year investigation of Vincent's infection. Dr. Francis P. McCarthy (Tufts College) discussed the "Etiology and Pathology of *Leukoplakia buccalis*."

On Saturday morning was held the joint session of the American Society of Parasitologists and Section N, with a splendid program arranged by Professor Horace W. Stunkard (American Society of Parasitologists). Professor D. H. Wenrich, Dr. R. M. Stabler and Dr. J. H. Arnett (University of Pennsylvania) revealed the results of their protozoological survey of 700 college freshmen. Dr. H. W. Brown and Dr. P. D. Lamson (Vanderbilt University) discussed "The Comparative Toxicity of Certain Anthelmintics." Dr. G. F. Otto (the Johns Hopkins University) described the blood picture in children in Louisiana infested with *Trichuris trichiura*. Dr. A. O. Foster (the Johns Hopkins University) told the results of blood studies of experimental infections with the dog hookworm, *A. caninum*. Dr. William H. Taliaferro (University of Chicago) gave as his presidential address a discussion of "Some Cellular Bases for Immunological Processes in Parasitic Infections." On Saturday afternoon a joint session of the American Society of Parasitologists and Section N was devoted largely to a symposium on typhus fever. Hans Zinsser (Harvard Medical School) discussed "Relationships of Different Types of Typhus." Dr. Henry Pinkerton (Harvard Medical School) spoke on "Rickettsiae in Tissue Cultures." Dr. S. B. Wolbach (Harvard Medical School) discussed "Pathological Aspects of Various Diseases of the Typhus Group." Dr. Marshall Hertig (Harvard Medical School) spoke on "Studies on Rickettsiae-Like Micro-Organisms in Insects." Dr. R. R. Parker (U. S. Rocky Mountain Spotted Fever Laboratory) discussed "The Basis of Regional Variation in the Virulence of Rocky Mountain Spotted Fever and the Discussion of Reservoirs of Infection."

The dental profession was represented actively in the affairs of the American Association this year for the second time. The joint sessions of the American College of Dentists on Friday with Section N included also in the morning the American Pharmaceutical Association; this constituted the first joint meeting of national organizations representing dentistry and pharmacy. Various constructive influences of the American Dental Association's Council on Dental Therapeutics were indicated. The session presented practical suggestions for cooperation among dentists and pharmacists for scientific advancement in the professional work of each group, and for the protection of the public and the professions against the use of ineffective or worthless remedial agents. The afternoon and evening sessions, held jointly with Section N, were devoted to dental subjects in fields where responsibilities of medical practise and dental practise overlap, and where the scientific methods and objectives are practically the same for both medicine and dentistry. The science of dentistry is being actively developed by an increasing number of investigators, many of whom, in the universities, are actively identified with the development of the medical sciences. The dental programs have reflected this scientific evolution. The dental sessions were notable also as offering a stimulus to increasing realization of the interdependence among the health-

service professions. It is becoming increasingly obvious that, in the regions where the scientific interests of these professions overlap but have been relatively neglected, important developments await more active cooperation among the leading workers in each group, which such sessions as those in affiliation with Section N are promoting in the public interest and to the scientific advantage of all concerned.

SECTION ON AGRICULTURE (O)

(Reports from T. E. Odland, H. B. Tukey, Wm. H. Martin)

Section O, the northeastern section of the American Society of Agronomy and the Potato Association of America held a joint session on Thursday. The program consisted of a symposium on "Field and Microchemical Methods for Determining Soil Deficiencies." Papers were presented by C. H. Spurway (Michigan Agricultural College), R. H. Bray (University of Illinois), M. F. Morgan (Connecticut Experiment Station, New Haven), Emil Truog (University of Wisconsin), S. F. Thornton (Indiana Experiment Station), and L. G. Willis (North Carolina Experiment Station). Each paper was followed by lively discussion. There were about eighty present at the morning session and about sixty in the afternoon. It was felt that the program was very valuable in affording an opportunity to compare the different soil-testing methods and learn what their limitations and applicabilities are. The discussions showed that without doubt much valuable information can be obtained regarding the status of the soil fertilizer needs by these tests. It was brought out clearly, however, that a certain test may prove quite satisfactory under a given set of conditions but may be entirely unadapted for others. There is danger in attempting to generalize too much in regard to any test and in attempting to make it too specific. The hope was expressed that some committee might be set up to make a study of the applicability of the different soil tests to various conditions. It seemed to be the general opinion that such a committee could make a very valuable contribution to the cause by such a study, since many factors need to be considered for each specific case and different tests often need to be adjusted or calibrated to fit these conditions in order to give reliable information.

The following officers were elected: Dr. A. G. McCall (U. S. Bureau of Chemistry and Soils), *representative on the executive committee of the section,* and Professor F. J. Sievers (Massachusetts State College), *member of the section committee.*

The thirtieth annual meeting of the American Society for Horticultural Science was held in fourteen sections, including a joint session with the American Society of Plant Physiologists and a joint session with the Section on Agriculture (O). One hundred and eighty papers were presented. The address of the retiring president, Professor Laurenz Greene (Purdue University), reviewed the progress of horticultural research. Dr. J. R. Magness (U. S. Bureau of Plant Industry) was elected president for the year 1934.

The twentieth annual meeting of the Potato Association of America, held on Thursday, Friday and Saturday, was one of the best attended in recent years. In addition to the joint session with the American Society of Agronomy on Thursday, there was held on Saturday afternoon a joint session with the American Phytopathological Society to discuss potato diseases. The subject of fertilizer studies of a field nature, particularly as regards the rôle of magnesium and the proper location of the fertilizer with respect to the seed piece, dominated the Friday afternoon program. Several reports from different states were in general agreement that locations of fertilizer at the side of the seed piece were superior to locations below the seed piece or mixed in the row. The Saturday morning session was devoted to a discussion of marketing methods and a consideration of the possibility of placing the potato industry under the Agricultural Adjustment Act. Porter R. Taylor reported on proposed marketing plans in various potato-growing sections. He stated that if a coordinated program of such marketing agreements, providing for control of grade and shipment of potatoes, can be placed in operation in the important shipping areas, it should achieve the purpose of the adjustment act for the potato grower, which is the establishment and maintenance of a parity price. The association went on record as favoring renewed efforts to effect such a degree of uniformity in seed potato certification as may permit of acceptable grade standards, thereby enabling federal recognition of a certified seed grade. It was agreed also that the Committee on Agriculture in Congress should be asked to provide more adequate federal funds for potato-breeding activities, thereby permitting of a more thorough and systematic attempt to produce commercially desirable, disease-resistant varieties of potatoes.

The following officers were elected: *President,* John R. Tucker (Central Experimental Farms, Canada); *vice-president,* J. B. R. Dickey (State College, Pennsylvania); *secretary-treasurer,* Wm. H. Martin (New Jersey Agricultural Experiment Station).

SECTION ON EDUCATION (Q)

(Report from William S. Gray)

The program of Section Q included two symposiums relating to specific problems, a joint dinner with Section I and two sessions devoted to brief reports of

twenty-eight research projects or activities. The central theme of the first session was "Components of Mental Ability." In discussing the organization of human nature, Dr. E. L. Thorndike (Columbia University) pointed out that it may be studied in genes, in the unlearned tendencies, which are our only clew at present to the genes for mental traits, and in the habits, tendencies, abilities, etc., into which the original unlearned tendencies are transformed. Because of the innumerable possibilities in this connection, it is customary to simplify the task by assuming the existence of unitary traits such as leadership, memory, imagination, reasoning, honesty. This procedure has certain limitations and dangers. Dr. E. B. Wilson (Harvard University), in considering issues connected with the analysis of intelligence, discussed general (nature) *versus* specific (nurture) factors, together with certain mathematical problems involved in identifying them. In an analysis of character traits, Professor Truman L. Kelley (Harvard University) reported data consisting of ratings upon eight character traits and objective measures derived through the use of an association test. The data were analyzed to determine among other items the extent to which the judges had independent concepts corresponding to the differently described traits. Professor Robert C. Tryon challenged the validity of the so-called "mathematic factors" as components of mental ability and urged vigorously the use of psychological analysis and the psycho-Mendelian factors. Dr. Harold Hotelling (Columbia University) discussed critically various issues involved in determining the number of independent components in a group of tests.

The papers presented at a second session related to the measurement of individual development. Dr. Walter F. Dearborn (Harvard University) described the various mental and physical measurements which have been secured during a period of twelve successive years in the Harvard psycho-educational clinic on the same individuals. Through the use of these records it has been possible to develop a new unit of measurement in studying growth or development, namely, the percentage which the annual increment of growth is to the total development at maturity. Such measures insure a clearer and more accurate understanding of the nature of specific aspects of individual development and greatly increase the possibilities of illuminating analyses. The nature and scope of the research interest in individual development are suggested, in part at least, by the following problems which were discussed: "The Measurement of Ossification of the Wrist and the Hand," by Dr. Psyche Cattell (Harvard University); "Mental and Physical Development at Adolescence," by James R. Hobson (Brookline, Mass., Public Schools); "Equating Measures of Mental Growth," by J. M. Ratcliff (Tufts College), and "Repeated Measures of Anatomical Development in the Same Individual," by Elmer D. West (Harvard University). In a report of a study of individual development in infancy, Dr. Harold C. Stuart (Harvard School of Public Health) emphasized the fact that continuous measurements of various aspects of development not only provide growth curves but also enable investigators to discover interrelationships between items not usually studied together for the same individual and to determine the effects upon development of various environmental and disease conditions.

Following the joint dinner with Section I, the retiring vice-president of each section presented a paper. In discussing "Consciousness and Habit Formation," Dr. Walter S. Hunter (Clark University) reviewed briefly the evidence which led early investigators to adopt among others two different theories of learning, namely, the theory of shifting stimulus control and the theory of lapsed consciousness. Later investigations, he stated, had produced evidence which challenged the validity of these theories and showed clearly the need of further experimentation. Dr. Stuart A. Courtis (University of Michigan) pointed out serious limitations in current achievement tests, and advocated "differential testing" as a valid method of psychological analysis. By differential testing he meant a procedure which utilizes the change in score on one test to that on a related test involving one or more elements not included in the first. By this method it is possible to identify the specific nature and amount of achievement measured. Taken as a whole, the twenty-eight reports of research presented during the afternoon sessions of the meeting represent a very wide range of interests and problems, varying all the way from the method of learning arithmetic in the primary grades to the effect of college fraternities on the scholastic standing of students, or from a very broad problem such as a survey of the scientific equipment and instruction in denominational colleges to a highly specialized topic such as the effect on reading ability of differences in the size and shape of ocular images.

ORGANIZATIONS RELATED TO THE ASSOCIATION AS A WHOLE

(Reports from Jennie Hall, Edward Ellery, Mildred C. Struble, H. R. Nelson, Agnes Z. Hill, Leroy Allen)

The American Nature Study Society opened its meeting on Wednesday with a program on adult education in natural science, led by A. F. Satterthwait, chairman; all phases of present demand and need for adult education were presented. The afternoon session was occupied by reports from committee workers in research and public school training, an exposition of the children's garden work of the Brooklyn Botanic Garden, and a demonstration of

radio teaching of science, as carried on in the Cleveland Elementary Schools. On Thursday morning a valuable symposium on elementary school teacher training in science was conducted by Gerald S. Craig. An illustrated paper on Ferns, by George T. Hastings, was given in the afternoon, followed by the annual business meeting. At the evening dinner Dr. Harold C. Bryant (U. S. National Park Service) gave an illustrated lecture on the National Parks. An attractive exhibit illustrating the educational work of public schools and museums in the neighborhood of Boston was arranged in rooms adjoining the assembly hall by Dorothea Clark and a committee from Springfield, Massachusetts.

The thirty-fourth annual convention of the Society of the Sigma Xi was held on Thursday afternoon. Reports of the society's officers showed the organization to be progressive and financially more than solvent. Charters for chapters were granted to Tulane University in New Orleans and the Massachusetts Institute of Technology in Cambridge. Certificates of award in commendation of research for students in institutions where there is no chapter of Sigma Xi were granted twenty students in seven institutions. The tentative plans were laid for the celebration of the semi-centennial of the society at Ithaca in the summer of 1936. The following officers were elected: *President,* Professor George Howard Parker (Harvard University); *secretary,* Dr. Edward Ellery (Union College); *treasurer,* Professor George B. Pegram (Columbia University); *member of the executive committee,* Professor L. J. Stadler (University of Missouri), and *member of the alumni committee,* Mr. Harold F. Norton (Newport News, Virginia). The usual buffet supper for delegates and guests followed the business session. In the evening the twelfth annual lecture given under the joint auspices of the association and Sigma Xi was delivered by Professor Henry E. Sigerist (the Johns Hopkins University), on "The Foundation of Human Anatomy in the Renaissance."

The meetings of Phi Kappa Phi Honor Society were devoted to discussions of policy and to officers' and committees' reports. President-General Aven Nelson (University of Wyoming) presided, and reported on his visits to seventeen far-western and middle-western chapters of the organization during 1933. The secretary-general, Dr. C. H. Gordon (emeritus professor, University of Tennessee), stated that the scholarship funds were intact and that the policy of awarding three annual scholarships of $500 each to selected students desiring to pursue graduate work might be expected to continue. The former president-general, Professor R. C. Gibbs (Cornell University) offered valuable suggestions relative to revising the constitution. The consensus of opinion expressed by the delegates was that this organization must continue its efforts to stimulate scholarship as definitely major among college aims and that it must stress its established function of fostering contacts between superior students in the professional and graduate groups with promising students of undergraduate level. To this end the policy of scholarship days was urged and a list of speakers for such occasions was made available.

A total was reported of 24,160 members to date; of these 1,785 are in residence at forty-eight campus chapters, with additional chapters in contemplation. The *Journal* was urged to include at least one scholarly and informative article per issue.

The Gamma Alpha Graduate Scientific Fraternity held its annual council meeting and convention on Friday and Saturday. The council devoted itself principally to a consideration of plans for a national program which will be useful to Gamma Alphans in particular and science in general. A committee was appointed to consider various suggestions and report to the next meeting. The convention met, following breakfast at the Harvard Faculty Club on Saturday morning. The meeting was brief. H. R. Aldrich (University of Wisconsin) was elected vice-president-secretary.

The session of Sigma Delta Epsilon opened with the annual business meeting, at which Dr. Edna Mosher (Adelphi College) and Dr. Agnes Zeimet Hill (University of Wisconsin) were reelected president and secretary. At the annual breakfast for all women in science, Dr. Margaret Ferguson, a national honorary member, gave a delightful talk on "Opportunities for Women in Research." On Friday a luncheon for members was held at the Cock Horse Inn, Cambridge. The local committee, consisting of Dr. Louise McDowell, chairman, Dr. Laetitia Snow and Dr. Helen W. Kaan, all of Wellesley College, was responsible in large part for the success of the meetings.

Pi Gamma Mu, the national social science honor society, held a luncheon on December 30. Two national officers attended the gathering, Dr. Leroy Allen (Southwestern College), the founder and present executive secretary, who acted as toastmaster and spoke briefly on the aims of the society and the urgency of social science, and Dr. Gordon S. Watkins, professor of economics at Los Angeles and second vice-president of Pi Gamma Mu, who gave the chief address of the occasion on "The Reintegration of the Social Sciences." Dr. Henry B. Ward (permanent secretary of the American Association for the Advancement of Science), Professor Franklin L. Roberts (Boston University), Mr. James A. Moyer (Massachusetts State Department of Education) and several others made brief addresses.