choice to represent the work and ideals of the American Association.

Professor Osborn's publications are many and in many fields. According to available information he has published seven scientific memoirs, eleven books and over seven hundred papers. He edited "A Naturalist in the Bahamas" (1910), a memorial to Dr. John I. Northrup, and "Fifty Years of Princeton, '77" (1927). The following are the titles of his books: "From the Greeks to Darwin" (1894), "Evolution of Mammalian Molar Teeth" (1907), "The Age of Mammals" (1910), "Huxley and Education" (1910), "Men of the Old Stone Age" (1915), "Origin and Evolution of Life" (1917), "Impressions of Great Naturalists" (1924), "The Earth Speaks to Bryan" (1925), "Evolution and Religion in Education" (1926), "Creative Education in School, College, University and Museum" (1927), "Man Rises to Parnassus" (1927). A survey of his published papers shows 14 on geology, 35 on zoology, 24 on comparative anatomy, 3 on eugenics, 30 on anthropology, 77 on evolution, 285 on paleontology, 52 on education, 5 on psychology, 80 on biographic subjects, 52 on administrative subjects and 36 in other fields.—B. E. L.

REPORTS OF THE SESSIONS OF SECTIONS AND SOCIETIES AT THE SECOND NASHVILLE MEETING

THE general reports of the second Nashville meeting have been published in SCIENCE for January 27. The present issue is mainly devoted to special reports of the sessions of the several sections and of the societies that took part in that meeting. Almost all reports from section or society secretaries were in hand by January 14. These have been edited and assembled for the following pages.

The permanent secretary is very grateful to the secretaries of the sections and societies for their hearty cooperation in this work, especially for the promptness with which the reports have been received this year. The material here presented is classified according to the sections of the association, after the manner of the arrangement of the general program of the meeting. It is to be noted that the days of the week mentioned are those from Monday, December 26, to Saturday, December 31, 1927.

SECTION A (MATHEMATICS)

Vice-president and chairman, R. C. Archibald; *retiring vice-president,* Dunham Jackson; *secretary,* C. N. Moore, University of Cincinnati, Cincinnati, Ohio. With the section met the American Mathematical Society (*president,* Virgil Snyder; *secretary,* R. G. D. Richardson, Brown University, Providence, R. I.) and the Mathematical Association of America (*president,* W. B. Ford; *secretary,* W. D. Cairns, Oberlin, Ohio).

(Report from R. C. Archibald)

Section A held a joint session Thursday afternoon with the two affiliated organizations. Professors Jackson and Ford presided, and three papers were presented: the first by Professor E. V. Huntington, of Harvard University, retiring chairman of the section; the second by Professor Dunham Jackson, retiring president of the Mathematical Association of America, and the third by Professor Arnold Dresden, of Swarthmore College, representing the American Mathematical Society.—Professor Huntington gave a non-technical account of "The Notion of Probable Error in Elementary Statistics." This address was published in SCIENCE for December 30, 1927.

Professor Jackson spoke on "The Human Significance of Mathematics." It was contended that the significance of advanced mathematical study in human society is more profound than an analysis of the immediate applicability of current research would indicate. Mathematics is of great benefit in promoting the habit of exact thinking, in some at any rate, of those who have experience of it. The universality and permanence of mathematical truth make a profound appeal to the constructive imagination and constitute a bond of common experience between thinking men of all times and places. Since mathematical knowledge as we possess it is a product of human thinking, the process of acquiring it contributes materially to the comprehension of the manner of working of the human intelligence and of the extent to which reliance can be placed on the results of its free play. And since our knowledge comes only in restricted measure from the discoveries of the great leaders in the science, and very largely from the collective experience of the race, every serious student, whether personally engaged in research or not, may feel that he contributes something to the completeness of the structure. This paper is to be published in *The American Mathematical Monthly.*

Professor Dresden's paper dealt with "Some Philosophic Aspects of Mathematics." Discussions of the foundations of mathematics occasioned by recent work of Brouwer, Hilbert and others led to the consideration of certain questions which bear on the essential character of the subject; *viz.,* the meaning of "existence" in mathematics, and the basis for confidence in the validity of its conclusions. In its essential aspects, mathematics has no strictly objective basis, but is, in a very definite sense, subjective and temporal; belief in the validity of mathematical conclusions rests upon respected successful verifications made in the applications of mathematics.

The American Mathematical Society held sessions for the presentation of seventy-two papers on Wednesday morning and afternoon and Thursday morning. There were in attendance 138 members, a number that compares favorably with 188, the number who attended the Philadelphia meeting last year, the largest in the history of the society. There were also in attendance fifty-two non-members. At the first session Professor James Pierpont, of Yale University, gave an interesting address on "Mathematical Rigor, Past and Present," in which were rapidly reviewed some of the main features of the development of standards of rigor in analysis since the invention of the calculus by Newton and Leibnitz. Not until the days of Cauchy, Gauss, Abel and Dirichlet did analysts employ reasoning relative to infinite processes which resembles that of to-day. Improvement in rigor has in the main been brought about by discovering possibilities whose existence had not been suspected and which rendered a good part of former proofs unsatisfactory. The next step taken to give mathematical reasoning more strength is due to Weierstrass. Until his time geometric notions were freely admitted in analytic proof. But the discovery of continuous functions without derivatives made manifest the wide gap which existed between geometric notions and their analytic formulation. Weierstrass was thus led to place all analysis on a purely arithmetic foundation. His name has been a synonym of mathematical rigor for fifty years. There has now arisen a school inaugurated by Kronecker and continued in one form or another by Poincaré, Borel, Weyl and Brouwer, who call themselves finitists, empiricists or intuitionalists. These aim to introduce a far more exalted type of rigor than has hitherto been deemed necessary, which if carried through will require a rebuilding of present analysis from the ground up. This movement is hotly challenged by the formalist school, whose protagonist is Hilbert. Time alone will settle the controversy. This address is to be published in the *Bulletin of the American Mathematical Society*.—The fifth Josiah Willard Gibbs lecture of the American Mathematical Society, on "Resonance in the Solar System," was delivered at the general session Wednesday afternoon, by Professor E. W. Brown, of Yale University. The lecturer developed certain consequences of resonance phenomena amongst the periods of revolution of planets and satellites. By means of the analogy to the motion of a frictionless pendulum under a periodic disturbance, the indeterminate nature of the problem of three or more bodies over long periods of time was emphasized. Two principal conclusions were drawn: (1) that any actual system like the solar system was in a continual state of development, owing to gravitational action alone; (2) that speculations into the remote past or remote future of such a system were more likely to be valid if reached by probability methods than if attempted by exact analysis. The address will appear in the *Bulletin of the American Mathematical Society*. The society elected Professor J. W. Young, of Dartmouth College, and Professor H. L. Rietz, of the University of Iowa, as vice-presidents for two years. Professor J. L. Coolidge, of Harvard University, was appointed to represent the society in the National Research Council for three years from July 1, 1928.

The Mathematical Association of America held its twelfth annual meeting on Friday morning and afternoon, when seven papers were presented. President Ford presided. The following elections were announced: Professor A. J. Kempner, of the University of Colorado, and Professor F. D. Murnaghan, of the Johns Hopkins University, as vice-presidents for one year; Professors Archibald, Eisenhart, Lane and Rietz, as trustees for a term of three years.—On Thursday a very successful dinner for the mathematicians was held at the Ward-Belmont School.

SECTION B (PHYSICS)

Vice-president and chairman, A. H. Compton; *retiring vice-president,* W. Duane; *secretary,* A. L. Hughes, Washington University, St. Louis, Mo. With Section B met the American Physical Society (*president,* K. T. Compton; *secretary,* H. W. Webb, Columbia University, New York City) and the American Meteorological Society (*president,* C. F. Marvin; *secretary,* Charles F. Brooks, Clark University, Worcester, Mass.).

(*Reports from A. L. Hughes and Charles F. Brooks*)

Section B and the American Physical Society held meetings on Wednesday, Thursday and Friday. Nearly one hundred members of the section attended the meetings. The address of the retiring vice-president, Professor W. Duane, of Harvard University, was given on Wednesday afternoon, on "The General Radiation." Beginning with a rapid recapitulation of the main facts known about the general radiation in X-rays, the speaker pointed out how some of them receive a natural theoretical interpretation while others can not as yet be accounted for on any theory. He then went on to describe his investigations on the general radiation from matter in the gaseous state. Professor Duane finds that the distribution of the general radiation from a gas differs considerably from that from a solid in that the energy is more concentrated towards the short wave-length limit. Theory has at present no explanation to offer for this result. Pro-

fessor Duane's address will be published later in SCIENCE. The address of the retiring vice-president was followed by a lecture by Dr. C. J. Davisson, of the Bell Telephone Laboratories, on "Diffraction of Electrons by a Crystal of Nickel." One of the most perplexing phenomena in physics is that radiation in some effects behaves exactly as though it were waves in a continuous medium, while in others it behaves like a torrent of tiny particles traveling with the velocity of light. Hitherto, the electron has been satisfactorily accounted for by supposing it to be a tiny material particle. Dr. Davisson and Dr. Germer have found, however, that when electrons impinge on a suitable metallic crystal surface they reemerge in definite directions, exactly as though they were X-rays of proper wave-length falling on the crystal. This behavior can not be explained at all on the supposition that the electron is a tiny material particle. The great significance of these results is that they show, for the first time, that the electron behaves in some phenomena just like a wave, while in others, it behaves like a particle. These discoveries are to be regarded as among the most fundamental of recent years.

The American Physical Society had a program occupying five half days. Fifty-three papers were communicated. On Wednesday Professor K. T. Compton, president of the American Physical Society, gave the presidential address on "Recent Studies of Electrical Discharges in Gases." He described briefly the principal features of the electrical discharge in gases, outlined various theories which had been proposed and pointed out the difficulties which bar the way to the application of the theories to actual conditions, except in specially selected, simple cases. He then proceeded to describe recent advances in this field (many of which have come from Professor Compton's own laboratory) and showed how we have now a much improved understanding of the various types of discharge and of the causes of the transitions between them.—On Thursday evening a very successful dinner was held, attended by over one hundred persons. The Nashville meeting will be remembered with pleasure by all who attended because of the unusually excellent arrangements for the physicists at the Ward-Belmont College.

The American Meteorological Society joined with Section E (Geology and Geography) and the Association of American Geographers in a symposium on "Problems of the Mississippi River," which occurred Thursday morning. About 150 persons attended. Five of the eight papers were on meteorological subjects. Four Weather Bureau flood forecasters, Frankenfield, Williamson, Barron and Cline, presented the fundamentals of flood causation and flood prediction in the Mississippi Valley, while Brooks, on behalf of Bangs and himself, gave a weather-map discussion of the great rainfall of April, 1927, to which was due the unusual magnitude of the recent flood. Special tribute was given to Dr. I. M. Cline, on account of his surpassing public service in the Louisiana region of the flood. The prime importance of the rainfall in the middle and lower parts of the Mississippi Basin and the relative insignificance of all other factors were emphasized and a plea was made for a thorough-going meteorological investigation of great rain periods and their antecedents.—A session was devoted to local climatological studies. Another was on winds. A third was largely on storms, but included papers on radio, and on the correlation periodogram.—Of special import to Tennessee was the Tennessee Weather Service session and luncheon on Friday, organized by Fergusson, Nunn and Williamson, all of them Tennessee meteorologists. A group of the cooperative observers of the state joined with many Weather Bureau officials and others to talk over affairs of mutual interest and the session was presided over by Professor C. F. Marvin, chief of the U. S. Weather Bureau and president of the American Meteorological Society. Mrs. Ross Woods, who maintains the long-record station at Palmetto, Tennessee, brilliantly addressed the group on "Duties and Experiences of a Cooperative Observer" and other observers spoke informally. The luncheon proved a most enjoyable occasion, with Roscoe Nunn as toastmaster.—William J. Humphreys was elected president and Edward Alden Beales vice-president for two years, while Willis Ray Gregg and Charles F. Brooks were continued as treasurer and secretary, respectively. The one-hundred-dollar prize of the Meisinger Aerological Research Fund was announced for award at the end of 1928. Resolutions were adopted (1) thanking the George Peabody College for Teachers for the excellent facilities of this meeting, (2) urging increased government appropriations for the *Monthly Weather Review* and (3) requesting an appropriation of $25,000 from Congress for a special investigation of ocean meteorology in relation to floods in the Mississippi and other rivers.

SECTION C (CHEMISTRY)

Vice-president and chairman, Roger Adams; retiring vice-president, Lauder W. Jones; secretary, Gerhard Dietrichson, Massachusetts Institute of Technology, Cambridge, Mass.

(Report from Gerhard Dietrichson)

Section C held meetings on Tuesday, Wednesday and Thursday. On Wednesday morning it joined with Section N (Medical Sciences) in a symposium

on "Some Contributions of Other Sciences to Medicine," an account of which will be found in the report of Section N. Section C held four other sessions. Professor Lauder W. Jones, of Princeton University, delivered the retiring vice-presidential address Tuesday afternoon, on "A Glimpse at Chemistry Here and Abroad." Having traveled extensively throughout Europe during the past two years, Professor Jones discussed some interesting comparisons of post-war conditions. He stated that the situation in many of the university laboratories, especially outside of Germany, is still disappointing but that it is gradually improving. European research institutions are somewhat more favorably situated. In an address entitled "Valence and the Electronic Theory," Professor W. A. Noyes, of the University of Illinois, reviewed the historical development of valence conceptions, leading up to the modern electronic theory, discussing in this connection his own notable contributions in connection with nitrogen trichloride and hypochlorous acid. As a result of the illness of Dean James Kendall, of New York University, his paper on "Separations by the Ionic-Migration Method" was read by the secretary of the section. In this paper Dean Kendall first told about his attempted separation of isotopes, which has not yet been accomplished. The separation of the constituents of other mixtures has been very successful, however. Among these may be mentioned the rare earths, radium and barium, and the alkaloids. Professor Harry B. Weiser, of Rice Institute, presented a paper entitled "Ionic Antagonisms in Colloid Systems." Through a study of the precipitating action of various electrolytes on inorganic colloids such as arsenic trisulphide and copper ferrocyanide, Professor Weiser has attempted to formulate the mechanism of the antagonistic effect of salt pairs. On the basis of his formulations he has proposed an explanation of the permeability of cell membranes. There were eleven shorter papers, some by members of the Vanderbilt University Medical School. These papers, as well as those presented at the joint session, showed clearly the increasingly close relation between some phases of medical and chemical research.

SECTION D (ASTRONOMY)

Vice-president and chairman, Walter A. Adams; *retiring vice-president,* Robert G. Aitken; *secretary,* Philip Fox, Northwestern University, Evanston, Ill.

(Report from Philip Fox)

The American Astronomical Society did not meet with Section D this year, and the attendance at the section session was therefore small. Two very successful sessions were held, however, one jointly with the Tennessee Academy of Science, and the general session of Wednesday evening was arranged by Section D. A report on the preparation of the extension of Burnham's Catalogue of Double Stars was given by Robert G. Aitken. The speaker outlined the form the publication will take, showing sample pages. The manuscript is ready through eight hours of right ascension and funds are available for printing as soon as the work is finished. Dinsmore Alter gave results of the application of correlation periodogram to the analysis of sun-spot data, expressing some doubt of the existence of a true period, but stating that, if such exists, 11.46 years seems to represent it most closely. C. T. Elvey compared the relative intensities of the Green Nebular Lines N_1 and N_2, finding that the intensity ratio of N_1 to N_2 was equal to 2.76, for the cases studied. R. H. Curtiss reported on the Lamont expedition to South Africa. He stated that the Blömfontein station would be ready to start the double star survey on the southern sky early in January. It is with deep regret that we realize that death interceded to prevent Professor W. J. Hussey from completing this great work, which he so effectively planned. A second paper by R. H. Curtiss was a review of the early years of stellar spectroscopy and the growth of the idea of spectral classification. The final paper, by C. C. Wylie, gave an illustrated account of the circumstances connected with the fall and finding of the Tilden Meteorite. (See SCIENCE, November 11, 1927, p. 451.)—The Wednesday afternoon session, held with the Tennessee Academy of Science, was commemorative of Edward Emerson Barnard, perhaps the most illustrious man of science native of Nashville. (See report of Tennessee Academy, in this issue of SCIENCE.)—At the general session Wednesday evening was delivered the address of the retiring vice-president of Section D, on "Edward Emerson Barnard, His Life and Works," by Robert G. Aitken.

SECTION E (GEOLOGY AND GEOGRAPHY)

Vice-president and Chairman, Charles Schuchert; *secretary,* G. R. Mansfield, U. S. Geological Survey, Washington, D. C. With the section met the Association of American Geographers (*president,* M. R. Campbell; *secretary,* Charles C. Colby, University of Chicago), and the National Council of Geography Teachers (*president,* R. G. Buzzard; *secretary,* George J. Miller, State Teachers College, Mankato, Minn.)

(Reports from G. R. Mansfield, Charles C. Colby and George J. Miller)

Although the Geological Society of America met at

Cleveland this year, yet the Nashville meeting of Section E brought together an interested group of about forty. A number in attendance at Nashville went later to the Cleveland meeting. Section E joined with the Association of American Geographers in a dinner Wednesday evening and with the American Meteorological Society and the Association of American Geographers in a session Thursday morning. Independent sessions of Section E were held Tuesday morning and afternoon and Wednesday morning. Nineteen papers were presented. Tuesday, the principal day of the meeting, was devoted to a symposium on the Mesozoic-Cenozoic stratigraphy of the Gulf States. At the morning session six state geologists displayed maps of their respective states and described the formations of Mesozoic and Cenozoic age. Professor Charles Schuchert, who presided, gave a paper on the paleogeography of North America during the Triassic and Jurassic, which served as a setting for the afternoon papers. L. W. Stephenson gave two papers, both of which were notable for their clarity and able presentation. The first served as an introduction to the paleontologic group and dealt with the major marine transgressions and regressions and with the structural features of the coastal plain. The second described the Upper Cretaceous or Gulf series and was illustrated by an elaborate correlation chart. A paper by F. B. Plummer and H. J. Plummer on the Midway correlations on the basis of the foraminifera was also noteworthy. It showed how serviceable a close and detailed study of these minute forms may prove in the identification of certain strata or horizons. On Tuesday evening a smoker was held at which the maps used during the symposium were on display and served as the basis of protracted and animated discussion. At the session Wednesday morning Austin F. Rogers contributed a noteworthy mineralogical study of the origin of the brown rock phosphate of Tennessee. C. Wythe Cook showed that the Hornerstown (greensand) marl and the Vincentown sand of New Jersey, long considered as belonging to the Upper Cretaceous, are really of Eocene age. G. R. Mansfield summarized the results of a long program of research by members of the U. S. Geological Survey in the Rocky Mountains of southeastern Idaho. At the joint dinner Wednesday evening Dr. G. H. Ashley delivered the address of the retiring vice-president for Section E, on "Geology and the World at Large." This paper was published in SCIENCE for January 13.

The Association of American Geographers held sessions from Wednesday to Saturday. A most successful feature of this meeting was the field trip on Friday, a field study of the Highland Plain and the Cumberland Plateau, of the Nashville Basin. Each of the two communities studied was traversed by a well-chosen route, by means of automobile buses. A mimeographed log showing the principal characteristics of each area helped very greatly in promoting discussion.—The Association of Geographers joined Section E and the Meteorological Society in a joint symposium Thursday morning, on "Problems of the Mississippi River." The meteorological conditions that cause floods in the river and the régime of the river during last spring's floods were treated in a series of scholarly papers by H. C. Frankenfield, R. M. Williamson, and W. E. Barron (all of the U. S. Weather Bureau), and C. F. Brooks, of Clark University. I. M. Cline, of the New Orleans station of the U. S. Weather Bureau, showed that the floods of last spring were predicted well in advance of their occurrence. William H. Haas, of Northwestern University, pointed out that any lengthening by the enlargement of meanders or by the extension of the "passes" into the Gulf would consequently result in a new and higher base level being imposed on the old, and the levees would have to be raised from time to time indefinitely. Conversely, any shortening of the route by which the river reaches the gulf would automatically bring on a new adjustment, with base level lower than the present, which would practically eliminate the necessity of further levee construction.

The five regular half-day sessions were notable for the general excellence of the papers and for active and discriminating discussion. Taken as an inventory of the trend and progress of American productive scholarship in geography, the papers given at Nashville show that the wave of interest in detailed, quantitative studies of small areas, which appeared a few years ago, is bringing highly meritorious results, and that rapid progress is being made in method and technique, both as to performance in the field and in the presentation of the results of field work. A paper by Preston E. James, of the University of Michigan, on "The Blackstone Valley of Massachusetts and Rhode Island," was particularly noteworthy for the effectiveness of its technique; the paper by Robert S. Platt, of the University of Chicago, on "A Field Study of an Iron Range Community: Republic, Michigan," was remarkable for its closely knit organization; and the contribution of Glenn T. Trewartha, fellow of the Guggenheim Foundation, on "A Regional Study in Eastern Shizuoka Prefecture, Japan," illustrated very well how technique and method devised for work in this country may be efficiently employed in a land where the language barrier presents maximum difficulty. Further evidence of current interest in the study of unit areas was furnished by a

report of progress on an experiment in cooperative field work being made by Wallace W. Atwood, W. Elmer Ekblaw, Clarence F. Jones and Charles F. Brooks, all of Clark University.—As in recent years the Association of Geographers joined Section E at the dinner for geologists and geographers. On that occasion was given the retiring vice-presidential address for Section E, by G. H. Ashley, on "Geology and the World at Large," and the presidential address for the Association of American Geographers, by M. R. Campbell, on "Geographic Terminology." Dr. Ashley's address has appeared in SCIENCE for January 13, 1928.

The Nashville meeting was unusually pleasant. The members were lodged in the comfortable dormitories of the George Peabody College for Teachers and the college cafeteria was kept open for their use. The sessions were held in the Social Religious Building of that institution and each afternoon those in attendance were the guests at tea of the department of geography.—The officers for 1928 are: *President,* Douglas W. Johnson, Columbia University; *vice-president,* W. L. G. Joerg, American Geographical Society; *secretary,* Chas. C. Colby, University of Chicago; *treasurer,* V. C. Finch, University of Wisconsin.

The National Council of Geography Teachers met on Tuesday and Wednesday, with a program that presented two distinctive features in the field of educational geography. Organizing geographical courses in teacher-training institutions was the theme of the first session, with special reference to the problem of giving adequate training in subject-matter, at the same time retaining a professional viewpoint. A summary of this important discussion will appear in the *Journal of Geography.* Another important topic was the significance of field studies in teacher training. The presidential address, by R. G. Buzzard, of the Illinois State Normal University, Normal, Ill., dealt with this phase of the work. Systematic field study is now being done in a number of the teachers' colleges of the country and plans for expansion are being matured. Mr. L. O. Packard, of the Teachers College of the City of Boston, was elected president for the ensuing year.

SECTION F (ZOOLOGICAL SCIENCES)

Vice-president and chairman, C. E. McClung; *retiring vice-president,* Winterton C. Curtis; *secretary,* Geo. T. Hargitt, Syracuse University, Syracuse, N. Y. The following-named organizations met with the section: The American Society of Zoologists (*president,* S. J. Holmes; *secretary,* D. E. Minnich, University of Minnesota, Minneapolis, Minn.), the Entomological Society of America (*president,* F. E. Lutz; *secretary,* J. J. Davis, Purdue University, Lafayette, Ind.), the American Association of Economic Entomologists (*president,* R. W. Harned; *secretary,* C. W. Collins, Melrose Highlands, Mass.), the American Society of Parasitologists (*president,* R. P. Strong; *secretary,* W. W. Cort, the Johns Hopkins University, School of Hygiene and Public Health, Baltimore, Md.) and the Wilson Ornithological Club (*president,* Lynds Jones; *secretary,* Howard K. Gloyd, Kansas State College, Manhattan, Kan.).

(Reports from Geo. T. Hargitt, D. E. Minnich, J. J. Davis, C. W. Collins and W. W. Cort)

A very successful and enthusiastic meeting of the many groups of zoologists associated with Section F was held at Nashville. The sessions were in rooms of the new Medical School of Vanderbilt University and thanks are due those who made the very satisfactory arrangements, as well as to the Medical School. Many papers were presented by informal demonstration rather than by formal reading, a method which added greatly to the interest and value of the contributions. All papers contributed by members of Section F were placed in the program of the American Society of Zoologists. Professor Winterton C. Curtis, of the University of Missouri, the retiring vice-president for the section, gave his retiring vice-presidential address, entitled "Old Problems and a New Technique," at the zoological dinner Thursday evening. He reviewed the older methods of investigation and pointed out their advantages and limitations. He then outlined the newer method and technique of irradiation by X-rays, showing the delicacy and specificity of this technique. The opinion was expressed that this newer approach offered a far more delicate method for the analysis of biological factors and a more promising field of experimentation than are offered by any of the older methods. This interesting and valuable address is to be printed in SCIENCE.

The American Society of Zoologists held sessions for the formal reading of papers on Wednesday, Thursday and Friday mornings and Thursday afternoon. Forty-five papers were read, exclusive of those on joint programs. These were distributed as follows: general and comparative physiology, 30; protozoology, 2; comparative anatomy, 4; cytology, 4; embryology, 5. The sessions were well attended, the attendance frequently running well over one hundred. On Wednesday afternoon the program was given over to informal demonstrations and exhibits, about thirty papers being presented in this manner. This session was particularly successful, as attested by large attendance and enthusiastic comments. On Wednesday

evening a large group attended the Biological Smoker, which was held in the Alumni Memorial Building of Vanderbilt University. The program closed at noon on Friday.

The Entomological Society of America held its twenty-second annual meeting on Tuesday and Wednesday, twenty-five unusually interesting papers being presented. One afternoon was devoted to an interesting symposium on "The Physiology of Insects." The papers on the general program dealt with every phase of entomology. R. H. Painter, of Kansas State Agricultural College, gave the results of a study of the method and nature of chinch bug feeding punctures and showed the relation of this study to the problem of resistant and susceptible varieties of plants. T. J. Headlee, of the New Jersey Agricultural Experiment Station, showed the practical possibilities of using the thermal constant in timing spray treatments for the codling moth. R. W. Leiby, of the North Carolina State Department of Agriculture, reported the structure of the intestine of the cotton boll-weevil and the abnormal pathology of cells of the intestine following feeding upon cotton foliage dusted with calcium arsenate. C. H. Kennedy, of Ohio State University, gave interesting results of a study of the origin and dispersal of the strong-flying, river dragon-flies (Macromia), presenting evidence that these dragon-flies originate in the Mississippi Valley and spread through Alaska and into Asia, Europe, Australia and South Africa.—The annual public address of the society was given this year by Dr. H. T. Fernald, of Massachusetts Agricultural College, on "Insects, the People and the State." The meetings were well attended, with from sixty to one hundred or more present at each session. Officers for the coming year were elected as follows: *President,* E. O. Essig; *secretary-treasurer,* J. J. Davis, Purdue University, Lafayette, Indiana.

The American Association of Economic Entomologists met from Tuesday to Friday, attendance being unexpectedly good, with more than two hundred present.—At the meeting of the Section of Plant Quarantine and Inspection (*chairman,* J. H. Montgomery; *secretary,* W. B. Wood) S. B. Fracker, of Washington, D. C., acted as secretary in the absence of Mr. Wood. In his address as chairman, J. H. Montgomery emphasized the importance of quarantine activities. Reports of the Central, Southern and Western Plant Boards and of the National Plant Board showed these organizations to be functioning in the direction of increased efficiency and uniformity. Introducing a symposium on the activities of the Federal Horticultural Board, Dr. C. L. Marlatt described "Recent Developments in Federal Plant Quarantine Work," emphasizing the control operations against the Mexican fruit-worm and the cotton pink-bollworm. Other papers dealt with the pink-bollworm and the Thurberia weevil, Narcissus inspection, the Mexican fruitworm, Pacific port inspection and pear-blight eradication. After a round-table discussion, during which developments in the Japanese-beetle and gipsy-moth problems were discussed informally, L. S. McLaine was elected chairman and S. B. Fracker secretary for 1928.—The Section of Apiculture (*chairman,* F. E. Millen; *secretary,* G. M. Bentley, Knoxville, Tenn.) held its session Tuesday afternoon and evening. No session of this section has ever been more successful in either interest or attendance. The chairman of this section for 1928 is H. F. Wilson and E. N. Cory (College Park, Md.) is secretary.—The Cotton States Branch held a joint session with the main organization Thursday afternoon, at which papers dealing with entomological problems in the South, including those related to the cotton boll-weevil, were presented. The general program opened Wednesday afternoon, with a business session. Reports of various committees were read, these being followed by the address of President R. W. Harned, entitled "Entomology in the Southern States." The speaker gave a most interesting compilation of the development of entomology in the South, showing that interest in entomology in those states ranks almost as high as California and some of the more populous Eastern states. There were six papers on the European corn-borer, which attracted much attention, with lively discussion following their presentation. There was a symposium on insecticides, where four entomologists reviewed briefly the development in this field to date. Nine papers under the heading "Insecticides and Appliances" were read, which covered in a large measure the interesting developments of the past year in this field. Two outstanding papers were presented at this session on "The Preparation of a Special Light Sodium Fluosilicate" and on "The Preparation of Special Calcium Arsenates containing less than 40 per cent. of Arsenic as As_2O_5," and the uses of these materials as boll-weevil poisons, by Captain H. W. Walker, of the Chemical Warfare Service. There were discussions of entomological problems related to truck, cereal, forage and field crops, forest and shade trees and ornamental plants, deciduous fruits, bulbs, greenhouse crops and tropical and sub-tropical plants. New data were presented on the codling moth. On Wednesday evening the seventh annual entomologists' dinner was held in honor of Dr. L. O. Howard, for thirty-three years chief of the U. S. Bureau of Entomology. Two hundred and forty-nine members and guests attended this dinner. Dr. H. A. Morgan, president of the University of Tennessee, acted as toastmaster. The

occasion was one of the most pleasing that the Entomological Association has enjoyed at its annual conventions. Dr. C. L. Marlatt, the present chief of the U. S. Bureau of Entomology, paid tribute to the work of Dr. Howard and Dr. Howard responded in a most fitting manner, also showing many slides and giving sidelights on his contacts with European entomologists. Dr. F. E. Lutz spoke on "Unapplied Entomology." Entertainment was furnished by local talent. The Extension Entomologists and Insect Pest Survey held a meeting Tuesday evening at the Hotel Hermitage, which was well attended. Professor W. B. Herms, of the University of California, was elected president; J. E. Graf, of the U. S. Bureau of Entomology, was elected vice-president and C. W. Collins (Melrose Highlands, Mass.) continues as secretary of the association.

The American Society of Parasitologists held its third annual meeting from Tuesday to Friday, with about fifty members present. One of the outstanding features of the program was the address of the retiring president, Dr. R. P. Strong, entitled "Some Parasitic Infections Observed in Equatorial Africa during 1926 and 1927." Dr. Strong gave a survey of some of the findings of his African expedition. In addition to the contributed papers, a symposium on the teaching of parasitology and a program of invited papers on medical parasitology were held. Great interest in teaching problems was in evidence. The discussion brought out the fact that one of the greatest needs of teachers of this subject is more adequate information on methods of obtaining material, and a very large number of practical suggestions along this line were brought out both in the papers themselves and in the discussion.

The invited papers on medical parasitology were of unusual interest. J. F. Kessel reported experiments in which he was able to infect various animals with certain of the intestinal protozoa of man, and suggested that host specificity is not as rigid in many parasitic protozoa as has been usually believed. P. D. Lamson, of the Medical School of Vanderbilt University, summed up the recent advances made by his group on carbon-tetrachloride poisoning, including the extremely important finding that the toxicity of this drug is related in a definite way to calcium deficiency. A. C. Chandler gave an illuminating analysis of the methods and results of his recent epidemiologic studies on hookworm disease in India, in which it has been shown that in only a few places is the intensity of the infestation with hookworm sufficient to make this disease a real public-health problem.

For the first time a number of the papers on the contributed program were presented by demonstrations, which proved to be very successful. An extensive demonstration on creeping eruption, a disease produced by the wanderings of the larvae of the canine hookworm (*Ancylostoma braziliensis*) in the human skin, was given by W. E. Dove and attracted a great deal of attention. The demonstration period gave an opportunity for a social hour, at which tea was served. A total of forty-five contributed papers were listed on the program, fourteen in protozoology, twenty-three in helminthology, four in medical entomology and four in general parasitology. More than half of the papers were related to parasites of man or of domesticated animals. An unusually large number of interesting and important contributions were made, only a very few of which can be mentioned here. There were three papers by G. W. Hunter, L. J. Thomas and H. E. Essex, respectively, which gave important new light on tapeworm life cycles. In two papers L. R. Cleveland first showed how to separate a trichinomonas of man from bacteria and then gave results of experiments on its growth in pure cultures of various microorganisms. These studies appear to open up a new field of possibilities in cultural studies of parasitic protozoa. In a very interesting and challenging paper on "The Economic Importance of Veterinary Parasitology," M. C. Hall pointed out how tremendous is the economic loss due to parasites of domesticated animals. Abstracts of the contributed papers appeared in the December number of the *Journal of Parasitology*, sent to all the members of the society. The following officers were elected for 1928: *President*, C. A. Kofoid; *vice-president*, R. W. Hegner; *secretary-treasurer*, W. W. Cort.

The Wilson Ornithological Club met with the section, but no report of its sessions has been received.

SECTION G (BOTANICAL SCIENCES)

Vice-president and chairman, William Crocker; *retiring vice-president*, Benjamin M. Duggar; *secretary*, Sam F. Trelease, Columbia University, New York City. The following named organizations met with the section: The Botanical Society of America (*president*, H. H. Bartlett; *secretary*, Arthur J. Eames, Cornell University, Ithaca, N. Y.), the American Phytopathological Society (*president*, M. F. Barrus; *secretary*, R. J. Haskell, U. S. Bureau of Plant Industry, Washington, D. C.) and the American Society of Plant Physiologists (*president*, Charles A. Shull; *secretary*, Scott V. Eaton, University of Chicago, Chicago, Ill.).

(Reports from Sam F. Trelease, Arthur J. Eames, Paul B. Sears, C. W. Dodge, S. C. Brooks, F. J. Schneiderhan, J. F. Adams and Scott V. Eaton)

As in recent years, Section G arranged a single ses-

sion of invited papers of general interest, held jointly with its constituent societies on Wednesday afternoon. Dr. B. M. Duggar gave the vice-presidential address on "Recent Viewpoints and Evidence tending to characterize the Agencies of Typical Mosaics." Dr. Chas. F. Hottes spoke on "Chromidia in Plant Cells." (These are fragments of chromatin lying freely in the cell, not massed into a nucleus.) Dr. W. W. Lepeschkin read a paper on "The Effect of Alcohol on the Turgor Pressure of Spirogyra." Dr. E. C. Stakman spoke on "Epidemiology of *Puccinia graminis*." Dr. A. B. Stout read an address on "Dichogamy in Flowering Plants." These were all very valuable contributions, but inadequate space prevents giving more than their titles here.

The Botanical Society of America, with a registered attendance of 218, held a successful meeting from December 27 to 31. The usual dinner for all botanists was held jointly with the American Society of Naturalists. The retiring president of the Botanical Society, L. H. Bailey, was unfortunately prevented by illness from delivering the presidential address, and President H. H. Bartlett related some of his experiences while living and collecting in Sumatra during the past year. President-Elect A. H. R. Buller spoke briefly.—Officers of the Botanical Society were elected as follows: *President,* A. H. Reginald Buller; *vice-president,* Irving W. Bailey; *council representatives,* H. H. Bartlett and I. F. Lewis; *corresponding members,* Abbé G. Bresadola, S. Ikeno, C. H. Ostenfeld, O. Rosenberg and R. von Wettstein. The following paragraphs summarize the reports of the four sections of the Botanical Society:

The General Section (*chairman,* G. P. Burns; *secretary,* Paul B. Sears) met on Wednesday, Thursday and Friday, with well-attended sessions and a program of twenty-six papers. Researches were reported in both descriptive and experimental morphology, and in cytology, genetics, physiology, paleobotany, taxonomy, ecology and technique. One session was devoted to a discussion of the teaching of botany. Of outstanding interest was the presentation of points of view that are being developed in the teaching of general botany at Chicago, Missouri and Wellesley. Gilbert M. Smith was elected *chairman,* and Paul B. Sears, *secretary* for the ensuing year.

The Mycological Section (*chairman,* W. C. Coker; *secretary,* C. W. Dodge) held two sessions with papers on cytological, morphological and physiological researches on fungi. The first session was devoted to general papers and phycomycetes. C. L. Porter reported on the effect of varying hydrogen-ion concentration and temperature upon a large number of pathogenic fungi. W. C. Coker discussed the occurrence of a large number of water-moulds in the soil. At the second session, W. J. Bach and F. A. Wolf discussed the cause of Citrus melanose. H. H. Whetzel discussed in great detail the relationships between fungi of the *Botrytis cinerea* group and Sclerotinia. C. W. Dodge discussed the morphology, phylogeny and taxonomy of the higher Plectascales. Structures resembling sexual organs were reported for Mesophellia and the systematic position of this genus was definitely determined as in the Ascomycetes instead of the Basidiomycetes. J. N. Couch discussed the structure and development of tropical species of Septobasidium, reporting germination of basidiospores.—At the joint session of the Mycological Section of the Botanical Society with the American Phytopathological Society, A. H. R. Buller discussed the growth of the mycelium of *Armillaria mellea* in relation to luminosity. J. H. Craigie reported an investigation upon sex in the rusts, in which it was found that *Puccinia graminis* is heterothallic. (See report of Phytopathological Society, below.) J. J. Taubenhaus and L. J. Pessin discussed the hydrogen-ion toleration of *Phymatotrichum omnivorum* in relation to possible control of this disease. B. O. Dodge reported on the morphology and cytology of fertile hybrid perithecia from crossing *Neurospora sitophila* and *N. tetrasperma.*

The Physiological Section (*chairman,* C. O. Appleman; *secretary-treasurer,* S. C. Brooks) held three scientific sessions, of which one was a round-table discussion on "Mineral Nutrition," and two were for the reading of twenty-five original papers. Paper mulch, by maintaining superior soil conditions and controlling weeds, will perhaps lead to radical changes in truck-crop cultivation. Lewis H. Flint reported on several years of field trials of paper mulch, with gratifying increases in yield. Adelia McCrea reported significant increases in both yield and drug potency of *Digitalis purpurea,* which in the seed bed had been grown under a special glass transmitting sunlight ultra-violet. Eloise Gerry described the effects of fire on wood structure and on yield of resin in long-leaf pine and also reported preliminary studies on the production of heptane by *Pinus Jeffreyi.*—On the theoretical side, a paper by D. T. MacDougal, J. B. Overton and G. M. Smith presented evidence for the existence in woody stems of continuous vascular air connections, and provoked much discussion of both methods and conclusions. The discussion was further stimulated by A. F. Hemenway's paper on the rate of sap flow in desert plants, as measured by the spread of introduced dyes. O. L. Sponsler and W. H. Dore explained, with the aid of space models, the arrangement of atoms and molecules in ramie cellulose, and the train of argument by which the structure of the individual C_6 units and their relative positions were de-

duced. W. E. Burge and collaborators showed that the intake of dextrose, levulose and galactose by Spirogyra is parallel to the utilization of these substances by Paramoecium and higher animals, in that it is increased by insulin and by optically active as opposed to optically inactive amino-acids.—The round-table discussion of mineral nutrition was introduced by D. R. Hoagland, and various phases of the subject were treated by J. S. McHargue, E. S. Johnston, F. W. Parker, W. J. Robbins, W. E. Tottingham and S. C. Brooks. Spirited discussion ensued, centering particularly about the effects of boron, the effects of light and the definition of terms.

The Systematic Section (*chairman,* C. C. Deam; *secretary,* F. T. McFarland) held two sessions. The Wednesday morning session was given over to the reading of six papers dealing with problems of classification, distribution and education in taxonomy. The Thursday morning session was taken up by an informal discussion of the flora of the Mississippi Valley.

The American Phytopathological Society held its eighteenth annual meeting from Tuesday to Friday. The attendance was about 175 and the arrangements were the best in recent years. It was generally remarked that the small daylight screen used this year for slide projection was quite unsatisfactory to a large part of the audience; larger screens are greatly needed.—Sixty-five new members were added to the roll, the total membership being now 750. Officers for 1928 were elected as follows: *President,* H. P. Barss; *vice-president,* F. D. Heald; *councilor,* F. D. Fromme. —The program contained ninety papers, twenty-nine more than last year's program. Four were given in joint session with Section G and twelve with the Mycological Section of the Botanical Society. The remaining papers may be classified according to subjects, as follows: crown gall, 10; potato and vegetable diseases, 11; cereal and forage diseases, 11; fruit diseases, 9; tobacco diseases, 8; mosaic diseases, 8; diseases of ornamentals, 7; sweet-potato diseases, 3, and miscellaneous papers given before the Southern Division of the Society, 7.—The dinner was attended by 169 persons. The principal speaker was Watson Davis, of Science Service. A quartette of typical Tennessee darkies crooned soft southern melodies and negro spirituals in a most effective manner, giving a background of unflagging interest. The reincarnation of Charles Darwin, in the person of F. D. Fromme, in a haunted atmosphere with a metaphysical accent, was another feature of the dinner. The dinner program was shorter and better than usual, an innovation that was greatly approved.

The causes and control of overgrowths and hairy root in nursery stock were dealt with by seven speakers. Wound overgrowth and crown gall of apple occurring in England, France and Holland were reported on by A. J. Riker.—Francis O. Holmes discussed technique for comparing various concentrations of tobacco-mosaic virus.—The importance of strict sanitation in propagating tobacco, for the control of true tobacco mosaic, was emphasized by W. D. Valleau and E. M. Johnson.—Tobacco ringspot was shown to be a virus capable of infecting a wide range of plants, by S. A. Wingard and F. D. Fromme, who succeeded in infecting plants of nineteen genera, representing eleven families.—Treating undelinted cotton seed with fungicidal dusts was reported to be economical by N. C. Woodroof.—C. R. Orton discussed the effect of disinfectants on the germination of seeds kept in storage for indefinite periods, reporting that the organic mercury dusts did not decrease germination, but increased it in many cases after storage periods of from one to three years.—The effectiveness of organic and inorganic mercury compounds for the control of large and small brown-patch of turf have again been confirmed by the studies of John Monteith, Jr., and A. S. Dahl.—New physiologic forms of *Tilletia tritici* may be the explanation for the gradual increase of the wheat disease in America, especially in Kansas, Virginia and Pennsylvania, according to E. G. Gaines.—Two new dust treatments for oat smuts were reported by J. D. Sayre and R. C. Thomas. The fungicidal base used was formaldehyde and iodine.— J. Johnson found that the properties of the potato rugose-mosaic virus are quite different from those of certain other potato viruses studied, such as leaf-rolling mosaic and spot necrosis.—S. P. Doolittle and M. N. Walker presented evidence to show that the aphis transmission of cucumber mosaic results from the virus being carried into the plant tissues on the proboscis of the insect and that the minute amount of the virus thus carried is exhausted during the first feeding period.—Further studies on the black root-rot of apple caused by *Xylaria mali* nom. nov., show that the fungus is also actively parasitic on Norway maple and Mahaleb cherry.—E. E. Wilson presented data which further emphasize the relationships of the time of leaf-fall to the maturity of ascospores of *Venturia inaequalis.* Additional studies on certain phases of this important apple disease were presented by G. W. Keitt with E. E. Wilson and J. M. Hamilton.—The toxic constituent of sulphur fungicides, according to H. C. Young and Robert Williams, is pentathionic acid. When sulphur was freed of its pentathionic acid and then placed in Van Tieghem cells it was not toxic to spores of *Sclerotinia cinerea.* A simple test for pentathionic acid was described.

Probably the most noteworthy contribution of the meeting was a paper by J. H. Craigie on the heterothallism of the rust fungi. Investigations of sex in

these fungi have shown that *Puccinia graminis* and *P. helianthi* are heterothallic. The sporidia are of two kinds, designated plus and minus. A plus sporidium gives rise to a plus mycelium and a set of pycnia that produce plus pycnospores. A minus sporidium gives rise to a minus mycelium and a set of pycnia that produce minus pycnospores. When a plus and a minus sporidium are sown close together on a leaf, the plus and minus mycelia resulting therefrom intermingle and produce diploid aecia. When plus pycnospores are brought into contact with a minus pycnium, or minus pycnospores with a plus pycnium, diploid aecia are produced, within a few days of transfer, on the under side of the pustule receiving the pycnospores. The pycnium is to be regarded not as a spermagonium, producing non-functional spermatia, but as an active organ which develops either plus or minus pycnospores and attracts flies, by means of which pycnospores of one sex are carried to pycnia of another sex.

The American Society of Plant Physiologists met from December 27 to 30. A dinner for all plant physiologists was held Wednesday evening, at the Chamber of Commerce, in commemoration of the 250th anniversary of the birth of Stephen Hales. President Charles A. Shull delivered a very interesting address at that time, on the life and work of Hales, with illustrations by means of lantern slides taken from Hales's famous book, "Vegetable Staticks." Dr. Burton E. Livingston followed with an address announcing the establishment of the Stephen Hales Prize Fund by the society. He emphasized the importance of this, the first fund to be established for a prize in plant physiology. The first award of the Stephen Hales Prize is to be made at the New York meeting next December. Finally, the election of the second Charles Reid Barnes Life Member of the American Society of Plant Physiologists was announced by Professor F. M. Andrews, chairman of the committee on that honorary membership. This honor is conferred for outstanding research in plant physiology. It was this year conferred on Professor F. E. Lloyd, of McGill University, Montreal.—Reports of committees at the business meetings indicated encouraging progress in many directions. President Shull called attention to the present excellent financial condition of *Plant Physiology* (the official journal of the society), which is already established as successful in every way. A unanimous vote of thanks was extended by the society to President Shull for his indefatigable efforts on behalf of the society since its organization. Dr. S. V. Eaton, secretary of the society, reported a large increase in membership during the year.—For the first time, arrangements were successfully made this year by which conflicts were completely avoided between the sessions of the Society of Plant Physiologists and those of the Physiological Section of the Botanical Society, to the great gratification of all.

The papers presented at Nashville were varied and generally of great excellence. F. M. Andrews, of Indiana University, described the opening of crocus and tulip flowers in response to temperature increase of a single degree or less.—W. E. Tottingham and H. Lowsma, of the University of Wisconsin, reported that chemical analyses of wheat plants, grown respectively in red-yellow, green-violet and ultra-violet light, showed highest nitrate assimilation and protein synthesis in the green-violet region.—Charles A. Shull, of the University of Chicago, described a quantitative study of the reflection of light from leaf surfaces. Reflection was found to be most complete for green light and low for red and blue light.—J. D. Sayre, of Ohio State University, found that light of wave-length greater than 680 μμ was ineffective in chlorophyll formation in many species of crop plants.—D. R. Hoagland, A. R. Davis and P. L. Hibbard, of the University of California, discussed the influence of one ion on the absorption of another by Nitella in dilute solutions.—S. Dunn and A. L. Bakke, of Iowa State College, showed that the amount of dye taken up by the wood of different species could not generally be directly correlated with their known hardiness.

The joint session of the society with Section G and the other affiliated societies is reported elsewhere. The valuable and spirited discussion before the Physiological Section of the Botanical Society on Thursday morning, on the mineral nutrition of plants, was followed in the afternoon by an equally interesting symposium before the Society of Plant Physiologists, on "What Needs to be Done Next in Plant Physiology?" C. B. Lipman, of the University of California, in a paper read by D. R. Hoagland, emphasized, among other things, a need for reform in the teaching of botany in laboratory and classroom. B. E. Livingston, of the Johns Hopkins University, drew attention to the present need for studies on the plant as a whole, especially in relation to its environment, and the need for further data on the interrelation of influential conditions, their mutual effects and their ranges of influence. D. T. MacDougal, of the Carnegie Institution of Washington, emphasized the great present need for work on photosynthesis, permeability, the dynamics of colloids and environmental influences on growth. E. J. Kraus, of the University of Chicago, urged that more attempts be made to correlate as yet isolated biological phenomena and pleaded for greater mutual understanding among physiological workers as well as for unremitting efforts in all phases of research.

At the final session on Friday morning occurred the first public showing of a motion-picture film on the "Physiology of Gametes in the Conjugatae," by F. E. Lloyd, of McGill University. This film vividly portrayed great activity in the protoplasm of conjugating cells and demonstrated the importance of vacuoles in the process.—A. R. Davis and D. R. Hoagland, of the University of California, described a simple apparatus for controlling the atmospheric environment of plants grown in culture solutions. It was found possible to predict plant yields and to duplicate results. —A progress report on chemical composition in relation to growth and reproductive responses in apple trees was made by Walter Thomas, of Pennsylvania State College, in which certain deficiency indices were described.—F. T. McLean and B. E. Gilbert, of Rhode Island Agricultural Experiment Station, presented results of studies on aluminum toxicity.—G. J. Peirce, of Stanford University, presented further observations on the behavior of algae found in brines, suggesting that these organisms may possibly be regarded as indicators of molecular drift toward regions of crystallization.—Moisture content, foliar transpiring power, and wilting, in relation to curing of hay, were described by A. L. Bakke and E. R. Henson, of Iowa State College, who found that differences between hay cured in the windrow and in the swath were smallest when the evaporation conditions were most intense.—H. L. Van de Sande-Bakhuyzen, of Stanford University, outlined a new theory of growth, permeability and correlation, based principally on hydration phenomena.

ORGANIZATIONS RELATED TO BOTH SECTIONS F AND G

(Reports from E. W. Sinnott, George D. Fuller, H. J. Van Cleave, L. C. Dunn and Elmer Roberts)

The American Society of Naturalists (*president,* C. E. McClung; *secretary,* L. J. Cole, University of Wisconsin, Madison, Wisconsin) presented on Friday afternoon a symposium on "Temperature and Life." The speakers emphasized not only the great importance of temperature in all vital activities but also the complexities of its various effects and the many difficulties which confront the physiologist in separating the influence of temperature from those of other factors in the environment. The speakers were as follows: M. H. Jacobs, Royal N. Chapman, James G. Dickson, Chas. F. Hottes and H. L. Shantz. The annual dinner of the society was held jointly with the Botanical Society of America on Friday evening.

The Ecological Society of America (*president,* C. Juday; *secretary,* A. O. Weese, University of Oklahoma, Norman, Okla.) met on Wednesday, Thursday and Friday. There were three general sessions, an invitation program in charge of the president of the society, and joint sessions with the Botanical Society and with the Society of Zoologists. Business sessions were also held daily and an informal dinner was held on Wednesday evening. The presidential address was given by Dr. Juday, at the morning session on Thursday. It was entitled "Chemical and Biological Studies of Some Lakes in Northwestern Wisconsin." A notable feature of the meeting was an invitation program Wednesday afternoon, consisting of seven papers. Four of these dealt with the inter-reactions of various classes of organisms. S. A. Waksman discussed the question of "Forest Humus, a Problem in Soil Microbiology." Elias Melin reviewed the present state of our knowledge of the "Mycorrhizal Fungi of Forest Soils and Their Relation to Tree Growth." The ecological relations of the root systems of forest trees were also discussed in papers by W. B. McDougall and J. E. Weaver. "The Present Status of Our Knowledge of the Ecology of Protozoa of the Soil" was presented by C. E. Skinner and the "Bioecology of Forest and Range" was dealt with in a paper by Walter P. Taylor and W. C. McGinnies. A. G. Vestal discussed the "Forest of the San Francisco Region in Relation to Chaparral and Grassland," and G. A. Pearson's paper was on the "Measurement of Physical Factors as an Aid to Silviculture."—The society confirmed the action of its president and his associates in forming the Ecological Society of America, Incorporated, under the laws of the State of Wisconsin. Simultaneously with incorporation a new class of membership was established, "Sustaining Members," whose dues are $10.00 per year. The extra funds obtained from such memberships are to be used in the publication of the results of research. The following officers were elected: *President,* H. L. Shantz; *secretary-treasurer,* A. O. Weese, University of Oklahoma, Norman, Okla.

The American Microscopical Society (*president,* Z. P. Metcalf; *secretary,* H. J. Van Cleave, University of Illinois, Urbana, Illinois) held its forty-sixth annual meeting on Wednesday. The following officers were elected: *President,* P. S. Welch; *secretary,* H. J. Van Cleave. The custodian of the Spencer-Tolles Fund, Professor Henry B. Ward, reported that the fund now has properties valued at more than $12,500. Grants from this fund for the encouragement and support of original investigations are available to members of the society. The report of the treasurer shows a balance of $1,378.90 in the general fund. The secretary called attention to the fact that sixty new members have been admitted during the year, approximately two hundred having been added during the three years of his term of office.

The Genetics Sections of the American Society of Zoologists and the Botanical Society of America

(*chairman,* R. A. Emerson; *secretary-treasurer,* L. C. Dunn, Storrs, Conn.) held well attended sessions on Wednesday, Thursday and Friday. The reading of papers occupied three mornings, one afternoon was devoted to demonstrations and on one afternoon the sections met jointly with the Geneticists Interested in Agriculture for a symposium on "Irregularities of Chromosome Behavior in Relation to Plant and Animal Improvement." Forty contributions were offered, twenty-four of them being read at the formal sessions. —Five of the papers read, one of the demonstrations and one of the papers given by title only, dealt with the effect of X-rays on plants and animals. Chief interest centered in the recent attempts to alter the course of inheritance and the frequency of mutation by treatment with X-rays. The most extensive experiments on this question were reported in detail by H. J. Muller, whose paper (for which the American Association Prize was awarded this year) is abstracted in the section on the Prize. By use of a special technique for measuring the frequency of mutations in *Drosophila melanogaster* he obtained results indicating that the application of sublethal doses of X-rays to sperm was followed by a large increase in the mutation rate of treated, as compared with control, cultures. The mutation rate in some treated cultures was estimated at 15,000 times the normal rate. F. B. Hanson, working in Dr. Muller's laboratory at the University of Texas, reported on the direct effect of X-rays on the productivity and sex ratios of Drosophila and reported also the appearance of many mutations in the X-rayed cultures. From the botanical side L. J. Stadler reported on the occurrence of new endosperm characters that apparently had arisen by mutation in maize ears X-rayed at the time of fertilization. The same investigator presented evidence for the occurrence of mutations in seedlings from treated barley seeds. T. H. Goodspeed and A. R. Olson reported that many variant types had been found in the progeny of X-rayed Nicotiana plants, and gave evidence of a considerable degree of chromosome irregularity following the treatment.—A direct effect of X-rays on colored mice was reported by R. T. Hance.—Four papers dealt with disease resistance. Two showed the inheritance of resistance to specific diseases in chickens.—C. H. Danforth reported that skin grafted from one young chicken to another assumed during growth the characters of the donor in respect to feather color and pattern but assumed the characters of the host in respect to sex and growth rate.—The following officers were elected for 1928: *Chairman,* H. J. Muller; *society representative,* O. E. White.

The Geneticists Interested in Agriculture held their eighth annual meeting jointly with the Genetics Sections of the Botanical Society and the Society of Zoologists on Thursday afternoon, with about one hundred and twenty-five persons in attendance. The program consisted of a symposium on "Irregularities of Chromosome Behavior in Relation to Plant and Animal Improvement," and a talk by Dr. L. C. Dunn on "Genetics in Europe." A. F. Blakeslee discussed irregularities of chromosome behavior in plants, drawing largely upon his work with Datura and pointing out that in many forms various combinations may be produced by breeding and preserved by vegetative reproduction. H. J. Muller emphasized the fact that most of the causes of irregularities in animals were either lethal in effect or produced sterility or other abnormal conditions; consequently little opportunity for animal improvement could be expected from this source. Following the symposium L. C. Dunn spoke briefly of research in genetics in Great Britain, Germany and Russia. Dr. C. M. Woodworth, of the Illinois Experiment Station, Urbana, Ill., was elected chairman.

SECTION H (ANTHROPOLOGY)

Vice-president and chairman, R. J. Terry; *retiring vice-president,* R. Bennett Bean; *secretary,* Fay-Cooper Cole, University of Chicago, Chicago, Ill.

(*Report from Fay-Cooper Cole*)

Section H held its sessions on Tuesday, Wednesday and Thursday. Since the Anthropological Association was holding its sessions elsewhere the attendance was small, but interest was keen and ample time was allowed for the discussion of papers. The first day was given over to problems relating to individual and race changes, which are of equal interest to physical anthropologists and students of the social sciences. A way must be devised to take the place of laboratory methods used in general biology. Investigations carried on in families which make up the various groups under question was favored.—The second day was devoted to archeology. Among the papers read, that dealing with the excavations of Beloit College in Northern Africa was of special interest. The sites excavated indicate an extensive culture of Aurignacian date, while the skeletal material appears to show a type of mankind varying somewhat from the dominant groups in Europe at that time. A lively discussion followed the presentation of evidence of three finds of relics of man associated with remains of Pleistocene mammalia by Dr. Oliver Hay.—On Thursday the members of the section were conducted, by Professor P. E. Cox, state archeologist of Tennessee, to an extensive series of Indian mounds about thirty miles from Nashville. The anthropology dinner was held Tuesday evening.

SECTION I (PSYCHOLOGY)

Vice-president and chairman, Knight Dunlap; *retiring vice-president,* Margaret Floy Washburn; *secretary,* Frank N. Freeman, University of Chicago, Chicago, Ill.

(*Report from Frank N. Freeman*)

An important feature of the program of Section I at the Nashville meeting was a joint session with the Southern Society for Philosophy and Psychology. This society holds its regular annual meeting in the spring, but this year it joined officially with Section I for one session. Several papers were contributed by members of the Southern Society and the session at which they were given was perhaps the most interesting of the meeting.—According to custom, Section I joined with Section Q for one session.—In her retiring vice-presidential address Dr. Margaret Floy Washburn presented an able argument in support of the mechanistic conception of animal behavior as contrasted with the vitalistic theory of emergent evolution. Dr. Washburn's address has appeared in SCIENCE for January 13.—The chairman of the section for the next year is Dr. H. C. Warren, and the newly elected section committeeman is Dr. M. Bentley.

SECTION K (SOCIAL AND ECONOMIC SCIENCES)

Vice-president and chairman, W. S. Leathers; *retiring vice-president,* Joseph H. Willits. The Metric Association (*president,* George F. Kunz; *secretary,* Howard Richards, 156 Fifth Ave., New York City) is the only one of the associated organizations that took part in the Nashville meeting.

(*Report from Howard Richards*)

Section K held no sessions at Nashville. It is hoped that some of the associated societies of this section will hold sessions or contribute programs for the great New York meeting next year. While it seems to be clear that the natural and exact sciences (which virtually make up the field of the American Association at present) and the social and economic sciences have very much in common and that these two groups of investigators have much to gain from some contact with each other, yet it is not generally customary for the two groups to meet at the same time and place. It follows that the session of this section in recent years have not generally enjoyed the atmosphere of research and discussion that characterizes the sessions of most of the other sections. The association is hopeful that workers in the social and economic sciences may be willing to join with it, at least at some annual meetings, in order that the research aspect of these great and important lines of study may from time to time be adequately represented along with the natural and exact sciences. The executive committee of the association will be glad to receive the benefit of suggestions from men of science who are interested in this general project, which is as important as it seems to be difficult.

The Metric Association held its eleventh anniversary meeting on Thursday, with an industrial conference in the morning and an engineers' conference and an educational conference in the afternoon. There were also a Weight and Measure Luncheon and the usual Metric Dinner. Seven metric advocates of Nashville institutions made a strong showing. A steady trend toward complete metric usage was reported.

SECTION L (HISTORICAL AND PHILOLOGICAL SCIENCES)

Section L is not yet organized. In recent years special committees on the history of science and on philology or linguistic science have arranged programs for the annual meetings. For the Nashville meeting no program was arranged on the history of science, which is now being adequately developed by the affiliated History of Science Society, and that society did not meet with the association this year. At the request of the executive committee of the association a session on linguistic science was arranged for this meeting by the newly-formed Linguistic Society of America, which is affiliated. A brief report on this session follows:

(*Report from Leonard Bloomfield*)

The session on linguistic science was held Friday afternoon with a small but interested group. Discussion was lively. Professor G. M. Bolling, of Ohio State University, presided. There were two papers on general linguistics. Professor E. Sapir (University of Chicago) reported on an association experiment in which a meaning was arbitrarily assigned to a vocal form, this form then altered by small steps, the observer being asked to state the meanings he associated with the altered forms. The results showed a high correlation between specific changes of form and of meaning. Professor Bolling read a paper discussing the postulate that phonetic laws have no exceptions; he pointed out the origin of the postulate's wording in a dispute of fifty years ago, and showed that under a tenable definition of the terms "law" and "exception" or under a modern rewording, the postulate is necessary for the science of language —a necessity which exemplifies the close connection of linguistics with natural science. Two papers dealt with problems of Algonquian study. Professor Truman Michelson (Bureau of American Ethnology) discussed the historical changes owing to which the

Arapaho language to-day diverges from other Algonquian, and pointed out the importance of the alternation of certain sounds in Central Algonquian. Professor Leonard Bloomfield (University of Chicago) presented certain forms of Swampy Cree which confirm a reconstruction that had hitherto depended on purely theoretical prediction. In the field of Indo-European Professor W. Petersen (University of Florida) discussed the Latin vi-perfect as an example of the irradiation of a formal element. Linguistic borrowing, as exemplified by loans from American English into the Hungarian spoken in America, was discussed in a paper by Professor F. R. Preveden (DePauw University).

SECTION M (ENGINEERING)

Vice-president and chairman, A. N. Talbot; *retiring vice-president,* C. R. Richards; *secretary,* N. H. Heck, U. S. Coast and Geodetic Survey, Washington, D. C.

(*Report from N. H. Heck*)

Section M met on Wednesday. The program of the morning session was arranged by the Engineering Association of Nashville. An afternoon session and a dinner were held jointly with Section C, the dinner being under the auspices of the Engineering Association of Nashville. The morning program included papers dealing with subjects of general interest but with special local appeal.—Wilbur A. Nelson, Virginia state geologist, discussed methods of developing the natural resources of Tennessee. Methods now in use by successful state geological surveys were described and new methods were suggested.—Major John F. Conklin, U. S. A., discussed the power possibilities of the Cumberland drainage area. The paper showed that the development of power will aid in flood control, while, with proper precautions, it will not interfere with the use of the river for navigation.—C. N. Bass, Tennessee highway commissioner, showed that Tennessee, by an improved highway system, has erased sectional lines and greatly aided progress. Travel in the United States by automobile, expressed in passenger miles, was 2.5 times as great in 1926 as by train. The congestion problem leads to much study.—George C. Fischer, Nashville smoke inspector, discussed smoke abatement in Nashville. Abatement of smoke was undertaken in 1926, by education, inspection, instruction and recommendation. The use of coke helped a great deal and the adoption of underfeed stokers with down-draft boilers has been effective.—C. R. Fountain, of the George Peabody College, on behalf of the institute of Radio Engineers, gave a paper on the contribution of radio to engineering. By animated motion pictures he showed the behavior of the electrons in radio tubes, etc., and pointed out that radio is a stimulus to youth to study engineering sciences, this being probably its greatest contribution to engineering.—At the afternoon session the address of the retiring vice-president for Section M, Dr. C. R. Richards, on the functions of Section M, was read in his absence. Section M, it is thought, should attempt to bridge the gap between the engineer and the fundamental scientist, furnishing opportunity for the engineer to voice his scientific needs and announce his achievements in adapting science to industry, and for the scientist to forecast the application of new theories and important discoveries. The publication of the results of such discussions should be provided for in some way and this need is an important problem before the section and the association. The main aim should be to establish a bond of interest and sympathy between engineers and scientists. Discussion followed and the project to make effective some of Dr. Richard's recommendations was referred to the section committee of Section M.—N. H. Heck discussed the earthquake situation in the Mississippi Valley, advancing several theories to account for the occurrence of mid-continental earthquakes, the processes of erosion and sedimentation being given important weight. Since no one knows whether or not a future great earthquake is now preparing, the need for scientific investigation is obvious. The plan of Dr. James B. Macelwane, S. J., for seismograph observations, triangulation and precise levels was described. Engineers should not only support this investigation but should keep in touch with work of the same sort being done elsewhere.—John A. L. Waddell presented a remarkable conception of a proposed national institute, to follow the lines of "L'Institut de France," but on a much larger scale. It was suggested that Section M might initiate action in establishing such an institute. After considerable discussion this matter was referred to the section committee, with instructions to make recommendations at the New York meeting.—Professor Thorndyke Saville, of the University of North Carolina, was unable to attend the meeting but sent a paper, "Water-power Development and the Interconnected Transmission Systems of the Southeast." By means of the most extensive system of interconnected power stations in the world, power may be relayed from Muscle Shoals and other Alabama water-power stations to the Virginia coal fields and steam-power generated at the mines might be sent in the reverse direction. Great additions will be necessary in the near future, about 60 per cent. of which will come from hydroelectric developments, the rest coming from steam plants. Great need for a comprehensive

investigation of the hydrographic phenomena of all the streams of this system was pointed out.

The address at the dinner was given by H. F. Moore, of the University of Illinois, on the "Mechanics of Materials: a Contribution of Applied Science to Pure Science." The theory of the mechanical failure of solids and the limits of reliability of the theory of elasticity are being worked out in engineering laboratories, and in the future the development of the mechanics of wave stress will probably be demanded. Intellectual aloofness from practical application and self-satisfied contempt of theory are alike marks of a narrow mind. The highway between pure science and applied science is not a one-way street.

SECTION N (MEDICAL SCIENCES)

Vice-president and chairman, G. Canby Robinson; *retiring vice-president,* Rufus I. Cole; *secretary,* A. J. Goldforb, College of the City of New York, N. Y.

(*Report from A. J. Goldforb*)

The Nashville program of Section N included subjects in anthropology, biochemistry, physiology, medicine, public health, parasitology, pathology and pharmacology. There was a program of invited papers and two joint sessions, with Section C (Chemistry) and with the American Public Health Association.—Dr. Rufus I. Cole, director of the Hospital of the Rockefeller Institute, in his retiring vice-presidential address (see SCIENCE for January 20, page 47) emphasized medical science and the sciences related to it. Dr. Aleš Hrdlička, of the U. S. National Museum, discussed the contributions of anthropology to medicine, and *vice versa.* He urged that a chair of anthropology be established in each medical school.—Dr. E. C. Kendall, of the Mayo Foundation, reviewed the problem of biological oxidations, discussing the contributions of chemists and biologists on this fundamental problem of the internal processes of organisms. He pointed out significant results in this field, the calorigenic relationships, the nature of intermediary metabolism, the influence of food accessories on metabolism, the oxidation influence of hormones, with a running commentary on problems still to be solved.—The recent dramatic development of our knowledge of anemia was reviewed by Dr. G. H. Whipple, of Rochester University Medical School, whose pioneer work led to the discovery of the etiology of pernicious anemia. Grains, vegetables and fish are least effective in stimulating hemoglobin regeneration, while leafy vegetables, meats and certain fruits are more effective. Liver is most effective.—Dr. Alfred F. Hess, of New York University and Bellevue Medical College, outlined the contributions of chemistry, physics and pathology to the solution of the problem of rickets, giving a cogently reasoned analysis of the influence of ultra-violet rays upon bone formation and on chemical substances in the superficial tissues of animals and plants. The effect of such diverse treatments as those of cod-liver oil and light upon normal bone formation were discussed and it was emphasized how specific are the effective wave-lengths and the substances involved and how minute is the quantity that transforms a rachitic animal into a healthy one.

The afternoon session was devoted to important medical problems of particular significance in the South. Colonel A. M. Stimson, of the U. S. Public Health Service, discussed the control of malaria and the extent to which its eradication may be evaluated in terms of money.—Dr. C. C. Bass, of Tulane University Medical School, reviewed the contributions of parasitology to medical science. He outlined cooperative work by workers in these two fields, in the eradication of hookworm, bubonic plague, malaria, etc., and pointed out the necessity of studying the protozoa of the intestine, of the mouth and of the vagina. It was suggested that pellagra may be due not merely to diet deficiencies but to insect hosts as well.—Dr. R. S. Cunningham, of Vanderbilt University Medical School, gave an analysis of tissue reactions to tubercle bacilli.—Dr. E. W. Goodpasture, of Vanderbilt University Medical School, gave the results of a study on a virus disease of poultry, which disclosed bodies that seem to be of great significance in the theory of virus disease in general.

SECTION O (AGRICULTURE)

Vice-president and chairman, L. E. Call; *retiring vice-president,* C. F. Marbut; *secretary,* P. E. Brown, Iowa State College, Ames, Iowa. The American Society of Agronomy contributed to the program of one session and the following named societies associated with the section held sessions of their own: the American Society of Horticultural Science (*president,* E. J. Kraus; *secretary,* C. P. Close, College Park, Md.), the Potato Association of America (*president,* H. C. Moore; *secretary,* Walter M. Peacock, U. S. Department of Agriculture) and the Crop Protection Institute (*chairman,* W. C. O'Kane; *secretary,* Paul Moore, National Research Council, Washington, D. C.).

(*Reports from P. E. Brown, C. P. Close and Paul Moore*)

A joint session with the American Society of Agronomy and the Association of Economic Ento-

mologists dealt with "The Corn-borer Situation." The papers emphasized the need of cooperation in corn-borer research and brought out recent developments in the entomological, agronomic and mechanical aspects of this problem. At the annual dinner of Section O and the associated societies was given the retiring vice-presidential address of Dr. C. F. Marbut, on "A Hitherto Neglected Factor in the Agricultural Situation."

The American Society for Horticultural Science held its annual meeting Tuesday to Thursday, with an attendance that surpassed the record. Some of the points brought out are indicated below. Yields of thirteen or fourteen tons of tomatoes per acre were reported for the varieties Marglobe, Columbia, Norton and Norduke, grown in Indiana.—It was found that the dry-matter content of tomato fruits varied inversely with the soil-moisture content.—Removal of apical buds of young tomato plants delayed production of first fruits about a week. Periodically leaf-pruned tomato plants in soil cultures with a liberal supply of nitrogen showed carbohydrate-nitrogen ratios that varied inversely with severity of pruning which was also true when similar plants were systematically root pruned.—Vitamin A in green asparagus fed to white rats at Michigan State College maintained good health, while rats fed blanched tips lost weight and died.—In Kansas in 1926 and 1927 it was found, with the Worden grape, that there was so little correlation between cane length or cane diameter and crop production that careful selection of canes as to size at time of pruning is not necessary. Peach fruit buds showed negative correlation between length of shoot and carbohydrate content; with high nitrogen content long shoots are produced and carbohydrates are used in growth, but with low nitrogen content little growth occurs and carbohydrates accumulate.—Fall-grown cabbage plants that are to flower in the spring show enlargement of stem apex in fall and winter, the flower-stalk primordium being differentiated about February 1; branches and flowers emerge about April 1.—Sweet-corn varieties with high percentage of translucent endosperm were of higher quality than others; as were also those with low percentage of pericarp and very little starchy endosperm; while high percentage of starchy endosperm is usually associated with low quality.—The haploid chromosome number in pollen mother cells is, in general, 8 for sweet cherries and 16 for sour and Duke varieties; abnormal chromosome behavior is associated with a high degree of pollen sterility in Duke varieties, and to a lesser extent in certain sour varieties. Attention was given to the occurrence of polycary in the microspores of sweet varieties.—Catalase activity of apple blossom buds in autumn varies but little with the vigor of the trees. No direct relationship was found between catalase activity and bud size.—From studies on ether extracts of year-old tissue of mature Jonathan apple trees it was found that the percentage of fat at the tops of shoots increased in April and decreased in early May.—Apple scions grafted on piece roots change the root character to that typical of the scion variety; variability of trees in the nursery row appears to be due principally to the manner in which the grafts were made and to differences in the scions while the use of seedlings as stocks seems to have little influence.—Hardening or blackening of the calyx end of the pear fruit seems related to the root stock used, being most often found on trees propagated on *Pyrus serotima, Pyrus ussuriensis* and Kieffer, but occurring only rarely on *Pyrus communis* or quince stocks.

The Potato Association of America met Wednesday, Thursday and Friday, this being its fourteenth annual meeting, but no report of the session has been received.

The Crop Protection Institute held its annual meeting on Tuesday evening, with a dinner at the Hermitage Hotel. The secretary-treasurer reported excellent progress; there are prospects for some endowment and the institute should be incorporated. Nearly $75,000 has been available in the last eighteen months and nearly $50,000 has been expended. Fifteen investigators were employed in projects. The chairman mentioned some of the projects now being worked on and emphasized the great advantage of the present cooperative plans, by which many institutions contribute to the same project. For example, the project on crown gall, under the chairmanship of Dr. R. E. Melhus, enjoys the cooperation of the U. S. Department of Agriculture, the University of Minnesota, Iowa State College and many nurserymen. Among the other projects are those of oil sprays, cattle repellants, oil emulsions, fineness of sprays and organic compounds of mercury and thallium as treatments against insects in stored grain. A promising series of poisons is being developed, derived from furfuramid, and a study of substances derived from oxidation of oils has been begun. Work is being carried on in fifteen states. Suggestions and constructive criticism is invited.

SECTION Q (EDUCATION)

Vice-president and chairman, Arthur I. Gates; *retiring vice-president,* Melvin H. Haggerty; *secretary,* A. S. Barr, University of Wisconsin, Madison, Wis.

(*Report from A. S. Barr*)

Section Q met on Monday, Tuesday and Wednesday. One session dealt with experimental study of

teaching, one with educational psychology (a joint session with section I), two sessions with matters of school administration and two with miscellaneous researches. The retiring vice-presidential addresses for Sections I and Q were given Tuesday evening at a joint meeting of the two sections with the Phi Delta Kappa Fraternity.

Retiring vice-president M. E. Haggerty spoke on "The Improvement of College Instruction." Pointing out that much present criticism of college instruction was ill-founded, he reviewed some problems peculiar to American colleges and universities: namely, those related to need for new objectives, curriculum construction, personnel management, improvement of examinations and marking systems, better teaching and the training of college teachers. Dr. Margaret Floy Washburn, retiring vice-president for Section I, gave a clear and vigorous paper on "Purposive Action," which has appeared in SCIENCE for January 13. In the discussions on the experimental study of teaching, led by H. L. Donovan (Peabody College), it was pointed out that about eight hundred thousand persons are employed in teaching, a third as many as in all other professions. Considering the rapid turn-over in the teaching profession, its training load is twice that of all other professions combined. Frank N. Freeman (University of Chicago) reviewed the contributions of educational psychology to the development of teaching procedures.

Seven papers on a variety of subjects were read at the joint session of Sections I and Q. Bird T. Baldwin (Iowa Child-Welfare Station) reported on a three-year study of the growth of elementary school children. Some of his results are: A marked overlapping of scores is found in all grades; the median increments on composite scores for boys and girls in the three years show insignificant sex differences; a pupil's future score can be predicted with fair accuracy from his previous score or scores, the difference between the actual score and the estimated score being approximately a half-year's educational growth. —A. S. Courtis (University of Michigan) proposed a new measure of teaching ability, based on the change of rate of growth in the children taught; his paper is to appear in *School and Society*.

Ten papers treated of the various aspects of school administration. G. D. Strayer (Columbia University) reviewed progress made in making school administration more scientific; P. C. Packer (University of Iowa) spoke on the function of the university school of education; N. L. Engelhardt (Columbia University) summarized researches on school buildings; H. F. Clark (Indiana University) read a brilliant paper on public school finance in the light of modern economic theory, pointing out, among many other things, that although it is usually assumed that schooling increases the income of the individual, yet a study of the earnings of groups of equal ability, the members of which have gone to school different lengths of time, does not support this assumption. Attention to economic theory might show advantages for planning the educational system in terms of the number of people that can be used in each of the occupations and professions.

Twelve papers were read in the two sessions devoted to a discussion of current research. Data gathered by W. C. Ruediger (George Washington University) from about six hundred college students show that 35 per cent. never had a course in physics, while the corresponding percentages for other subjects are as follows: Chemistry, 32; zoology, 59; physiology, 39; history and appreciation of art, 64; ancient history, 11; European history, 23. F. P. O'Brien (University of Kansas) concluded that colleges are successful neither in attracting nor in holding the mentally fit; 53 per cent. of those whose mental scores had placed them in the upper half of the range of high-school graduates do not apply for entrance to any institution of higher learning and the students eliminated (more than half of whom left in the first year) are not inferior. O. W. Caldwell (Columbia University) described the new educational internship of the Lincoln Institute of School Experimentation as a means of training experimental workers. Lentz (Washington University) presented new tests of sex interest. Many other interesting, important and stimulating contributions were made.

ORGANIZATIONS NOT SPECIALLY RELATED TO ANY PARTICULAR SECTION

In addition to those already named, the following organizations held sessions at the Nashville meeting: The Society of the Sigma Xi (*president,* F. R. Moulton; *secretary,* Edward Ellery, Union College, Schenectady, N. Y.), the American Nature-Study Society (*president,* George R. Green; *secretary,* E. Laurence Palmer, State College, Pennsylvania), the Tennessee Academy of Science (*president,* W. S. Leathers; *secretary-treasurer,* John T. McGill, Vanderbilt University, Nashville, Tenn.), the Gamma Alpha Graduate Scientific Fraternity (*president,* Richard Hartshorne; *secretary,* Sidney M. Cadwell, 561 W. 58th St., New York City), the Honor Society of Phi Kappa Phi (*president,* L. H. Pammel; *secretary,* C. H. Gordon, University of Tennessee, Knoxville, Tenn.), and the Sigma Delta Epsilon Graduate Women's Scientific Fraternity (*president,* Julia A. Colpitts; *secretary,* Amy G. McKeel, Cornell University, Ithaca, N. Y.).

(Reports from Edward Ellery, John T. McGill, Sidney M. Cadwell, R. M. Peterson and Amy G. McKeel)

The Society of the Sigma Xi held its twenty-eighth convention on Tuesday. Reports were made by the officers and charters were voted for chapters at the University of Maryland, Lehigh University, University of Illinois College of Medicine, and Kansas State Agricultural College. Officers were elected as follows: *President,* Vernon Kellogg; *secretary,* Edward Ellery; *treasurer,* George B. Pegram. The annual dinner was followed by the Sixth Annual Sigma Xi Lecture, delivered at the Tuesday evening general session of the association, by President Clarence Cook Little, of the University of Michigan, who spoke on "Some Opportunities for Research in Mammalian Genetics."

The American Nature-Study Society met on Tuesday and Wednesday. No report has been received.

The Tennessee Academy of Science, officially affiliated with the American Association, on Monday afternoon joined Section D in a session devoted to reminiscences of the late Edward Emerson Barnard, a native of Nashville. The latter session was opened by Judge Robert Ewing, chairman of the Board of Trustees of Watkins Institute, Nashville, who was a member of the reception committee for the first Nashville meeting, fifty years ago. J. W. Braid, chemist-photographer and instrument maker, spoke of Barnard's first work with Van Stavoren, photographer and portrait painter, his enthusiasm for astronomy, his use of an old spyglass as his first telescope, etc. P. R. Calvert, who was intimately associated with Barnard for eight years in the gallery of R. Poole, successor to Van Stavoren, told the story of Barnard's introduction to Simon Newcomb in the State Capitol at the meeting of the American Association in Nashville in 1877. Barnard joined the association at that meeting. Olin H. Lambeth told of Barnard's exceptional admission to the university as a special student, and at the same time as assistant instructor in astronomy. Robert G. Aitken, Philip Fox and D. W. Morehouse gave interesting accounts of their association with Barnard at the Lick and Yerkes observatories. The session closed with a tribute to Barnard by Miss Mary R. Calvert, his niece and his secretary and assistant for many years at the Yerkes Observatory. Since Barnard's death she has carried to completion his last great work, the "Atlas of Selected Portions of the Milky Way," recently published by the Carnegie Institution of Washington. A collection of photographs, medals and other Barnardiana was on exhibition during the meeting.

The Gamma Alpha Graduate Scientific Fraternity held a dinner Thursday evening, at which Dr. William Crocker, of the Boyce Thompson Institute for Plant Research, spoke on "A Pan-American University in Porto Rico: a Great Move for International Peace." The projected university would be affiliated with the other graduate schools at the University of Porto Rico. Porto Rico is the best common meeting ground for the Spanish and English cultures of the western hemisphere, which among other things makes the island very well suited for an international educational project.

The Honor Society of Phi Kappa Phi held its tenth general convention on Tuesday evening and Wednesday. There was an active discussion of concrete methods for the encouragement of scholarship in educational institutions. Favorable action was taken on a petition for a chapter at Parsons College, Fairfield, Iowa. Officers were elected as follows: *President,* R. C. Gibbs; *secretary,* C. H. Gordon.

The Sigma Delta Epsilon Graduate Women's Scientific Fraternity held its annual convention following a breakfast on Wednesday morning. The breakfast was open to all women interested in science and was attended by fifty-seven women, representing twenty-eight institutions. Dr. Frances Wick, of Vassar College, spoke on "Some Reflections upon Invisible Radiations and Their Effects," and her talk was much appreciated by physicists and biologists alike.

SPECIAL NOTES

(1) This issue of SCIENCE contains the reports of the sessions of sections and societies at Nashville. The general reports of the meeting have appeared in the preceding issue, for January 27.

(2) Copies of the issue for January 27 may be had free from the permanent secretary's office, Smithsonian Institution Building, Washington, D. C., so long as the supply lasts.

(3) Members who were enrolled for the year 1927 but who have not yet sent in their dues for 1928 are asked to do so now; otherwise the journal subscriptions can not be continued longer.

(4) All who are interested in the advancement of science and education should belong to the American Association. New members are received at any time. Information about the organization and work of the association and about the responsibilities and privileges of membership therein may be secured at any time from the permanent secretary's Washington office, Smithsonian Institution Building, Washington, D. C.