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THE FOURTH CHICAGO MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

Edited by Dr. HENRY B. WARD

PERMANENT SECRETARY

THE MEETING IN GENERAL

IN general content and effect the Chicago meeting was characterized by the older members as the most remarkable in the history of the association. It is not difficult to see the justification for this view. The character of the occasion, the setting given the meetings, the contributions of distinguished foreign guests to the programs, the intellectual stimulation of the achievements of a hundred years of scientific progress, all served to make the occasion truly noteworthy.

The unique character of the Century of Progress exhibit of the significant scientific discoveries of the past hundred years appealed with especial force to the members and guests of the association. The great conception of the organizers of the exposition developed under the guidance of the National Research Council had become a living demonstration of the fundamental rôle of science in the progress of the immediate past. Even a world-wide depression had not crippled the undertaking. This was neither an advertising show nor even merely a museum with static exhibits, but a dynamic demonstration of progress in human welfare that carried the mind irresistibly forward into the safe path for the future.

In the absence from the United States of Professor Henry Norris Russell, of Princeton, who was elected president of the association last January, the retiring president, Dr. John J. Abel, of the Johns Hopkins

University, officiated on various public occasions. Professor Russell had gone to England to deliver the Halley Lecture at Oxford University.

The general plan for the meetings outlined in the preliminary announcement was carried out with relatively few and minor changes. Scientific programs in the morning, symposia or longer technical addresses in the afternoon and general sessions or major social functions in the evenings proved to be a workable and effective arrangement of a wealth of material.

Naturally attention was centered about the foreign guests, and their addresses, together with invited papers by leading American scientists, were the outstanding features of the meetings. Wide-spread interest in these contributions led to the preparation of extended reports by press correspondents, which were accorded even front page positions in some metropolitan dailies. These accounts were so carefully written that the reading public acquired a good conception of the scientific work presented at the Chicago meetings.

The program was too extensive to permit of review here. Even the conspicuous features just noted in general could not be discussed in detail. Furthermore, the record of the foreign guests has been printed in SCIENCE and the content of their addresses given wide currency through the press. Arrangements are being made by special societies and otherwise to provide for printing the complete record of some symposia, as shown in the reports of secretaries included in the latter part of this article. Such a meeting is most difficult to present in an abstract. Its value in promoting the advancement of science was often the subject of comment during the sessions.

No small part of the interest aroused was due to the triad of scientific buildings, the Field Museum, the Shedd Aquarium and the Adler Planetarium, which were in intimate relations to the exposition grounds. These splendid institutions, together with the recently established Museum of Science and Industry in Jackson Park, drew frequent comments from scientific visitors as evidences of science progress worthy of a great city.

REGISTRATION

The official record of registration at the Chicago meeting totals only 1,341; under the circumstances the record could not have been other than incomplete. The widely scattered meeting places, the desire to hear and to come into personal contact with foreign guests, the wealth of outside attractions and the weather, which, like that elsewhere in the country, broke the record of some forty years, all contributed to reduce the number of those who took pains to make formal appearance at headquarters for registration. Furthermore, in most instances special rates of travel provided for the Century of Progress made it unnecessary for members to secure railway validation certificates and reduced the value of formal registration to a considerable degree. Nearly all the registrations were made in the first few days, though even then many were present who did not register. During the second week, when the attendance was much larger, the office of the association registered very few. Secretaries reported that the attendance of members in the affiliated societies was large for a summer meeting, and yet within the period involved in the preparation of this report it has been impossible to secure complete data on that point. Estimates of the number of scientific men and women in attendance varied from 4,000 to 10,000.

Of those registered as in attendance the totals for the places best represented are as follows:

Chicago	266	Wisconsin	65
Illinois	117	Foreign	56
New York	152	California	52
Ohio	80	Pennsylvania	52

The registration came from 47 states, New Mexico alone being unrepresented, the District of Columbia, Alaska, Canada and many foreign countries.

The doubts expressed in advance by some that the widely separated meeting places and the wealth of outside attractions would affect unfavorably attendance on the various sessions, were happily unrealized. Many sectional and society reports state that programs were well attended and some even record a capacity audience or a crowd exceeding the normal capacity of the hall. Contrary to the general expectation, the evening sessions, with one exception, were exceedingly well attended and the audiences evidenced marked interest in the topics presented by lingering to discuss in groups or to make individual inquiries of the speakers.

The general program issued by the local committee was a most attractive brochure of nearly 200 pages. The handsome cover and numerous illustrations were often praised. In addition to general information it listed as usual the sectional and society programs. The general sessions and joint sessions, which constituted a special and highly appreciated feature of the Chicago program, were handled under separate headings. Fifteen of the sections of the association participated in some way and forty of its affiliated societies. In all, over one thousand addresses and papers were presented. Never before have so many of the engineering societies met together with the association at any one time. Although five other sections and their affiliated societies met in the second week, still the engineering joint programs alone included nearly one half of the items listed for the entire two weeks covered by the meeting. These

contributions were in every way noteworthy and by their extent also warranted special consideration so that a separate report on the meetings of Section M (Engineering Sciences) and affiliated societies is being prepared by the secretary of that section and will appear in a subsequent issue of SCIENCE.

SOCIAL FUNCTIONS

On Monday evening, June 19, the president and the board of trustees of A Century of Progress held a reception in honor of the American Association for the Advancement of Science, its affiliated societies and foreign guests. Members who registered the first day were given a card admitting to the exposition grounds. As the group assembled in the open air theater occupying the court of the Hall of Science, opportunity was afforded to meet informally the foreign guests and exchange greetings before the program was opened. The address of welcome was given by President Rufus C. Dawes, of A Century of Progress, and the response by Dr. J. J. Abel, retiring president of the association. Professor Arthur H. Compton, representing the Chicago scientific group, spoke on the progress of science, and Professor Niels Bohr on behalf of the visiting scientists from abroad. Later, a reception was held in the Trustees' Lounge of the Hall of Science, when representative citizens and scientific men were privileged to meet the officers of the exposition and foreign guests.

On Thursday evening the association gave a banquet in honor of the foreign guests. The occasion was graced by the presence of a number of foreign consuls, who had joined the association in paying honor to the distinguished scientists present as foreign guests. Honor tables had been reserved by consular representatives of England, Germany, Italy, France, Denmark and Hungary. Dr. J. J. Abel, presiding at the speakers table, opened the program by a brief discussion on the history of science and thought. He then called upon Dr. R. A. Millikan, who took charge as toastmaster and introduced the speakers. The president of A Century of Progress, Mr. Rufus C. Dawes, was called upon first and was followed by Dr. Hugo F. Simon, dean of the diplomatic corps and consul-general of Germany, who spoke for the consular representatives. The toastmaster announced as the theme for the foreign guests chosen to represent the group, "Science in the Coming Century." He then introduced successively the following:

Filippo Bottazzi, Italy, physiology.
Henri Piéron, France, psychology.
Jakob Bjerknes, Norway, meteorology.
Wolfgang Koehler, Germany, psychology.
Sir Daniel Hall, England, agriculture.
Edwin B. Wilson, United States, medicine.

Each spoke of the future from the standpoint of his own field but with due consideration of present world conditions and in a manner that commanded close attention and generous applause. While the audience was not as large as had been expected, no doubt by reason of the extreme weather conditions, those present joined with President Abel in pronouncing it a historic occasion.

In connection with the general session on Friday evening, the Field Museum held open house for members of the association and guests, thus affording unusual opportunity for enjoying the riches of the institution. The Adler Planetarium and Astronomical Museum offered members and foreign guests a special showing on Sunday evening that was greatly appreciated. The Museum of Science and Industry in Jackson Park, only very recently opened in the rehabilitated Art Museum building of the Columbian Exposition of 1893, welcomed members of the association and the engineering societies on Thursday evening in Engineering Week. In addition to these general major social functions, numerous society dinners, private gatherings and group conferences gave a wealth of opportunities for contact and discussion that helped in large measure to make the meeting memorable for those who participated.

Especial mention should be made of the courtesies extended to visiting ladies by the local committee. The afternoon excursions and visits to points of interest were highly enjoyed. The unexpectedly large numbers that took advantage of the opportunities offered sometimes created evident difficulties, but the leadership was resourceful and few of the visitors even knew of the problems, since they were so promptly and successfully solved. The guests were loud in their praises of the ladies who managed the trips and who entertained them so hospitably.

MEETINGS OF THE COUNCIL

The council held only two meetings at Chicago. The first occupied the afternoon of the opening day, Monday, June 19, and the second fell on Wednesday morning. The following items merit special mention:

On recommendation of the executive committee, the council elected Wilson Compton, of Washington, D. C., a member of the finance committee of the American Association for the Advancement of Science to succeed A. S. Frissell, deceased.

On recommendation of the executive committee, the council voted unanimously that the life membership of George Starr White be cancelled and that the life membership fee paid in 1931 be returned.

On recommendation of the executive committee, the council voted to authorize a conference on the teaching of science to be arranged for the Boston meeting by the Committee on the Place of Science in Education.

The following resolution was presented:

The Southwestern Division of the American Association for the Advancement of Science requests the council and the executive committee of the association to provide for the study of the economics of scientific personnel and scientific projects and for the prosecution of such effective and aggressive measures as may thereby be revealed as necessary.

Present events show that educational and other efforts have failed conspicuously to arouse public comprehension and appreciation of scientific research and a realization of the importance of its continued progress. On the contrary, incredible as it appears, the pursuit of science now seems to be regarded by the majority of Americans, if they may be judged from the utterances of their elected representatives, as a luxury, to be tolerated by moderate appropriations in times of so-called prosperity, and to be pruned to the limit in times of stress. Yet nothing can save scientific research in public institutions if it is not supported by public funds provided at the insistence of enlightened public opinion. The Southwestern Division therefore feels that the American Association for the Advancement of Science should promptly rehabilitate the Committee of One Hundred on Scientific Research, provide a full-time secretary for the committee, and outline a progressive program designed to improve public appreciation and support of science in its broadest aspects.

The council discussed fully the situation and the work which had been done by the Committee of One Hundred on Scientific Research. Informal approval was expressed for the views of the Southwestern Division as presented in the resolution. It was pointed out further that at the present time the complexity of the situation and the financial difficulties were serious obstacles in the way of formulating and carrying out the program proposed. The executive committee was requested to prosecute further the study of this problem. It seemed clear that the handling of the question would involve the organization of several subcommittees to deal with separate aspects and fields involved. This would call for the selection of appropriate leaders for each of those committees who should be not only adequately informed but also free to devote the requisite time to the particular project involved.

At the close of the discussion the council voted that the executive committee be asked to draft appropriate resolutions and send to President Roosevelt, setting forth the unfortunate consequences of the reduction of funds of federal bureaus for scientific research.

On recommendation of the executive committee, the council elected Vannevar Bush as secretary of Section M (Engineering).

The executive committee brought to the attention of the council a recent proposal which threatens to do violence to the National Parks policy of the association as outlined in a general resolution adopted January 1, 1926. This concerned Yellowstone Park. The proposal was presented fully by the permanent secretary, who explained the significance of the Yellowstone Lake proposal. The council voted to reaffirm its resolution of January 1, 1926, and instructed the permanent secretary to communicate this action to the Secretary of the Interior and others interested.

A communication from the Quetico-Superior Council, referred by action of the executive committee, was presented, together with documents concerning the proposed wilderness sanctuary to be set aside by Canada and the United States as a peace memorial. The executive committee recommended that the council approve the plan. After full discussion showing outspoken and unanimous approval of council members for the proposed utilization of this unique natural area, it was voted to authorize the permanent secretary to transmit this view for the hearing before the International Joint Commission. In accordance with these instructions the following reply was sent:

"After full discussion the council of the American Association for the Advancement of Science voted unanimously to reaffirm previous action in approving and endorsing the program of Quetico-Superior Council. We believe that the unique character of this area and its outstanding scenic recreational and inspirational values demand proper provision for their preservation and coordinated use."

On recommendation of the executive committee, the council authorized the organization of a committee on governmental research as soon as it is feasible to make the necessary arrangements.

A report from Dr. F. G. Cottrell, chairman of the committee on patents, trade marks and copyrights, was read to the council by the permanent secretary. On recommendation of the executive committee the report was accepted and the council voted to enlarge the committee by adding the name of Joseph Rossman and to appoint him as chairman to replace F. G. Cottrell (resigned), Dr. Cottrell to remain a member of the committee.

The report of the booklet committee was presented by Joseph L. Wheeler, chairman, who summarized the work already done and plans for the future. The executive committee recommended that the booklist committee be authorized:

(1) To proceed to arrange for the editing of a series of science booklists for young people in cooperation with the American Library Association and with a group of teachers of science;

(2) To solicit funds from some appropriate foundation or from interested and appropriate scientific concerns to print these lists;

(3) To solicit funds from some appropriate foundation or from interested and appropriate scientific concerns to publish further editions of the 27 adult lists now being distributed;

(4) To use the phrase "In cooperation with the American Library Association" on subsequent lists, as the A. L. A. is an affiliated body and as the libraries of the country have been so active in the preparation and distribution of lists.

The council voted its appreciation of the work done by the booklist committee and its approval of the recommendations presented by the executive committee.

On vote of the council appropriate resolutions of thanks

were approved and ordered spread upon the minutes as follows: The fifth Chicago meeting is without parallel in the history of the association: through the generous cooperation of the Century of Progress twenty-seven of the most distinguished scientific workers of the world came to join the sections and the affiliated societies in discussion of the contributions made by research to the progress of the past and to the formulation of plans for the future advancement of science. This rich program, including many symposia and joint sessions, has presented to citizens of Chicago and to visitors from more distant sections a record of scientific achievement which was not only full of interest but impressive even to those familiar with the work in these various fields.

The American Association for the Advancement of Science desires to express its hearty appreciation of the many services rendered to the organization by the Century of Progress Exposition and especially to its distinguished president, Rufus C. Dawes, whose prompt and cordial cooperation was constant inspiration and did much to make the occasion successful.

To Henry Crew, director of the exhibit of the basic sciences, and to Philip Fox, chairman of the local committee, sincere thanks are due for assistance in directions too numerous to mention.

To the University of Chicago and to Northwestern University the association and its affiliated societies are deeply indebted for facilities furnished in meeting places so well adapted to our purposes and so generously placed at our disposal.

The thanks of the association are also due to all the hotels that made special arrangements to provide meeting places and other facilities for the sections of the American Association for the Advancement of Science and its several affiliated societies.

The council desires further to acknowledge with appreciation the services of the press and its numerous workers who have handled so effectively the large mass of material presented at the various meetings.

SCIENTIFIC SESSIONS

SECTION A (MATHEMATICS)

(Report from E. R. Hedrick)

The meetings of Section A were held in conjunction with those of the American Mathematical Society and the Mathematical Association of America. The American Mathematical Society met daily from Monday, June 19, to Friday, June 23, principally in Eckhart Hall and Mandel Hall of the University of Chicago, but one session was held on Thursday, June 22, in the Hall of Science at the Century of Progress Exposition.

At the general sessions of the society on Monday afternoon, Thursday morning, Friday morning and afternoon, forty-six papers were presented briefly by their authors; abstracts of these will be published in the July number of the *Bulletin* of the society, and a general account of the meetings will appear in the September issue of the *Bulletin*.

On Tuesday afternoon, two principal addresses were delivered at a joint session of Section A and the American Mathematical Society. Professor Tullio Levi-Civita, of the University of Rome, spoke on "Some Mathematical Aspects of the New Mechanics." The author emphasized the necessity of abandoning not only ordinary mechanical laws but also previous conceptions of isolated moving particles. He discussed the Heisenberg uncertainty principle and the Schrödinger wave-equation, and pointed out that the theory of characteristics of partial differential equations can be made to explain the dualism of de Broglie. The address was circulated in preprints and will be published in full in the August issue of the *Bulletin* of the society. Professor George D. Birkhoff, of Harvard University, delivered an address entitled "Quantum Mechanics and Asymptotic Series." He discussed the asymptotic series solution of any linear partial differential equation in powers of a parameter, as a generalization of the Schrödinger wave-equation in connection with the Hamilton-Jacobi partial differential equation; he considered also the existence and the nature of the corresponding characteristic values and functions. This address will appear in full in an early issue of the *Bulletin* of the society.

On Wednesday morning, Professor Lipót Fejér, of the University of Budapest, delivered an address on "The Infinite Sequences Arising in the Theories of Harmonic Analysis, of Interpolation, and of Mechanical Quadratures." This address also was circulated in preprints and will be published in the August number of the *Bulletin* of the society. Addresses were delivered also by Professor C. N. Moore, of the University of Cincinnati, "On the Use of Cesàro Means in Determining Criteria for Fourier's Constants"; and by Professor Dunham Jackson, of the University of Minnesota, on "Certain Problems of Closest Approximation." At the meeting on Wednesday afternoon, addresses were delivered by Professor Tullio Levi-Civita, of the University of Rome, on "Nets on a Surface and an Extension of Trigonometry"; by Professor W. C. Graustein, of Harvard University, on "Invariant Methods in Differential Geometry"; and by Professor Enrico Bompiani, of the University of Rome, on "Deformations of Higher Species of Surfaces and Manifolds."

On Friday afternoon, the last of the principal addresses was delivered by Professor L. E. Dickson, of the University of Chicago, on "Recent Progress in Additive Number-theory." This address will appear in full in an early issue of the *Bulletin* of the society. More detailed accounts of these addresses and of other papers will appear in the July and the September issues of the *Bulletin* of the society.

The Mathematical Association of America held meetings on Tuesday morning, Thursday afternoon and Saturday afternoon. At the Tuesday meeting in Eckhart Hall of the University of Chicago, papers were presented by Professor H. E. Slaught, of the University of Chicago, on "The Lag of Mathematics behind Literature and Art in the Early Centuries"; by Professor George D. Birkhoff, of Harvard University, on "Mathematics and Art"; and by Professor E. V. Huntington, of Harvard University, on "The Postulational Method in Mathematics." On Thursday afternoon, at a meeting in the Hall of Science, papers were read by Dr. T. C. Fry, of the Bell Telephone Laboratories, on "Fundamental Concepts in the Theory of Probability"; by Dr. H. A. Babcock, on "Applications of Mathematics to Real Estate Problems"; and by Dr. D. H. Lehmer, on "A Number Theory Machine." On Saturday afternoon, at a meeting held in Northwestern University, Professor T. F. Holgate spoke on "Mathematical Reminiscences of the World's Fair of 1893." More detailed accounts of these papers will be published in forthcoming issues of the *American Mathematical Monthly*.

SECTION B (PHYSICS)

(Reports from Henry A. Barton, A. J. Dempster and Eric R. Miller)

All the sessions of Section B were held jointly with the American Physical Society. In many cases other sections of the association and other societies were also joint participants, this procedure making for an excellent exchange of ideas. On Tuesday morning a symposium was held on the "Application of Quantum Mechanics in Chemistry." Section C (Chemistry) was the guest of Section B for this session. Professor Niels Bohr very kindly presided and called for the four papers of the symposium, namely: "Electron Energies in Atoms and Molecules," by Dr. J. C. Slater, of the Massachusetts Institute of Technology; "Quantum Mechanics of Condensed Ring Systems, Free Radicals and other Complex Molecules," by Dr. Linus Pauling, of the California Institute of Technology; "Quantum Mechanics and Chemical Reactions," by Dr. Henry Eyring, of Princeton University, and "Electronic Structures of Polyatomic Molecules," by Dr. R. S. Mulliken, of the University of Chicago. On Monday afternoon Professor J. Bjerknes, of the Geophysical Institute, Bergen, Norway, one of the guests of the association, delivered an address on "Atmospheric Soundings: Methods and Results." (See report of the American Meteorological Society.) On Tuesday afternoon Section B was the guest of Section A (Mathematics) at a symposium reported under Section A. On Wednesday morning Section B was the guest of Section C (Chemistry) at a symposium on "Isotopes." This symposium is reported under Section C, but mention should be made here that under the leadership of Dr. F. W. Aston, of Cavendish Laboratory, Cambridge, England, a guest of the association, this symposium became one of the most important physical sessions of the meeting. Wednesday afternoon was marked by the address of Professor Enrico Fermi, of the University of Rome, another guest of the association, on "The Theory of Hyperfine Structures." The same evening Sections B and C jointly sponsored a public program in Thorne Hall. The addresses delivered on this occasion were "The Story of Isotopes," by Dr. Aston, and "New Light on Nuclear Physics," by Dr. R. A. Millikan. Professor Bohr presided, being introduced to the audience as chairman by Professor A. H. Compton. The general audience made evident their appreciation of the opportunity to hear these distinguished speakers. On Thursday morning a joint session was held with the American Astronomical Society. The session consisted of a symposium on "Spectroscopy and Astronomy." Papers delivered were "Technique of Stellar Spectrophotometry and Intensities of Some Stellar Absorption Lines," by Dr. Theodore Dunham, Jr., of Mount Wilson Observatory; "Atomic Configuration in Spectroscopy," by Dr. A. G. Shenstone, of Princeton University; "Astrophysics and the Ionization Theory," by Dr. W. S. Adams, of Mount Wilson Observatory, and "Matter in Inter-stellar Space," by Dr. Otto Struve, of Yerkes Observatory. Thursday afternoon a public address was given by Professor Bohr on "Space and Time in Contemporary Physics." This meeting was held in the Illinois Building of A Century of Progress Exposition and was attended by a crowd exceeding the normal capacity of the hall. On Friday morning a symposium was held on "Nuclear Disintegration." This symposium, supplementing the one on isotopes, made the Chicago meeting a veritable milestone in the research field of the atomic nucleus. Papers were presented on "Recent Work on Nuclear Disintegration at the University of California," by Dr. E. O. Lawrence, of that university; "The Disintegration of Light Elements by High Velocity Protons," by Dr. J. D. Cockcroft, of Cavendish Laboratory, Cambridge, England; "Disintegration Experiments on Elements of Medium Atomic Number," by M. A. Tuve, of the Department of Terrestrial Magnetism, and "Disintegration of Nuclei by Neutrons," by Dr. W. D. Harkins.

The American Meteorological Society (meeting with Section B of the association at Chicago from June 19 to 21), was fortunate in having as its guest the eminent Norwegian meteorologist, J. Bjerknes, professor in the Geophysical Institute, Bergen, Norway, and joint author, with H. Solberg, of the well-

known polar front theory of cyclones. Dr. Bjerknes led the symposium on dynamics of extra-tropical cyclones with an account of the results of hourly ascents through two cyclones that passed over Brussels in 1928, and discussed the critical slopes for instability at warm and cold fronts, also the association between large scale wave motions at the base of the stratosphere and the waves at the polar front surface below. Andrew Thomson, Meteorological Office, Toronto, illustrated the structure of the cyclone of November 18–19, 1931, which was accompanied by a 115 mile an hour hurricane in Hudson Strait, and explained its violence by the non-occlusion of the warm front. Dr. W. J. Humphreys, of the U. S. Weather Bureau, Washington, showed that cyclones originate (1) in cyclonic troughs, (2) by the inductive effect of a hurricane, (3) as secondaries from the Aleutian low, especially when it extends inland, and (4) in foehn winds in the lee of the Rocky Mountains. A symposium on radiation and the general circulation of the atmosphere was opened by Dr. Humphreys with an account of what is known quantitatively about the reflection, scattering and absorption of incoming and outgoing radiation in the atmosphere. John Patterson, director of the Meteorological Office of Canada, explained a new method of eliminating the plateau effect in reducing the barometer to sea-level and showed comparative weather maps made by the old and the new methods. Dr. Bjerknes gave a theory of atmospheric circulation based on the observation that the equatorial zone receives more heat than it radiates, while the polar caps receive less. The surplus is transported by a circulation that divides into compartments, in which the trajectories are typical anti-cyclonic ellipses, the western ends of which are elevated in the atmosphere and form the well-known anti-trades above the trades at the eastern end of the adjacent compartment. Professor T. A. Blair, of the U. S. Weather Bureau, Lincoln, Nebraska, closed the discussion with an account of the correlation between weather types and pressure anomalies in the progressive averages for 3-month periods.

A historical symposium on a century of progress in meteorology included papers on "Pioneers," by Eric Miller, of the U S. Weather Bureau, Madison, Wisconsin; on "The Development of Aerological Instruments and Methods," by S. P. Fergusson, of the Blue Hill Observatory; and on "The Application of Meteorology to Aeronautics," by W. R. Gregg, of the U. S. Weather Bureau, Washington, D. C. Among papers of a more general character, Dr. Bjerknes exhibited an improvement on Sir Napier Shaw's tephigram method of evaluating the kinetic energy of the rising air in cumulus clouds; Professor Dinsmore Alter, of the University of Kansas, showed the relative amplitudes of all the periodicities discovered by applying the correlation periodogram to a very long series of English rainfall observations, T. G. Shipman, of the U. S. Weather Bureau, Davenport, Iowa, brought out some little known phenomena of tornadoes and showed by statistics that the chance of being killed by a tornado is very much less than the chance of being executed for murder, even in the United States, and R. A. Dyke, of the U. S. Weather Bureau, New Orleans, Louisiana, showed graphs of the relations between mean minimum temperature and the chance of freezing temperature and other degrees of cold, for various months and seasons. At the session of the society held in the Hall of Science, Mr. Fergusson showed the results of recent anemometer tests that he has been making, including some instruments constructed of balsa wood. The micro-climatological studies of flying fields required to meet the needs of aviators were considered in a paper by Professor J. E. Woodman, of New York University, and the forest fire conditions of New England in general and in the unusual spring of 1933 were presented by T. E. Reed, of the U. S. Weather Bureau, Boston. These papers were followed by a symposium on optical meteorology, in which the president of the society, Dr. H. H. Kimball, of the Blue Hill Observatory, gave an account of methods and results of measurements of atmospheric depletion by interposing colored glass screens in front of a pyrheliometer. Dr. Bernhard Haurwitz, of the University of Leipzig, now in residence at the Massachusetts Institute of Technology and the Blue Hill Observatory, then discussed atmospheric turbidity. After an intermission, during which the audience was increased considerably by visitors to the World's Fair, Professor Bjerknes gave a public address on the history, methods and results of atmospheric soundings. He pointed out that the manned balloon flights which culminated in the famous stratosphere flight of Piccard to 16,500 meters altitude are being superseded for meteorological purposes by large numbers of unnoticed flights with unmanned sounding balloons equipped with self-recording instruments that weigh as little as 25 grams and which have penetrated to an altitude of 36,000 meters. Meteorographs with automatic radio-transmitters have been employed with success in the polar regions and over the oceans for several years. The results of these observations are the detailed information about air masses of different temperatures and the wave motions at their interfaces that constitute storms.

SECTION C (CHEMISTRY)

(Report from J. H. Simons)

Section C held five sessions, four of which were joint sessions with other sections of the association,

at which there were symposia of mutual interest. A luncheon was held in conjunction with the Chicago Chemists Club and a dinner and evening meeting in conjunction with the Chicago Section of the American Chemical Society. The section also cooperated with Section B in a general session, at which Dr. F. W. Aston and Dr. R. A. Millikan spoke. A symposium on "Colloid Chemistry Related to Biological Problems" was held jointly with Section N. Under the title of "Sedimentation Constants and Molecular Weights of the Respiratory Proteins," Dr. The. Svedberg reported on a review of the molecular weights of the blood proteins throughout the animal kingdom. Dr. Filippo Bottazzi spoke on "Physico-Chemical Properties of Concentrated Blood Serum." In a paper on "The Electrostatic Forces in Systems Containing Biological Components," Professor Edwin J. Cohn explained the properties, such as dielectric constant, melting and boiling points of the amino acids, by considering these molecules as carrying both positive and negative charges. Professor J. W. McBain, in his paper, "Some Experimental Methods Applicable to Biological Problems," described three methods—diffusion cells, ultrafiltration and the ultracentrifuge. He showed the apparatus and gave a demonstration of a high-speed air-driven centrifuge. "Isotopes" was the title of a symposium held jointly with Section B. Dr. Enrico Fermi presided. Dr. F. W. Aston gave a paper on "Some Measurements of the Relative Abundance of Isotopes," in which he showed how these were determined and how by their use checks could be had between the physical and chemical atomic weights. In his paper, "Neutrons and Isotopes," Professor W. D. Harkins discussed the abundance of different types of nuclei. Dr. K. T. Bainbridge reported on "The Masses of Isotopes and the Disintegration of Atoms," as shown in the mass spectrograph. Dr. E. W. Washburn, speaking on "Isotopic Fraction of Water," emphasized the chemical interest in obtaining the heavy isotope of hydrogen pure and in large quantity and described how this could be accomplished by electrolysis. Professor H. C. Urey described "A Diffusion Method for the Separation of Isotopes." "The Magneto-Optic Method in the Study of Isotopes" was presented by Dr. Fred Allison, and he reported many new isotopes.

Ten papers were presented at a session for contributed papers. Dr. The. Svedberg gave one on "Ultracentrifugal Study of the Action of Papain on Ovalbumin." Dr. W. D. Lansing and E. O. Kraemer reported on "The Molecular Weight of Cellulose in Cuprammonium Solvent." Dr. J. W. Williams, in his paper, "Dielectric Constant Theory and the Molecular Weight of Protein Material," showed how the molecular weight could be determined from the change of dielectric constant with frequency. Two papers related to the theories of gaseous reactions were given —"The Explosion of Azomethane," by A. O. Allen and O. K. Rice, and "The Thermal Decomposition of Methyl and Ethyl Ether at Low Pressure," by D. V. Sickman and O. K. Rice. Dr. Frank C. Whitmore presented a paper on "Recent Developments in the Field of Intramolecular Rearrangements." Other papers presented were: "Resonance Energies in Conjugated Systems Containing Benzene Rings," by Jack Sherman; "The Magneto-Optic Method for Quantitative Analysis," by Professor Edna R. Bishop, "The Chemical Action of Intense Audible Sound," by Dr. E. W. Flosdorf and Professor L. A. Chambers, and "Measurements of the Absolute Adsorption by the Microtome Method," by Professor Robert E. Swain. An account of the symposium on "The Application of Quantum Mechanics in Chemistry" will be found in the report of Section B, and an account of the symposium on "The Measurement of Geologic Time" will be found in the report of Section E. At the luncheon a number of short and non-technical talks were given by Dr. Niels Bohr, Dr. Enrico Fermi, Dr. F. W. Aston, Dr. K. T. Compton, Dr. A. H. Compton and others, and at the dinner Dr. F. W. Aston, Dr. R. A. Millikan, Dr. K. T. Compton, Dr. J. W. McBain, Dr. W. A. Noyes, Dr. E. W. Washburn, Dr. W. D. Harkins, Dr. F. C. Whitmore and Dr. E. C. Franklin gave short after-dinner remarks. Dr. The. Svedberg gave the address of the evening on "Sedimentation of Molecules in Centrifugal Fields."

SECTION D (ASTRONOMY)

(Report from Raymond S. Dugan)

The meeting opened on June 22 with a symposium on spectroscopy and astronomy arranged jointly with Section B and the American Physical Society. The speakers were Dr. W. S. Adams, Dr. Theodore Dunham, Jr., Professor A. G. Shenstone and Dr. Otto Struve. Even the one physicist emphasized the astronomical applications of spectroscopy. Sessions were held at the Planetarium on June 23 and 24 for contributed papers. Twenty of the thirty-four papers dealt with spectroscopic researches. Two papers were presented jointly with the History of Science Society. The society was addressed by Mr. Adler, donor of the Planetarium, by Director Philip Fox, and by Mr. Donoghue, general superintendent of the South Park Commissioners. Dr. W. S. Adams, president of the society, presided, being relieved at one of the sessions by Dr. V. M. Slipher, chairman of Section D. On Saturday afternoon many of the members went to Williams Bay and spent the evening, on the invitation of Professor Struve, at the Yerkes Observatory.

At the annual business meeting of the American

Astronomical Society, Harlow Shapley was elected *vice-president;* R. S. Dugan, *secretary;* F. C. Jordan, *treasurer;* J. C. Duncan, C. O. Lampland and H. T. Stetson, *councilors;* H. N. Russell, H. D. Curtis and Frederick Slocum, members of the Division of Physical Sciences, National Research Council. Frederick Slocum, A. H. Joy and J. A. Pearce were elected a committee on nominations for the next annual meeting. Eleven new members were elected. The society accepted a gift of $1,000 from Annie J. Cannon, which she had received as a prize from the Association to Aid Scientific Research by Women, establishing an award to be made in recognition of the work of women in astronomy. The meeting in December will be held in Cambridge, Massachusetts, at the time of the association meeting.

SECTION E (GEOLOGY AND GEOGRAPHY)

(*Report from Kirtley F. Mather*)

In cooperation with members of the Geological Society of America and the Geographic Society of Chicago, Section E held six meetings in Chicago on June 20, 21 and 22. It was the most successful summer session in the history of the section, with a large attendance of geologists and geographers, most of whom were from the Middle West. The meetings scheduled for Tuesday were held in Rosenwald Hall and Burton Court at the University of Chicago, where excellent arrangements had been made by Professors D. Jerome Fisher and F. J. Pettijohn. At the morning session, presided over by Professor R. T. Chamberlin, chairman of Section E, six papers in the field of structural and dynamic geology were presented and discussed by many of the 65 persons in the audience. These ranged in subject-matter from "A Quantitative Study of Wave Erosion on the West Shore of Lake Michigan," by Professor John R. Ball, of Northwestern University, through a consideration of "Endomorphic Copper Deposits in Dioritic Intrusives at San Jose, Mexico," by Dr. Edson S. Bastin, of the University of Chicago, to a stimulating paper "On Ultrametamorphism and Anatexis," by J. J. Sederholm, of Helsingfors, Finland, a guest of the association and the Century of Progress Exposition. In the afternoon, seven papers in the field of paleontology and stratigraphy were read. These included papers on "Scolecodont Classification," by Professor Carey Croneis and Harold W. Scott, of the University of Chicago, "Recent Evidence on the Age of the New Albany Shale," by John Huddle, of the University of Indiana, and a preliminary report on "The Pleistocene of Cuba," by Professor Horace G. Richards, of the Philadelphia Academy of Science. At 4:30 P. M. on Tuesday, Dr. Sederholm was introduced by Professor C. K. Leith, president of the Geological Society of America, and delivered a public address on the "Progress and Scope of Precambrian Research," in which he reviewed the remarkable success which geologists have achieved in the attempt to decipher the tangled record of the earlier two thirds of geological history. Sixty-three geologists and geographers assembled at 6:30 for an informal dinner at Burton Court, which was followed by an illustrated lecture on "Recent Geological and Geographical Research in Antarctica," by Griffith Taylor, of the University of Chicago.

For Wednesday afternoon a joint session with sections B and C and affiliated societies, devoted to a symposium on "The Measurement of Geologic Time," had been arranged by the secretary of Section E, with the assistance of Professor A. C. Lane, of Tufts College. This meeting was held, under the chairmanship of Professor W. D. Harkins, of the University of Chicago, in the Lincoln Auditorium of the Illinois Host Building at the Century of Progress Exposition and was attended by a capacity audience of approximately 300. The nature and rates of disintegration of radioactive elements occurring in minerals was discussed by Professor A. F. Kovarik, of Yale University, Dr. C. S. Piggot, of the Geophysical Laboratory, A. V. Grosse, of the University of Chicago, and I. Kurbatov, of Berwyn, Illinois. W. D. Urry, of the Massachusetts Institute of Technology, presented the results of recent research concerning the determination of the age of helium-bearing rocks and meteorites, some of the latter of which certainly are much older than the earth. Data indicating that the age of pitchblende from Great Bear Lake, Canada, is approximately 1,375,000,000 years were presented by J. P. Marble, of the U. S. Geological Survey. Dr. R. C. Wells, of the U. S. Geological Survey, announced the first known occurrence of thorianite in the United States and discussed the usefulness of thorium minerals as age indicators. That the last ice sheets had disappeared from the Lake Superior region about 20,000 years ago and that ground temperatures there are appreciably warmer than they were 3,000 years ago were the conclusions of President W. O. Hotchkiss, of the Michigan College of Mining and Technology, and Professor L. R. Ingersoll, of the University of Wisconsin. Age determinations of the travertine deposits of Yellowstone Park, based on their radium content, were announced by Dr. Herman Schlundt, of the University of Missouri. Two joint sessions of Section E and the Geographical Society of Chicago had been arranged for Thursday by Professor Charles C. Colby, of the University of Chicago. These were held in the Field Museum of Natural History and were attended by from 75 to 100 persons. Mr. H. E. Bradley, president of the Geographical

Society of Chicago, served as chairman during the forenoon and Dr. R. T. Chamberlin during the afternoon. Seven papers in the field of human geography were presented and discussed. These included reports on geographical studies in the Lower Rio Grande Valley of Texas, by Professor K. C. McMurry, of the University of Michigan, and at Tyneside, by Professor H. M. Leppard, of the University of Chicago. Dr. Richard Hartshorne, of the University of Minnesota, stimulated much discussion by his paper on geographic and political boundaries in Upper Silesia, an area of international tension.

SECTION F (ZOOLOGICAL SCIENCES)

(Reports from George T. Hargitt and W. E. Hinds)

Section F of the American Association for the Advancement of Science held sessions from Tuesday to Thursday, June 20 to 22. Very delightful and valuable were the symposia which brought together the results and conclusions of investigators from different countries. The first of these, a joint session of Sections F and N on Tuesday morning, covered the field of the factors involved in nerve activity. The general field was surveyed and summarized by Professor G. H. Parker, Harvard, and Dr. A. V. Hill, London, followed with an account of investigations upon heat production in nerves during activity. The relations to nerve activity of respiration, chemical and electrical factors were discussed by Dr. W. O. Fenn, Rochester, Dr. R. W. Gerard, Chicago, and Dr. H. S. Gasser, Cornell. A second symposium on Thursday considered the problem of aquatic animals and their environment. The Ecological Society of America conducted the session which took up the following phases of the question: Conditions of life at great depths of the ocean, Dr. August Krogh, Copenhagen; The centrifugable plankton and non-centrifugable organic content of water, Professor C. Juday and Dr. E. A. Birge, Wisconsin; Ecology of lake fishes, Dr. A. S. Pearse, Duke; Biochemistry of marine invertebrates, Dr. Paul S. Galtsoff, U. S. Bureau of Fisheries; and a general discussion by Dr. V. E. Shelford, Illinois.

Five societies, the American Society of Naturalists, Genetics Society of America, American Society of Agronomy and Sections F and O of the association combined in a joint session on genetics at which two addresses were given: Dr. Richard Goldschmidt, Berlin, discussed the influence of the cytoplasm in gene-controlled heredity and Professor Sewall Wright, Chicago, on theories of dominance from physiological and evolutionary viewpoints. The following separate addresses were given during the sessions: Dr. Joseph Barcroft, Cambridge, (1) "Respiratory Processes of the Mammalian Foetus" and (2) "Some Observations on the Evolution of the Body Considered in Relation to that of the Mind"; Dr. August Krogh, Copenhagen, "A Discussion and Comparison of the Sources of Energy and Life Phenomena of Terrestrial and Marine Organisms"; Dr. A. V. Hill, London, "Wave Transmission as a Basis of Nerve Activity." Dr. R. J. Tillyard, of Canberra, Australia, gave an interesting discussion of the possible lines of evolution of the insects, before a joint session of the Entomological Society of America, the American Association of Economic Entomologists and Section F of the association. The exchange of views and personal contacts of American and foreign zoologists was a most profitable and interesting part of the sessions. Meetings were held in the buildings of Northwestern University Medical School, Field Museum of Natural History and the University of Chicago. The thanks of the section are extended to these institutions and the local representative of Section F for their generous cooperation and the ample facilities afforded. Chairmen for the various sessions were: Professor G. H. Parker, Harvard, Dr. F. R. Lillie, Chicago, Dr. Charles Zeleny, Illinois, Dr. W. E. Hinds, Louisiana, Dr. V. E. Shelford, Illinois, Dr. A. J. Carlson, Chicago, and Dr. E. B. Powers, Tennessee.

A joint meeting of Section F of the association with the affiliated entomological societies was convened at the James Simpson Theater, Field Museum, on June 22 at 10 A. M., with about 150 in attendance. The president of the American Association of Economic Entomologists, Dr. W. E. Hinds, presided during the opening address, which was given by Dr. R. J. Tillyard, of Canberra, Australia. Dr. Tillyard presented an interesting and well-illustrated discussion of various theories of "The Evolution of Insects," closing with a statement of his own conclusions which have been based upon long study in this field.

Dr. A. J. Carlson presided during the second address of the joint meeting, which was given by Dr. A. V. Hill, of University College, London. Dr. Hill spoke upon "Wave Transmission as the Basis of Nerve Activity." The joint meeting of the two entomological societies was a dinner meeting held at the Chicago Woman's Club on the evening of June 23, with 50 in attendance. Dr. C. H. Richardson, vice-president of the Entomological Society of America, acted as toastmaster. Business matters were considered briefly. Very interesting talks were given by Dr. E. F. Phillips on "Entomology in Soviet Russia, with Particular Reference to Beekeeping," and by Mrs. Phillips on "Certain Aspects of Home Economics in the Land of the Soviets."

SECTION G (BOTANICAL SCIENCES)

(Reports from Charles A. Shull, Loren C. Petry and Neil E. Stevens)

Section G and Section O, with the societies affiliated with them, met mainly in joint meetings held from

June 20 to 22. The first meeting on Tuesday morning was held under the auspices of the Botanical Society of America, at the Field Museum of Natural History, with Dr. E. J. Kraus presiding. In the opening address Dr. Ludwig Diels, of Berlin, discussed individualization and aggregation in the floral region of the Angiosperms. He traced the development of the Angiospermae in two great lines from the simplest forms with small greenish perianths. In one line the flowers have become individualized through the development of conspicuous peduncles and perianth cycles, which are either regular or zygomorphic. In the other line of development aggregation occurs, flowers having very short peduncles or none. In these the perianth remains small. Two side branches present different types of pollination, anemogamous and zoogamous. The climax of aggregation is reached in the Compositae. Dr. Diels pointed out that the two principles, individualization and aggregation, have been working in different phyla of the Angiosperms, with similar results in different groups. The most individualized types, such as the Tubiflores and Orchids, and the most aggregated types, such as the Gramineae and Compositae, are to be considered the most successful of modern Angiosperms.

The second address was by Sir Daniel Hall, director of the John Innes Horticultural Experiment Station at Merton, who discussed polyploidy in the genus Tulipa. The discovery of polyploidy in the genus in 1927 cleared up the long-standing confusion between *T. sylvestris* and *T. australis*, the one being diploid and the other tetraploid. Other cases of polyploidy have since been found, and examination of fifty species revealed one pantaploid, 6 tetraploids and 5 triploids. The polyploids are larger flowered than the diploids from which presumably they have sprung; and, while they show reduced fertility, possess a marked stoloniferous habit, which may be regarded as a condition of survival. In the absence of Dr. C. E. Allen his paper on "Polyploidy in Hepaticae" was read by Dr. Emma Fish.

Tuesday afternoon was left open for an informal inspection of the new greenhouses and botanical laboratories of the University of Chicago. In spite of the intense heat many of the visiting botanists availed themselves of this opportunity. At 6:00 P. M. there was an informal reception, following which about 190 botanists dined together at the Cloister Club, Ida Noyes Hall, University of Chicago. After dinner the group repaired to the Ida Noyes Theater to hear Dr. Ludwig Diels on "Phytogeography and the Theory of Wegener." This theory assumes that the western continent and Australia have been separated from Europe and Africa in comparatively recent geologic time by drifting of the continents. The present distribution of many species and genera of trees and herbaceous plants was brought forward to show that Wegener's theory is not borne out by the facts of phytogeography. The theory can not be accepted even as a working hypothesis. Phytogeography must remain autonomic in the consideration of its problems, and work them out in connection with paleontological evidence and zoogeography. On Wednesday the Botanical Society of America and the Ecologists went on a field trip to the Warren Forest and Dune Reservation in Michigan. This is an unusually fine region for the study of vegetational dynamics. There were 60 in the party, which was led by Dr. George D. Fuller and several assistants. On Thursday a smaller group visited Wychwood, a nature reservation at Lake Geneva, Wisconsin, which has recently been acquired by the University of Chicago.

Section G, Section O and various societies, particularly the phytopathologists, met on Wednesday morning, June 21, at Kent Theater, University of Chicago, for a historical program dealing with the development of plant pathology in America. Dr. Karl M. Wiegand, vice-president of Section G, presided, and presented Dr. Jean Dufrénoy, of the Experiment Station at Pont-de-la-Maye, Gironde, France. Dr. Dufrénoy gave an illustrated lecture on "Local Immunity in the Plant Cell." Susceptibility of host tissue is always associated with a reversion of affected parts to an embryonic condition. Resistance is always associated with an abundant storage of phenolic compounds in cells menaced by infection. A resistant host is one which, regardless of ecologic conditions, develops phenolic compounds in cells around the infection court rapidly enough to check the progress of the parasite. A susceptible host is one which, under ordinary growing conditions, develops enough meristematic tissue in the infection court for the parasite to thrive upon. The point was brought out that sometimes only a portion of the individual cell is affected. Dr. Dufrénoy states that studies in immunity and resistance must take into consideration these local changes within the cell. Dr. Neil E. Stevens, of the U. S. Department of Agriculture, presented a paper on "The Dark Ages in Plant Pathology," in which he recalled the early history of the development of plant pathology during the period 1833–1872. This was followed by a most interesting and delightfully intimate view of the personalities and activities of pathologists, during the period 1872–1933, by Dr. J. C. Arthur, of Purdue University, who was one of the pioneers in the development of plant pathology and one of the few living botanists whose memories span these sixty years of development.

Wednesday afternoon the plant pathologists enjoyed a tour of the South Water Markets under the

leadership of Dr. G. B. Ramsey, market pathologist of the U. S. Department of Agriculture. Twenty-two members made this trip, and reported a very interesting and instructive time viewing the great quantities of fruits and vegetables, and discussing problems in market pathology. On Thursday morning Dr. Otto Appel, of Berlin, gave an address of great interest to all plant pathologists, entitled "Development of Plant Protection in the World." His views on this subject were considered so important that they warranted the appointment of a special committee to work with him. Dr. Appel stressed the fact that nations need to cooperate more closely in developing plant disease control. He feels that it is a great mistake to rely upon legislation to prevent diseases from spreading from one country to another. Two other addresses, "A Century of Research in Plant Pathology," by H. H. Whetzel, of Cornell University, and "A Century of Plant Disease Control," by Dr. I. E. Melhus, of Iowa State College, were valuable comprehensive summaries, which harmonized with the Century of Progress celebration. Dr. Melhus began with Unger's book on "Exantheme der Pflanzen," published in 1833. With De Bary's contributions to our knowledge of parasitism, the development of disease control became at least a possibility. Actual control began with Millardet's accidental discovery of Bordeaux mixture. Seed treatment and sanitation in connection with plant disease work followed, and in recent years the development of genetically resistant strains through study of variability, selection, and hybridization has become a very potent factor in the control of plant disease.

On Wednesday evening at 6:00 P. M. Section O, jointly with Section G and related societies, held a dinner meeting at the Chicago Woman's Club. After the dinner, Dr. A. R. Mann, vice-president of Section O, introduced the distinguished foreign guests. Dr. Jean Dufrénoy discussed the nature of death changes in protoplasm. In living protoplasm there is a clearly visible harmonious arrangement of homogeneous parts of the cell. In death this changes to a crowding of microscopically heterogeneous materials. The cell is a harmonious structure, coordinating a number of homogeneous materials, the contours of which can be made out under the microscope or ultramicroscope, making the architectural design of the cell observable. Killing the cell suddenly preserves the architectural disposition of the cell materials, making those materials themselves visible through ultramicroscopic changes of structure admitting of staining. Slow death preserves neither the architectural disposition of the cell material nor even its microscopic structure, since premortal changes are mainly concerned in the splitting of the homogeneous unstainable living complex into a coarse granular collection of its constituents. He was followed by Sir Daniel Hall in a discussion of whether variations may be induced in wild species by bringing them into cultivation. Sir Daniel challenged the Darwinian view that variability increases because of the rich nutrition of cultivated plants and because of release from competition. Illustrating with various plants, particularly *Primula sinensis,* it was shown that the variability observed on introduction of wild forms into cultivation is to be explained as the result of the emergence of recessives, the result of past mutations, and the fact that man seizes upon and protects these hidden mutations whenever they appear, so that they survive. In the case of *Primula sinensis* there is no evidence that the rate of mutation has increased any since the genetic studies of this species was begun by Bateson in 1904.

The meeting was concluded by an important communication from Dr. Appel, who described a method of measuring vitality, detecting diseased conditions of potato tubers before planting them. These vitality measurements were based upon changes of permeability of the interior cells, which could be measured by means of a potentiometer or conductivity outfit.

On Thursday morning, June 22, the American Society of Plant Physiologists held a symposium on radiation and plant life. Dr. C. O. Appleman, of the University of Maryland, presided. The nine invitation papers on this program considered thermal, light, ultraviolet and x-ray effects, photoperiodic responses and supplementation of daylight with electric light. Some work which has been done on the measurement of the qualities of sunlight under variable natural conditions at the Smithsonian Institution was presented by Dr. W. H. Hoover, who discussed the influence of natural and controlled radiations on the CO_2 absorption by plants. The problem of interrelation of light and temperature was discussed by Dr. A. R. Davis, University of California, who was unable to be present in person. He showed the inadequacy of the older views of limiting factors, and, with data obtained from plants grown under fully controlled conditions, showed that the interrelations are very complex. An outstanding feature of his work was the chemical analyses of plants grown at different temperatures which showed a great increase in cellulose and hemicellulose at high temperatures, and very great reductions in lignocelluloses. A critical paper dealing with growth as a criterion of physiologic responses to radiation was presented by Dr. E. S. Reynolds, of the Missouri Botanical Garden. Growth was shown to be the resultant of many chemical and physical reactions, some of which are accelerated, some depressed by certain types of

radiation, such as ultraviolet, x-rays, etc. He says that these radiations can not be expected to affect every one of the physical and chemical activities in an accelerative fashion, or all in a retarding fashion; and that numerous apparently contradictory results must be expected as long as growth alone is taken as a criterion of stimulation or retardation as the result of purely quantitative applications of energy. This is especially true when specific differences of plant materials are taken into consideration. The practical results of photoperiodic responses of greenhouse crops and certain floral species were discussed and illustrated by D. Alex Laurie, of Ohio State University. The main work was done with chrysanthemums, which were shaded in various ways with cloth covers, with the result that much earlier blooming can be induced, and the crop season extended through a much longer season, with a succession of bloom hitherto impossible.

The responses of plants to artificial radiations and electric lights as supplements to daylight were described by Mr. R. B. Withrow and Dr. Laurenz Greene, of Purdue University. Low intensity radiation (15-watt lamp) increases flower production and earliness about as favorably as higher intensities (500-watt lamps). Blue radiation supplementing daylight retards growth in pansy, stock and aster; red supplements accelerate growth in these species, while yellow-green supplementing radiation has less effect than either of the others. Short periods of supplementing light applied at the right time produce as great effects in flower production, earliness, stem length, etc., as much longer periods. The results of both papers show that electric lights of low light intensity may find very practical use in commercial greenhouse practise. Dr. H. W. Popp presented a discussion of ultraviolet work done at Pennsylvania State College, illustrated with lantern slides, which has failed to show any stimulative action as the result of ultraviolet treatments of germinating and growing seedlings This critical résumé and the critical discussion by Reynolds represent two contrasting points of view which must receive attention from radiologists. Dr. W. E. Tottingham described some of the interesting chemical studies which have been made of plants grown under different conditions of ultraviolet of solar origin. Lipide constituents particularly seemed to be related to ultraviolet radiations. The concluding paper was by Dr. C. A. Shull, of the University of Chicago, who gave an illustrated review of the x-ray experiments which have demonstrated the stimulative action of small doses of x-rays. Increased green and dry weight and shortened period from germination to heading have been found for Marquis spring wheat, and increased growth in the case of Minhardi and Trumbull wheat. Tillering has been stimulated, and enlarged leaf areas are usually produced with stimulative doses. With controlled nutrition, sunflowers have shown increased growth in height, stem diameter, green and dry weight. Sunflowers grown without nitrogen in the nutrient solution failed to show stimulation from x-ray treatments, indicating that the increased growth observed in x-rayed seedlings is not caused by a greater ability to re-utilize stored nitrogen in the treated seedlings. Attempts have been made to determine whether previous small doses of x-rays, by inducing accommodation, can protect cells from more destructive treatments. Only one experiment has been tried, but the plants given short doses preceding a killing dose did not succumb quite as rapidly as those which had not been previously treated.

The presentation of the papers was accompanied by a lively discussion which added much to the zest and value of the symposium as a whole.

PROGRAMS RELATED TO BOTH SECTION F AND SECTION G

(Report from A. I. Ortenburger)

Phi Sigma Biological Research Society carried the biological program into the second week of the association meetings at Chicago. Sixty-four papers were presented during the three sessions held at the Stevens Hotel. Twelve papers were read by title. These papers presented by junior research workers ranged in subject-matter from a consideration of the physiology of bacteria through a series of cytological, morphological and taxonomical studies in both plants and animals to a detailed study of the embryology of the vertebrate spleen. The meetings were well attended. Representatives of the several chapters were in attendance and the following officers were elected: Dr. Paul A. Warren, Tufts College, *president;* Dr. M. H. Hatch, University of Washington, *vice-president;* and E. H. Stewart, *treasurer.* Following the banquet at the Chicago Woman's Club, Dr. Leon J. Cole, professor of genetics at the University of Wisconsin, presented certain of his observations on the fertility of hybrids in the pigeon and dove with a general discussion of the possibility of determining the origin of domestic varieties by means of fertility studies. The American Microscopical Society held a luncheon and an afternoon conference and business meeting. At this reports were given and plans perfected to enable the society to continue its work unimpaired despite the fact that its funds had been tied up in closed banks. The effective work of the secretary and the treasurer under these trying conditions was highly commended by the members present in the conference.

SECTION H (ANTHROPOLOGY)

(Report from Wilton Marion Krogman)

Section H met jointly with the American Anthropological Association. To Mr. Henry Field, chairman of the local committee, is due much of the credit for the details of the program. To the Western Society of Engineers and to the Field Museum of Natural History the associations are indebted for many courtesies in providing assembly facilities, on Thursday and Saturday and Friday, respectively. The Thursday morning sessions were given over to a consideration of ethnological problems. Dr. M. J. Herskovits discussed the historical basis of the origin theories of American Negro culture, demonstrating the use of source material. Professor A. R. Radcliffe-Brown dealt with the concept of society as a structure and presented the several theories dealing with social organization. This was followed by a presentation, by Dr. R. Redfield, of a concrete demonstration of culture changes in a Mayan society. Dr. E. Sapir then summed up the historical and functional methods in anthropology. The Thursday afternoon session was given over to a visit to the anthropological exhibits of the Century of Progress under the guidance of Drs. Fay-Cooper Cole and T. Wingate Todd.

The Friday morning session was given over to archeology. Professor A. T. Olmstead made a spirited plea for cooperation between the archeologist and the historian in the Near East. Following this, Dr. Alfonso Caso discussed the discoveries at Monte Alban and their relation to Mayan and Aztec cultures. Dr. Carl Guthe, director of state archeological surveys, outlined national progress in archeological discovery and technique. Mr. Thorne Deuel discussed the pictorial survey and cataloguing of the Mississippi Valley, and Dr. Arthur Kelley discussed the rôle of Southern Illinois in the Mississippi Valley. The Friday afternoon session was designed to lead up to the special address in the evening by Dr. C. U. A. Kappers. All papers, therefore, centered upon the history of the Near East. Professor E. A. Speiser presented a general discussion of ethnic relationships in the Near East. Dr. Leland Parr demonstrated in a very convincing manner that racial relationships in the Near East may be discerned by various physiological tests. Mr. Henry Field discussed the prehistory of the Near East and related the earliest physical types to the present inhabitants of Central Mesopotamia. Dr. W. M. Krogman presented his conclusions regarding the successive physical types in Anatolia associated with the Hittite Empire. At the conclusion of the afternoon meeting we were privileged to inspect the newly opened Hall of Races of Man, and to have a preview of the Hall of Stone Ages, both installed in the Field Museum under the direction of Mr. Henry Field. Prior to the evening meeting Section H held its annual dinner, at which time the less formal aspects of the meetings were discussed.

Section H was host to the association at the Friday evening meeting when Dr. C. U. A. Kappers gave a very clear and interesting discussion of the race types of the Near East in connection with the history of that area. On the basis of a very comprehensive survey of cranial material and living populations he offered a coherent outline of race movements in the Near East. The Saturday morning session was devoted to physical anthropology, and centered upon the human brain. Dr. Kappers discussed racial differences, Dr. T. Wingate Todd the growth of the brain, and Dr. W. H. F. Addison and Dr. H. H. Donaldson individual differences in the brain. The symposium was concluded by Dr. C. J. Herrick, who discussed the general implication of anthropological studies of the brain.

SECTION I (PSYCHOLOGY)

(Report from John E. Anderson)

Section I held meetings from Tuesday, June 20th, to Saturday, June 24th. The meetings consisted of a series of symposia which were organized about papers given by the distinguished foreign guests of the association and of addresses presented by those guests. The meetings were well attended. On Tuesday afternoon the symposium topic was "Gestalt Psychology." Professor Wolfgang Koehler, of the Psychologische Institut de Universität im Schloss, Berlin, Germany, presented the results of new experiments on learning and recall which indicated that the learning of homogeneous material takes place less readily than that of non-homogeneous material. Professor Koehler also discussed the rôles of similarity and dissimilarity of content in retention. Professor R. H. Wheeler, of the University of Kansas, discussed "Some Misunderstood Aspects of Gestalt Psychology," and Dr. Heinrich Klüver, of the Institute for Juvenile Research of Chicago, delivered a paper on "Relations and Relata," in which the relativity of sensory phenomena was stressed. After the meeting the Chicago Psychological Club entertained Section I and the foreign guests of the section at a tea. On Wednesday morning the symposium topic was "Intelligence." Professor Charles E. Spearman, of the University of London, after reviewing the history of the concept of intelligence, presented a new definition of intelligence in terms of the recognition of relations and the eduction of correlates. He suggested that the word "noe-genesis" be used as a substitute for the term "intelligence." He also described a new test for in-

telligence. Professor Florence L. Goodenough, of the University of Minnesota, discussed the "Reliability and Predictability of Intelligence Tests for Young Children," pointing out that predictability increases with age, since a larger part of the whole which is to be predicted is available as the basis of prediction. Professor Harold E. Jones, of the University of California, spoke on "Intelligence in Maturity and Old Age." The peak of intelligence, as measured by tests, is reached in the early twenties, after which there is a slow and gradual decline. Following this symposium Professor Henri Piéron, of the Institut de Psychology, Paris, France, delivered an address entitled "The Sensorial Basis of Knowledge," in which he surveyed the existing knowledge of sensory processes and pointed out the extreme delicacy of sensitivity when considered in terms of the amount of physical energy necessary to produce it. On Thursday morning a symposium on "Sensory Psychology" was held, at which Professor Piéron gave an address on "The Analysis of the Time of Reaction." After reviewing the literature and analyzing the factors in reaction time, he developed a series of formulae to cover the interrelations of the various factors. Professor Walter R. Miles, of Yale University, by photographic analyses showed the rôle of learning in the fixation reaction of the human eye, heretofore supposed to be reflex. Professor A. H. Lauer, of Iowa State College, discussed "Some Neglected Aspects of Reaction Time as a Measure of Sensori-Motor Capacity." This symposium was followed by an address by Professor Emilio Mira, of Barcelona, Spain, on "A New Conception of Moral Behavior," in which he presented the results of two experiments in which judgments were made as to behavior in given moral situations. He emphasized the tremendous variability of moral judgments and more particularly the importance of the situation as a determiner of action. Moral behavior depends upon the purpose of behavior rather than upon the outcome. On Friday morning a symposium on "Personality and Character" was held, at which the first paper was given by Professor Mira, entitled "The Development of Sociability." In this paper he traced the development of behavior in primitive social groups from fear, through rage, thence to magic and mysticism and finally to an objective and scientific point of view. In individual development the process is paralleled. The defensive attitudes of the infant are replaced by aggressive attitudes which in turn are replaced by attitudes of affection as the child moves toward the objective attitudes of the adult. Professor Mandel Sherman, of the University of Chicago, presented a paper on "The Relation between Culture and Insanity," showing how the delusions of psycho-neurotic patients are colored by the cultural background from which they come. This was followed by a paper by Professor Floyd L. Ruch, of the University of Illinois, on the "Differential Decline of Learning Ability in the Aged: A Possible Explanation of Their Conservatism," in which it was shown that the decline in learning ability of the aged is more marked in those learning situations involving new contexts than in those in which the context is similar to that already experienced. On Saturday evening, at a general session of the association, Professor Charles E. Spearman, of the University of London, gave an address on "Recent Advances in Our Knowledge of Human Personality," in which he reviewed the development of the psychology of personality during the century of progress.

SECTION K (SOCIAL AND ECONOMIC SCIENCES)

(Reports from Herbert Blumer and Henry Schultz)

The meeting of the American Sociological Society was devoted to a series of round-table discussions on the following subjects: "Collective Behavior in the Depression"; "Experimental Social Psychology"; "Crime"; "The Family"; "The Community"; "Rural Sociology"; "Prediction and Forecasting"; "Graphic Presentation"; "Minimum Standards of Training in Research Techniques." The discussion in the round-table on "Collective Behavior" centered about basic economic changes and their effects on public attitudes. Specific attention was given to the psychology of relief, urban and rural restlessness and differential responses to deprivation. Short papers were presented by Burdette Lewis, of the American Welfare Association, Frank H. Knight, of the University of Chicago, James H. Rodgers, of Yale University, Royal E. Montgomery, of Cornell University, James O. Babcock, of the University of Chicago, and Harry Stack Sullivan, of New York, under the sponsorship of Harold D. Lasswell, of the University of Chicago. One session was devoted to "Experimental Social Psychology," under the chairmanship of Dr. Franklin S. Fearing, of Northwestern University. Brief papers recording experimental studies on attitudes were given by Dr. L. L. Thurstone, H. B. Carlson, James M. Stalnaker, James P. Russell, Ruth Peterson and Donald A. D. Boyer, all of the University of Chicago, and Ross Stagner, of the University of Wisconsin. The group interested in the subject of "Crime" centered their discussion on the statistical and ecological aspects of criminal behavior, and also discussed crime from the standpoint of personality and institutions. William F. Byron, of Northwestern University, led the discussion, in which the chief contributors were C. C. Van Vechten, Jr., of the University of Chicago, R. Clyde White, of Indiana Univer-

sity, Andrew Theodore, Northwestern University, Donald Clemmer, research sociologist, Southern Illinois State Prison, Dr. Ben Reitman, of Chicago, and Frank Smith, of Chicago. The round-table on "The Family," under the chairmanship of Ernest R. Mowrer, of Northwestern University, centered its attention on the problems of divorce and marital adjustment. The chief aspects dealt with were the value of divorce statistics, the legal problem of divorce by mutual consent and the prediction of success and failure in marriage. Papers were presented by Calvert L. Dedrick, of the University of Wisconsin, Charles R. Metzger, of Indiana University, and Leonard S. Cottrell, Jr., of the University of Chicago. In the round-table on "The Community" the chief topics for consideration were population patterning in the metropolitan community and nucleation of business sub-center development. Discussion was under the direction of R. D. McKenzie, of the University of Michigan. Reports were given by C. E. Batchelet, of the Bureau of the Census, Washington, D. C., H. J. Kaufmann, of the Detroit Board of Education, Charles S. Newcomb, of the University of Chicago, Earl S. Johnson, of the University of Chicago, Ernest Fisher, of the University of Michigan, Marvin L. Niehuss, of the University of Michigan, and Henry Babcock, of William Babcock and Sons, Chicago. The chief topics treated by the round table on "Rural Sociology," with Dwight Sanderson, of Cornell University, as chairman, were the sociology of the farm family and the effect of direct action movements on farmers' organizations. Papers were presented by E. L. Kirkpatrick, University of Wisconsin, Charles E. Lively, of Ohio State University, Carl C. Taylor, of Raleigh, North Carolina, E. D. Tetreau, Ohio State University, and Ray E. Wakeley, of Iowa State College. The meetings of the round table on "Prediction and Forecasting" were given to the discussion of the possibilities and limitations of sociological prediction. Specific consideration was given to prediction of social movements, theft, success on parole, success or failure in marriage, followed by a general discussion of the future of prediction in sociology. The meetings were under the direction of Samuel A. Stouffer, of the University of Wisconsin. Papers were given by Selig Perlman, University of Wisconsin, Henry A. Peel, of the University of Wisconsin, Earl Holzinger, of the University of Chicago, Frank H. Knight, of the University of Chicago, William F. Ogburn, of the University of Chicago, Leonard S. Cottrell, Jr., of the University of Chicago, Clark Tibbitts, of the University of Michigan, and Lowell S. Selling, of the Institute for Juvenile Research, Chicago. The meeting on "Graphic Presentation" was devoted to a discussion of the methods of presentation of statistical materials on charts and maps, with illustrations. The chairman was Howard W. Green, of the Cleveland Health Council. Reports were given by Charles S. Newcomb, of the University of Chicago, Roy Wenzlick, of the Real Estate Analysts, Inc., St. Louis, and J. C. Ellickson, of the University of Chicago. The problem of professional training adequate for social research was taken up in the two meetings of the round table on "Minimum Standards of Training in Research Techniques." Discussion centered chiefly on the content of courses for graduate students proposing to undertake social investigation. Papers were given by Samuel A. Stouffer, of the University of Wisconsin, Frederick F. Stephan, of the University of Pittsburgh, and by the chairman, Walter C. Reckless, of Vanderbilt University.

The Econometric Society held four joint sessions, with Sections K and O and other societies, from Wednesday, June 28, to Friday, June 30. On Wednesday morning, it met jointly with Section O, with the chair occupied by Colonel Edward N. Wentworth, to listen to four papers on the elasticities of demand and supply. Sir Daniel Hall, director of the John Innes Horticultural Institution, Merton, England, emphasized the fact that, although the demand for particular crops may be inelastic, the demand for farm products in general is quite elastic. Under free trade this condition would redound to the benefit of the farmer as well as to that of the rest of the population, since the law of substitution would have full play. The development of extreme nationalism, with its economic corollary, the high protective tariff, has tended to perpetuate the production of farm crops for which the demand is inelastic in many high-cost areas, thus aggravating the present economic depression. Professor Harry Pelle Hartkemeier, of the University of Missouri, showed that the determination of supply curves for agricultural products is generally more difficult than is the determination of demand curves, for weather fluctuations interfere with attempts of the farmer to adjust production to price changes. Using the method of multiple correlation, he deduced the supply functions for potatoes and corn from the data for production, price, temperature and precipitation. He showed that farmers producing potatoes not only planned their production on the basis of the price of the preceding year but that they also made allowance for price changes caused by abnormal weather conditions. The elasticity of supply decreased from 1896 to 1914, as the supply curve shifted its position upward. For corn the data yielded no statistically significant net relation between the price in any one year and the production in the following year. Dr. Roswell Whitman, of the Illinois Emergency Relief Commission, discussed the problem of deriving the elasticity of demand for producers'

goods, such as iron, steel, copper, etc. He showed that the problem was much more difficult than that of deriving demand curves for agricultural commodities. However, with the aid of techniques which have been used in other studies of demand, he has succeeded in deducing demand curves for steel which give an insight into the behavior of the steel market, and which measure to a first approximation the reaction of steel sales to various factors. His analysis shows that rising prices increase sales, but that high prices decrease sales, and *vice versa*. Dr. Louis H. Bean, of the United States Department of Agriculture, analyzed the demand for cotton by his well-known graphic method, and advanced the thesis that for most practical problems the graphic method is superior to the mathematical approach. The discussion of these four papers took up most of the afternoon. Several speakers took particular exception to Bean's claims for the superiority of the graphic method and pointed out the fact that there is no way of determining the standard error of a free-hand curve, since it is impossible to determine the number of degrees of freedom.

On Thursday morning, with Professor Wesley Clair Mitchell in the chair, the Econometric Society had a joint symposium with Section K on business cycle theory. Dr. Carl Snyder gave the results of his latest investigations in the per capita growth of industrial production. He presented charts showing that the per capita growth of production and trade in the United States from about 1800 to 1929 appears to have been at a rate varying but little from an average of about 2.8 per cent. per annum. From this he drew the conclusion that there seems little evidence available to suggest that the rate of our industrial growth per capita since the world war differed appreciably from that of the period preceding the world war, or for the whole century preceding. If anything, it was rather less than more. Dr. Snyder discussed the bearing of his findings on the movement of real wages. Professor Harold T. Davis summarized his researches in the application of the theory of harmonic analysis to economic data. He showed that, although a series may yield fairly significant cycles, yet when it is broken up into two parts and each part analyzed separately, the results may be quite different. Professor Irving Fisher, of Yale University, summarized his debt theory of depressions. He advanced the thesis that there is no such thing as "the" business cycle in the sense of a rhythmic occurrence, although the irregularity of the intervals between crises does not necessarily preclude the possibility of a rhythmic or cyclical tendency or of a composite of many such tendencies. Although there is an element of truth in each of the competing theories which attempt to explain the cyclical tendencies, the most important factor is the fact that there is so much over-indebtedness that the mass effort to liquidate it defeats itself. The distressed selling results in swelling each dollar owed faster than the payments of debt shrink the number of dollars owed. The less the debts become in terms of money, the more they become in terms of goods. Professor Fisher took issue with Mr. Norman J. Silberling, of the Silberling Research Corporation, who stressed the monetary factor in business cycles and the importance of a correct understanding of the equation of exchange. Professor James G. Smith, of Princeton University, discussed the impact of business cycle theory on political thought and action. The disrepute of the equilibrium theories of the classical economists and the emphasis on the disequilibrium forces in the economic order by business cycle theorists have given rise to the demands for "economic planning." According to the equilibrium theory of the American psychological school, the events of the period since 1929 are a demonstration of the existence of equilibrating forces made necessary by futile economic planning; they are not a demonstration of the existence of inherent disequilibria, as is now commonly argued.

On Friday afternoon and evening, the Econometric Society, jointly with the American Society of Mechanical Engineers, the American Society for Testing Materials, and the American Institute of Electrical Engineers, sponsored a symposium on "Some Fundamental Problems of Mutual Interest to Scientific Economists and Engineers." Professor Irving Fisher, of Yale University, was chairman of the afternoon session. At this session a paper by Dr. Charles Roos, secretary of the Econometric Society, was read by Professor H. T. Davis, of Indiana University, in which he discussed the "Contributions of the Mathematician to Economics," dealing in particular with demand phenomena. Dr. T. C. Fry, of the Bell Telephone Laboratories, in a paper, "The Mathematical Theory of Rational Inference," dealt with certain phases of the mathematical theory underlying probable inductive inference basic to the interpretation of economic and engineering data. Under the subject, "The Engineering Economist of the Future," Dean Dexter S. Kimball, of Cornell University, emphasized the need of broad scientific, economic and social training on the part of any engineer who hopes to contribute to the solution of the complex economic problems. The papers provoked a lively discussion, led by Professors Henry Schultz, of the University of Chicago, A. A. Potter, of Purdue University, and Harold Hotelling, of Columbia University, President Harvey N. Davis, of Stevens Institute, C. F. Hirshfeld, director of re-

search of the Detroit Edison Company, Dr. Anson Hayes, director of research of the American Rolling Mill Company, and L. K. Sillcox, vice-president of the New York Air Brake Company. Mr. Ralph E. Flanders, chairman of the committee on the relation of consumption, production and distribution of the American Engineering Council, acted as chairman of the evening session, and the presidents of the four sponsoring societies acted as honorary chairmen. In a paper on "Some Fundamental Problems of the Engineer," Dr. F. B. Jewett, president of the Bell Telephone Laboratories, gave a general picture of some of the things a social scientist needs to know about the present and potential possibilities of engineering developments and some of those that the research and development engineer, interested in raising the standards of living, needs to know about the present and potential possibilities of social and economic developments if each is to cooperate with the other in the most successful solution of many of the complex problems of mutual interest. One of the foreign guests of the association and the Century of Progress, Dr. A. P. M. Fleming, director of research and education of the Metropolitan-Vickers Electrical Company, Manchester, England, discussed the subject, "The Internationalization of Scientific Knowledge as a Factor in World Economic Recovery." At the close of the meeting the Gantt Medal was presented by the Gantt Medal Board of Award to Mr. Henry S. Dennison, president of the Dennison Manufacturing Company, for his contributions to scientific and economic management practises.

SECTION L (HISTORICAL AND PHILOLOGICAL SCIENCES)

(Report from Joseph Mayer)

The main part of the program of the section at Chicago consisted of a symposium on "Nationalism," held in the Auditorium of the Chicago Historical Society. It was an evening meeting (June 26), well attended (around 450), with eminent speakers participating in both the program of listed papers and in the discussion. The rest of the section meetings consisted of two joint sessions: one, on June 21, with sections G and O, reports of which will be found under those sections; and the other, with the American Astronomical Society, on June 23, in the Adler Planetarium, at which two interesting papers were presented. The first one, by Mr. Frederick E. Brasch, secretary of the History of Science Society, dealt with the significance of early astronomical observations in the American colonies. The second paper, by Dr. W. Carl Rufus, of the University of Michigan, gave a penetrating analysis of the philosophic point of view (mainly Newtonian) of David Rittenhouse, the early American astronomer. The symposium on "Nationalism" was presided over by Professor James A. James, of Northwestern University. Professor Bernadotte E. Schmitt, chairman of the department of history in the University of Chicago, spoke on "Nationalism in Europe since 1815." After sketching the origins of modern nationalism as the result of the political revolution in France and the industrial revolution in England, he argued that nationalism was not a very effective force until after 1850, as was proved by the failure of the revolutionary movements of 1848. But in the second half of the nineteenth century it became the most important factor in both domestic and international politics. Its excesses were largely responsible for the ever-growing international tension, and its full consequences were realized in the crisis of July, 1914. During the war of 1914–1918, governments were forced by the pressure of national opinion to fight to the bitter end, while at the Peace Conference of Paris nationalistic ambitions triumphed to a large extent over all other considerations. The second speaker was Dr. Charles A. Beard, author of "The Rise of American Civilization," who, in his usual vigorous and persuasive manner, analyzed various aspects of nationalism in American history. He first pointed to the interesting fact that the word "national" had been avoided by the makers of the Constitution and that political parties and the country in general were uncertain until after 1865 whether the United States was a nation or not; he concluded that war, in most instances, seems to be the important factor in establishing the supremacy of national allegiance. He then went on to indicate various ways in which nationalism has expressed itself in United States policy, using as illustrations the imperialism of the McKinley age with its mission to civilize, uplift and Americanize so-called backward peoples; recent immigration legislation with its effort to set the racial composition of the American people in a preconceived pattern; and the present economic autarchy with its substantial exclusion of competing commodities through high tariffs. He concluded his excellent address by pointing out how American foreign policy is at the present time conditioned by the American brand of nationalism. The last of the set addresses was by Dr. Albrecht Mendelssohn Bartholdy, Director of the Institute of Foreign Affairs, Hamburg, Germany, who spoke on "Imperialism, Nationalism and International Peace." His significant contribution had to do with drawing a distinction between nationalism as politically conceived and as expressing a more fundamental unity of people developing gradually a homogeneous set of mores and customs. He suggested that these underlying mores are the more important phases of the nationalistic spirit and do not necessarily conflict with those of

other nations. They are rather more cooperative and can be utilized as a basis for a real and constructive internationalism. The discussion, of which a stenotypist record was made, was participated in by Dr. Bernard Fäy, of the Collège de France, Paris; Professor Charles E. Merriam, of the University of Chicago, and Professor E. A. Ross, of the University of Wisconsin. Dr. Fäy attempted to define nationalism in terms of geographical area plus a common feeling among the inhabitants; he indicated that nationalism goes back before the eighteenth century, especially in England and France, and that the importance of these early beginnings should not be overlooked. Dr. Merriam pointed out that it is hardly constructive to take a critical attitude toward nationalism, unless some alternative is presented. He asked whether a religious spirit, an economic spirit or any other alternative cohesive force might be regarded as better than nationalism at the present time, and suggested that satisfactory answers to such questions are the important ones in considering the problems of nationalism and imperialism. Professor Ross agreed, for the most part, with Professor Merriam and felt that the time had come when internationalism should be emphasized in all countries.

SECTION N (MEDICAL SCIENCES)

(Report from Walter M. Simpson)

The program of Section N consisted of four symposia and a general public meeting. On Monday morning, June 19, a joint session with Section C was given over to a symposium on "Colloid Chemistry Related to Biological Problems." The speakers at this joint session were Professor Edwin J. Cohn, of the Harvard Medical School, Dr. T. Svedberg, of Upsala University, Sweden, Professor J. W. McBain, of Stanford University, and Dr. Filippo Bottazzi, of the Istituto di Fisiologia, Naples, Italy. The substance of this symposium appears in the report of Section C. On Tuesday morning, June 20, occurred a joint session with Section F, with C. H. Parker as the presiding officer. The title of the symposium was "Physical and Chemical Changes in Nerves during Activity." The speakers were Dr. A. V. Hill, of the University of London, Professor W. O. Fenn, of the University of Rochester, Professor R. W. Gerard, of the University of Chicago, and Dr. S. H. Gasser, of Cornell University Medical School. The account of the papers presented at this symposium will be found in a report of Section F. On Tuesday evening a general session commemorating "A Century of Progress in Medicine," open to the members of the association and to the people of the community, was held at Thorne Hall, McKinlock Campus of Northwestern University. Dr. Morris Fishbein, editor of the *Journal* of the American Medical Association, gave a highly entertaining and instructive talk on "Frontiers of Medicine." Dr. Fishbein traced medical progress from the days of Hippocrates and Galen, through the middle ages to the days of Harvey, Sydenham and Pasteur. Dr. Paul Dudley White, of Harvard University Medical School, talked on "Heart Disease: Then and Now." Dr. White described the seven ages of man as reflected in the various forms of heart disease. Dr. Max Cutler, of the Tumor Clinic at Michael Reese Hospital, Chicago, talked on "The Conquest of Cancer." Dr. Cutler emphasized the urgent necessity for the early recognition and treatment of various forms of cancer. He indicated that many forms of cancer were curable if recognized early and if adequate surgical and radiological treatments are promptly instituted. The splendid papers by Drs. Fishbein, White and Cutler were brimful of important health-giving advice to laymen. Dr. A. J. Carlson, of the University of Chicago, ably presented the speakers.

The Wednesday morning session was given over to a symposium on "Pathological Physiology," with Dr. Arno B. Luckhardt, of the University of Chicago, presiding. Dr. Arthur L. Tatum, of the University of Wisconsin, spoke on "Morphine Addiction and Morphine Tolerance." Dr. Tatum presented evidence that tolerance to the depressant action of morphine seemingly parallels intolerance to stimulation. Dr. Tatum presented the conception that the increased irritability of stimulatable central nervous structures in effect antidotes and outlasts the depressant actions on depressible structures. Dr. C. H. Best, of the University of Toronto, who collaborated with Dr. F. G. Banting in the original researches on insulin, discussed "Fatty Changes in the Liver of Normal and Diabetic Animals." Dr. Maurice B. Strauss, of Thorndike Memorial Laboratory, Boston, Massachusetts, who has collaborated with Minot and Murphy in the monumental researches on pernicious anemia, discussed "The Etiology of Pernicious Anemia and the Related Macrocytic Anemias." Dr. Strauss described the investigations which have led to the discovery that pernicious anemia is essentially a deficiency disease, due to the absence of an anti-anemic factor in the gastric mucosa or to a reduction in intake of vitamin B_2. Dr. William H. Park, of the Department of Health, New York City, discussed "BCG Vaccination." Dr. Park related the remarkable results which have been achieved by the administration, orally and by injection, of inactivated bovine tubercle bacilli in providing protection against the development of active tuberculosis.

The Thursday morning session was given over to a symposium on "Surgical Endocrinology," with Dr.

Walter M. Simpson, of the Miami Valley Hospital, of Dayton, Ohio, presiding. The introductory paper on "A Century of Progress in Surgery" was read by Dr. George Crile, of the Cleveland Clinic, Cleveland. Dr. Crile discussed in a lively and entertaining manner the enormous strides which have been made during the past century in anesthesia, antisepsis and asepsis, management of shock and the careful handling of tissues. Dr. Max Ballin, of Detroit, described "The Clinical Recognition and Surgical Treatment of Parathyroidism." Dr. Ballin told of the researches which have been conducted by him and others which have led to the important discovery that the obscure disease known for many years as Von Recklinghausen's disease of bones, and certain other bone diseases, are due to a disturbance of function of the parathyroid bodies. Dr. Percival Bailey, of the Department of Neurosurgery of the University of Chicago, discussed the "Surgical Control of Hypophyseal Disorders." Dr. Bailey related the characteristic syndromes produced by various disorders of the hypophysis and told how they might be overcome by proper surgical and radiological management. Dr. John de J. Pemberton, of the Mayo Clinic, Rochester, Minnesota, talked on the recent developments in the clinical recognition and surgical management of hyperfunction of the thyroid gland. Dr. Pemberton described the various steps, such as the isolation of active principle of the thyroid secretion, the judicious use of iodine and modern surgical methods, which have led to the remarkable progress in the control of this disease. The final paper in the symposium was given by Dr. Evarts Graham, of Washington University, St. Louis, who discussed "The Clinical Recognition and Surgical Treatment of Hypoglycemia Produced by Tumors of the Islets of Langerhans." Dr. Graham presented the records of several patients, many of whom suffered severe nervous disorders, who were found to have tumors of the islets of Langerhans in the pancreas. The excessive demand for sugar and the symptoms of nervous disorders were promptly abolished in many by recognition that the symptoms were due to a perverted or excessive secretion of insulin by the neoplasm of the islets of Langerhans. The cytology of these tumors was discussed by Robert R. Bensley, of the University of Chicago. This remarkable symposium demonstrated many of the ways in which surgery has become an exact science, both as regards diagnosis and the surgical alleviation of nature's defects.

SECTION O (AGRICULTURE)

(Report from P. E. Brown)

Section O joined with the American Society of Plant Physiologists, the Botanical Society of America, Section G, the Ecological Society and the American Society of Agronomy, on June 20, in a program featuring Dr. Ludwig Diels, of the University of Berlin, on the subject of "The Taxonomy of the Angiosperms," and Sir Daniel Hall on the subject, "Polyploidy and the Species Question in the Genus Tulipa." On June 21, with the same societies and the American Phytopathological Society, a joint program featured Professor Jean Dufrénoy, of Brice, France, on the subject, "Local Immunity in the Plant Cell," and Drs. Neil Stevens and J. C. Arthur in a plant pathology review. In the afternoon of June 21, Section O joined with the Naturalists in a program on heredity, featuring Dr. R. Goldschmidt, of the Kaiser Wilhelm Institute of Biology. The section sponsored a dinner jointly with the other societies, and the speakers were Professors Dufrénoy, Sir Daniel Hall and Dr. Otto Appel, of Berlin. Dr. A. R. Mann, chairman of Section O, presided. On June 22, with the same societies, a joint program was given, at which Dr. Otto Appel was the guest speaker on the subject, "The Development of Plant Protection in the World." On Wednesday, June 28, Section O had a joint program with Section K and the Econometric Society and the American Society of Agronomy on the subject "Elasticity of Demand and Supply," with Sir Daniel Hall the visiting speaker. The programs as arranged were very enjoyable and the arrangements made by Dr. E. N. Wentworth, of Armour's Livestock Bureau, local representative of the section, were perfect. All the programs were well attended, and about 75 were present at the dinner.

SECTION Q (EDUCATION)

(Report from William S. Gray)

Four sessions of Section Q were held on June 29 and 30. The first session had for its central theme "Recent Advances in the Study of Components of Mental Ability." Dr. Karl J. Holzinger discussed the general problem of factor analysis and characterized each of several methods used in analyzing factors. The best general procedure appears to be that of setting up tests according to a factor plan and then to apply the simple tetrad methods of Spearman. Professor Charles Spearman, of the University of London, gave an account of some of the problems involved in his two-factor theory. He described the general plan of the "Unitary Traits Study," to which he is the chief contributor. According to the work done thus far, a considerable number of unitary traits have already been identified. Each of these was briefly described. The second session was concerned with "The Function, Value and Future of Educational Research." In discussing the work of research bureaus in public-school systems, Dr. W. W.

Theisen emphasized the fact that they must provide the public with accurate information concerning the work and achievement of the schools and detailed facts which will show the effect of recent proposed changes, such as short school terms, larger classes, curtailed curriculums, etc. In a discussion of the contribution of college research bureaus, Dr. V. A. C. Henmon emphasized the development of adequate techniques of investigation, the development of valid standards, the demonstration of the inadequacy of present practises and achievements and the identification of conditions that are sadly in need of study and correction. In commenting upon "The Function of Research in Departments of Education," Dr. Edgar Dale emphasized the need for the better coordination of research activities, for the elimination of duplicating educational activities and for the rebuilding of the educational system of the commonwealth on an orderly and factual basis. Following a detailed analysis of "The Dependability and Value of Survey Types of Investigation," Dr. Walter S. Monroe concluded that studies employing the survey technique are as a rule relatively unimportant and that very few of them have contributed directly to the development of a science of education. The third session was introduced by two discussions of maturation and its relations to intelligence. Dr. C. R. Griffith presented an illuminating analysis of the psychology of maturation, in which certain current views were vigorously challenged. Dr. C. H. Judd pointed out the importance of a symmetrical development of individuals at each stage in their growth to the end that integrated, organized personalities may result. The second part of the program was concerned with the essentials of an education in contemporary life. In referring to the elementary level, Miss Bess Goodykoontz pointed out the importance of a well-balanced program of basic training presented under varied conditions. In considering the secondary level, Dr. A. K. Loomis emphasized the importance of the study of contemporary life. In discussing the college level, Dr. C. S. Yoakum stressed the value of the great divisions of human knowledge and of the tools which are essential in learning about and in investigating problems in various fields. The concluding session of the program had for its central theme "Education in a Democracy." S. J. Duncan-Clark, editorial writer for the *Chicago Daily News,* presented a discriminating analysis of the need for free public education in the United States and challenged the wisdom of present organized effort to curtail the educational opportunities of young people. The fact was emphasized repeatedly that the welfare of a democracy depends upon an enlightened citizenry. Only as the state provides adequate facilities for education can we hope to reconstruct intelligently the present social order.

SCIENTIFIC EVENTS

THE PREVENTION OF EARTHQUAKE DAMAGE

THE Seismological Society of America, at its meeting of April 8, 1933, at the University of California at Los Angeles, instructed its board of directors to issue a public statement concerning earthquake hazard and the importance of the inclusion in building codes of provision for earthquake-resistant design and construction. The statement endorsed by the board of directors is as follows:

It is common knowledge that from time to time in the past earthquakes have occurred in California strong enough to cause damage to property and even loss of life. Geological studies and instrumental records of seismic activity indicate a high degree of probability that similar earthquakes will occur from time to time in the future.

Man can not prevent or control earthquakes any more than he can prevent or control tornadoes or typhoons. However, recent experience in severe earthquakes, especially in Japan, in California and in Italy, has demonstrated that buildings designed and constructed to resist earthquakes suffered only slight or no damage, while many buildings not so designed or constructed were seriously damaged or even demolished, too often with injury to persons and loss of life.

In the light of past experience and of present knowledge, there is no excuse for the erection of schools, theaters, hotels, apartment houses, churches or other buildings where many persons are expected to live or congregate, without proper provision having been made to prevent possible damaging or destructive effects of earthquakes. The public should be protected by strictly enforced building codes carrying specific provisions for earthquake resistance.

In general, buildings should be so designed and constructed in all their parts as to resist a horizontal force of one tenth their weight. The foundations should be strong and adapted to the character of ground on which they rest, and the buildings should be well attached to them. Parapet walls, decorative projections and veneer walls should be either very securely fastened to the frame or else omitted. The buildings should be designed as completely separate units, or well tied together, and properly braced. It is less expensive and more feasible to protect a community against earthquake damage than against fire damage.

By appropriate building design and construction, and only by such design and construction, can earthquake damage be prevented, and fear of such damage eliminated.