and by Princeton University and the University of New York in 1924. He has been awarded the Hébert prize of the Paris Academy, the Cresson medal of the Franklin Institute, the medal of the National Institute of Social Sciences, the Edison medal of the American Institute of Electrical Engineers, the Medal of Honor of the Radio Institute, and other similar recognitions. He is a recipient of the Pulitzer prize, for his autobiography. He is a member of the American Philosophical Society, of the American Academy of Arts and Sciences and of the National Academy of Sciences. The American Association for the Advancement of Science is indeed fortunate in having Michael I. Pupin as its president.—B. E. L.

THE WASHINGTON SESSIONS OF THE SECTIONS AND SOCIETIES

Reports of the programs of the sections and societies at the Fifth Washington Meeting have been prepared from accounts sent in by section and society secretaries and others who have kindly acted as reporters. The permanent secretary is much gratified at the fine spirit of cooperation generally evidenced by the secretaries of the organizations that took part in the great Washington meeting. It must be realized that the task of preparing even a brief report on one session or a series is in itself something of an undertaking unless one is used to doing that sort of thing. The magnitude of this task is increased when the report must be prepared within a week or so following the close of such a meeting as we have just had. The permanent secretary wishes to express his thanks and also the appreciative gratitude of the association to all who have helped to make the reports of the Fifth Washington Meeting as good as they are.

The reports received naturally vary greatly in regard to suitability for use. Great improvement is shown from year to year, not only in the promptness with which the reports are sent in but also in the care and thought and ability with which they are prepared.

One of the greatest needs of present-day science is to perfect means by which the workers in any field may easily secure a fairly good idea of what is going on in other fields and the annual publication of these reports is planned to aid in that direction. Each branch of scientific endeavor that is represented by an organization in one of these great scientific conventions surely deserves appreciation by all scientific workers as well as by the intelligent public in general. The work of preparing these reports is consequently just as important to the sections and societies and to the advancement of learning as is that of preparing the programs. The secretaries and other reporters and the members of the various societies are asked to study this year's reports critically, and to note suggestions for further improvement in future years. It is true that the permanent secretary's part in this work is still much more in evidence than is desirable. The permanent secretary has done only his best in cases where the reports received seemed to require alteration or rewriting; doubtless this best is not very good in some instances and suggestions for future improvement will be gladly received.

The section reports are arranged below in the serial order of the association sections to which they pertain, together with the reports of those societies whose fields are of general or less technical interest. Lack of space precludes the publication in this issue of SCIENCE of all the reports of the societies that met with the American Association at Washington. The remaining reports, of which there are about forty, will appear in later issues, grouped according to the association sections to which the societies are most closely related.

Because of the very great attendance at the Fifth Washington Meeting the supply of the general program was exhausted and copies of it can not be supplied. The summary of events was reprinted, however, and copies of that may be had—as long as the supply lasts—on application to the Washington office.

SECTION A (MATHEMATICS)

Vice-president and chairman, J. C. Fields.

Retiring vice-president, Harris Hancock.

Secretary, William H. Roever, Washington University, St. Louis, Mo.

(*Report by William H. Roever*)

Section A held two joint sessions, one on Wednesday morning with the American Mathematical Society and the Mathematical Association of America and the other on Thursday morning with Sections B and D and the two mathematical societies. In the absence of Professor J. C. Fields, Professor H. L. Rietz, president of the Mathematical Association of America, presided at the session on Wednesday morning and Professor Oswald Veblen, retiring president of the American Mathematical Society, gave an address entitled "Remarks on the foundations of geometry." A very brief outline of this address, which will be published in full in the *Bulletin of the American Mathematical Society,* will appear later in the report of the meeting of the society. The other address of this session was given by Professor Harris Hancock, retiring chairman of Section A, on the subject, "The foundations of the theory of algebraic numbers." In this address, which was published in full in SCIENCE for January 2 and 9, Professor Hancock made some general observations on the ultimate

recourse to mathematics in the formulation of physical theories and then introduced by simple examples the notion of number realms. He then pointed out that the extension of these realms by the introduction of new numbers necessitates the making of certain modifications, in order that the usual theorems of arithmetic may hold in the more general realms. The ideal factors of Krummer and Dedekind were mentioned and other points in the theory were illustrated. At the Thursday morning session Professor W. F. G. Swann, retiring chairman of Section B, and Professor John W. Miller, chairman of Section D, presided. The first address of this session was given by Professor H. N. Russell, of Princeton University, on the subject, "Stellar evolution." The speaker described the recent theory of Professor Eddington and its relation to Russell's earlier work. The essential feature of Eddington's theory is the hypothesis that in the interior of a star the outer electrons of the atoms are removed, so that the atoms may be very much more closely packed together than was previously assumed. This leads to a consideration of gases many times more dense than the heaviest known element on the earth and gives the typical star a much longer life than was previously estimated. Professor Archibald Henderson, of the University of North Carolina, gave an address, entitled "Is the universe finite?" which is briefly outlined in the report of the meeting of the Mathematical Association of America, to follow. Professor Russell read a paper by Dr. E. P. Hubble, of Mt. Wilson Observatory, on "The distance of the spiral nebulae." In this paper Dr. Hubble described how he had been able to separate the aggregate of stars around the edges of the spiral nebulae into star clusters and thus to get an estimate of the distance of the spiral nebulae from the earth. The estimated distance is enormous, being of the order of magnitude of 1,000 light years. The reader emphasized the value of this paper as giving direct experimental information on the question of the size of the universe.

In the general exhibition there were books and models of interest to mathematicians. In particular, there were exhibits of the publications of the American Mathematical Society and of several publishers, including books on advanced mathematics. The exhibits of calculating machines, such as the Mercedes, the Millionaire and the Monroe, also proved interesting to mathematicians. The very fine exhibit of the Coast and Geodetic Survey, for which Dr. W. D. Lambert was responsible, was of unusual interest.

Professor J. C. Fields, chairman of Section A, who was prevented by illness from attending the meeting, sent a telegram of greetings to the mathematicians assembled in Washington.

This meeting was specially marked by the second award of the Bôcher Memorial Prize, for a memoir published in the society's *Transactions;* the prize was equally divided between E. T. Bell, of the University of Washington, for his paper entitled "Arithmetical paraphrases," and S. Lefschetz, of the University of Kansas, for his paper entitled "On certain numerical invariants of algebraic varieties with application to abelian varieties." On Tuesday evening the second Josiah Willard Gibbs lecture was delivered by Robert Henderson, vice-president of the Equitable Life Assurance Society, who spoke on "Life insurance as a social service and as a mathematical problem." The retiring address of President Veblen, entitled "Remarks on the foundations of geometry," was delivered at the joint session on Wednesday morning. His paper dealt with the following topics: The relation between matter and space, geometry of paths, the choice of undefined terms, postulates for analysis situs and the arithmetic point of view. Both Mr. Henderson's and President Veblen's papers will be published in full in the *Bulletin of the American Mathematical Society.* This meeting was probably the largest in the history of the society, with regard to both attendance (more than 150) and number of papers on the program. At the regular sessions of the society 56 papers were presented by 39 authors, on the theory of numbers, algebra, analysis, the foundations of mathematics and mathematical astronomy and physics. Authors of these papers represented 11 states (including California and Texas as well as the east and middle west) and Canada; an important paper was presented by Professor C. de la Vallée Poussin, of the University of Louvain, entitled "Sur les fonctions indéfiniment dérivables." A joint dinner of the society, the Mathematical Association and Section A of the American Association for the Advancement of Science was held at the Franklin Square Hotel on Thursday evening, with Professor J. L. Coolidge as toastmaster; the attendance was over one hundred.

SECTION B (PHYSICS)

Vice-president and chairman, K. T. Compton.
Retiring vice-president, W. F. G. Swann.
Secretary, S. R. Williams, Amherst College, Amherst, Mass.

(Report by S. R. Williams)

Section B participated in two joint sessions. The first was with the American Physical Society, Section D and the American Astronomical Society, on Tuesday afternoon, with Vice-president Compton presiding, at which was given the address of the retiring vice-president, Professor W. F. G. Swann, of Yale University. His subject was: "The trend of thought

in physics." The second joint meeting in which Section B took part was on Thursday morning, with Sections A and D, the American Mathematical Society, the Mathematical Society of America and the American Astronomical Society.

SECTION C (CHEMISTRY)

Vice-president and *chairman,* F. G. Cottrell.

Retiring vice-president, E. W. Washburn.

Secretary, W. D. Harkins, University of Chicago, Chicago, Ill.

(*Report by Gerhard Dietrichson, assistant secretary*)

A joint meeting of the Washington and neighboring sections of the American Chemical Society, together with Section C of the A. A. A. S., was held during both the forenoon and afternoon of Tuesday, December 30, to Friday, January 2, inclusive. The Thursday session was devoted largely to a symposium on X-rays and crystal structure, in which a number of physicists also took part. The sessions throughout were well attended and much interest was evidenced in the various papers presented, of which there were about 40. These represented a wide and well-selected range of subjects. An important feature of the meeting was that sufficient time, in many cases as much as one hour, was allowed for the presentation and discussion of each paper. On Thursday evening a dinner was held at the Cosmos Club, which was attended by about fifty chemists.

The address of the retiring vice-president, E. W. Washburn, of the National Research Council, was devoted to a detailed discussion of some effects of the atmosphere upon various physical measurements. The latter included in particular the effect of dissolved air upon the thermometric ice-point, a comparison of static and dynamic methods for vapor pressure measurements, the determination of specific heats at constant volume and at constant pressure, and a differentiation between three distinct types of heats of vaporization. Dr. Washburn's address was published in the issue of SCIENCE for January 16.

One of the most interesting papers was that presented by Dr. W. H. Eddy, of Columbia University, on the activity of bios. Dr. Eddy described the successive steps in the fractionation and purification of bios as the result of which a crystallin product was obtained which appears to be closely related to vitamin B. The bios crystals were found to have a decided temperature coefficient. Dr. Eddy also called attention to the multiplicity of bioses as indicated by experiments carried out at the University of Toronto and at Columbia University. The sulphur amino acid, $C_6H_{11}NSO_2$, obtained by J. H. Muller, was found to be only slightly less active than the crystallin product $C_6H_{11}NO_3$, obtained by Dr. Eddy. Professor W. A. Noyes, of the University of Illinois, related his experiences in Europe during the past year. He commented regarding the seemingly greater tendency in European universities to consider qualifications for independent research rather than teaching ability in the appointment of professors. He concluded by telling about his activities in connection with efforts to restore normal international relations with German and Austrian chemists. Dr. A. L. Day, of the Geophysical Laboratory, gave a paper on the causes of volcanic activity. He spoke of temperature variations of the lava lake in Mt. Lassen and Mt. Kilauea and called attention to the surprising variation in composition of the gases evolved. The theory proposed by Dr. Day is to the effect that volcanic action does not indicate a molten condition of the earth's interior but results from the crystallization process which takes place upon the gradual accretion of water to highly supercooled silicates.

The subject of atomic structure very properly made up a considerable part of the program for the meeting. Dr. Harold C. Urey, of the Johns Hopkins University, discussed the relation between the static and the dynamic concepts of the atom. Dr. Urey showed that within the atom the electronic orbits can be described with a high degree of approximation by assuming that each electron is moving in a static field of force. It may be that the best method of describing the atom is not by the use of the idea of a static field of force, but at least this is one way. Dr. Charles P. Smythe, of Princeton University, discussed the electric moments of molecules. Dr. Smythe pointed out that when the centers of gravity of the positive and of the negative charges in the molecule coincide the arrangement of the charges is symmetrical and the field of force around the molecule is small, but when they do not coincide the molecule may be regarded as containing an electric doublet, two charges equal in size but opposite in sign and very close together. The size of this doublet, which gives rise to an electric field around the molecule, is measured by its moment, the value of which has been calculated by a new method for the molecules of a large number of inorganic and organic substances, from experimental data. These values of the moment are found to be in agreement with our theories of structure. Another interesting paper was presented by Dr. Robert S. Mulliken, of Harvard University, on the interpretation of band spectra; *i.e.*, spectra of molecules. Dr. Mulliken called attention to the important part played by the quantum theory in the interpretation of line spectra, or the spectra of atoms. In a similar way it appears that the quantum theory will be of much help in a study of the structure of molecules. As yet the theory has been applied to only a moderate number of relatively simple substances in the gaseous state. One of the striking results obtained so far is an explanation of the transitory existence of certain molecules never found by chemists,

as for instance, He_2 and CN. The quantum theory also makes possible a determination, by means of the spectrum of a molecule, of the exact distance apart of its component atoms, the exact rate at which they vibrate when properly stimulated and also the forces holding them in place. The spectral relations of molecules made up of atoms having isotopes was also discussed, with reference to the possibility of detecting the existence of isotopes. Dr. Karl T. Compton, of Princeton University, told about the different types of excited atoms and explained how they may be produced through electronic impact and light absorption. He emphasized the importance of band spectra in the study of excited atoms and concluded by describing experiments that have been carried out by Dempster and Kannenstein for determining their period of existence. Dr. Arthur H. Compton, of the University of Chicago, spoke about the scattering of X-rays as having furnished us with our first knowledge of the number of electrons in different atoms. The arrangement of these electrons in various atoms has been studied by comparing the observed intensity of scattered X-rays with the intensity calculated for different arrangements of the electrons. The intensity of the reflection of X-rays by crystals has also been used to determine the distribution of the electrons. Recent work has however cast doubt on the wave theory of X-rays, which is the fundamental basis of this work. The wave-length of scattered X-rays differs from that of the primary rays; this receives a complete explanation on Einstein's idea of radiation quanta. When X-rays are scattered, electrons should recoil from the scattered quanta, and such recoiling electrons have actually been observed.

Dr. R. W. G. Wyckoff, of the Geophysical Laboratory, reviewed the progress in the study of the internal structure of crystals by means of X-rays, which makes possible a determination of the elements of symmetry. Dr. Edgar T. Wherry, of the Department of Agriculture, discussed the subject of isomorphism and atomic dimensions, calling attention to the fact that the seemingly decisive factor in determining isomorphism is that of the atomic domain. Examples were cited of substances having a similar crystalline structure and still exhibiting a lack of isomorphism. In order to make the arrangement of atoms in the crystal more readily understandable, Dr. Wherry recommended that planes be passed midway between the points so as to outline polyhedrons representing an assemblage of atomic domains. Dr. W. P. Davey, of the General Electric Company, presented a paper on atomic and ionic radii. Dr. Davey discussed the two methods of packing that give the closest arrangement of spherical atoms; *i.e.*, the face-centered cube and the body-centered cube. In view of experimental results showing that atomic hydrogen will permeate cold alpha iron it is concluded that the body-centered cubic structure of the latter has tunnels running through it which are big enough for atomic hydrogen to pass through but which are too small for molecular hydrogen. The shapes and sizes of various kinds of atoms and ions were discussed in detail. Dr. Ancel St. John, of New York City, described many interesting applications of X-rays in studying the structure of pure metals and alloys. Dr. M. S. Kharasch, of the University of Maryland, discussed a number of reactions involving unsymmetrical organic compounds for establishing the degree of electronegativity of various radicals. Dr. R. A. Baker, of Syracuse University, presented a study on the status of the electron in the teaching of high school and college chemistry. Much difference of opinion was encountered with regard to the emphasis to be placed on this aspect of the subject in beginning courses. Dr. Charles A. Kraus, of Brown University, gave an excellent address on the properties of compound substances in the metallic state. He pointed out that these substances, such as $SnNa_4$, for example, may be considered as salt-like in character which would indicate that most of the chemical elements are amphoteric. The amphoteric character of certain organic radicals was also discussed.

A paper on solvated systems by Dr. Harry N. Holmes, of Oberlin College, aroused a great deal of interest. When insoluble substances are formed the product is called a gel if all the liquid present is held as a solid but a gelatinous precipitate if only a part of the liquid is held. Demonstrations of various gels were given. Dr. Holmes also described the natural formation of quartz from prehistoric gelatinous silicic acid. Many gels when properly dried to a low water content become extremely porous with marked capacity for taking up certain gases. Patrick's silica gel and the Holmes-Anderson improved form are examples. There are many important industrial as well as theoretical applications of adsorption and capillary condensation by gels. Dr. F. Russell v. Bichowsky, of Johns Hopkins University, spoke about the present status of thermochemical data, emphasizing the importance of securing more accurate data, and appealed for a new interest in the subject. It was pointed out that much of the needed work is such that it may possibly be undertaken by a government organization rather than by universities.

Oxidation-reduction indicators formed the subject of a paper presented by Dr. Mansfield Clark, of the Hygienic Laboratory. Extensive data were given for electrode potential differences in solutions of various dyes and their reductants at different pH values. A simple device was shown for developing equations applicable to each individual case. The fact that the levels of energy intensity associated with the two

equivalents involved in the oxidation-reduction of a given dye are exactly the same for each equivalent and the fact that the hydrogens associated with the acidic properties created in the reductant have enormously different ionization constants, lead inferentially to the conclusion that Wieland's theory of hydrogen transport is inadequate. A simpler concept is found in the transport of electron-pairs followed or not followed by the binding of H-ions, according to the acid-base conditions of the solution.

Dr. Eugene C. Bingham, of Lafayette College, discussed recent studies on the flow of matter. The fundamental formulas for elastic deformation, viscous and plastic flow were discussed and shown to be quite distinct and independent. Dr. William Blum reviewed the work on electroplating that is being done at the Bureau of Standards. He emphasized the importance of studying dynamic rather than static electrode potentials in determining the best conditions for good "throwing power" and a suitable structure of the deposit. Dr. F. O. Rice, of the Johns Hopkins University, spoke on catalysis in homogeneous systems involving certain slow organic reactions. Two suggestions were made with regard to meeting the difficulties encountered. The first was that of assuming the existence of "residual molecules" and the second that of applying the law of mass action to the actual equilibria which may be considered to exist in the solution rather than to the ordinary stoichiometric equation representing the reaction. Dr. R. C. Wells, of the U. S. Geological Survey, discussed the chemistry of native copper deposition.

The following titles represent additional interesting papers that were given at the sessions: "Some observations on ammonia catalysts," by Dr. J. A. Almquist, of the Fixed Nitrogen Research Laboratory; "Studies on hydrofluoric acid: 1. Compounds of hydrofluoric acid with organic bases," by Dr. Raymond M. Hann, of the Bureau of Chemistry; "The influence of sulphur on the color of dyes," by Dr. E. Emmet Reid, of the Johns Hopkins University; "The determination of oxygen and hydrogen in metals by vacuum fusion," by Drs. Louis Jordan and J. R. Eckman, of the Bureau of Standards; "The titration curve of 'arsenoxide,'" by Dr. R. K. Cannan; "Some principles of the alum process for the clarification of water," by Dr. L. B. Miller; "Some new hydazines," by Drs. H. D. Gibbs and W. L. Hall; "A delicate test for phenols," by Dr. H. D. Gibbs; "Products of the dry distillation of Steffen waste water," by Dr. W. J. Geldard; "The effect of temperature and time of storage on the physical properties of undeveloped brown-print paper," by Drs. T. D. Jarrell and F. P. Veitch; "The caking of fertilizer salts," by Drs. A. R. Merz and W. H. Ross.

SECTION D (ASTRONOMY)

Vice-president and chairman, John A. Miller.

Retiring vice-president, Heber D. Curtis.

Secretary, F. R. Moulton, University of Chicago, Chicago, Ill.

(*Report by F. R. Moulton*)

Section D held two joint meetings. The first was with Section B on Tuesday afternoon, when Professor W. F. G. Swann gave his retiring vice-presidential address for Section B on "Trend of thought in physics," and Professor H. D. Curtis gave his retiring vice-presidential address for Section D on "The equinox of 1950." The second joint meeting was with sections A and B, on Thursday morning, when Professor Henry Norris Russell gave an address on "Stellar evolution," and Professor Archibald Henderson gave an address entitled, "Is the universe finite?"

The title of the address of Professor Curtis led many to expect that he would discuss the technical question of the choice of an equinox and reference lines, a problem that must be considered because the plane of the earth's equator is slowly changed by the attractions of the moon and sun upon the earth's equatorial bulge. He did, indeed, refer briefly to this subject, but his address was chiefly upon the probable progress of astronomy in the quarter century from 1925 to 1950. His discussion and also that of Professor Russell made clear the rapidity with which the views of astronomers have recently been changed, upon such questions as the dimensions of the Galaxy, the duration of stars and cosmic evolution. Speaking of possible developments in astronomical instruments, Professor Curtis asked his hearers to "dream" of a dry plate one hundred times as sensitive as any now in use. Such an improvement would be equivalent, for photographic purposes, to making the Lick telescope 30 feet in diameter and the 100-inch reflector on Mount Wilson more than 80 feet in diameter. He said that the maximum efficient size of refractors seems not to exceed 48 inches, and of reflectors sixteen feet. Consequently, there is more hope in the improvement of photographic plates, and in extensions of the use of the interferometer and the photoelectric cell than in the enlargement of refractors or reflectors. The speaker sees little probability of a great increase in our knowledge of the moon, planets or comets in the next quarter century. But he thinks it likely that many of the puzzling problems presented by the sun may be solved. Geological evidence shows that our sun must have been radiating almost exactly at its present rate for at least two hundred million years. In fact, many astronomers have just now become willing to admit that the life period of a star is a matter of trillions, rather than millions, of years. It is suggested that the source of the sun's radiant

energy may be sub-atomic, an idea that has been current among some astronomers for more than a decade. This same point was referred to by Professor Russell, who quoted from MacMillan, Jeans and Eddington the thought that the sun's mass is in a sense changed to energy and radiated away. Such a suggestion is in harmony with some of the implications of the general relativity theory. According to this suggestion, the sun's mass is being decreased at the rate of about 4,000,000 tons per second—a rate, by the way, that will not appreciably alter its size or rate of radiation for ten thousand million years. Increase in knowledge of stellar astronomy has been rapid in recent years. Professor Curtis said that astronomers now use in discussing our Galaxy units of a thousand light years. He then expressed himself as regarding many of the spiral nebulas as exterior galaxies of millions of stars, in general characteristics similar to our own. This conception, for which there is much evidence, leads on to that of vast systems of galaxies, or milky ways, which may, in turn, be units in still larger cosmic organizations. Professor Curtis believes the next quarter of a century will witness a great extension of our knowledge of these questions and an improvement of our theories of them. He maintains, however, that our views should be based primarily on the average, or dominant, type of celestial object rather than upon exceptional ones.

The address of Professor Russell will be printed in *Popular Astronomy*. It contains an account of the author's own work upon stellar evolution, and the modifications that have been introduced by Iaka on the ionization of the elements in stars and by Eddington's researches on the internal constitution of stars.

Professor Henderson's address gave a summary of the attempts that have been made to determine the radius of the physical universe on the basis of general relativity. A number of lines of approach indicate for this quantity a distance of the order of 6×10^{12} times the distance from the earth to the sun, approximately the distance light travels in one hundred million years.

SECTION E (GEOLOGY AND GEOGRAPHY)

Vice-president and chairman, W. C. Mendenhall.

Retiring vice-president, N. M. Fenneman.

Secretary, E. S. Moore, University of Toronto, Toronto, Ontario.

(*Report by E. S. Moore*)

The sessions of Section E occupied four days, Tuesday to Friday, inclusive, with one evening session. Wednesday and Thursday afternoons were set aside for visits to the Carnegie Geophysical Laboratory, the map printing and engraving establishment of the U. S. Geological Survey and the National Museum. Our thanks are due to our Washington hosts for their hospitality during the entire meeting of the section. On Tuesday evening Section E and the Association of American Geographers had a very enjoyable dinner at which 118 persons were present. W. C. Mendenhall presided and the addresses of the retiring officers were presented. C. F. Marbut, retiring president of the Association of American Geographers, delivered his address on "The promulgation, decline and renaissance of Malthusianism and its relation to the character and geographic distribution of the soil." The title of Professor Fenneman's retiring address was "A classification of natural resources." These addresses will both be printed in the near future. Thursday forenoon was mostly occupied with reports of committees. The chairmen of six of the committees of the Division of Geography and Geology of the National Research Council presented interesting reports on their work, and David White, chairman of the division, spoke for the work of the division as a whole. The report of the committee on "Geology in city parks" was presented by E. S. Moore. The report showed that some progress had been made since the last report. Probably the most prominent feature of the reports from the National Research Council was the description by F. E. Wright of a light, portable apparatus that he has recently designed for the rapid and accurate determination of gravity. It is expected to measure variations in gravity with an accuracy of one part in one million and to make possible studies in isostasy which have hitherto been impossible. Friday forenoon was set aside for a symposium on "Ancient climates" and a series of excellent papers was presented. It is hoped that these papers will appear in the *Popular Science Monthly* at an early date. In the number and quality of the papers presented and in the variety of its interesting features the Washington meeting of Section E was quite an outstanding one.

SECTION F (ZOOLOGY)

Vice-president and chairman, Edwin Linton.

Retiring vice-president, Edward L. Rice.

Secretary, Herbert W. Rand, Harvard University, Cambridge, Mass.

(*Report by Herbert W. Rand*)

In accord with the practice which has prevailed for several years, no program of papers was presented by Section F as such. The zoological part of the association meeting was arranged under the auspices of the several special societies related to the section. The outstanding event for which Section F was responsible was the address of the retiring vice-president of the section, Dr. Edward L. Rice, of Ohio Wesleyan University. The address, entitled "Darwin and Bryan

—a study in method," was given in the afternoon of Tuesday, December 30, to an audience which quite filled the seating capacity of the spacious girls' gymnasium of the Central High School. The address was itself an admirable example of the method which, the speaker urged, should dominate all endeavor toward truth, whether in the field of science or in that of religion. It was a calm open-minded unbiased review of the issue, devoid of sarcasm and ridicule, tolerant and courteous in every allusion to those who are unable to accept the doctrine of evolution. The address was in the main, as the title indicated, a comparison of the methods of thought and deduction exhibited by Mr. William J. Bryan in his spectacular oratorical attacks upon the idea of evolution with Charles Darwin's painstaking, patient, laborious accumulation of facts, from the critical evaluation of which, by employment of most stringent logic, certain deductions could be made. He said:

Mr. Bryan's main attack is an argument deduced from the assumption of the literal accuracy of the Bible in general and of the first two chapters of Genesis in particular. This assumption is not biblical; it was not uniformly accepted in the early church, nor is it accepted by the leading Bible scholars of to-day.

Darwin's work on the contrary is based upon a hypothesis, or what Mr. Bryan terms a "guess," followed by the most complete verification and leading to a degree of probability amounting to practical certainty.

Dr. Rice urged a higher degree of tolerance and open-mindedness, not only in the opponents of the evolution idea, but also on the part of those engaged in scientific research.

The dogmatic method of Mr. Bryan is happily not followed by all theologians; nor, unhappily, does Darwin's scientific method characterize all his followers. It is to be hoped that the outcome of the present controversy may be the alliance of a more scientific religion and a more religious science.

Following Dr. Rice's address, the annual business meeting of Section F occurred, with President Linton acting as chairman. To succeed Professor Henry B. Ward, the retiring member of the section committee, the section elected, for four years, Professor S. O. Mast, of Johns Hopkins University.

The biologists' smoker, arranged by the Union of Biological Societies with cooperation by the American Association, was held at the New National Museum on Monday evening, following the opening general session of the association.

SECTION G (BOTANICAL SCIENCES)

Vice-president and *chairman,* G. R. Lyman.

Retiring vice-president, Charles J. Chamberlain.

Secretary, Robert B. Wylie, University of Iowa, Iowa City, Iowa.

(Report by Robert B. Wylie)

A joint session with the Botanical Society of America, the American Pathological Society and the American Society of Plant Physiologists was held on Tuesday afternoon. This program had been organized under the direction of the section committee and was designed to present recent investigations in certain divergent lines of work with plants. The vice-presidential address, on "The origin of the Cycads," given by Dr. Charles J. Chamberlain, brought forward important generalizations from his long-continued studies in this group. In considering the possible origin of these plants a hypothetical ancestor was assumed combining well-established features of several Paleozoic forms. From such ancestor he would derive as divergent lines the Mesozoic Bennettitales and the modern Cycadales. The former were characterized by the reduction of lateral pinnae and retention of the terminal ovule of the megasporophyll; the latter by reduction of upper pinnae and retention of lateral ovules. This conclusion depends in large measure upon the fundamental principle of paleontology that parts once lost during phylogeny can not be regained. Dr. J. E. Weaver discussed his investigations on roots, in particular the habits of grassland vegetation of the great plains. About 90 per cent. of the species of this region are rooted well below 2 feet and often as deep as from 12 to 22 feet. The rate of growth of roots is often as much as one half inch per day, and, as in the major roots of corn, may be as much as two or two and one half inches per day. Variations in roots in different types of soils, the total extent of root systems and the persistence of root-hairs were also discussed. Dr. E. J. Kraus discussed soil nutrients in relation to vegetative growth and reproduction. After reference to methods of work in this field he described some striking results based on chemical analysis, with relation to nitrate and carbohydrate content, illumination, etc. Nitrate nitrogen within the plant is not a necessary accompaniment to the vegetative condition, but in many instances may well be regarded as are the unmetabolized nitrogenous reserves. Dr. L. O. Kunkel took up the present status of mosaic and related diseases. Such disturbances are so different from other plant maladies that it seems necessary to suppose that they are due to a special kind of pathogen. The agent producing mosaic disease is thought to be corpuscular. It may not be ultra-microscopic, for plasticity rather than size may account for its filterability. It was suggested that our knowledge of these obscure but important diseases may be advanced by studies on host relationships, on insect carriers and on the intra-cellular amoeboid bodies associated with many different mosaic diseases.

SECTION H (ANTHROPOLOGY)

Vice-president and *chairman,* E. A. Hooton.

Retiring vice-president, E. A. Hooton.

Secretary, R. J. Terry, Washington University School of Medicine, St. Louis, Mo.

(*Report by R. J. Terry*)

Beginning with the St. Louis meeting at the close of 1919, Section H has continued to devote its activities to a program chiefly of physical anthropology, other branches of the subject being cared for by the several societies affiliated with the section. At the recent Washington sessions of the section there were twenty-six titles presented, the majority dealing with some aspect of physical anthropology. The meeting began at the George Washington University, on Thursday evening, January 1, with a symposium before a joint session of Sections H and I, on "Tests of immigrants," which was presided over by the vice-president for the section, Dr. E. A. Hooton. The speakers invited from the two sections were Drs. Carl C. Brigham and R. S. Woodworth, Professor Franz Boas and Dr. Aleš Hrdlička. An interesting discussion was developed around the methods in use for testing and the physical and mental conditions encountered among foreigners coming to America. About two hundred and fifty members and guests were present at this meeting. The second and third meetings, held in the New National Museum Friday and Saturday forenoons, included titles covering a broad range of physical anthropological research, from studies of prehistoric man, such as Miss Ruth Sawtell's "Azilian skeletons," to what might be called applied anthropology in the papers of Dr. Charles B. Davenport on "Mongolians and Mongoloids," Dr. W. W. Graves, on "Scapular types," and Dr. Louis Berman, on "Endocrine glands." Professor Miloslavick demonstrated anthropological features of the large intestine, discovered among central Europeans; further contributions on the weight of organs were presented by Professor Bean, and the anthropological position of the Armenians was defined by Professor Boas. Mr. H. L. Shapiro's study of the racial hybrids of Norfolk Island, with pictures of the descendants of the mutineers of Pitcairn Island, was a most interesting contribution. This, together with Dr. Truman Michelson's paper on the physical features of the Samoans, Tongans and Marquesans, and Dr. A. I. Hallowell's "Measurements of Labrador Indians," brought forth an animated discussion. A paper of unusual interest was ably presented by Dr. Adolph Schultz, on "The evidence of variability in fetal and adult life," indicative of the hereditary nature of several forms of variation which had been determined quantitatively. Interesting contributions in other branches of anthropology were the following: Miss H. Sewell Wardle on "The scope of the rite of adoption," M. Stansbury Hagar on "Symbolism of the Portsmouth works," Dr. D. Sutherland Davidson on "Theories of social organization in Australia," Dr. J. Walter Fewkes on "The archeology of Florida" and Dr. Anita Newcomb McGee on "The length of a human generation," the last being a critical review of the opinions of statisticians who have dealt with this question. The attendance averaged one hundred and ten at the Friday and Saturday sessions and discussion of papers was, in general, spontaneous and spirited. The social feature of the meeting, the anthropologists' dinner Friday evening, was attended by sixty members and guests, Dr. J. Walter Fewkes presiding.

SECTION I (PSYCHOLOGY)

Vice-president and chairman, R. S. Woodworth.

Retiring vice-president, G. Stanley Hall, *deceased.*

Secretary, Frank N. Freeman, University of Chicago, Chicago, Ill.

(*Report by Frank N. Freeman*)

Section I held a single session, jointly with Section H (Anthropology), the rest of the psychology program being in charge of the American Psychological Association. The subject of the joint program was "Tests of immigrants." Frank Boas, R. S. Woodworth, Aleš Hrdlička and Carl Brigham took part. The next meeting of Section I will probably occur next December 30th and 31st and January 1st, at Kansas City. It is hoped that some psychologists who attend the Ithaca meeting of the Psychological Association next year will be able to attend part of the section meeting. It is planned to hold two joint sessions with Section Q (Education).

SECTION K (SOCIAL AND ECONOMIC SCIENCES)

Vice-president and *chairman,* Thomas S. Baker.

Retiring vice-president, John F. Crowell.

Secretary, Frederick L. Hoffman, Wellesley Hills, Mass.

(*Report by Frederick L. Hoffman*)

The sessions of Section K were unusually well attended and the discussions emphasized a deep interest in the topic for this year's program, "New problems of western civilization." The first address was by Dr. John Franklin Crowell on "The development of modern family life," bearing directly upon questions concerned with the evolution of the family in the light of the historical facts of the past. The next speaker was Dr. Thomas S. Baker, president of the Carnegie Institute and vice-president for the section, who spoke on "The rights of the unintelligent." Dr. Baker's address attracted considerable attention and proved a thoughtful contribution to a

much neglected phase of the psychology of the crowd. Mr. Waldo G. Morse read a paper on "The law—in its relation to society," suggesting far-reaching reforms, tending towards clarification and simplification, for which the outlook unfortunately is not very encouraging. The next three papers had to do with the "Conservation of vision," "The economic aspects of heart disease" and "The comparison of races," the latter by Mr. James Gregg, of the Hampton Institute. Mr. Gregg's paper emphasized the conclusion that there is no fundamental, intrinsic difference in the native ability of different races, eliciting a considerable and more or less divergent discussion. Dr. Roswell H. Johnson read a paper on "The use of median as a minimum requirement of international migration."

The outstanding address of the meeting was on "Conservation in the paper and pulp industry," by Dr. H. S. Graves, of Yale University. Dr. Graves, who was formerly chief forester of the United States government, brought to bear an immense experience and thoughtful reflection upon a question of the utmost concern to the nation. All his points were fully illustrated by reference to the actual facts of the situation, suggesting a decidedly more active interest on the part of the public in the problems presented.

"Employee representation" was the subject of an address by Dr. Henry C. Metcalf. Professor Leonard D. White discussed the subject of "Scientific research and state government." A paper on "The ethics of trade organization" was presented by Mr. J. George Frederick, which also attracted considerable attention. Professor John A. Fairlie's paper was on "Some phases of British administrative legislation," the session for the day concluding with an address on "Glances at population problems of South America," by Mr. William A. Reid, of the Pan-American Union. This paper emphasized the great future possibilities of settlement and development in South America, different viewpoints being presented in the discussion as regards the broadening of our American interests in Latin-American countries.

On the last day Miss Bertha Luckey discussed "Racial differences in mental ability," while Mr. Frank M. Phillips presented an admirable address on "Modern schools and playgrounds." Miss Luckey's paper amplified observations of Mr. Gregg and was also subjected to considerable discussion. Professor E. A. Kirkpatrick presented an address on "Marriage laws and race betterment," the morning session concluding with "Some observations on the American physique," by Dr. Frederick L. Hoffman. The last session included four papers, the first being on "The practical significance of the Boy Scout movement," by Mr. Colin H. Livingston. All present were delighted with the comprehensive presentation of the facts regarding this important movement in the training of young boys for manhood and the active duties of life. A paper on "The plan and scope of the Y. M. C. A," unfortunately could not be read on account of the speaker's absence. Along a similar line was a paper on "The national Catholic welfare congress," by Dr. Frederick Seidenburg, illustrating a wide range of useful activities, and comprehending a thoroughly well-thought-out plan of welfare organization, under the directive influence of religious training and ideals. Dr. Joseph Mayer, of Tufts College, presented a very thoughtful discussion on "Modern business education and research," emphasizing the importance of research as an educational basis in the training of young men for executive or directive functions in business or administration. The last paper was on "The quality of population and food supply," by Professor Rudolph M. Binder. It reemphasized many well-known viewpoints in a condensed form, suggestive of the necessity of considering the future in our present-day developments.

The section officers for next year are: *Vice-president* and *chairman,* Professor Fred R. Fairchild, Yale University; *secretary,* Dr. Frederick L. Hoffman, Wellesley Hills, Mass. The section committee consists of: Professor Wm. B. Bailey, retiring end of 1925; Dr. H. S. Graves, retiring end of 1926; Dr. John Franklin Crowell, retiring end of 1927, and Mr. Maurice Holland, retiring end of 1928.

The Metric Association

President, George F. Kunz.

Secretary, Howard Richards, 156 Fifth Ave., New York City.

No report has been received, but it may be noted that the Metric Association meeting was this year better attended and more active than ever before. The organization arranged a striking exhibit in the general exhibition, showing metric instruments and metric methods.—B. E. L.

The American Political Science Association

President, James W. Garner.

Secretary, Frederic A. Ogg, University of Wisconsin, Madison, Wis.

(Report by Frederic A. Ogg)

The twentieth annual meeting of the American Political Science Association was held in Washington, December 29 to 31. The registration was 136, and the number of members actually in attendance was probably not less than 160. Attendance at the various sessions was without exception excellent. Departing from custom, the association met apart from both the

American Historical Association and the American Economic Association, and found much interest in meeting along with the American Psychological Association and other organizations affiliated with the American Association for the Advancement of Science. Notable features of the program included a series of six round tables, meeting on the successive forenoons of the meeting and devoting themselves to fruitful discussion of selected aspects of political sceince and public affairs. This feature was an experiment in the form in which it was carried out, but was generally regarded as thoroughly successful. Other important features were the address of the British ambassador, the presidential address of Professor James W. Garner, of the University of Illinois, a joint session with the psychologists and a series of interesting luncheon conferences on the three days of the meeting. The committee on instruction presented a valuable report on state legislation requiring the teaching of the constitution or general instruction in civics or American history. The American Council of Learned Societies Devoted to Humanistic Studies presented to the Political Science Association, as one of the twelve constituent organizations, announcements of several important projects in hand, that of largest general interest being the preparation of a twenty-volume Dictionary of American Biography, made financially possible by a subvention of half a million dollars recently tendered by the New York Times Company. The preparation and publication of this dictionary will be under the immediate direction of a committee composed of four representatives of the American Council of Learned Societies, two appointees of the New York Times Company, and a managing editor to be chosen by these six persons. Another interesting announcement was made by the association's representatives in the Social Science Research Council to the effect that the Laura Spelman Rockefeller Memorial has agreed to provide a liberal sum of money to be used, beginning in 1925–26, for research fellowships of an advanced character in the field of social sciences. Officers for 1925 were elected as follows: *President,* Charles E. Merriam, University of Chicago; *first vice-president,* A. R. Hatton, Western Reserve University; *second vice-president,* Raymond Moley, Columbia University; *third vice-president,* Charles G. Haines, University of Texas; *secretary-treasurer,* Frederic A. Ogg, University of Wisconsin.

SECTION L (HISTORICAL AND PHILOLOGICAL SCIENCES)

Vice-president and *chairman,* Louis C. Karpinski.

Retiring vice-president, Florian Cajori.

Secretary, Frederick E. Brasch, Smithsonian Division, Library of Congress, Washington, D. C.

Section L now consists of two rather distinct groups, each operating through a special committee of the American Association. Until this year the Committee on the History of Science has acted as the section committee for the section, but now the philological group is well organized and the section is operating somewhat as two organizations. The programs prepared by the two committees are reported below.—B. E. L.

The Committee on the History of Science

Chairman, Louis C. Karpinski.

Secretary, Frederick E. Brasch, Smithsonian Division, Library of Congress, Washington, D. C.

(*Report by Frederick E. Brasch*)

The program on the History of Science for the fifth Washington meeting was arranged jointly by the association's committee on this subject and the newly formed History of Science Society, with cooperation of the American Historical Association. On account of the joint character of the sessions they are reported under the society below.

The Committee on Philological Sciences

Chairman, W. A. Oldfather.

Secretary, Mark H. Liddell, Purdue University, Lafayette, Ind.

(*Report by the secretary*)

The Washington session on philological sciences was the third and most interesting meeting the committee has arranged. Outstanding features of the program were as follows:

The Thursday morning program, Dr. Joseph Dunn in the chair, opened with a brief summary of the modern scientific and historical data bearing upon the origins and linguistic affinities of the Celts. Dr. Dunn called especial attention to the rich field of language material found in early Irish. Professor Thomas Fitzhugh discussed with copious illustrations the original rhythmic elements of Latin and Greek verse forms. An account of the aims and methods of the new project for the "Dictionary of Medieval Latin," recommended by the committee and recently endowed by Mr. Ochs, of the New York *Times,* was presented by Professor J. L. Paetow, its original proposer. The afternoon session, Professor Fitzhugh in the chair, opened with a discussion by Professor G. M. Bolling, of the bearing of newly discovered papyri on the text of Homer, together with some ingenious restorations of these very dilapidated fragments. There followed a paper by Professor Robert H. Hiller, on the emotional significance of the common Greek particle usually translated "indeed"; and another by Professor S. G. Oliphant, who pointed out with some humor that the Greek work for "cattle," which is usually explained as being derived from a compound

meaning "moving forward," owed its origin to the fact that it was originally applied to sheep, and recorded their peculiar habit of grazing forward against the wind, as observed by modern sheep-herders. Professor D. A. Penick then discussed Paul's Greek style in its relation to the Pauline authorship of the Epistles, and was followed by Professor Steele who vigorously and convincingly protested against vocabulary percentages alone as a means of determining authorship. In the early part of the Friday session, devoted to the general problems of linguistics, Professor Leonard Bloomfield called attention to some interesting analogies between the Indo-European languages and those of the American Indians, and emphasized the need of better training and wider outlook on the part of students of language problems. Professor Frank R. Blake drove home Dr. Bloomfield's point with a paper on the importance for linguistic study of the lesser known families of speech. Professor George F. Flom then presented an analysis of the Old Norse elements in the little known dialect of Shetland. There followed an interesting series of X-ray lantern slides by Professor G. Oscar Russell, which went to show that our current ideas of phonetics, depending upon the assumption that given vowel tones were made in the same way by all speakers, was a fallacy, and that our current phonetics based upon these assumptions would have to be modified accordingly. In the discussion of this interesting paper it was pointed out that recent work in acoustic physics was rapidly furnishing the material for new scientific conceptions of language based upon mathematcial and physical laws; and that to forward this new phonetics by making the recently perfected instruments of precision accessible to students of language was the chief reason for the committee's recommendation of the project for a National Laboratory of Phonetics presented at the Cincinnati Conference last year. The afternoon session, Professor O. F. Emerson in the chair, followed an informal luncheon of the members at the Cosmos Club. Dr. Emerson convincingly demonstrated the importance of analogy in determining the development of language, showing especially how singular forms had displaced original plurals in the history of Old and Middle English inflections. Professor A. R. Morris then pointed out the rhythmic elements in modern so-called free verse, and Professor F. N. Scott discussed the chief differences between British and American idiom, showing that (1) in the field of modern slang each was more or less independent of the other, with vapidity as the general characteristic of the former, and explosive emotionalism as that of the latter; that (2) in the common everyday vocabulary the differences consisted only in a few hundred words; and that (3) in the field of literary expression the two idioms were practically identical. The Saturday morning session, Dr. E. Sapir in the chair, consisted of scholarly papers by Drs. Truman Michelson and E. Sapir upon questions of Amerindian philology; a summary of the contents of the Kashmerian Atharva Veda, by Professor LeRoy C. Barret; and a discussion of Dostoyevsky and Scythism, by Professor Clarence A. Manning.

The History of Science Society

President, L. J. Henderson.

Secretary, Frederick E. Brasch, Smithsonian Division, Library of Congress, Washington, D. C.

(*Report by Frederick E. Brasch*)

The first annual meeting of the newly organized History of Science Society was held, together with the fourth annual meeting of Section L of the A. A. A. S., on Wednesday and Thursday, December 31, and January 1. The program committee attempted to present history in a comprehensive and genetic order, with the thought that the concepts of history are to be derived from the study of paleontology. In very clear and concise statements Dr. John C. Merriam, president of the Carnegie Institution of Washington, and one of America's great authorities in the science of paleontology, presented a study of the development of present-day conception of paleontological history. He pointed out the fundamental importance of the records of paleontology as basis for study of human history and its correlation to the study of the history of science.

Following the past order of experience of program procedure, the committee also formulated a definite and fixed idea in having a connected series of papers or addresses upon some particular phase of history of scientific thought. In the following papers the development of scientific thought, through from the early Middle Ages to the end of the Fifteenth Century, was presented by a number of America's best scholars of medieval history. In this remarkable series of addresses it was clearly evident to the student of the history of science that this field of research is rich in material for future study. Dr. Charles H. Haskins, of Harvard University, emphasized the status of Arabic science in Christian Europe, and that the Arabs were worthy contributors during the eleventh and twelfth centuries. Dr. George Sarton, Research Associate of the Carnegie Institution of Washington, also pointed out the importance of the study of medieval science, and its contributing factor to the modern period. He also emphasized the connecting bond between Arabic science and the period immediately following, namely,

the Middle Ages. The natural sciences in the University of Paris during the Middle Ages gave an interesting revelation of the struggle between the more advanced students and the adherents of Aristotle's physics. Dr. L. J. Paetow, of the University of California, discussed this phase. Nature was to be revealed from the written records and books and not by empirical methods, consequently science slept in the background of credulity. The last paper of this series was given by Dr. Lynn Thorndike, of Columbia University. The "Study of western science of the fourteenth and fifteenth century" is contained in manuscript records that manifestly form for the future historian of science labor for years to come. Dr. Thorndike listed many of the more important books and manuscripts and especially recommended these as sources for new researches.

Dr. R. C. Archibald, of Brown University, presented an interesting account of Benjamin Peirce, who for over fifty years taught mathematics at Harvard University. This beautiful remembrance of Dr. Archibald's old tutor is to be published in one of the journals of the American Mathematical Society. Dr. C. E. Tharaldsen, of Northwestern University, gave a life sketch of Dr. William A. Locy, who died October 9, 1924. As a pioneer, Dr. Locy's spirit will be remembered throughout the history of science in America.

Dr. C. A. Browne, chief chemist of the United States Bureau of Chemistry, presented a paper entitled "Scientific notes from the books and letters of John Winthrop, Jr. (1606–1676), first governor of Connecticut."

The address of the retiring chairman and vice-president of Section L entitled "Leibnitz, the master builder of mathematical notations," was given at the second session by Dr. Florian Cajori, of the University of California. It was pointed out that, unlike Descartes and Newton, Leibnitz gave prolonged and persistent attention to mathematical notations. At different times he tested four different symbols for equality, three for proportion, three for coincidence of geometric figures, two for similarity, four for congruence, five for multiplication, three for division and about half a dozen for aggregation of terms. As a result of this painstaking experimental method, Leibnitz finally advanced more mathematical symbols that have retained their place to the present time than has any other mathematician. Preeminent is his symbolism for the differential and integral calculus.

The business meeting of the History of Science Society was held on the evening of December 31, at the Cosmos Club. At this time the council of the new society elected the following officers for the year (1925): *President,* L. J. Henderson; *vice-presidents,* J. H. Breasted and Florian Cajori; *secretary,* L. Leland Locke, and *treasurer and assistant secretary,* Frederick E. Brasch. Also five council members were reelected, namely, Isaiah Bowman, E. W. Brown, Henry Crew, David Starr Jordan and George Ellery Hale.

SECTION M (ENGINEERING)

Vice-president and chairman, A. E. Kennelly.

Retiring vice-president, John T. Faig.

Secretary, Hugh Miller, 2023 G Street, N. W., Washington, D. C.

(*Report by Hugh Miller*)

There were two meetings of Section M, on the evenings of Tuesday and Wednesday, December 30th and 31st. Owing to inclement weather the attendance was not as large as expected, but there were about 50 at each meeting, and there was a lively interest in the papers presented and considerable discussion. Dr. Kennelly was unable to be present at the first meeting and Dr. William Bowie presided. The paper by Mr. Alfred D. Flinn, director of the Engineering Foundation, absorbed the interest of all those present and aroused considerable discussion regarding engineering research. The second meeting was featured by papers by Major General William M. Black, retired, formerly chief of engineers, U. S. A., and Hon. Robert B. Howell, senator from Nebraska. Senator Howell's paper on the "Engineer and legislation" provoked the most discussion, as he discussed at some length the economic conditions surrounding agriculture and their relation to the welfare of the country as a whole. He stated that the engineering type of mind was necessary to a satisfactory solution of the problem, and it was encouraging to see how many of the engineers present were vitally interested in this fundamental economic problem. Senator Howell pointed out that the direct influence of the engineer upon legislation has been very slight in the past and referred to the fact that he had been able to find only two engineers who had been members of the U. S. Senate previous to his election, and both of these had given up the practice of engineering some years before their election. On the other hand, there has always been a large majority of lawyers, and the number of business men in the Senate has been steadily increasing in recent years. The number of lawyers has decreased somewhat, but the combined percentage of practicing lawyers and business men has remained almost constant over a period of 100 years, amounting to practically 74 per cent. of the membership. Several speakers mentioned the great help that engineers have been to agriculture and ways in which they could be more

useful in the future. The points mentioned were transportation by rail and water, improved farm machinery, power and other conveniences on the farm, irrigation and the development of commercial fertilizer on a large scale. Among those who took part in the discussion were: Brigadier General William H. Bixby, another former chief of engineers, U. S. A.; Colonel E. Lester Jones, director of the U. S. Coast and Geodetic Survey; Professor H. S. Moore, of the University of Illinois, and Dr. William Bowie, of the U. S. Coast and Geodetic Survey.

The section unanimously passed the following resolution: "Resolved, that Section M of the A. A. A. S. heartily supports the movement to establish a National Museum of Engineering and Industry in Washington, and recommends to the council of the association its endorsement of the project." The resolution was presented to the council at its meeting on January 2nd and was referred to the executive committee.

At a previous meeting of the council a committee was appointed to consider the question of recommending for the annual meeting next year a series of short addresses by representatives of the fundamental sciences before the Engineering Section. It is hoped that this plan may be carried out, as it should be of great interest and would tend to make a definite field of usefulness for the Engineering Section.

SECTION N (MEDICAL SCIENCES)

Vice-president and chairman, William A. MacCallum.

Retiring vice-president, Richard P. Strong.

Secretary, A. J. Goldfarb, College of the City of New York, New York, N. Y.

(Report by A. J. Goldfarb)

The Washington meeting was unusually significant for the outstanding character of the joint meetings, and for the large number, high standard and wide extent of the papers in the individual societies affiliated with Section N. The meeting began with a joint meeting of Section N with the Physiological, Biochemical, Pharmacological and Pathological Societies, the first one in many years. There were four invited speakers. Each had time to give, and did give, a clear, adequate, rounded account of significant researches. Many independent reports attest to the increasing value of such fuller discussion of important and widely different problems. The relationship of the ductless glands to one another was carefully discussed by Dr. Marine; Dr. Lusk discussed in his fine and dramatic way the source of energy in muscular activity; the trail-blazing exposition of the chemistry and physics of circulation was given by Dr. Henderson; a clear and convincing parallelism between light, temperature and other climatic factors with the corresponding cyclical change in syphilis and cancer was given by Dr. Wade Brown. As in the last two years, there was a second meeting devoted to discussion by representatives from the fields of medical research, parasitology and medical entomology. This year anthropologists also cooperated, and the American Society of Bacteriologists likewise met with the section. Even the large room put at our disposal was totally inadequate. Dr. Strong's retiring vice-presidential address bespoke the aims of the section. In the investigation of a plant disease he was led not only into the fields of plant pathology, but of protozoology, parasitology of reptiles and of man. A single organism passes through all these hosts, and is curiously different morphologically and physiologically in each case. To understand its etiology and the adaptive changes of the organism it was necessary to study in each of these related fields.

Dr. Draper's paper showed the necessity of an understanding of anthropometry in disease. Dr. Hess closely correlated his studies on the results of irradiation of plants and of oils, which contained no vitamins, with the healing effects produced on animals fed with such irradiated foods. The implication to human needs was evident. Most significant of all, he traced the results to the action of a definite chemical substance in the skin. Dr. Cort's fine presentation of new and absorbingly interesting factors in the spread of hookworms was based upon his recent studies in China. Dr. Francis, of the Bacteriological Society, gave a dramatic and most interesting account of a bacterial parasite of rodents and a corresponding bacterial disease in man, both of which were finally shown to be the same organism. With this knowledge, this increasingly widespread disease may now be controlled.

There was a good deal of overcrowding at the medical science sessions and the facilities were not quite adequate. There were petty annoyances. But the meetings were nevertheless of an unusually high character, bringing together workers in allied fields in larger numbers than ever before in the history of the association. The outstanding achievement is clearly the bringing together of so great a number of workers from so large an area, including the most eminent investigators in their respective fields, to stimulate all to the highest standards, and, above all else, to discuss interrelated scientific problems.

THE FEDERATION OF AMERICAN SOCIETIES FOR EXPERIMENTAL BIOLOGY

Chairman, A. S. Warthin.

Secretary, E. B. Krumbhaar, Philadelphia General Hospital, Philadelphia, Pa.

(The Federation is composed of four societies, each of which will be reported later.—B. E. L.)

(*Report by E. B. Krumbhaar*)

The following notes summarize a joint session of all four societies held on Wednesday afternoon. Three memorials were read of members who had died during the last year. Dr. William H. Howell spoke of Theodore Hough, who was one of the last pupils of Newell Martin. Dr. W. G. Garrey gave a beautiful tribute to Jacques Loeb, both as a scientist of the very highest order and as a man and a friend. E. K. Marshall spoke of Benjamin S. Neuhausen, a very promising young member of the Biochemical Society, recently deceased, who had worked for two years in his laboratory.

The scientific program of the joint session was opened by Murlin's paper on the administration of insulin by the alimentary tract, wherein he showed various ways by which this might be done efficiently. The causes of gastric secretion were studied by Ivy and others from the University of Chicago. They found not only that intestinal juice, through a Thery fistula, would stimulate acid secretion, but that an inflated bag would also do this by distention and by increasing gastric motility. Dr. Cannon, in his study of a pseudaffective state in cats, called attention to the facts that the bodily changes that accompany extreme emotions are elemental and that many are the same in man and animals. By destroying both frontal lobes and the lateral cortices of cats, whose hearts had been denervated and vascular system attached to pressure recording apparatus, he was able to observe numerous "release phenomena." Struggling, scratching, biting, extension of claws and erection of hair, occurring frequently but not continuously, were associated with increased blood pressure and blood sugar content.

Collip, of Alberta, presented an extremely important preliminary communication on a hormone that he had isolated from the parathyroid gland. He claimed to have the extract of an active principle, as powerful as insulin, which on injection would prevent tetany for 30 hours in parathyroidectomized animals. He had been able to keep one such animal alive for 10 weeks by the use of this extract. He also was able to produce such a rise in blood calcium that vomiting occurred, then weakness, atony, coma and death. The blood became so thick that it would not pour. He found that dogs without both thyroid and parathyroid were more sensitive, which he considered the first definite evidence of antagonism between the thyroid and parathyroid. When this work is extended and verified, it should rank as an extremely important physiological discovery.

Mansfield Clarke, the distinguished exponent of hydrogen ion concentration, and his associates at the Hygienic Laboratory gave an interpretation of the biochemical reduction of methylene blue. No subject is more important in biology to-day than that of oxidation and reduction. We hope his work will be as productive in this field as with the hydrogen ion. The paper by Gesell and his associates on experimental data relating to the chemical regulation of respiration showed that the reaction of the circulating blood is not the factor controlling the stimulation of the respiratory center. These investigators believe that, of greater importance, is the condition within the center itself. Novy's important study of the respiration of cells—such as those of the tubercle bacillus—emphasized the need in biology for studying pure cell preparations rather than tissues or whole animals. For the first time, an accurate respiratory quotient for the tubercle bacillus was given (.836 glycerin; .992 glucose); showing that the tubercle bacillus "needs air as much as an animal does." Hugh Young recounted the efforts made in his institute to obtain a true "therapia sterilisans magna," and the partial successes obtained with mercurochrome and gentian violet. The session was closed by O. G. Garne's demonstration of a new and ingenious method of recording time intervals, and its use in experimental physiology, pharmacology and pathology.

SECTION O (AGRICULTURE)

Vice-president and chairman, L. R. Jones.

Retiring vice-president, R. A. Pearson.

Secretary, P. E. Brown, Iowa State College, Ames, Iowa.

(*Report by P. E. Brown*)

Section O held a joint session with the geneticists interested in agriculture on Monday morning and on Tuesday afternoon arranged a joint program with the American Society for Horticultural Science. On the latter program the section was represented by Oswald Schreiner, who spoke on "Fertilizer experimentation on truck and orchard soils," and by A. J. Pieters, who gave a paper on "Where forage crops touch horticulture." On Wednesday afternoon the section held a joint session with the American Society of Agronomy, the program consisting of a symposium on "Agricultural conditions in foreign lands." C. V. Piper spoke on "British agriculture," H. L. Schantz on "Native and European agriculture in East Africa," J. G. Lipman on "Agricultural conditions in Germany," H. V. Harlan on "Agriculture of the Punjab and Kashmir in India" and H. H. Bennett on "Agriculture in Central America." Several of the speakers illustrated their addresses with

very fine lantern slides. The program was most interesting and profitable. About eighty were in attendance. On Wednesday evening the annual dinner of Section O and all students of agriculture was held at the Hotel Harrington. The address of the retiring vice-president of the section, Dr. R. A. Pearson, president of the Iowa State College, was read at the dinner. The subject of the address was, "Better adapting our educational and investigational efforts to the agricultural situation." Interesting discussion followed the address and the suggestions made by the speaker were heartily endorsed.

SECTION Q (EDUCATION)

Vice-president and chairman, L. A. Pechstein.

Retiring vice-president, Henry W. Holmes.

Secretary, A. S. Barr, Department of Education, University of Wisconsin, Madison, Wis.

(*Report by A. S. Barr*)

Eight well-attended sessions of the section were held on Tuesday, Wednesday and Thursday. The attendance was almost treble that of any previous session, mainly made up of technical students of education. One of the most interesting sessions was the one on "Education as a science," led by S. A. Courtis, who spoke on "The construction of measuring instruments." The other speakers were E. L. Thorndike and Charles H. Judd. Courtis traced the history of the scientific method and discussed some of its applications to education. Thorndike spoke on "The nature of intellect," and discussed the progress so far made in measuring intelligence, with a consideration of the relation between information and judgments; he showed the close relationship existing between the two. Dr. Judd spoke on "Experimental work in school procedure" and reviewed a number of the laboratory studies relating to the study of school subjects and developed somewhat in detail the laboratory technique through the use of the study of reading as an example. (These papers will be published in *School and Society.*) Another very interesting session was the Tuesday morning session, on "Special applications of the scientific method to educational problems." Dr. L. L. Thurstone (University of Chicago) presented the field of "Statistical methods as applied to educational methods," Dr. M. R. Trabue (University of North Carolina) spoke on "The contribution of educational measurements," Dr. Frank N. Freeman (University of Chicago) discussed the "Psychology of school subjects," Dr. S. A. Courtis (University of Michigan) dealt with "The experimental study of instructional problems," and Dr. Wm. A. McCall (Columbia University) discussed "Mental measurement."

One session dealt with "Scientific research with the pre-school child." "Experimental education and the nursery school," "The validity of standards of measurement in young children," "Study of emotions of pre-school children" and "Studies of the relation of mental and physical development" were reported upon. Students of education were impressed with the tremendous amount of learning that goes on prior to the school period. Another session was given over to "Character education" as a scientific problem. Dr. E. S. Starbuck (University of Iowa) spoke on "Research methods in character education," Sister Mary McGrath (St. Mary's College, Monroe, Michigan) discussed "Research findings in the moral development of children," Dr. Wm. Clark Trow (University of Cincinnati) spoke on "Character traits," Dr. George A. Coe (Columbia University) dealt with "Problematic factors in the concept of moral education," and Mr. Milton Fairchild spoke on "Methods of human research." A session was devoted to "Public school administration" and "Problems of financing public education" were discussed by Dr. George D. Strayer; "Scientific procedures in school accounting," by Dr. John Guy Fowlkes, University of Wisconsin, and some "Unsolved problems in school administration," by Dr. J. Cayce Morrison, Ohio State University. Two sessions of eight papers each were given over to the discussion of "Experimental education."

THE SOCIETY OF SIGMA XI

President, F. K. Richtmyer.

Secretary, Edward Ellery, Union College, Schenectady, N. Y.

(*Report by Edward Ellery*)

The twenty-fifth convention of Sigma Xi was held on Tuesday, December 30. It comprised a business session in the afternoon, a dinner in the early evening and a general session held jointly with the American Association in the evening. At the afternoon session Professor F. K. Richtmyer, president of the national organization, presided. Delegates were present from twenty-four chapters and three Sigma Xi clubs. President Richtmyer gave a report from the executive committee covering the following items: (1) The committee regards as particularly important the extension of the society to institutions outside of the United States, especially to educational institutions in Canada; (2) a fellowship committee, consisting of three members, is to be appointed, and the sum of $2,000 was allotted to the committee to be expended in the support of research during the academic year 1925–26, as the fellowship committee may decide; (3) the California Institute of Technology chapter will be installed February 5th; (4) the executive com-

mittee is considering requests from eleven institutions for charters. Mr. C. E. Davies, of the alumni committee, gave a report of the dinner of the alumni resident in New York and vicinity given November 17th, at which over two hundred were present. Dean Ellery reported from the secretary's office that the work of the office had reached a stage which demanded that the society should engage a full-time paid secretary. He also recommended that action should be taken in the near future appointing one authorized jeweler for the society, and that all insignia should be obtainable only through the official order of the national secretary. There was full and free discussion regarding the recommendations of the president and secretary, and the consensus of opinion was in harmony with the ideas of the executive committee regarding the future of the society. The treasurer's report was given by Dean George B. Pegram, of Columbia University. It showed that the fellowship fund contains to date practically $3,000 and that there is a small balance remaining over the expenses of the society for the past year. Dean Pegram further reported that during the year, for the first time in its history, the society had budgetted its expenses, and a budget for the coming year had been prepared and accepted by the executive committee.

At the dinner held in the cafeteria of the Interior Department Building, short speeches were made by Dr. Frederick F. Russell and Senator Joseph E. Ransdell, of Louisiana. Dr. Russell gave expression to his interest in Sigma Xi ideals and in the organization of the society for a larger work in the promotion of research. Senator Ransdell spoke of the great work done by science in eradicating epidemic diseases of man and animals in the south. The evening session was held jointly with the American Association, being the third general session at Washington, with Dr. Frederick F. Russell as the speaker. It has been reported under general sessions.

THE AMERICAN ASSOCIATION OF UNIVERSITY PROFESSORS

President, A. O. Leuschner.

Secretary, H. W. Tyler, Massachusetts Institute of Technology, Cambridge, Mass.

(*Report by H. W. Tyler*)

The annual meeting was held at the building of the National Academy of Sciences on Saturday and Monday, December 27th and 29th. Reports were presented by the committees on academic freedom and tenure; on the status of women in college and university faculties; also an informal statement by the chairman of the committee on college athletics. A group of sub-committee reports dealt with extra collegiate intellectual service; general reading for undergraduates; preceptorial and tutorial systems. Brief reports were also made by the committees on systems of sabbatical years; cooperation with Latin-American universities to promote exchange of professors, trips and fellowships; freedom of teaching in science.

In connection with the report on academic freedom and tenure, resolutions were adopted supplementing the report of a recent investigation at the University of Tennessee. These resolutions state: (1) That the complications which led to the dismissals could have been easily composed by a wise administration; (2) that none of the dismissals were justified; (3) that the rights for an impartial hearing of those dismissed were violated; (4) that conditions such as have been disclosed in the University of Tennessee are detrimental to the purposes of the institution and to the interests of higher education in general; (5) that the discussion of educational policies and proposals for the betterment of the institution, which discussion has been objected to by the administration, is the duty of every faculty member; (6) that the seeking of the counsel, on the part of faculty members, from the officers of the American Association of University Professors should have been welcomed and not resented by the administration of the University of Tennessee.

A resolution was adopted bearing on the question of civilian instruction at Annapolis and West Point, the sense of which is as follows: The efficiency of instruction in general academic subjects at the U. S. military and naval academies depends upon the employment of skilled teachers. Such teachers are, as a rule, likely to be recruited and retained only if good conditions of appointment, promotion and security of tenure during good service are maintained, and it is urged that means toward the maintenance of these conditions be continued and strengthened and clarified where necessary.

It was voted that the association recommends to the U. S. Commissioner of Education that in plans for future Education Weeks topics of controversial character should be avoided. It was voted that the association record its judgment that the conferring of honorary Ph.D. degrees is contrary to sound educational policy as now generally recognized.

THE GAMMA ALPHA GRADUATE SCIENTIFIC FRATERNITY

President, E. M. Gilbert.

Secretary, Lee M. Hutchins, Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C.

(*Report by Lee M. Hutchins*)

The annual council meeting, convention and banquet of the fraternity were held at the Raleigh Hotel

on Thursday, January 1st. These meetings celebrated the quarter-century anniversary of the founding of the fraternity, the eighteenth anniversary of its first national convention and the fourth anniversary of its affiliation with the American Association for the Advancement of Science. One hundred and fifty active and alumni members registered at the Gamma Alpha booth in the registration room at the New Willard Hotel, all the chapters being represented. The council meeting and the convention were presided over by President Gilbert, and Dr. J. Brian Eby, of Washington, was toastmaster at the banquet.

A charter was presented to the Washington Alumni Gamma Alphans, which organized the sixteenth chapter of the fraternity, to be known as the Washington Alumni Chapter.

The national officers of the fraternity for 1925 are: *President,* A. H. Wright (Cornell University); *vice-president and secretary,* J. E. Ackert (Manhattan, Kansas); *treasurer,* W. B. Burnett (Mellon Institute); *recorder,* C. C. Murdock (Cornell University); *editor,* nomination assigned to the Illinois chapter; *representatives in the council of the American Association for the Advancement of Science,* H. L. Rietz (University of Iowa) and Alvah Peterson (Rutgers College). The 1925 council meeting and convention of Gamma Alpha will be held in Kansas City, contemporaneous with the meetings of the American Association for the Advancement of Science.

THE SIGMA DELTA EPSILON GRADUATE WOMEN'S SCIENTIFIC FRATERNITY

President, Adele L. Grant.

Secretary, Evelyn I. Fernald, Rockford College, Rockford, Ill.

(*Report by Evelyn I. Fernald*)

Two new chapters were announced: Gamma, at the University of Illinois, and Delta, at the University of Missouri. The national officers elected for the coming year are as follows: *President,* Eloise Gerry (University of Wisconsin); *first vice-president,* Adelaide Spohn (Cornell University); *second vice-president,* Mary G. Haseman (University of Illinois); *secretary,* Edna M. Feltges (University of Wisconsin); *treasurer,* Grace H. Griswold (Cornell University).

Wednesday morning, after the breakfast held for all women interested in science, Mrs. Charles D. Walcott, of Washington, D. C., gave a very interesting and finely illustrated account of her expeditions in the western mountains. She showed a large number of wonderfully beautiful paintings and photographs. Forty-nine women were present.

THE WASHINGTON EXHIBITIONS

(*By Charles A. Shull, Manager of the Exhibition*)

The exhibition held in connection with the fifth Washington meeting of the American Association for the Advancement of Science and Associated Societies was by far the largest and finest in the history of the association, and was in every way a worthy accompaniment to the largest meeting of scientists in the history of the world. Under the skilful direction of the chairman of the local committee on exhibits, Mr. W. J. Showalter, of the National Geographic Society, whose efficient and genial service to the association and to the exhibitors is deeply appreciated, the arrangements were carried out in such a way as to make the general exhibition almost ideal from the standpoint of a scientific and educational as well as from that of a commercial enterprise.

Local conditions made it impossible to stage the entire exhibition in a single locality, and many different buildings held exhibits of great interest to visiting scientists. The main exhibition was placed in the Gymnasium Building of George Washington University; but exhibits were also to be found in the corridors of Central High School and at the Hygienic Laboratory, the Carnegie Institution Building, the New National Museum, the National Geographic Society headquarters, the National Academy of Sciences Building, the U. S. Department of Agriculture, the U. S. Weather Bureau, the Bureau of Standards and the Naval Observatory. The American Association for the Advancement of Science is very grateful to these institutions for their cordial cooperation, particularly to the George Washington University for the use of its gymnasium. It extends its thanks to those who made it possible to use the building for exhibition purposes and to all cooperating institutions.

The exhibits themselves may be grouped according to their locations, as in the following summary:

EXHIBITS MAINLY IN THE GENERAL EXHIBITION

The Bausch and Lomb Optical Co., The Spencer Lens Co. and *The Scientific Cinema and Supply Co.* furnished projection apparatus and screens for the lecture rooms. In this very fine service to the association and the scientists they were joined by the *Trans-Lux Daylight Picture Screen Co.,* of New York City, who not only exhibited their opaque projector in the general exhibition, but also provided daylight screens for many of the lecture rooms where lanterns were required. This splendid service on the part of these four companies went far toward making the presentation of data more successful than ever before, and was an important contribution to the meeting as