SPECIAL ISSUE CONTAINING REPORTS OF THE DES MOINES MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES. EDITED BY BURTON E. LIVINGSTON, PERMANENT SECRETARY.

SCIENCE

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THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORTS OF THE DES MOINES MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND ASSOCIATED SOCIETIES

GENERAL FEATURES

THE Des Moines meeting of the American Association for the Advancement of Science was held from Friday, December 27, 1929, to Thursday, January 2, 1930. This was the eighty-sixth meeting of the association and the second one to be held in the state of Iowa, the first having occurred at Dubuque in August, 1872. The preliminary announcement of the Des Moines meeting appeared in a special issue of SCIENCE for November 29, 1929. The sessions of the association and the associated societies were nearly all accommodated in hotels and other down-town buildings, all within a few blocks of one another. There was no snow and the weather throughout convocation week was uniformly fine and unusually warm for the season. Arrangements and facilities were generally unsurpassed and the meeting was successful in every way.

The president for this meeting was Robert A. Millikan, director of the Norman Bridge Physical Laboratory, of the California Institute of Technology, at Pasadena. As most readers know, President Millikan is one of the greatest leaders in physical research and in the advance of science and education. On Sunday afternoon he delivered a remarkably valuable and inspiring address on the importance of science to humanity. It was given in the Shrine Temple auditorium, before a very large audience. This address appears in the February issue of *Scribner's Magazine*.

REGISTRATION

Eighteen hundred and eighty persons registered at the Des Moines meeting, but the actual attendance was much larger. The residence distribution of those who registered is shown in the accompanying list. Altogether, about one hundred and ninety scientific

sessions were held and about twelve hundred and thirty papers and addresses were delivered. These were distributed among the sciences approximately as follows: Mathematics, 48; physics, 60; chemistry, 18; astronomy, 16; geology and geography, 40; zoology, 305; botany, 263; ecology, genetics, etc., 94; anthropology, 14; psychology, 35; social and economic sciences, 21; historical and philological sciences, 9; engineering, 21; medical sciences, 16; agricultural sciences, 204; education, 38; science in general, 24. Many society dinners, luncheons and smokers were held, with excellent attendance.

REGISTRATION AT DES MOINES BY STATES AND PROVINCES

Alabama	6	Nebraska	74
Arizona	4	Nevada	1
Arkansas	7	New Hampshire	4
British Columbia	2	New Jersey	17
California	22	New Mexico	2
Colorado	26	New York	78
Connecticut	14	North Carolina	6
Delaware	3	North Dakota	10
District of Columbia	44	Ohio	58
England	1	Oklahoma	24
Florida	6	Ontario	5
Georgia	2	Oregon	4
Idaho	1	Pennsylvania	33
Illinois	170	Philippine Islands	2
Indiana	51	Porto Rico	2
Iowa (Des Moines excluded)	311	Quebec	2
Des Moines	262	Rhode Island	2
Kansas	76	South Carolina	1
Kentucky	11	South Dakota	12
Louisiana	12	Tennessee	16
Maine	9	Texas	28
Manitoba	5	Utah	4
Maryland	21	Vermont	0
Massachusetts	24	Virginia	8
Michigan	65	Washington	6
Minnesota	97	West Virginia	6
Missouri	95	Wisconsin	107
Mississippi	11	Wyoming	6
Montana	4	Total	1,880

THE LOCAL COMMITTEE AND REPRESENTATIVES OF SECTIONS

The General Local Committee for the Des Moines meeting was made up as follows:

D. W. MOREHOUSE, president of Drake University, *general chairman of the local committee.*

J. W. STUDEBAKER, *vice-chairman;* superintendent of the Des Moines public schools.

L. B. SPINNEY, *vice-chairman;* Iowa State College, Ames, Iowa.

G. E. HAMILTON, *secretary of the general committee and chairman of the special committee on hotels, dinners, etc.;* Des Moines Convention Bureau.

WALTER L. BIERRING, *chairman of the special committees on finance and local membership;* 1210 Bankers Trust Building.

T. J. EDMONDS, *chairman of the special committee on news service;* Iowa Tuberculosis Association, 518 Frankel Building.

E. C. LYTTON, *chairman of the special committee on personnel and registration;* Drake University.

HENRY NOLLEN, *chairman of the special committee on reception and entertainment;* Equitable Life Insurance Company of Iowa, Equitable Building.

C. L. PYE, *chairman of the special committee on meeting places, equipment and exhibits;* Iowa State Teachers Association, 416 Shops Building.

R. C. WOOLMAN, *chairman of the special committee on local transportation, information, signs, etc.;* Independent School District, 629 Third St.

The following named persons served as local representatives of the several sections of the association:

Section A (Mathematics), I. F. Neff, Drake University, Des Moines.

Section B (Physics), P. S. Helmick, Drake University, Des Moines.

Section C (Chemistry), A. J. Rider, Drake University, Des Moines.

Section D (Astronomy), D. W. Morehouse, Drake University, Des Moines.

Section E (Geology and Geography), Jas. H. Lees, Iowa Geological Survey, State House, Des Moines.

Section F (Zoological Sciences), L. S. Ross, 1308 27th St., Des Moines.

Section G (Botanical Sciences), I. E. Melhus, Iowa State College, Ames.

Section H (Anthropology), Sherman Kirk, Drake University, Des Moines.

Section I (Psychology), R. H. Sylvester, Drake University, Des Moines.

Section K (Social and Economic Sciences), Herbert W. Bohlman, Drake University, Des Moines.

Section L (Historical and Philological Sciences), Olynthus B. Clark, Drake University, Des Moines.

Section M (Engineering), Anson Marston, Iowa State College, Ames.

Section N (Medical Sciences), John H. Peck, 1222 Bankers Trust Bldg., Des Moines.

Section O (Agriculture), Mark Thornburg, State House, Des Moines.

Section Q (Education), W. F. Barr, Drake University, Des Moines.

Representative for Organizations Not Related to Any Particular Section, Jean Carroll, Meredith Publications, Des Moines.

The general committee and its subcommittees, aided by the local representatives, performed a very fine service to American science in caring for the innumerable details of arrangements for the meeting. That this meeting occurred in Des Moines was pri-

marily due to the efforts of Dr. D. W. Morehouse, president of Drake University, who first presented invitations from Des Moines at the second Toronto meeting, in December, 1921. In his proposal for a meeting in Des Moines Dr. Morehouse was immediately supported by the Iowa Academy of Science, which is affiliated with the American Association, by the Des Moines Chamber of Commerce, by his own Drake University and by the City of Des Moines and its institutions and organizations, as well as by the local press and many people of Des Moines. Mr. George E. Hamilton, secretary of the Des Moines Convention Bureau, gave very freely of his time and energy through the months preceding the meeting, acting as secretary of the general local committee and as chairman of the subcommittee on hotels. The convention bureau's staff devoted themselves to the work of preparing for the meeting. The great devotion of the chairmen of the subcommittees is greatly appreciated. Each of these chairmen had special charge of a portion of the preparations and a fine spirit of very successful cooperation was shown. Drake University and the Iowa Academy of Science were the prime movers in making this meeting possible. The Iowa State Legislature made a special appropriation to enable the academy to take a leading part in underwriting the local expenses. But Dr. Morehouse said that the host for the meeting was really the City of Des Moines and the State of Iowa. The well-known Iowa State College aided greatly, and several sessions of the meeting were actually held in the nearby city of Ames, where the college is located.

THE A. A. A. S. PRESS SERVICE AND THE PRESS

The Press Service of the American Association, a newly organized service of which Mr. Austin H. Clark, of the U. S. National Museum, is director, has operated throughout the year in the very important work of bringing science news to the people through the newspapers. For more than a month before the meeting Mr. Clark devoted a large part of his energy and interest to the exacting task of preparing press releases of the manuscripts of papers that were to be delivered at Des Moines. As in recent years, the permanent secretary's office sent a special request to each person whose name appeared in the program manuscripts as these came from the society and section secretaries, each author being asked to send immediately two copies of his paper, or at least two copies of an abstract, for use by the Press Service. A very large number of those who presented contributions and addresses at Des Moines were prompt in complying with this request and an unusually large amount of exceptionally excellent material was in Mr. Clark's hands several weeks before the opening of the meeting. This material was worked over and mimeographed when necessary, the release date being clearly marked in each instance, and the resulting newspaper releases were made available to the representatives of Science Service and the other news organizations in time so that unusually good stories were prepared and distributed to the great dailies long before the papers were actually presented at the meeting.

The Press Service of the association had the cordial cooperation of Mr. Watson Davis and the other members of the staff of Science Service, in the direction of which the American Association is joined with the National Academy of Sciences and the National Research Council. The representatives of the other great press agencies were also very cordial and helpful in their cooperation, as were also the representatives of many newspapers of Des Moines and other cities. Mr. T. J. Edmonds, of the Iowa Tuberculosis Association, was chairman of the local subcommittee on news service, and his aid and cooperation are greatly appreciated. The news of this meeting took a very prominent place in the local newspapers both before and during the meeting period and the meeting was adequately treated in a very large number of newspapers throughout the United States and Canada. The association is engaging increasingly in this important feature of its work, to aid in the distribution of science knowledge among the people, and it greatly appreciates the aid and cooperation of the press all over the land.

THE GENERAL PROGRAM

The General Program of the Des Moines meeting, a book of 256 pages, was available on the morning of Friday, December 27, at the registration offices, in the Shrine Temple. It contains the usual program material, including the special scientific programs of over thirty independent organizations that met with the association this year. As in recent years, there is a valuable index of authors of papers and addresses and a very useful summary of events by days. These annual programs of the association meetings furnish reliable indications of the progress and trend of science from year to year. Copies of the Des Moines program may be had free, as long as the supply lasts, in respanse to requests sent to the permanent secretary's Washington office.

Dr. Sam F. Trelease, of Columbia University, secretary of the association council and program editor for the permanent secretary's office, was in charge of publication. He was again very ably assisted by Mrs. Helen M. Trelease. They devoted themselves to this work for more than a month previous to the opening of the meeting, spending the last ten days at Des

Moines. To the secretaries of the societies and sections, who supplied the manuscripts for the special programs, the association is very grateful.

THE GENERAL EXHIBITION

A large number of makers of scientific apparatus and materials and publishers of scientific books aided in making the Des Moines meeting successful by exhibiting their wares in the general exhibition, which was exceptionally well housed on the lower floor of the Shrine Temple. Science workers derive much benefit and pleasure from the annual exhibitions, which have become an important feature of the association meetings. A list of the firms that took part in the exhibition (E) or had advertisements in the program book (P), or both (E, P), is given below.

Bausch and Lomb Optical Co. (E, P)
P. Blakiston's Son and Co. (E)
Brooklyn Botanic Garden (P)
Central Scientific Co. (E, P)
Chicago Apparatus Co. (E)
Clay-Adams Co. (E, P)
Commission on Standardization of Biological Stains (P)
Denoyer-Geppert Co. (E)
H. Eisenstein and Co., Inc. (P)
Encyclopædia Britannica (E)
Julien P. Friez and Sons, Inc. (P)
General Biological Supply House (E, P)
Kewaunee Manufacturing Co. (P)
Kny-Scheerer Corp. (P)
Leeds and Northrup Co. (E)
E. Leitz, Inc. (E, P)
B. Login and Son, Inc. (P)
Open Court Publishing Co. (P)
Schwartz Sectional System (E)
Spencer Lens Co. (E)
Charles C. Thomas (E)
Triarch Botanical Products (E, P)
D. Van Nostrand Co. (E)
W. M. Welch Scientific Co. (E, P)
B. Westermann Co., Inc. (P)
Weston Electrical Instrument Corporation (E)
Williams and Wilkins Co. (P)

Members of the association and friends of science can help the organization a great deal if they will, whenever occasion arises, encourage manufacturers and supply houses to take space in the annual science exhibition and to insert advertisements in the programs of the meetings and in the official journal, SCIENCE.

The Bausch and Lomb Optical Company and the Spencer Lens Company generously loaned many lanterns for use in the numerous session rooms. The Iowa Visual Service Bureau, of Des Moines, and Drake University loaned lanterns and motion-picture projectors, and motion-picture projectors were loaned by the Des Moines Public Schools, the Ankeny Public Schools and the Valley Junction Public Schools. To all these organizations the association and the societies are very grateful.

THE DES MOINES PRIZE

The seventh award of the American Association prize of $1,000 was made at Des Moines to Dr. A. J. Dempster, professor of physics in the University of Chicago. This prize is awarded annually to the author of a notable contribution to the advancement of science presented at the annual meeting. The funds for the prize are generously supplied by a member who does not wish his name made public. The committee on award was this year composed of the following members: Charles E. Allen, University of Wisconsin, *chairman;* P. W. Bridgman, Harvard University; Fay-Cooper Cole, University of Chicago; S. C. Lind, University of Minnesota; H. L. Rietz, University of Iowa. To these gentlemen is here expressed the gratitude of the association for their efficient and valuable service in this important and delicate part of the association's work.

Dr. Dempster's contribution constitutes an important extension of the work of the French physicist, Louis de Broglie, for which the Nobel prize in physics was recently awarded. According to the de Broglie wave mechanics small particles should exhibt the behavior of waves when reflected. The Americans, C. Davisson and L. H. Germer, of the Bell Telephone Laboratories, recently demonstrated this experimentally for electrons reflected from the surface of a crystal of nickel, and the gold medal of the National Academy of Sciences was awarded to Dr. Davisson for that contribution. Now the same thing has been shown by Dempster, for protons reflected from a crystal of calcite. So streams of electrons and streams of protons both behave like waves in some respects and like particles in other respects. This apparent paradox is of very great fundamental interest to students of the nature of matter and energy, and its various implications are now receiving much attention.

GENERAL SESSIONS AND COMPLIMENTARY LECTURES

There were many more general lectures at the Des Moines meeting than at any earlier one. In recent years the program of general lectures has received an increasing amount of attention, partly in response to a continually growing public demand for easily understood accounts of current scientific progress and partly because the specialists in the many fields of science are becoming increasingly appreciative of their need for

general information about current scientific work along lines other than their own.

The general lectures at Des Moines were grouped in two series, those given at general sessions of the association and those presented as complimentary to the public. The general sessions were generally held at 4:30 in the afternoon or in the evening, while the complimentary lectures were generally given at 2:30 in the afternoon or in the evening. Many of these were held in the Shrine Temple auditorium, an unusually fine hall with ingenious arrangements for beautiful lighting effects. Space limitation prevents more than a cursory review here of those lectures.

General Sessions.—The retiring presidential address was given at the opening session, Friday evening, by Henry Fairfield Osborn, who was president of the association for 1928. His title was "The Discovery of Tertiary Man." This address has been published in SCIENCE for January 3, 1930. The general reception followed the opening session and both were very well attended.

At a general session on Saturday afternoon Dr. Fay-Cooper Cole, of the University of Chicago, gave an address on "An Anthropologist's View of Race," in which he presented an interesting discussion of how the present human races may have been produced and of the meaning of "superior" and "inferior" races.

The eighth annual Sigma Xi lecture was given at the general session Saturday evening, under the joint auspices of the Society of the Sigma Xi and the American Association. The speaker was George H. Parker, of Harvard University, whose subject was "Some Aspects of Human Biology." He considered how human improvement may be accelerated and guided, not only through improvement in the social inheritance of the individual (environment, education, opportunity) but also through the conscious restriction of undesirable germinal inheritance, as in the prevention of reproduction by individuals with marked social defects.

A general session on Monday afternoon was devoted to an address by James B. Macelwane, S.J., of St. Louis University, on "Earthquakes and What They Tell Us." His discussion brought out the causes of earthquakes as now understood and reasons why they occur more frequently in some places than in others.

On Monday evening, before a general session, W. T. Bovie gave an interesting discussion of "The Relation between the Size of the Energy Atom and Its Physiological Effect." He discussed responses of lower organisms to their radiant-energy environment, giving attention to the evolution of animal and plant adaptations that are related to radiation. Many responses are selective and attuned to specific ranges of wavelength or spectral frequency bands that represent determinate ranges of quantum magnitudes.

Two general sessions occurred on Tuesday afternoon. One of these was devoted to a symposium on "The Salary Problem," arranged by the association's Committee of One Hundred on Research, of which Rodney H. True, of the University of Pennsylvania, is secretary. Dr. True writes that this topic has been given prominence at several recent sessions arranged under the auspices of the Committee of One Hundred, because of the conviction that the question of adequate salaries is one of the prime influences exerted on research in America and that it deeply affects the general social outlook and welfare. President Robert A. Millikan occupied the chair at this symposium. William A. Noyes, of the University of Illinois, discussed "The Salary Problem as Seen by the Professor." R. Y. Stewart, of the U. S. Forest Service, spoke for Harry G. Knight, of the U. S. Bureau of Chemistry and Soils, who was absent on account of illness. His topic was "The Salary Problem as Seen by the Government Executive." A paper by Edward A. Filene, of Boston, on "The Salary Problem in its Social Implications" was read by the secretary in the absence of Mr. Filene. This symposium brought out many interesting and even startling facts concerning the generally low salaries of research workers in educational and government institutions as compared with the corresponding salaries of those engaged in industrial research and other comparable lines of work. It is expected that a fuller report of the symposium will appear in a subsequent issue of SCIENCE.

The seventh annual Josiah Willard Gibbs lecture was delivered at the other general session on Tuesday afternoon, under the joint auspices of the American Mathematical Society and the American Association. The lecturer was Irving Fisher, of Yale University, who spoke on "The Application of Mathematics to the Social Sciences." It was pointed out that there are several distinct branches of social science to which mathematics has been or may be applied: (1) pure theory, (2) the fitting of formulas to statistics, (3) correlation, (4) probabilities.

The general session of Tuesday evening was devoted to a lecture on "Glaciation—the Background of the Development of the Mississippi Valley," by George F. Kay, of the University of Iowa. The story of glaciation in the Iowa region was interestingly and clearly told, the origin of Iowa soils was shown to be definitely related to the action of ice-sheets that invaded this region in glacial times, and the dependence of present human culture on the soil was emphasized.

On Wednesday afternoon a lecture on "Some Aspects of Celestial Evolution" was delivered at a gen-

eral session, the lecturer being Edwin B. Frost, of the Yerkes Observatory, of the University of Chicago. Dr. Frost's lecture dealt with the phenomena of novae, which may rise from obscurity even to the first magnitude in a day or two. It was pointed out that such outbursts are not infrequent, seeming to be due to internal explosions that blow off an outer shell of the star and are accompanied by a great expansion of luminous matter. The relation of the outbursts of novae to the time scale of celestial evolution was critically considered.

This unusual series of general sessions was closed on Wednesday evening by a lecture on "The Laws of Racing Fatigue in Men and Horses," delivered by A. E. Kennelly, of Harvard University, who discussed a remarkable general relation between going time and average speed for running, pacing and trotting horses and for walking, running, skating, rowing and swimming men. It was pointed out that the going time varies inversely very nearly as the ninth power of the average speed in all these instances.

Complimentary Lectures for the People of Des Moines.—The complimentary lectures were arranged primarily for the people of Des Moines, including school and college students. They constituted a definite contribution by the American Association toward the reliable dissemination of scientific knowledge among the people. Ten of these lectures were presented and one of them was presented twice. All were illustrated. The speakers and their topics are shown below.

"Where Iowa Gets Her Weather," by Charles F. Brooks, of Clark University; Saturday afternoon.

"Exploration for Human Origins and Migrations in the Far Northwest," by Aleš Hrdlička, of the U. S. National Museum; Saturday evening.

"The Alleged Sins of Science," by Robert A. Millikan, president of the American Association for 1929; Sunday afternoon.

"Collecting Live Animals in Africa," with motion pictures, by William M. Mann, of the U. S. National Zoological Park; Monday afternoon. This lecture and showing of the exceptionally fine motion pictures was repeated, by special request, on Tuesday afternoon.

"Our Ocean of Air: What It Is and Where It Came from," by W. J. Humphreys, of the U. S. Weather Bureau; Monday afternoon.

"The Adler Planetarium and Astronomical Museum of Chicago," by Philip Fox, of the Adler Planetarium; Monday evening.

"By Airplane to Pigmy Land" (New Guinea), by M. W. Stirling, of the Bureau of American Ethnology, Smithsonian Institution; Tuesday afternoon.

"The Living Wealth of Alaskan Waters," by Lewis Radcliffe, of the U. S. Bureau of Fisheries; Tuesday afternoon.

"Turning the Clock Back Ten Million Years," by Arthur S. Coggeshall, of the Saint Paul Institute, St. Paul, Minnesota; Wednesday afternoon.

"Clouds of Everywhere and Their Splendors," by W. J. Humphreys, of the U. S. Weather Bureau; Thursday afternoon.

BUSINESS PROCEEDINGS OF THE COUNCIL AND EXECUTIVE COMMITTEE AT DES MOINES

The executive committee met Friday forenoon and the council met in the afternoon of the same day. The council held sessions on Saturday, Monday, Tuesday and Wednesday at nine o'clock, and the executive committee held a session immediately following each of these council sessions, also a session on Sunday morning. The following items of business were transacted.

(1) The permanent secretary presented a mimeographed report on the status of membership for the year ending September 30, 1929, and for that portion of the year 1929–30 from September 30 to December 20. On September 30, 1929, the paid-up membership was 17,520, which is 2,083 more than the corresponding number for September 30, 1928. The total enrolment (including paid-up members and members one or two years in arrears) was 18,462 on September 30, 1929, which is 2,134 more than on September 30, 1928. On October 1, 1929, 327 names of members in arrears for two years were regularly dropped from the roll and 209 members resigned or died between September 30 and December 20, 1929. In the same period 851 new members were enrolled, and the total enrolment on December 20 was, therefore, 18,777.

(2) The council accepted a report from Herbert Osborn, of Ohio State University, representative of the association on the board of trustees of *Biological Abstracts.*

(3) On recommendation by the executive committee, a progress report of the Committee on Source Books in the History of the Sciences was accepted by the council. The chairman of this committee is Gregory D. Walcott, of Long Island University. The "Source Book in Astronomy" has been published and that for mathematics is to appear soon. Other source books are in preparation.

(4) On recommendation by the executive committee, a report of the Committee on Popular Science Book-lists was approved by the council. This committee, the chairman of which is Joseph L. Wheeler, of the Enoch Pratt Free Library, Baltimore, is engaged in the preparation of attractively printed lists of book titles in the several branches of science, the titles being selected as suitable for use by those who are not specially trained in science. These lists are to be made freely available to the general public and school students, through public libraries and other available means. The work is in an advanced stage.

(5) The committee on calendar reform, consisting of A. E. Kennelly (*chairman*), W. W. Campbell, A. R. Crook, Gano Dunn and C. F. Marvin, presented a report to the council, which was adopted, as had been previously

recommended by the executive committee. The report now becomes an action by the council, which follows:

A Resolution on Calendar Reform

WHEREAS, The Council of the American Association for the Advancement of Science desires to reaffirm the resolution on Calendar Reform adopted at Washington, January 2, 1925, which is worded as follows:—"*Resolved,* that the American Association for the Advancement of Science approves of any alteration in the calendar that would adjust it to modern conditions for scientific work and that the Association would welcome in this connection cooperation with other bodies such as the committees of the League of Nations that are concerned with this subject";[1] and,

WHEREAS, The Council is convinced that calendar simplification should be internationally adopted for the benefit not only of scientific work, but also of commerce and of the peoples of the earth in their daily lives, and likewise for the promotion of international and national understanding; therefore, be it

Resolved, That the Council advocates calendar simplification for international adoption as soon as may be practicable, and the calling of an international conference to report upon the best method, agreeable to all nations concerned, that will remove the serious defects of the present calendar; and favors a revision of the calendar such that the year will consist of thirteen months of twenty-eight days each and an extra day of non-week-day name, with an additional midyear leap day in leap years.

(6) The council accepted a progress report of the Committee of One Hundred on Research and the development of further plans for the work of the Committee of One Hundred was referred to the executive committee of the Committee of One Hundred, with power. The Committee of One Hundred, the secretary of which is Rodney H. True, of the University of Pennsylvania, presented a very successful symposium on "The Salary Problem," at a general session of the association held Tuesday afternoon. That symposium is briefly reported in the section on General Sessions in this issue of SCIENCE.

(7) The Committee on Place of Science in Education, through its chairman, Otis W. Caldwell, of Columbia University, presented a plan for cooperative work with secondary schools, by which it is hoped to discover and encourage students who possess capacity for scientific work. The plan was approved in principle and referred by the council to the executive committee, with power, for such further consideration and action as might be deemed necessary. The executive committee considered this project further and referred it, with power, to the executive committee of the Committee on Place of Science in Education.

(8) The permanent secretary's audited financial report and the audited report of the treasurer for the fiscal year 1928–29, together with a note by the permanent secretary on these reports, summarizing them and bringing them up to December 20, were presented to the council by distributing mimeographed copies, and the council followed the recommendation of its executive committee and accepted the reports. The council congratulated the permanent secretary's office on the excellent financial status of the association. These reports are summarized elsewhere in this issue of SCIENCE.

(9) On recommendation by the executive committee the council voted that an appropriation of $3,000 for grants for 1930 be made from the treasurer's available funds, to be allotted by the committee on grants. The allotment has been made and the list of grantees for 1930 is given elsewhere in this issue of SCIENCE.

(10) On recommendation by the executive committee three emeritus life members were elected as follows: E. L. Nichols (M78F81), H. L. Fairchild (M78F83), David Todd (M79F81). Readers are reminded that the membership formula shows the year of enrolment in the association (after the letter M) and the year of election to fellowship (after the letter F).

(11) On recommendation by the executive committee the council voted that the annual addition of $1,000 to the publication fund be discontinued, because the fund already consists of $4,536.50, which is more than it was planned to accumulate in the four-year period between the editions of the Proceedings volume. The sum of $536.50 is to be transferred from the publication fund to the generally available fund.

(12) The arrangements for the A. A. A. S. Press Service were continued for 1930 without change. It is planned that this service is to be active throughout the year, to facilitate the distribution of science news through the daily press, the radio and other available agencies.

(13) On application from Kappa Delta Pi, an honor society in education, the council voted to enroll that organization as officially associated with the American Association, related to Section Q.

(14) Ninety-three members were elected to fellowship, distributed among the sections as follows:—

Section A, 2; Section B, 23; Section C, 5; Section D, 21; Section E, 1; Section F, 3; Section G, 4; Section H, 2; Section I, 1; Section K, 13; Section O, 14; Section M, 2; Section N, 2.

(15) On reference by the council, the executive committee adopted the following amendment to the by-laws, to replace Section 4, of Art. II:

Article II, Section 4.—Members may be elected by the council to be fellows of the association and members so elected shall remain fellows only so long as they retain membership. If a fellow discontinues his membership and subsequently rejoins the association he shall automatically again become a fellow from the time of rejoining, without another election. Members are eligible to nomination for fellowship if they have contributed to the advancement of science either by the publication of original research or in other significant manner. Nominations for election to fellowship may be made by any three fellows, by the permanent secretary or by any section secretary, but before being submitted to the Council every nomination shall have been first approved by the section committee in whose field the nominee's scientific work mainly lies.

Explanatory note.—It is understood that members are eligible to fellowship nomination if their names occur in the most recent edition of "American Men of Science"

[1] Summarized Proceedings of the American Association for the Advancement of Science, 1921–1925, page 66.

or if they have been elected to an affiliated organization in a membership class for which a research qualification is required. It is understood that the phrase, "the publication of original research," implies more than the publication of a dissertation for the Ph.D. degree, and that it is the intention to admit members to fellowship on the basis of publication only after they have shown more evidence of productiveness than the attainment of the Ph.D. degree. The phrase, "or in other significant manner," is taken to include advanced teaching and the guiding of research, also suitable patents and the accomplishment of work not shown by publication, as in engineering or other projects in the fields of applied science. A majority of those voting shall constitute approval of a nomination by a section committee.

(The amendment and its explanatory note differ from the old Section 4 of Art. II in the following ways: (1) The rule about automatic reelection to fellowship upon rejoining the association is new. (2) The wording of the definition of eligibility is improved, but the meaning is not altered. (3) Nomination by three fellows is new; nomination by the nominee himself is now discontinued, also nomination by any member. (4) The old by-law did not specify preliminary approval by the section committee concerned, but that specification was made by special vote of the council and has been presumably in effect for a number of years, though it may not have been adhered to in all cases when a section secretary has transmitted nominations to the council.)

(16) On recommendation of the executive committee the council voted that members residing outside of the United States shall no longer be required to pay the extra postage on their journals.

(17) The council adopted the following resolution on the Michael P. Rich Bequest:

WHEREAS, The late Doctor Michael P. Rich, of New York City, with a generous purpose to provide some part of the means needed for organizing American scientific men in the interest of development and progress and with a vision of the fundamental relation of this movement to the future of America, provided in his last will and testament that the association should receive from his estate a bequest of ten thousand dollars ($10,000) to be added and to become a part of the endowment fund; therefore, be it

Resolved, That the council in this way acknowledges publicly and for permanent record and in behalf of the scientific workers of America its deep appreciation of the gift and the spirit which animated it. Further, be it

Resolved, That the council speaking for the association orders that this part of the association's permanent endowment be named The Michael P. Rich Fund, and be so carried on the records of the treasurer; the income of which is to be utilized for the advancement of science and education as the best judgment of the association shall determine in accordance with the development of America and the changing conditions of its work.

Therefore, The council directs that copies of these resolutions be spread upon its records, printed in its publications and transmitted to the executors of the estate and to relatives of the late Doctor Michael P. Rich.

(18) In connection with information given to the council by Dr. F. R. Moulton concerning the Chicago Exposition of 1933 and upon recommendation of the executive committee, the council voted that the time of the next Chicago meeting be changed from December, 1932, to the summer of 1933, preferably the first week of September, and the council adopted the following resolution expressing the willingness of the American Association to cooperate with other organizations in connection with the International Science Congress that is being planned as a feature of the 1933 exposition at Chicago.

A Resolution Concerning the Relation of the American Association to the Chicago Exposition to be Held in 1933

WHEREAS, The American Association for the Advancement of Science has learned that an international science congress is being considered as a feature of the great Chicago Exposition in 1933, and

WHEREAS, The association regards it as highly desirable that an international congress or a series of international congresses be held in connection with the above-mentioned exposition; be it therefore

Resolved, That the American Association for the Advancement of Science, which represents over 18,000 members, mostly residing in the United States, and 120 associated scientific organizations, will be glad to cooperate with other scientific associations and societies and with the management of the exposition in connection with arrangements for the proposed international congress to emphasize the important place of science in a century of progress.

(19) The council approved a tentative schedule of future meetings, including summer meetings, which appears elsewhere in this issue of SCIENCE.

(20) A special committee, consisting of Robert A. Millikan and Walter S. Adams, was named to investigate the possibilities in regard to the proposed summer meeting in the Los Angeles region in 1931.

(21) The council adopted the following resolution on the Copeland-Wainwright Bill, now before the Congress of the United States.

WHEREAS, Those who are interested in the advancement of science appreciate the very great service done to science and humanity by the heroic sacrifices of Major Walter Reed, Major James Carroll and Doctor Jesse W. Lazear, in connection with the early experimental study of yellow fever, which has subsequently led to the control of this disease largely as a result of their heroism; be it therefore

Resolved, That the American Association for the Advancement of Science favors and strongly urges the passage of the Copeland-Wainwright Bill now before the United States Congress, in so far as that bill provides suitable annual pensions for the widows of the above-mentioned men, and be it further

Resolved, That the American Association greatly appreciates the well-directed efforts of Congressmen Copeland and Wainwright and their supporters, toward the passage of the Copeland-Wainwright Bill.

(22) The council adopted the following resolution on the maintenance of the National Parks System of the United States:

In view of the present discussion of the National Parks System and of numerous proposals for its extension, the American Association for the Advancement of Science, with its 19,000 members and 120 associated organizations,

desires to reaffirm its position taken after careful study of the problem and expressed in a resolution adopted in December, 1927, as follows:

(1) The association approves the creation of those national parks only which meet the highest standards of the system, namely, which are wholly or almost wholly areas of original, unmodified natural conditions, each a unique example of its landscape or geologic type in the country; and

(2) The association declares that, as the only reservational system for preservation of the primitive and majestic in nature, the protection inviolate of the system of national parks demands extraordinary watchfulness and care; and

(3) The association recognizes that, by reason of its peculiar limitations and conditions, the system of national parks possesses facilities for popular education in nature and for inspiration, which have incalculable value to individuals and the nation.

And the association directs that the permanent secretary of the American Association for the Advancement of Science shall send copies of this resolution to President Hoover, to the Secretary of the Interior, to the Secretary of Agriculture and to the secretaries, chairmen and members of the Public Lands and other committees of both houses of Congress having this matter in charge.

(23) The council commended the efforts of the Conservation Committee of the Camp Fire Club of America toward the maintenance of the present high standards of the National Parks System of the United States, and referred, for a statement of the position of the association in this connection, to the resolution adopted by the council at Nashville, December 28, 1927, and to the resolution on the same subject adopted by the council December 31, 1929 (see item 22, above).

(24) The council adopted the following resolution on the control of the Mediterranean fruit fly.

WHEREAS, The American Association for the Advancement of Science recognizes that the presence of the Mediterranean fruit fly in Florida is a serious menace to the horticultural and agricultural interests of the southern and western states, and that its permanent establishment in that region would materially affect the interests of the consuming public of the entire nation; therefore, be it

Resolved, That this association wishes to express its appreciation of the vigorous and effective manner in which the program of control has been carried out and urges that every feasible measure, most of all scientific investigation of the causes and effects of this pest, be taken that will lead to its control and ultimate suppression.

(25) The council elected the association president for 1930 and other officers, as shown elsewhere in this issue of SCIENCE.

(26) Just before adjournment the council adopted the following resolutions of thanks:

(A) The council wishes to express to President Millikan its great appreciation of the efficient manner in which he has occupied the presidency, and thanks him especially for the efficiency and geniality with which he has presided at the sessions of the council and other sessions at Des Moines.

(B) The council expresses its gratitude to Dr. D. W. Morehouse, general chairman of the local committees of the Des Moines meeting, for the highly efficient service he has rendered to the association and requests him to transmit its hearty thanks to the chairmen of the several special committees on arrangements, through whose cordial cooperation this meeting was made so successful.

(C) The council thanks the Iowa Academy of Science, Drake University, the School Board of Des Moines, the Des Moines Club, the Women's Club and the people of Des Moines and Iowa for their hospitality and their interest in the work of the association.

(D) The council expresses its appreciative thanks to the newspapers of Des Moines, to the representatives of Science Service, the Associated Press and the United Press and to the other press representatives who cooperated so efficiently, both before and during the period of the meeting, with the Press Service of the American Association in its efforts to disseminate the science news of the meeting as widely as possible.

(27) The next regular session of the executive committee is to occur in Washington on Sunday, April 27, 1930. The next regular session of the council is to occur at Cleveland on Monday, December 29, 1930.

THE PRESIDENT ELECT

At the council session Tuesday morning, December 31, 1929, Dr. Thomas Hunt Morgan, director of the Kerckhoff Laboratories of the Biological Sciences, of the California Institute of Technology, was unanimously elected president of the American Association for the Advancement of Science for the year 1930. Professor Morgan was born in Lexington, Kentucky, and is a graduate of the University of Kentucky. He received the Ph.D. degree at the Johns Hopkins University in 1890 and spent the following year there as Bruce fellow. For the next thirteen years he was professor of biology in Bryn Mawr College. In 1904 he was called to Columbia University as professor of experimental zoology, where he remained till last year. His call to the California Institute of Technology resulted in the transfer of one of our most eminent zoologists from the Atlantic to the Pacific Coast. He is the third member of that comparatively young California institution to be elected to the presidency of the American Association. The California Institute may be legitimately proud of its three association presidents: Arthur A. Noyes, Robert A. Millikan and Thomas H. Morgan. Dr. Morgan is now president of the National Academy of Sciences. He has received a number of honorary degrees and holds membership in many learned societies. His membership in the American Association dates from 1904, and he has been a fellow of the association since 1906.

The literature of experimental zoology and genetics contains many valuable contributions by Morgan and his students. He is the author of many well-known books, among which are the following titles:

"Regeneration," 1901.
"Evolution and Adaptation," 1903.
"Experimental Zoology," 1907.
"Heredity and Sex," 1913.

"The Mechanism of Mendelian Heredity" (with A. H. Sturtevant, H. J. Muller and C. B. Bridges), 1915 (rev. edit., 1922).
"A Critique of the Theory of Evolution," 1916.
"Sex-Linked Inheritance in Drosophila," 1916.
"The Physical Basis of Heredity," 1919.
"The Genetic and the Operative Evidence Relating to Secondary Sexual Characters," 1919.
"The Origin of Gynandromorphs," 1919.
"Human Inheritance," 1924.
"Evolution and Genetics," 1925.
"The Theory of the Gene," 1926.
"Experimental Embryology," 1927.
"What is Darwinism?," 1929.

The newly elected president's many successful researches are familiar to all biologists. They have been concerned largely with the physical basis of heredity, with the physiological aspect of inheritance. With Morgan's leadership and under the influence of his masterly reasoning and adequately planned experimentation the hypothesis of the germ plasm as the bearer of hereditary characters has become progressively clearer in the last quarter century, many able minds having taken part. From vague and merely hypothetical beginnings at the hands of Weissmann and others this theory has become the modern theory of the gene, the best account of which is Morgan's recently published book of that title. That genes are very small particles or aggregates of matter that are transmitted from parent to offspring, fundamentally influencing the development and the characteristics of organisms, is now generally held by students of genetics. To explain the origin of new forms of animals and plants it is supposed that new combinations of genes are continually arising and that a particular kind of gene may occasionally become fundamentally altered, under suitable conditions. The physical nature of genes and how they may become transformed so as to exert new influences, thus taking part in the origin of new forms of organisms, are topics of great present interest, in the consideration of which the findings of cytology and cell physiology are being studied in the light of our rapidly growing chemical and physical knowledge, notably in the field of colloid chemistry. Morgan points out[1] that changes in genes are to be considered as possibly occurring either in the direction of greater complexity or in the opposite direction; to begin to understand the nature of supposed gene changes we shall need to know "more concerning the chemical constitution of the genes and how they grow and divide." In a similarly clear manner Morgan goes on to call attention to the present futility of attempting to discuss whether or not genes may arise *de novo* or how they may have come originally into existence. He regards it as at least possible that genes may have the nature of organic molecules, but emphasizes the fact that evidence for such a supposition is inadequate at present; they may be aggregates of molecules. He finds it difficult, however (*loc. cit.*, p. 310), "to resist the fascinating assumption that the gene is constant because it represents an organic chemical entity." He considers that "this is the simplest assumption that one can make at present," and that "since this view is consistent with all that is known about the stability of the gene it seems, at least, a good working hypothesis."—B. E. L.

[1] "The Theory of the Gene," 1926, p. 308.

THE FINANCIAL CONDITION OF THE ASSOCIATION

The audited report of the association treasurer for the fiscal year closing September 30, 1929, and the audited financial report of the permanent secretary for the same year were accepted and approved by the council at Des Moines. These reports are on file in the Washington office of the association and copies may be secured on request. The following summary notes on them have been prepared by the permanent secretary.

Note on the Treasurer's Report for the Fiscal Year 1928–29. The total amount of the endowment fund of the association was $159,776.66 on September 30, 1929. This consisted of the Richard T. Colburn fund ($85,586.45), the W. Hudson Stevens fund ($4,381.21), the Michael P. Rich fund ($10,000.00), the Jane M. Smith fund ($5,000.00), the accumulated contributions from friends of the association ($3,559.00), the fees of sustaining members ($7,000.00) and the fees of life members ($44,250.00). On the same date the amount of available treasury funds (unexpended income from the endowment and special reserves) was $19,520.07, consisting of unexpended reserves ($13,727.23), the undisbursed balance of the 1928–29 appropriation for the Committee of One Hundred on Research ($792.84) and the prize fund ($5,000.00). On October 1, 1929, the balance on account of the Committee of One Hundred reverted, to be added to the unexpended reserves, which then amounted to $14,520.07. Liabilities for 1930 against this available fund were $1,388.00, consisting of the annual rental to be paid for the treasurer's safe-deposit box ($20.00) and journal subscriptions to be paid for life and sustaining members for 1930 ($1,368.00). The unappropriated and undesignated balance of the treasurer's available funds was therefore $13,132.07 on October 1.

Since the last-mentioned date appropriations from the treasurer's available funds have been made amounting to $4,300.00, consisting of appropriations for the Committee of One Hundred on Research for 1929–30 ($1,000.00), for allotment by the Committee

on Grants for Research for 1930 ($3,000) and for three emeritus life memberships ($300), leaving a balance of appropriable funds amounting to $8,832.07. Of this amount $6,723.48 had been accumulated before the fiscal year 1928–29 and is considered as a treasurer's emergency fund. Without decreasing this emergency fund the executive committee may make further appropriations for the current fiscal year amounting to $2,108.59. The principal of the prize fund is held in trust for the annual prizes of $1,000 each. Since October 1 that fund has been increased by a further gift of $1,000 from the original donor and it has been decreased in the same amount by the award of the Des Moines prize. The treasurer, therefore, now holds $5,000 in the prize fund, definitely designated for five annual prizes of $1,000 each, the first of which is to be awarded at the Cleveland meeting next December.

Note on the Permanent Secretary's Financial Report for the Fiscal Year 1928–29.—A summary of the permanent secretary's financial report of September 30, 1929, follows:

	Forwarded from last report	Receipts, 1928–29	Disbursements, 1928–29	Balance, Sept. 30, 1929
Emergency fund	$5,000.00			$5,000.00
Publication fund (for Proceedings volume)	3,000.00	$11,340.50	$ 1,703.53	12,636.97
Meeting fund		5,753.41		5,753.41
Committee on Place of Science in Education	427.00		9.52	417.48
Joint Committee on Research in Colleges	90.58	50.00	106.11	34.47
Miscellaneous Liabilities	1,684.74	1,771.77	1,684.74	1,771.77
Generally available	5,219.61	126,114.96	124,090.48	7,244.09
Total	15,421.93	145,030.64	127,594.38	32,858.19

By act of the council, the permanent secretary's emergency fund is maintained at $5,000 from year to year. On December 20, after all expenses of the Proceedings volume for 1925–29 (published October 15, 1929) had been paid, and after $1,000 had been added to the publication fund from the receipts of 1929–30, the balance of the publication fund was $4,536.50. Of this, $4,000 is reserved for the next Proceedings volume and the remainder is now transferred to the generally available fund. The meeting fund is a new one, derived from the fifth New York meeting. It is reserved for deficits that may accrue from meetings with incomes less than their costs, being therefore an emergency fund for meetings.

THE DES MOINES SESSION OF THE SECRETARIES' CONFERENCE

(*Report from Harley J. Van Cleave*)

The Des Moines session of the secretaries' conference was held on Sunday afternoon and evening, December 29, with Philip Fox in the chair. Special attention was given to a discussion of the relationship between the sections of the association and the related professional societies. Coordination of programs and the possibility of scheduling joint sessions and society dinners through the agency of this conference, to avoid conflicts of allied interests, were discussed. Members of the secretaries' conference dined together, at the annual secretaries' dinner, provided by the American Association. Following the dinner, Dr. Livingston explained in detail the new by-law relating to nominations to fellowship in the association and presented an account of the new procedure to be followed by section secretaries and their section committees in making up annual lists of fellowship nominations for action by the council. The secretary of the secretaries' conference for 1930 is Harley J. Van Cleave, secretary of the American Microscopical Society. The chairman for 1930 is Philip Fox, secretary of Section D (Astronomy).

THE DES MOINES SESSION OF THE ACADEMY CONFERENCE

(*Report from A. C. Walton*)

The Academy Conference acts as a standing committee of the American Association, to facilitate the work of the affiliated academies of science and to further cooperation among them and between them and the association. Its membership consists of the council representatives of the affiliated academies (one from each academy) and three members named by the council to represent the association at large. The conference secretary carries on a correspondence with its members throughout the year and an annual session, with a complimentary dinner provided by the association, is held at each annual association meeting.

The Des Moines session of the Academy Conference was held Friday afternoon, beginning at 4:30, with Howard E. Enders in the chair. D. W. Morehouse, secretary of the conference for 1929, automatically became chairman for 1930 and Chancey Juday, of the Wisconsin Academy, was elected secretary for

1930. In the absence of Dr. Juday, A. C. Walton, of the Illinois Academy, was appointed secretary *pro tem.* A vote of thanks and appreciation was extended to Dr. Enders, for his activity in the early days of the Academy Conference; he was the first secretary and did much to get the organization started.

Mr. Louis Astell, of the West Chicago High School, an invited guest of the conference, read a suggestive, informing and stimulating paper on "How State Academies May Aid Science Study among High-school Students." Mr. Astell told of the successful organization and operation of science clubs in Illinois high schools. It is planned that this paper will soon be published, with the help of the Committee on the Place of Science in Education, of which Otis W. Caldwell, of Columbia University, is chairman. Dr. Caldwell, who was present at the session as an invited guest, spoke in the discussion following Mr. Astell's paper. A. C. Walton, secretary of the Illinois Academy, and Lyell J. Thomas, also of the Illinois Academy and an invited guest at the session, spoke on the very successful campaign that is being carried out among the Illinois high schools. It seemed clear that state academies may do a great deal for the advancement of science by leading or aiding in organized effort to find and encourage exceptional high-school students who have a bent for and an interest in science study. The new project of the American Association's Committee on the Place of Science in Education, authorized by the association council at Des Moines, is planned as a nation-wide move in that direction and the committee with that project in charge would welcome the cooperation of state academies.

The session closed with the annual academy dinner, given by the American Association to the members of the conference. At the dinner the following resolution, proposed by John T. McGill, of the Tennessee Academy, was unanimously adopted.

WHEREAS, The interchange of their publications by the affiliated state academies would be advantageous in promoting closer relationship with one another and in disseminating information about their special activities; therefore, be it

Resolved, That each academy is requested to send to the other academies copies of its current publications and of back numbers as far as feasible.

A unanimous vote of appreciation was extended to Dr. Livingston and through him to the American Association for the success of the Academy Conference and also for the courtesy of the academy dinner.

FUTURE MEETINGS

It was voted by the association council at Des Moines to inaugurate a new plan by which the American Association is to hold two meetings a year instead of the single annual meeting. Winter meetings are to be continued as heretofore, and in addition a summer meeting is to be held each year, either at the beginning or at the end of the summer. The first of the summer meetings is scheduled for the summer of 1931, probably in the region of Los Angeles. The Pacific Division and the Southwestern Division will hold meetings as usual in 1930, that of the Pacific Division being at Eugene, Oregon, from June 18 to 21, while that of the Southwestern Division will occur at Tucson, from April 21 to 24.

The schedule of future meetings of the association, as far as it has been made out, is shown below:

December, 1930, Cleveland (Monday, December 29, 1930, to Saturday, January 3, 1931).
Summer, 1931, probably Los Angeles region.
December, 1931, probably New Orleans (Monday, December 28, 1931, to Saturday, January 2, 1932).
Summer, 1932, probably Montreal.
December, 1932, probably New Haven (Monday, December 26, to Saturday, December 31, 1932).
Summer, 1933, Chicago.
December, 1933, undecided (Wednesday, December 27, 1933, to Tuesday, January 2, 1934).
Summer, 1934, probably San Francisco.
December, 1934, probably Rochester, N. Y. (Thursday, December 27, 1934, to Wednesday, January 2, 1935).
Summer, 1935, probably Minneapolis.
December, 1935, undecided (Friday, December 27, 1935, to Thursday, January 2, 1936).
Summer, 1936, undecided.
December, 1936, Washington, D. C. (Monday, December 28, 1936, to Saturday, January 2, 1937).

It is to be noted specially that the large meeting that would regularly occur at Chicago in December, 1932, has been changed to the summer of 1933. This change was due to the decision of the American Association to cooperate in every possible way with the plans and arrangements for the "Century of Progress" exposition, which is to be held at Chicago in the summer of 1933, with science as its keynote and a great international congress of science as an important feature. The exact dates of the proposed summer meetings are still to be fixed. The dates for the winter meetings are determined by a general rule of the council, according to the week day on which New Year's day falls.

It is hoped that many societies will plan to meet with the association at the summer meetings. The scientific societies are always invited to meet with the larger organization at its winter meetings, if they so desire, and the same invitation will hold for the summer meetings.

THE SCIENTIFIC SESSIONS AT DES MOINES

The following accounts of the sessions of the sections and societies that took part in the Des Moines

meeting have been prepared from reports received from the several secretaries, as indicated. They are arranged according to the association sections. It will be noted that several societies are shown as related to both the zoological and botanical sections and that another group is shown as related to the association as a whole.

SECTION A (MATHEMATICS) AND RELATED ORGANIZATIONS

(Report from C. N. Moore)

Section A held a joint session on Monday afternoon with the American Mathematical Society. R. C. Archibald gave the retiring vice-presidential address, on "Mathematics before the Greeks," which was published in SCIENCE for January 31. O. D. Kellogg delivered an invitation address on "An Unsolved Problem of Uniqueness in Potential Theory," which dealt with the well-known Dirichlet problem and a number of related theorems. The seventh Josiah Willard Gibbs lecture was given by Irving Fisher, of Yale University, at a general session on Tuesday afternoon. The title of the address was "The Application of Mathematics to the Social Sciences." It began with a tribute to Gibbs as a great scientific genius and a personal appreciation of him as a most inspiring and stimulating teacher. It was then pointed out that Gibbs's work in vector analysis had proved useful not only in physics and mathematics but also in economics. The address mainly dealt with the four different branches of social science to which mathematics has been or may be applied: (1) pure theory, (2) fitting of formulas to statistics, (3) correlation and (4) probabilities. The lecturer expressed the opinion that there would be an ever-increasing use of mathematical methods in the field of social science. Professor Fisher's address will appear in the *Bulletin of the American Mathematical Society*. At a joint session of the American Mathematical Society and the Mathematical Association of America L. L. Dines gave an invitation address on "Linear Inequalities and some Related Properties of Functions," in which he outlined a theory of systems of linear algebraic inequalities analogous to the classical theory of systems of linear equations. The theory was then generalized so as to comprehend inequalities of non-algebraic character, and in particular linear inequalities in infinitely many unknowns, and linear integral inequalities. This paper will be published in the *Bulletin of the American Mathematical Society*.

On Tuesday morning was held a joint session of Sections A and K and the American Mathematical Society, at which were presented papers dealing with mathematical methods used in the social sciences. The principal paper was an invited address by Henry Schultz, on "The Standard Error of a Forecast from a Curve." The American Mathematical Society held a general session on Monday morning, followed by two sectional sessions devoted to "Algebra and Number Theory" and to "Applied Mathematics." It held two sectional sessions on Tuesday morning, devoted to "Analysis" and to "Geometry."

The Mathematical Association of America held sessions on Wednesday morning and afternoon, in addition to the joint meeting Tuesday afternoon with the American Mathematical Society. R. P. Baker spoke on the geometric representation of groups, illustrating his remarks by numerous slides of the appropriate geometric configurations. M. H. Ingraham discussed the structure of algebras of infinite order and especially the application of the theory of transfinite numbers and well-ordered sets to this problem. J. W. Young gave an outline of the contents of his forthcoming Carus Monograph on Projective Geometry. On Wednesday afternoon E. B. Lytle discussed the manner in which appreciation of form could be used as an index of mathematical ability. W. H. Roever showed how the laws of rolling motion might be utilized in the construction of roller bearings with sliding friction completely eliminated and Warren Weaver showed how mathematical methods might be used in dealing with problems of ore location.

The Chauvenet prize, of $100, was awarded to T. H. Hildebrandt, of the University of Michigan, for his paper on "The Borel Theorem and its Generalizations" (*Bulletin of the American Mathematical Society* for 1926). This prize is awarded every three or four years for the best expository paper published in English by a member of the Mathematical Association in each three or four year term prior to the year of the award.

A joint dinner for mathematicians was held Tuesday evening, at which W. H. Bussey, of the University of Minnesota, acted as toastmaster. E. R. Hedrick, president of the American Mathematical Society, and J. W. Young, president of the Mathematical Association of America, spoke on important features of the activities of their respective societies, and several other speakers discussed pertinent topics.

SECTION B (PHYSICS) AND RELATED ORGANIZATIONS

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

Section B met with its affiliated societies, the program being mainly in charge of the officers of the societies. The program for Tuesday afternoon was arranged by Section B. The first address was that of the retiring vice-president for the section, P. W. Bridgman, of Harvard University, on "Permanent

Elements in the Flux of Present Day Physics." Professor Bridgman opened with a short review of the astonishing advances made in physics within the last two or three decades, emphasizing the significant changes in our outlook on the physical world which have been necessitated by the work of Einstein, Bohr, Heisenberg, Jordan, Dirac and Weyl. Then came a discussion of what constitutes an adequate theory in physics. At one time it was considered necessary to attempt to explain all physical phenomena in terms of mechanical models, but this has been largely replaced and physicists are now generally content merely to describe and correlate the phenomena considered, using mathematical equations as the most concise way of effecting the description. The extraordinary success of the wave mechanics in interpreting results has led some to think that perhaps a real finality in our view of the physical world has at last been attained. But this is unlikely; many puzzles still remain unsolved, and their solution may call for further far-reaching changes in the theory. While it may be impossible for the majority of physicists to take time to master the mathematical technique of the new wave mechanics, yet Professor Bridgman thinks that every physicist should be sufficiently familiar with the fundamental concepts of this theory to enable him to think out problems in terms of these concepts, at least in a qualitative manner. The details of most of the mathematical developments are probably transient and need not be deeply studied by non-specialists, but certain broad fundamental principles probably transcend the mathematics by which they have been discovered.

The vice-presidential address was followed by two invitation addresses, one by A. Landé, of the University of Tübingen, and the other by L. H. Thomas, of the University of Cambridge. Professor Landé discussed "Polarization of Matter Waves." He pointed out that a Stern Gerlach apparatus with a screen having a suitable aperture is a polarizer for atoms, just as a Nicol prism is for light. But, while two Nicol prisms are "crossed" when they differ in orientation by 90°, two Stern Gerlach units have to differ in orientation with respect to each other by 180° to be "crossed" (*i.e.*, to refuse transmission to the matter beam passed by the first unit). Elliptically polarized matter beams can be formed out of linearly polarized beams by an intermediate transverse magnetic field between the two Stern Gerlach units. Rotation of the plane of polarization of matter beams can be effected by a longitudinal magnetic field between the two Stern Gerlach units. The analogy with optics is complete if the correspondence between the angles already mentioned is taken care of. The simple picture of quantization of direction in space fails in many cases and must be replaced by the methods of wave mechanics.

Dr. Thomas spoke on "The Wave Mechanics of Collision Processes." While there is considerable difference of opinion as to the meaning of the wave-mechanics, this does not extend to the methods of using it in practice. In the simplest possible case, the free motion of a single particle, solutions of the wave equation are built up out of error functions; mathematically these are most convenient and they are immediately seen to express exactly the Heisenberg uncertainty relation. When the wave equation for two particles that may collide is considered the solution takes a form recognized as expressing just what would be expected from a particle theory of the collision combined with the Heisenberg uncertainty; this requires essentially a wave-function which has a value for any possible position of the first particle combined with any possible position of the second. Finally, although it starts with an extended wave, an approximate solution of the wave-equation for a simplified picture of α-particles passing through a gas represents just that appearance of tracks seen in experiments and regarded as characteristic of a particle theory. It appears that the wave-picture can be extended right up to actual observation and, if the wave formulation is ultimate, it seems that we can, almost that we must, as C. G. Darwin expresses it, "put the inexplicable feature of the quantum theory, the irreconcilability of wave and particle, in exactly the place where we have got in any case to have an inexplicability in the transfer from objective to subjective." It may be that, given electrons, protons and the general nature of space and time (that is, given the form of the wave equation), all that remains of our knowledge may be expressed by the equation; but there still remains the form of the wave equation itself and we may have to go deeper to describe this.

Since there were but thirty-one contributed papers the American Physical Society completed its program in three sessions, Monday morning and afternoon and Tuesday morning. On Tuesday morning, the president of the society, H. G. Gale, of the University of Chicago, gave his presidential address, on "The Interplay of Theory and Experiment in Modern Spectroscopy." Balmer discovered in 1885 an empirical law connecting the frequencies of certain lines in the spectrum of atomic hydrogen. In 1913, Bohr, starting from the new quantum theory, not only accounted for these lines, but predicted other groups of lines, whose existence was soon confirmed by experiment. At the same time the confusion between the identity of the lines of ionized helium and those of atomic hydrogen was cleared up. A slight discrepancy found

between the wave lengths of certain lines in the spectra of ionized helium and of hydrogen was completely explained by Bohr in terms of the finite mass of the nucleus, but the lines in the hydrogen spectrum were known to have a fine structure which was not taken care of by the simple Bohr theory and Sommerfeld combined relativity change of mass with the idea of elliptical orbits, and was able to give a satisfactory description of the fine structure. The intensity relations in the fine structure were not correctly given by the Sommerfeld theory, however, and Landé introduced a third quantum number "*j*," which was very useful in the theory of the Zeeman effect. The introduction of a quantum number for the spin of an electron by Uhlenbeck and Goudsmit, together with the other quantum numbers, led to a satisfactory theory of multiplets. But, while the first two quantum numbers used by Bohr could be correlated in a straightforward manner with the dimensions of the orbits, no such clean-cut correlation could be made for the additional quantum numbers. Although many interesting relations could be described empirically in terms of these quantum numbers, the state of affairs was unsatisfactory and paved the way for the introduction of wave mechanics. Just as Balmer was the first to find an empirical relation for a certain atomic spectrum, so Deslandres is to be regarded as the first to attack band spectra successfully. Because of the presence of two outer, loosely bound electrons in molecular hydrogen, helium and lithium, there are parallelisms between the spectra of these molecules and the spectrum of atomic helium. The history of the discovery of two kinds of hydrogen, *viz.*, para-hydrogen and ortho-hydrogen, was traced. Lastly, the new field of nuclear spin was mentioned, together with the most promising ways of disclosing it experimentally.

The tenth birthday of the American Meteorological Society was fittingly celebrated by the biggest meeting the society has held, thanks to the mid-west meteorologists, headed by Charles D. Reed. Four sessions, with long and lively discussions, were attended by from forty to over sixty persons. With mid-west interest in meteorology revolving chiefly around the climate of this great agricultural region and the rapid strides being made in aeronautics, this meeting was occupied very largely with climatological and aeronautical work. Officials of the U. S. Weather Bureau's climatological service in Illinois, Wisconsin, Iowa, South Dakota, Nebraska and Kansas spoke of the work of the large and earnest corps of cooperative observers. These observers were represented on the program by H. P. Lasher, with "Observations Regarding the Effects of Air Pressure upon Animal Life," and H. W. Kerr, speaking on "Amateur Radio in Emergencies." Discussion was very active. The history of climatological work in the United States was discussed: G. K. Greening, "Climatic Conditions in the Louisiana Purchase as Found by Lewis and Clark"; Clarence J. Root, "The Meteorological Service One Hundred Years Ago," and Eric R. Miller, "New Light on the Beginnings of the Weather Bureau from the Papers of Increase A. Lapham."

President W. J. Humphreys' second presidential address, on "The Structure of the Atmosphere," provided an appropriate setting for a group of papers on airways weather work. Wesley L. Smith brought out the great importance of meteorology from the operations standpoint and F. H. Weck described a busy day at the Chicago airport. V. E. Jakl and W. C. Devereaux emphasized the hindrance imposed by fog and low clouds on aviation, and George Yates indicated the limits placed by weather on aerial photography.

Scientific long-range weather forecasting received a boost by Thomas A. Blair, in a paper on "Summer and Autumn Pressure Anomalies Affecting Winter Temperatures in the Upper Mississippi Valley." Characteristic distributions of pressure over the northern hemisphere were found to precede cold or warm winters in the upper Mississippi Valley. Mr. Blair and others were of the opinion that only through the use of northern hemisphere pressure departure maps (covering three months at a time) could a forecaster get such a picture of each year's situation as to enable him to forecast winter temperature for our interior.

John Patterson, director of the Meteorological Service of Canada, was elected president of the society for 1930 and 1931, and Edward Hall Howie, of the U. S. Weather Bureau, San Francisco, was elected vice-president for 1930 and 1931. Charles F. Brooks and Willis Ray Gregg were reelected secretary and treasurer, respectively, for 1930. H. Helm Clayton, Andrew E. Douglass, W. I. Milham, F. W. Reichelderfer and B. M. Varney were elected councilors for 1930–32.

SECTION C (CHEMISTRY)

(*Report from J. A. Wilkinson and W. F. Coover*)

All the sessions of Section C were held jointly with the Midwest Regional Group of the American Chemical Society, the Ames Section of the latter acting in the capacity of host. The Friday afternoon session, held in Des Moines, was devoted to a symposium on "Teaching General Chemistry." Neil Gordon, of Johns Hopkins University, editor of the *Journal of Chemical Education,* led the discussion and among the other speakers were teachers from high schools, junior colleges, liberal arts colleges, agricultural col-

leges and universities. R. A. Worstell, of Ft. Madison, and Neil Lutes, of Dubuque, outlined the problems and difficulties of teaching chemistry in the high school, and L. L. Minor, of Mason City, discussed the problems for the junior college. James E. Webster, of Oklahoma A. and M. College, reported the results of a questionnaire concerning the content of chemistry courses given at different schools to students in agriculture. Dr. Gordon emphasized the possibilities of talking motion pictures to supplement other methods of instruction in general chemistry. The paper that developed the greatest amount of discussion was presented by Willis J. Bray, of Missouri Teachers College, Kirksville, who presented results of aptitude tests showing that the difficulty experienced by students in general chemistry is largely due to the inability of the students to *read rapidly* and *understandingly* the ordinary text-book.

On Saturday morning at Ames the address of C. E. Kenneth Mees, retiring vice-president for Section C, was delivered by Leslie G. S. Brooker, in the absence of Dr. Mees. It dealt with development of photographic sensitizing dyes of the cyanine series. Orland R. Sweeney discussed possibilities for chemical utilization of agricultural products, especially the manufacture of wood and paper substitutes from cornstalks. At luncheon Dr. Mary Rising, of the University of Chicago, addressed the women on the subject of the contributions of chemistry to medicine with special reference to narcotics, anesthetics and analgesics.

On Saturday afternoon there were two simultaneous sessions, one devoted to a symposium on the "Chemical Utilization of Agricultural Products" and the other to a series of contributions. W. E. Emley, of the U. S. Bureau of Standards, discussed the "Manufacture of Xylose." A small cooperative plant is now producing about fifty pounds of xylose daily, using cottonseed bran. O. M. Buswell outlined his researches on the industrial utilization of cornstalks for the production of gas by the sludge process. H. A. Webber told of successful "Studies on Cornstalk Cellulose." Henry Gilman's paper was on "Furfural and its Derivatives," reporting on the preparation from furfural of many compounds, such as food preservatives, perfumes, flavoring extracts, antiseptics, insecticides, fungicides, anti-knock compounds and sweet-tasting compounds. E. V. Collins presented a paper by himself and J. B. Davidson, on the "Collection of Agricultural Materials." Difficulties encountered in the harvesting of cornstalks and getting them ready for transportation were discussed. Machinery for this is still in the experimental stage.

SECTION D (ASTRONOMY)

(*Report from Philip Fox*)

Section D held three sessions of papers contributed by astronomers from the Mississippi Valley. In the absence of Harlow Shapley, chairman of Section D, the retiring vice-president, J. S. Plaskett, and D. W. Morehouse presided. Several papers dealt with solar activity, all indicating that the present maximum is very broad. Among such papers were the account by C. D. Higgs and F. E. Roach of the recent November–December, 1929, disturbances, of unusual magnitude; an account of solar observations from 1890 to 1929 by D. E. Hadden, and a new attempt to relate the cause of sun-spots to planetary perturbations, by W. A. Luby. There were two excellent papers on the eclipse of May 9, 1929, the first by W. A. Cogshall, with beautiful photographs of the corona, taken at Iloilo, P. I., the second by H. T. Stetson, who got interesting results at Alor Star in spite of unfavorable sky. But perhaps the most important of this group of papers was that of H. T. Stetson on "Solar Activity and Radio Transmission in 1929." The motion-picture camera is coming into use in astronomy, as was illustrated by Dr. Stetson's motion pictures showing the various stages of the eclipse of the sun, and by a film by Philip Fox, showing the rotation of Jupiter and the progress of the moon into the earth's shadow during the eclipse of November 27, 1928. Dr. Stetson caught the very interesting instant of the appearance of the diamond ring effect. C. C. Wylie, who has enlisted wide cooperation in the observation of meteors, gave a discussion of material gathered and also plans for future observations by photographic methods. E. B. Frost presented a note on the installation of the Hale spectrohelioscope, a new and important tool for solar investigation; and E. A. Fath, a note on remounting a telescope, in which he described the making of a pier from boiler plates, joints being welded with an acetylene torch.

There were three papers on stellar spectroscopy. First, a paper by Paul Bourgeois, of the Yerkes Observatory, on the system 61 Mu Orionis, a system similar to 13 Ceti, a visual binary of rapid period, of which one component is a spectroscopic binary. The perturbations capable of observation in the spectroscopic system add great interest. Second, observations of 7 Epsilon Aurigae, by O. Struve and C. T. Elvey. This star is interesting not only because it has the longest known period of the eclipsing binaries, but also on account of the beauty and unusual variations in the spectrum. The third spectroscopic paper, Dr. J. S. Plaskett's vice-presidential address, on "Motions

of the B-Type Stars," was by far the most important paper of the program. An enormous number of observations (including the radial velocities of 815 stars), mainly accumulated at the Dominion Astrophysical Observatory, Ottawa, was given masterful and penetrating treatment, with results that point emphatically to the conclusion that our galaxy is in rotation about a distant center in the direction of longitude 327 degrees. This result makes our galaxy appear to be even more closely akin to the spiral nebulae than was supposed. It may be significant that the indicated direction of this motion coincides with that suggested by Dayton C. Miller's observations on ether drift. E. B. Frost's address on "Some Aspects of Celestial Evolution" was given at a general session of the association, as has been noted. This lecture dealt with the dramatic phenomenon of new stars and their bearing on theories of stellar and planetary evolution. A complimentary lecture to the public was given by Philip Fox on "The Adler Planetarium and Astronomical Museum of Chicago," which is to open about April 1, 1930.

An account of the astronomical features of the Des Moines meeting would be incomplete without mention of the visit to the Drake Municipal Observatory, which bears a dedication from the City of Des Moines to Professor D. W. Morehouse, president of Drake University, a rare college president, who, in addition to his many and exacting administrative duties, finds time to give a course in general astronomy and to direct the activities of this observatory.

SECTION E (GEOLOGY AND GEOGRAPHY)

(Report from Kirtley F. Mather)

Section E held four sessions on Monday and Tuesday. None of the organizations related to this section were in session in Des Moines, but about seventy-five geologists attended the meeting and thirty-eight papers were listed on the program. The address of the retiring vice-president, Frank Leverett, of the University of Michigan, was given Monday afternoon on "Problems of the Glacialist." Among other subjects, the causes of glacial climates were considered. Discussion centered chiefly about the papers by G. F. Kay and E. T. Apfel, "The Pre-Illinoian Pleistocene Geology of Iowa"; C. L. Baker, "Tectonics of the Eastern Mexico Cordillera and the Laramide Thrusts of Trans-Pecos Texas"; A. L. Lugn, "Ground Water Hydrology and Pleistocene Geology of the Platte River Valley and Adjacent Areas in Nebraska"; E. H. Barbour, "Proboscidea of Nebraska," and H. J. Cook, "Recent Discoveries concerning Ancient Man in North America." Other papers dealt with the stratigraphy and paleontology of various localities in the Mississippi Valley and with the physiographic development or glacial history of various portions of the northern states. On Monday afternoon a lecture complimentary to the public, on "Earthquakes and What They Tell Us," was delivered in the Shrine Temple auditorium by Dr. J. B. Macelwane, of St. Louis University. This lecture was illustrated in part by a motion-picture film on earthquakes recently produced by Pathé Exchange in cooperation with the department of geology of Harvard University. Monday evening a dinner for geologists and geographers was held in Younkers Tea Room, attended by approximately fifty guests. Tuesday evening George F. Kay, of the University of Iowa, vice-president of the American Association for Section E, delivered a lecture on "Glaciation: the Background of the Development of the Mississippi Valley," at a general session of the association.

SECTION F (ZOOLOGICAL SCIENCES) AND RELATED ORGANIZATIONS

(Reports from Geo. T. Hargitt, D. E. Minnich, J. J. Davis, T. H. Jones, Blanche Wheeler and Jesse M. Shaver)

Section F held no separate sessions at Des Moines and all contributed papers from its members appeared in the program of the American Society of Zoologists, which extended from Monday to Wednesday. The American Society of Zoologists held sessions for the reading of papers on Monday and Tuesday mornings. Fifty papers were read, exclusive of joint programs, distributed as follows: general and comparative physiology, 33; cytology, 7; embryology, 6, and miscellaneous, 4. The sessions were well attended, the attendance frequently running well over one hundred. The Monday afternoon program was given over to informal demonstrations, about twenty papers being presented in this manner. Most of the sessions were held in the library and annex of the Hotel Savery. The thanks of the two organizations are extended to the hotel management and to the local committee for their efficient preparations. Some of the sessions of the genetics section of the society were held at the Iowa State Agricultural College, in Ames. Joint sessions were held with the American Society of Parasitologists on Monday morning and with the Ecological Society of America on Tuesday morning. The annual biological smoker occurred Monday evening, a most enjoyable social gathering in the Scottish Rite Temple, whose fine building was opened for inspection and whose hospitality was generously extended. Several of the lectures at general sessions and several of the complimentary non-technical lec-

tures were of a biological character and were enjoyed by many of the attending zoologists.

On Tuesday evening a dinner for all zoologists was held at the Hotel Savery (headquarters), attended by about two hundred, following which was delivered the address of the retiring vice-president of Section F, M. F. Guyer, of the University of Wisconsin. Speaking on "The Germinal Background of Somatic Acquirements," Professor Guyer discussed the relations of organisms to their surroundings, their adaptations, variations and modifications, and pointed out some of the possible correlations between these and the germinal constitution. The germ cells and genes are subject to the same influences as the body and have been shown in some cases to be directly influenced or modified by external forces. This paper is to be published in SCIENCE. On Wednesday morning a general session of all zoologists was devoted to the address of the retiring president of the American Society of Zoologists, C. B. Davenport, on the topic, "Light Thrown on Evolution by Genetics." Dr. Davenport discussed genes in relation to both individual development and evolution; both are related to the same internal causes and are conditioned by the environment; it is to the genes and their behavior that we go for an understanding of ontogeny and evolution.

The Entomological Society of America held its twenty-fourth annual meeting from Saturday to Monday, with thirty-one contributed papers. One afternoon was devoted to an invitational symposium on "Important Contributions which America has Made to the Study of Insects." The discussions on this subject included taxonomic contributions by C. E. Mickel, biological by D. M. DeLong, morphological by W. P. Hayes, physiological by E. F. Phillips, ecological by S. A. Graham and economic by Arthur Gibson. Much interest and discussion were aroused by this symposium. All papers on the program were exceedingly interesting in their special fields. Of general interest were the following: "The Food of Insects Viewed from the Biological and Human Standpoint," by the retiring president, C. T. Brues; "Analysis of Metamorphosis in Insects," by C. H. Kennedy; "Dragon-fly Collecting in China," by J. G. Needham; "The Biotic Constants of Insects," by R. N. Chapman, and "Entomology around the World," by T. D. A. Cockerell. The annual public address of the Entomological Society was given by William M. Mann, director of the National Zoological Park, at Washington, on "Economic Adventures of an Uneconomic Entomologist." Dr. Mann told of experiences in Lower California, Mexico and Central American countries. On Sunday there was an informal inspection of the entomological work of the Iowa State College, at Ames. The officers of the Entomological Society for 1930 are: *President,* Edith M. Patch; *vice-president,* R. E. Snodgrass; *second vice-president,* R. W. Doane; *secretary-treasurer,* J. J. Davis.

The American Association of Economic Entomologists held its forty-second annual meeting from Monday to Wednesday. At the meeting of the Section of Plant Quarantine and Inspection (F. N. Wallace, *chairman;* S. B. Fracker, *secretary*), Mr. Wallis discussed the training and temperament required for successful plant quarantine enforcement. The status and importance of the Mediterranean fruit-fly eradication campaign in Florida were described by L. A. Strong and Wilmon Newell. Other phases of federal quarantine activities and similar work in the various states were discussed by a number of speakers. Officers of the Quarantine Section for 1930 are: E. N. Cory, *chairman;* S. B. Fracker, *secretary.*—The Section of Extension (J. A. Hyslop, *chairman;* G. F. MacLeod, *secretary*) held a symposium of several short papers on cooperative work among extension entomologists.—The Section of Apiculture (G. M. Bentley, *chairman;* E. N. Cory, *secretary*) was addressed by the chairman and had a program consisting of ten papers, dealing with various phases of apiculture. R. L. Parker is chairman for 1930 and F. B. Paddock is secretary.

The general program of the Association of Economic Entomologists began on Tuesday morning, with the address of President T. J. Headlee, on "Some Tendencies in Modern Economic Entomological Research." This was followed by the reading of fifty-seven papers. Of these there were four papers on insects affecting forest and shade trees, eighteen on insects affecting deciduous fruits, thirteen on insects affecting cereal, forage and field crops, one on insects affecting animals, five on insects affecting truck crops, five on insects affecting the household and stored products and six on unclassified topics. Of the papers on insects affecting deciduous fruits, there were six on the codling-moth and five on the oriental fruit moth, various measures for the control of each pest being discussed. Papers relative to new pests of apple, cherry and raspberry were also presented. Papers on insects affecting cereal, forage and field crops dealt with the biology of the Hessian fly and the corn-borer, the pink bollworm, wireworms and certain insects attacking clover and alfalfa. Papers dealing with insects affecting truck crops had to do with the Mexican bean-beetle, the potato leaf-hopper and the onion maggot, while those relating to insects affecting the household and stored products covered the control of insect pests of upholstered furniture, storage of furs and other garments, the pea weevil

problem and methods of protecting seed. Papers having to do with insecticides dealt with lead arsenate and sodium fluosilicate, arsenical substitutes, oil sprays and insect respiration in relation to the toxicity of contact insecticides. Other papers were presented on parasites, insect association studies and experimental plots.

On Sunday many of the members attending the meeting of the Association of Economic Entomologists visited the Iowa State College at Ames, where they learned much of the work of the departments of zoology and entomology and attended an entomologists' dinner. The speaker at the dinner was Herbert Osborn, of the Ohio State University, who discussed the early history of entomology in the central states. The regular entomologists' dinner was held at the Hotel Savery in Des Moines on Tuesday evening, and it was well attended and very much enjoyed. Franklin Sherman is president of the Association of Economic Entomologists for 1930, J. S. Houser is first vice-president and A. F. Burgess is secretary.

The American Society of Parasitologists held its sixth annual meeting from Saturday to Tuesday, with about seventy members present. The address of the retiring president, N. A. Cobb, on "Recent Aspects of Nematology," was of unusual interest. After showing a fine series of lantern slides to illustrate the recent advances in knowledge of the structure and biology of the free-living nematodes, Dr. Cobb pointed out in detail the inadequacy of the discussion given to this group in text-books of zoology. An important feature of the Des Moines program was a symposium on veterinary parasitology. E. R. Becker and J. A. Schulz reported some interesting experiments on the infusoria of the stomachs of ruminants, indicating that these protozoa were of no aid to the host in the digestion of food. M. C. Hall discussed in a very entertaining and stimulating way the training and point of view needed by a student on entering the field of veterinary parasitology, and F. C. Bishopp gave a review of the most important unsolved problems in the relation of insects to veterinary medicine. The symposium closed with a motion picture prepared by J. N. Shaw and B. T. Simms on the liver flukes of sheep, cattle and goats.

An unusually large number of interesting papers were contributed, a portion of which were presented wholly or in part by demonstrations. A. E. Woodhead presented by motion picture and lantern slides some of his recent studies on the larvae of Bucephalus. In papers on the germ-cell cycle of the digenetic trematodes F. C. Brooks reported that he was unable to find any indication of polar bodies in the sporocysts and rediae, and he presented a new theory of trematode development. H. E. Meleney presented a preliminary report on some community surveys for intestinal protozoa in Tennessee, which showed a very high incidence of the dysenteric ameba, *Endamoeba histolytica*. Besides those in the symposium and the address of the retiring president there were fifty-two papers on the program, of which twenty-one were read by title. Of the contributed papers sixteen were in protozoology, twenty-nine in helminthology and seven in entomology or general parasitology. These papers give a fairly good cross section of the research that is being done in the United States in parasitology. They show the present emphasis on experimental method and the part that practical problems of human or economic interest play in the field. The following officers of the Society of Parasitologists were elected for 1930: *President,* W. W. Cort; *vice-president,* E. C. Faust; *secretary-treasurer,* N. R. Stoll; *new council members,* Benjamin Schwartz and W. B. Herms.

The Wilson Ornithological Club held its sixteenth annual meeting on Friday and Saturday with 210 registered members and visitors present. Twenty-six papers covering a wide range of topics were presented and eight papers were read by title. The order of moulting of feathers in birds was traced by treating each feather tract separately, by Lynds Jones. L. H. Pammel showed interesting lists of flowers that humming-birds have been observed to visit, together with dates of their visitation. Humming-birds leave in the fall immediately after frost kills the humming-bird flowers. The chemical nature of the saliva used by the chimney swift in gluing its nest together was described by Althea R. Sherman and Burton H. St. John. L. J. Cole presented some data on determinate and indeterminate egg-laying, especially of the house wren. Jesse M. Shaver analyzed statistically various temperature factors as related to the time of ending of the mocking-bird's evening song. The distribution and taxonomic relations of the crowned sparrows were considered in a paper presented by Myron H. Swenk. An especially pleasing paper was the comparison of the old, sincere ornithologists of the past with the numerous publicity seekers and nature fakirs of the present, by Althea R. Sherman. Seven papers at this meeting were illustrated by motion pictures. The following officers were elected for 1930: *President,* J. W. Stack; *vice-president,* Frank L. Burns; *secretary,* Jesse M. Shaver; *treasurer,* W. M. Rosen; *councilors:* Albert Ganier, Myron H. Swenk, Mrs. Margaret M. Nice, Lynds Jones.

SECTION G (BOTANICAL SCIENCES) AND RELATED ORGANIZATIONS

(Reports from Sam F. Trelease, Arthur J. Eames, A. S. Foster, F. E. Denny, G. W. Martin, W. A. Whitney and W. H. Horr)

As in recent years, Section G arranged a single session of invited papers of general interest, held jointly with the associated botanical societies on Tuesday afternoon. C. E. Allen gave the retiring vice-presidential address on "Inheritance in a Hepatic." This very interesting address on Dr. Allen's fundamental botanical research in genetics was followed by a symposium on the biology of maize, in which G. N. Collins, Paul Weatherwax, E. W. Lindstrom and L. W. Durrell read papers on the phylogeny, ontogeny, genetics and pathology of maize. These papers, together with those read at a special session of Section O on maize, provided a very valuable summary of recent investigation on that important plant.

The Botanical Society of America held a most successful meeting from Monday to Wednesday, with a registered attendance of 260. The sectional meetings were unusually well attended, with much discussion. The annual dinner for botanists was held on Tuesday evening, with 221 present. President Margaret C. Ferguson presided, and retiring president A. H. R. Buller delivered the presidential address. Illustrated reports of the recent remarkably successful summer meetings of the society were presented by A. J. Eames and L. W. Durrell. The following officers were elected: *President,* L. W. Sharp; *vice-president,* R. H. True; *editor-in-chief,* E. W. Sinnott.

At three well-attended sessions of the General Section of the society topics in paleobotany, cytology, morphology and anatomy were considered. By means of lantern slides, the details of tracheary pitting and the relationship of primary to secondary xylem in fossilized wood of Callizylon were clearly demonstrated. The anatomy of the so-called "pistol-butted" trees of mountain slopes occasioned discussion, especially in regard to physiological and developmental factors. A paper dealt with the origin of the cellular layers and the chemical nature of the cell walls in the seed coats of alfalfa and clover. Several papers were concerned with special phases of the morphology of cryptogams, and interesting reports were made on the development and structure of the gametophytes of various liverworts, on the monoecious gametophytes of several species of Equisetum and on the imperfect state of our knowledge of the life-cycle of the marine alga Leathesia. A paper on gamete formation in certain marine diatoms emphasized the need for further American research in this field. Several papers dealing with angiosperm morphology were read, and an observation on dehiscent sterile achenes in the strawberry was discussed. A preliminary report was presented on the morphology and initial ontogenetic divergence between cataphylls and foliage leaves in Oenothera and Eleocharis. A report of the detailed development of cotton fibers was of particular interest.

Three meetings of the Physiological Section of the Botanical Society were held. Of special interest were invited papers by Ernest Bateman, of the U. S. Forest Products Laboratory, on toxicity of chemicals to fungi, and by E. J. Lund, of the University of Texas, on bioelectric currents in plants as related to the life activity and correlation of cells. Lund's report was supplemented by papers by Gordon Marsh on the inherent electromotive force of the onion root tip. There were five papers on the general subject of plant nutrition: Wanda K. Farr showed growth curves of root hairs in solutions of calcium phosphate at different pH values; Sophia H. Eckerson gave the results of a microchemical study of tomato plants during phosphate starvation and recovery; Mary E. Reid presented further reports on the nitrogen metabolism of squash under different conditions; F. B. Wann reported on the effect of iron salts on the recovery of plants from chlorosis, and Wann and E. O. Leonard showed the relation of nitrates to the growth of cuttings of *Mentha piperita.* Two papers dealt with the virus problem: A. A. Dunlap showed that the mosaic and yellows diseases had contrasting effects upon the carbohydrate and nitrogenous substances, and B. M. Duggar gave a further report upon the inactivating effect produced by the addition of various substances to tobacco virus. J. B. Overton and E. A. Cockefair found that in the aging of century-old cells of cactus the chemical changes were much more marked than the cytological changes. G. J. Peirce was able to introduce starch suspensions into the petioles of plants and thus follow the path of conduction in the vessels. Adelia McCrea noted a favorable effect of ultra-violet light upon the potency of *Digitalis purpurea.* Measurements of the internal and external temperatures of leaves were reported by J. C. Frazier and E. C. Miller. There were two papers on respiration: by F. G. Gustafson on tomato fruits and by B. E. Livingston and W. B. Mack, who reported a double optimum in oxygen concentration. Other subjects treated were: regeneration of tissues by cuttings, glucosides of Marrubium, reducing substances in plants, rest period of seeds and buds as related to storage conditions and chemical treatments. The officers of the Physiological Section for 1930 are:

Chairman, E. N. Transeau; *vice-chairman,* E. F. Hopkins; *members of the board,* B. M. Duggar and L. Knudson; *secretary,* F. E. Denny.

The Mycological Section held two sessions, notable for the unusual attention paid to the Phycomycetes. F. B. Cotner discussed the development and cytology of zoospores of the Oomycetes under controlled temperature conditions; E. M. Gilbert and W. A. Kuntz made significant contributions to the life histories of species of Empusa. Papers on fungi of other groups included those by Leva B. Walker on *Ascoidea rubescens,* by A. H. R. Buller on Sporobolomyces and by B. O. Dodge on microconidia of Monilia. The section approved a projected program in commemoration of the hundredth anniversary of the birth of Anton de Bary, to be presented in cooperation with the American Phytopathological Society, at the Cleveland meeting next December.

The American Phytopathological Society held its twenty-first annual meeting from Saturday through Tuesday with an attendance of about 150. The officers for 1930 are: *President,* H. S. Fawcett; *vice-president,* Max W. Gardner; *secretary-treasurer,* F. C. Meier; *councilor,* H. P. Barss; *editor-in-chief of Phytopathology,* H. B. Humphrey. The program consisted of ninety-three papers delivered before the society's sections and five delivered at two joint sessions, with Section G of the American Association and with the Society of American Bacteriologists. The contributions may be classified as follows: cereal diseases, twenty-five; vegetable diseases, thirty-two; fruit diseases, thirteen; miscellaneous diseases, twelve; diseases of ornamentals, nine. There were two invited papers, by Christine Buisman, on the Dutch elm disease, and by R. P. White, on the future of the pathology of ornamentals. The annual banquet on Saturday evening will long be remembered because of the clever program of original songs, impersonations, etc., rendered by members from Iowa, Minnesota and Wisconsin. On Sunday evening was held the second annual meeting with business men and farmers, the discussion being this year on "What Present Trends in Agriculture Demand of Plant Pathology." Thomas Roberts (General Milling Company) spoke on the great west and wheat; the nation's greatest crop, corn, was discussed by H. A. Wallace (Wallace Publishing Company); the sugar-beet industry was represented by W. H. Baird (American Beet Sugar Company), and a paper on conserving the intensive crops prepared by C. G. Woodbury (National Canners Association) was read.

The Monday sessions were held at the Iowa State College, at Ames, where there was an elaborate exhibit of experimental work. Displays of virus diseases, crown-gall investigations and corn seed treatments were noteworthy. There were three simultaneous sessions Monday morning and a joint session in the afternoon with the Society of American Bacteriologists, with papers on bacteriophage and plant and animal viroses.

The extension pathologists held a round-table discussion on Tuesday with R. E. Vaughan, of Wisconsin, as chairman, who emphasized the importance of disease control projects in close cooperation with other extension work, the extension pathologist being the contact agent between investigator and farmer. From the contributions the following are mentioned at random. The Dutch elm disease, caused by *Graphium ulmi,* was described by Christine Buisman, who pointed out the dangers should this fungus cross the ocean. Margaret Newton, Thorvaldur Johnson and A. N. Brown, and E. C. Stakman, M. N. Levine and R. U. Cotter, reported independently upon the hybridization and mutation in *Puccinia graminis.* J. C. Walker showed that resistance to cabbage yellows was inherited as a dominant character. The status of late blight of tomatoes in California was discussed by G. B. Ramsey and Alice A. Bailey. Texas root rot of cotton was described by Walter N. Ezekiel and J. J. Taubenhaus. The toxicity of flax extracts for *Fusarium lini* was correlated with the susceptibility or resistance of the variety from which the extracts were taken, stated E. S. Reynolds. Injury to apple leaves and limbs due to spray oil was reported by P. A. Young. The seasonal development of crown gall and hairy root were described by A. J. Riker, E. Hildebrand and G. W. Keitt. John E. Sass reported on histological studies of apple callus knots. The movement of the crown-gall organism through the tissues of the tomato plant was described by Spas Ivanoff and A. J. Riker. Years when pomaceous fruit diseases are prevalent, stated L. R. Tehon and G. L. Stout, are those years when drupaceous fruit diseases are relatively unimportant. The present status of tomato bacterial canker was discussed by Mary K. Bryan. Selection of plants and plot screening again proved successful for the control of aster yellows, as reported by L. R. Jones and Regina S. Riker. L. O. Kunkel reported a disease of tomatoes apparently identical with aster yellows. The emetic substances in scabby barley are apparently associated with glucosides and basic nitrogen compounds, according to Allan D. Dickson, Karl P. Link, B. H. Roche and James G. Dickson. Transmission by various insects of two potato-virus diseases was reported by R. W. Goss. Two virus diseases of the jimson-weed appear to be related respectively to diseases of similar nature in tomatoes and potatoes, according to

R. W. Samson. A method for recording the distribution of copper dusts and sprays on leaves was described by F. M. Blodgett and E. O. Mader. H. M. Quanjer reported on the comparison between the American and European leafroll of potatoes. Factors affecting the development of the aecial stage of *Puccinia graminis* were discussed by Ralph U. Cotter. The presence of the mycelium of *Peronospora schleideni* in onion flowers was described by H. T. Cook. G. B. Ramsey and Alice A. Bailey stated that ultra-violet light stimulates sporulation in *Macrosporium tomato* and *Fusarium cepae*. B. M. Duggar described the use of diatomaceous earth filters as standard technique in clearing expressed plant juices. Stomatal infection of tobacco by mosaic was reported by Burt Johnson and B. M. Duggar. Histological changes under mosaic infection were described by Melville T. Cook.

The annual dinner of the American Society of Plant Physiologists occurred Monday evening, with eighty-five members present. The address of President S. V. Eaton was on "Mineral Nutrition of Plants with Special Reference to Sulphur." J. B. Overton announced the first award of the Stephen Hales prize to D. R. Hoagland, and J. H. Gourley announced that C. A. Shull and G. T. Peirce were elected to Charles Reid Barnes life membership.

Thirty-five papers were presented in the regular sessions and eight in the joint session with the American Society for Horticultural Science. R. B. Harvey discussed storage temperatures and freezing injuries to vegetables, and time and temperature factors in the hardening of plants. According to P. W. Rohrbaugh, heat precipitable colloids are produced in the hardening process in apple-trees. T. N. Martin found for sweet clover a shift in growth from tops to roots beginning about October 1. Eric Ashby reported that *Lemna minor* showed a much greater development in a medium containing minute quantities of organic matter than in an inorganic medium containing the same elements, suggesting the presence of auximones. Charles Sheard and A. Frances Johnson found a change in electric potentials and currents produced in plants under various types of radiant energy; leaves "take a coat of tan" under ultra-violet irradiation. Walter F. Loehwing reported that increased light intensity decreased the acidity of the expressed sap of wheat seedlings. F. M. Andrews moved protoplasm from one sieve tube to another by centrifugal force but could not move the layer adjacent to the cell wall.

At a session devoted to corn and small grains J. D. Sayre presented a paper on a method for extracting sap from maize plants, and V. H. Morris proposed a method for the quantitative analysis of the expressed sap. W. E. Tottingham's investigations showed that temperature did not affect the nitrogen content of maize but that the shorter waves of visible light favored the intake of nutrients from water cultures. George H. Dungan told how the removal of leaves lowered the quantity or quality of corn according to the time of their removal. In similar work W. E. Loomis showed that 20 per cent. of the leaves of tasseled corn was necessary to maintain the vegetative structures, suggesting that (1) translocation is a limiting factor for photosynthesis in maize, (2) moderate decrease in leaf area does not produce a corresponding decrease in dry-matter production and (3) any influence that decreases the translocation rate retards photosynthetic activity. J. D. Sayre reported that demonstrable iron accumulated only around the veins at the nodal plates in maize. V. H. Morris found a gradual increase in dry matter in the stem from the time of tasseling to maturity; reducing sugars were about equally distributed in all parts of the stem and decreased with maturity, but half of the sucrose was found in the lowest four joints.

In the session with the American Society for Horticultural Science Charles Sheard discussed germination, stalk length, leaf area, wet weight and chlorophyll development in plants grown under vita-glass, ordinary window glass, blue glass and amber glass, respectively. J. R. Magness reported a correlation between number of leaves per fruit and fruit size; with twenty leaves per apple the fruit size was 50 per cent. greater than with ten leaves per apple. W. P. Tufts presented observations on seasonal temperature and fruit ripening in certain California valleys. Ora Smith reported on the rest period, interior gas analysis and permeability to gases in potatoes stored in wet and in dry surroundings at different temperatures. P. A. Young reported greater absorption of oil into the leaf at the margin of a drop of spray than at the center of the drop. J. H. Gourley and E. F. Hopkins found no difference in keeping quality between apples from trees receiving the normal amount and those receiving three times the normal amount of nitrate fertilizer, even though the nitrogen content of the fruit was appreciably greater in the latter instance.

At the final session W. E. Tottingham described methods of presentation used by him in teaching plant biochemistry. H. P. Cooper, working with forty-five samples of pasture grasses, found that the metallic constituents with high standard electrode potential were apparently selectively absorbed. J. E. Weaver

and W. J. Himmel found a decided difference between Typha roots grown in water and those grown in well-aerated soil. Joseph C. Gilman and C. H. Barron reported that the temperature of germinating sterilized oats was raised 6.8° C. but that when *Aspergillus fumigatus* was present on oats with but 18 per cent. of water the temperature was raised 26.4° C. Robert P. Marsh reviewed his work on ferrous-sulphate treatment of clover and the accumulation of the salt in the leaves as shown by X-ray photographs.

ORGANIZATIONS RELATED TO SECTIONS F AND G

(Reports from E. W. Lindstrom, A. O. Weese and P. W. Whiting)

The American Society of Naturalists held a symposium on radiation on Wednesday afternoon. Selig Hecht spoke on "Radiation and Vision," describing and illustrating some newer methods of investigating quantitatively visual acuity in relation to the distribution of the rod-and-cone mechanism of the eye. By an ingenious experiment he demonstrated and projected in motion picture the visual response of Drosophila to a series of light stimulations calibrated to correspond with the theory of the random distribution of the light receptors in the eye. The results were startlingly satisfying and very consistent with our knowledge of eye structure. H. J. Muller spoke on "Radiation and Genetics," summarizing our knowledge on the production of mutations by X-ray, radium and natural earth emanations and showing the bearing of this on evolution. He said that if an electron has been able to knock out a portion of a gene (giving a retrogressive mutation), it has also been able to put it back again, making it possible for progressive variations to be thus produced. Robert Emerson, speaking on "Radiation and Photosynthesis," gave a critical survey of what is known of the relations between chlorophyll and light. He described some experiments on the relation of light and chlorophyll content to photosynthesis in the alga Chlorella, in which the chlorophyll content may be regulated at will by controlling the supply of iron in the medium. The rate of photosynthesis was found to vary almost directly with the amount of chlorophyll in the cell. An audience of 150 were well pleased with the program and with the remarks of the presiding officer, President G. H. Parker. A. F. Blakeslee was elected president for 1930 and Charles Zeleny vice-president. At the annual dinner Wednesday evening President Parker gave an address entitled "Kim Kurmah, or What Are We About?" with a humorous and searching analysis of the activities of the teacher and investigator in biology.

The Ecological Society of America met on Monday, Tuesday and Wednesday. The Monday afternoon and Tuesday morning sessions were held jointly with the Botanical Society of America and the American Society of Zoologists, respectively. The president's symposium, on the "Ecological Importance of pH," was of special interest, as was also a symposium on "Range Ecology," held at Iowa State College Wednesday afternoon. The society dinner was held at Ames Wednesday evening and was followed by an address, "Concerning Community Studies," by the retiring president, W. C. Allee. The following officers were elected: J. E. Weaver, *president;* W. P. Taylor, *vice-president;* A. O. Weese, *secretary-treasurer;* Barrington Moore, *editor.*

The American Microscopical Society held its forty-eighth annual meeting on Monday and elected the following officers for 1930: *president,* D. H. Wenrich; *first vice-president,* L. H. Tiffany; *second vice-president,* H. W. Stunkard; *member of executive committee,* S. Eddy. To honorary membership, the society elected Edward Pennock and Wm. Hoskins, who have maintained membership continuously since 1879. A $50 life membership was awarded to Samuel Eddy for securing the largest number of new members in the competition of 1929. A committee with Paul S. Welch as chairman was commissioned to draw up resolutions on the death of former secretary T. W. Galloway, for publication in the proceedings.

The ninth annual meeting of the Joint Genetics Sections of the American Society of Zoologists and the Botanical Society of America was held in part at Iowa State College, Ames, in part at Des Moines. At three sessions twenty-nine papers were read, among which a noteworthy contribution was made by Sewall Wright, entitled "Evolution in a Mendelian Population." Among exhibits and demonstrations was one by G. H. Rieman, illustrating genetic factors for pigmentation in the onion bulb and their relation to disease resistance. E. W. Lindstrom showed growing specimens of haploid tomatoes and of diploids derived both sexually and asexually from these, also microscopic preparations demonstrating chromosome segregation in haploid tomatoes. F. B. Hanson reported a striking parallelism between increasing X-ray voltage and lethal mutation in Drosophila, and also experiments demonstrating the effect of earth radiation in producing lethal mutations. Several papers reported new cases of linkage in plants and animals. It was voted that a committee be named to investigate the possibilities of organizing American geneticists and to report at the Cleveland meeting. Officers for 1930 are as follows: *chairman,*

L. J. Cole; *secretary-treasurer,* P. W. Whiting; *society representative,* L. J. Stadler.

SECTION H (ANTHROPOLOGY)

(Report from C. H. Danforth)

Section H held sessions on Monday. The early occurrences of man in America and the archeology of the Mississippi Valley were the two outstanding subjects discussed. The opinion seems to be gaining ground that man and mammoth existed contemporaneously on the American continent; but granting this (which many students are reluctant to do), the question still remains as to whether man appeared earlier, or certain extinct mammals persisted longer, than has heretofore been supposed. P. E. Cox, state archeologist of Tennessee, argued that man in America has an antiquity comparable to that of early man in other parts of the world. Harold J. Cook, of the Colorado Museum, discussed the paleontology of Colorado, Oklahoma and Texas in relation to human finds in this region, particularly the "Folsom man." E. B. Renaud, of the University of Denver, reported on the prehistoric culture of these people. Cook emphasized the association in this region of human bones with those of extinct forms of bison, mammoth, etc., in formations where recent species other than man are not represented. Suggestion of a possibly late persistence of the mammoth was found by William D. Strong, of Nebraska, in an interesting series of Algonkian myths whose source would be difficult to explain except on the basis of an original first-hand knowledge of living proboscidians.

A discussion of the present status of the Nebraska Indians and a tentative outline of the archeology of Iowa with many illuminating data on the history and geography of the state were presented, respectively, by A. E. Sheldon, of the Nebraska Historical Society, and Charles R. Keyes, of the Iowa Archeological Survey. An interesting contribution to physical anthropology was contained in a paper by George D. Williams, of Washington University, who finds that, irrespective of total stature or length of tibia, the fleshy belly of the gastrocnemius is shorter in proportion to total muscle length in the Negro than in the white subject.

There was a joint session with the National Research Council's committee on state archeological surveys, at which Carl E. Guthe presided. Dr. Guthe laid stress on the extent of unwitting vandalism and irreparable loss to science occasioned by uninformed amateur collectors, especially curio seekers. Bones and artifacts are practically valueless in the absence of the fullest possible information as to source and associations. These most important data are the very ones which are most often lost or rendered equivocal by the amateur and the poorly equipped museum. It behooves anthropology vigorously to discourage curio seeking, to promote a better appreciation of what facts are important and to strive for the type of cooperation between professional and amateur that has proved so mutually helpful, for example, in ornithology and in astronomy. In the vice-presidential address Dr. Fay-Cooper Cole stressed the importance of the anthropological view-point in the treatment of Indians, immigrants and dependent peoples generally. Examples from the experience of Dutch, English and other colonial powers were cited to show the excellent results that have commonly followed study of and concessions to native religions and customs as contrasted with the almost invariably disastrous outcome when these considerations have been ignored.

SECTION I (PSYCHOLOGY)

(Report from John E. Anderson)

The Des Moines program of Section I was the most extensive one ever arranged by the section, due in part to the fact that, owing to the holding of the Ninth International Congress of Psychology in September, no meeting of the American Psychological Association was held this year. On Friday morning there was a joint session with Section Q, devoted to invitation papers. George D. Stoddard, of the University of Iowa, discussed the objectives of research in child development, with many illustrations from the experimental literature; M. E. Haggerty, of the University of Minnesota, described the methods and progress of his extensive historical analysis of the literature on learning, and Frank N. Freeman, of the University of Chicago, presented the results of his important study on the resemblance of twins. On Friday afternoon a second joint session was held with Section Q for the presentation of the vice-presidential addresses. Howard C. Warren, of Princeton University, retiring vice-president for Section I, spoke on "The Organic World and the Causal Principle," giving a scholarly and constructive analysis of the relation between the doctrine of emergent evolution and the mechanistic interpretation of the universe. Truman Lee Kelley, of Stanford University, retiring vice-president for Section Q, spoke on "The Scientific *versus* the Philosophical Approach to the Novel Problem," bringing into clear relief the characteristic features and results of the two methods of approach. During the remainder of Friday afternoon and on Saturday five sessions were held for contributed

papers, of which thirty were read. Four of these were in the field of general psychology, seven in experimental psychology, six in genetic psychology, seven in educational psychology and the remaining six may be classified as miscellaneous. The attendance at all sessions was unusually good, varying from 70 for the smallest session to 250 for the session at which the vice-presidential addresses were given.

SECTION K (SOCIAL AND ECONOMIC SCIENCES)

(*Report from Charles F. Roos*)

Sections K and M (Engineering) held a symposium on the relations of the social sciences and statistics to engineering, with invitation addresses. In a paper on "The Placement of Engineering Graduates before and after Graduation," John R. Bangs, Jr., of Cornell University, contradicted the somewhat current opinion that the engineering profession is slightly overcrowded. Professor Bangs proposed that engineering schools have a personnel officer who should obtain careful character and vocational analyses from many acquaintances of each student and from these prepare a rating for industrial organizations and for helping the student in picking the right kind of a position. He questioned the ethics of a minority of industrial concerns which try to force students into hurried decisions. In 1928 nearly five times as many positions were offered as there were men in the mechanical engineering graduating class of Cornell University, and the majority of starting salaries were in the neighborhood of $150 per month. During the last three years average starting salaries have increased about $2 per month per year. The old method of determining stresses and strains by picturing material as a continuous, homogeneous, isotropic substance, capable of being subdivided indefinitely without losing any properties exhibited in the bulk, is erroneous, according to F. B. Seely, of the University of Illinois, who read a paper on "The Statistical Element in the Mechanics of Materials." Experiments involving repeated stresses (fatigue of metals) and studies of the internal character of metals made possible by the use of the metallurgical microscope have produced considerable modification in our conception of materials, and material is now pictured as an aggregate of structural units varying as to size and shape, disposed at random orientation and containing internal discontinuities such as minute cracks and inclusions which are also distributed according to the laws of chance. For such a conception the problem of determining stresses is one where exact calculations can have no place, but occurrences are governed by probabilities and are susceptible to statistical analysis. In his paper on "Economic Quality Control of the Manufactured Article," W. A. Shewhart, of the Bell Telephone Laboratories, said that the aim in manufacturing is no longer to do exactly what we want to do, but to approach what we desire within certain limits. This revision in ideas brings with it a modification of methods of controlling quality all the way from the raw material to the finished product. By the use of probability and statistical theories it is now possible to control quality within limits and to obtain more economically a product which does not vary more than a specified amount which may be left to chance. Dr. Shewhart exhibited charts to show that his method actually works in the manufacturing of telephones and other equipment used by the telephone companies. Harold Hotelling, of Stanford University, gave a paper entitled "The Economics of Exhaustible Assets."

In his vice-presidential address on "The Future of Retirement Schemes for Superannuated Employees," H. L. Rietz, of the University of Iowa, took and defended the position that both the employer in industry and the public, as an employer for the public service, should clearly recognize retirement allowances as sound business and not as acts of charity. He predicted that there will gradually be a more and more pronounced drift towards retirement plans of the reserve, contractual type, operated by organizations as permanent and trustworthy as legal reserve life insurance companies and subject to state supervision similar to that exercised over life insurance companies. The remainder of the Monday program was devoted to invited and contributed papers by E. B. Reuter, G. D. Stoddard, C. I. Bray, E. D. Starbuck, W. G. Bergman, C. F. Roos and J. E. Brindley. Tuesday morning was devoted to a joint program with Section A (Mathematics) and the American Mathematical Society, the program consisting of papers by Henry Schultz, H. L. Rietz, H. Hotelling, G. R. Davies, P. R. Rider and H. A. Meyer. In an invited paper on "The Standard Error of a Forecast from a Curve," Henry Schultz, of the University of Chicago, employed a formula due to Gauss but the importance of which appears not to have been recognized before, and showed that forecasts of the population of the United States are subject to much larger "probable errors" than statisticians have generally supposed. Professor Schultz showed that, assuming that the well-known Pearl-Reed population curve is the proper one to use in estimating our future population, the chances are even that the actual population in the year 2100 will differ by more than ten and a

half millions from the forecasted population of 196 millions. The accepted methods lead to a corresponding error of estimate of only a half million. Using for illustrations the production of hay in the United States and the growth of yeast under laboratory conditions, Professor Schultz showed further that there is no necessary relation between the goodness of fit of a curve to past observations and its reliability for forecasting the future.

SECTION L (HISTORICAL AND PHILOLOGICAL SCIENCES)

The work of Section L is carried on in two parts, with a committee for each part, including a chairman and a secretary. At recent annual meetings the programs of the two parts of Section L have been arranged by their respective affiliated societies—the History of Science Society and the Linguistic Society of America. Neither of these societies met with the association at Des Moines, but each of the two parts of the section was represented by a program of invitation papers. These two programs are reported separately below.

The History of Science Part of Section L. (Report from P. E. Brown and B. E. Livingston)—The program of the History of Science Part of Section L was presented Saturday forenoon and afternoon, in two joint sessions with Section O (Agriculture), with invitation papers. Charles E. Payne, of Grinnell College, presided at the forenoon session and made an introductory address, which was followed by a paper on "The Agricultural Revolution in the United States, 1860–1930," by L. B. Schmidt, of Iowa State College. "Some Pre-revolutionary Correspondence on Agriculture" was presented and discussed by Rodney H. True, of the University of Pennsylvania. George W. Hendry, of the University of California, gave a paper on "Adobe Brick as a Source of Agricultural History." At the afternoon session a paper on "Science and the New History" was presented by Irving B. Richman, of Muscatine, and one on "Some Means of Collecting Indian Lore" was presented by Edgar H. Harlan, of the Iowa State Archives. Both sessions aroused interesting discussion. At the close of the Saturday afternoon session a tour of inspection through the Archives of the Historical Memorial and Art Department of the State of Iowa and of the personal archives of Mrs. E. D. Spaulding was arranged by Mr. Harlan and Mr. Cassius C. Stiles. A paper on the history of science, entitled "Mathematics before the Greeks," was presented by R. C. Archibald, of Brown University, at the Monday afternoon session of the mathematical organizations. Some historical contributions were also presented before the American Meteorological Society.

The Linguistic Sciences Part of Section L. (Report from J. P. LeCoq)—The position of linguistics as a science and as the basis for the precise recording and transmission of scientific observation and thought is not always recognized, but an appreciation of these relations seems to be increasing. At a session on linguistics held Saturday morning, Stephen H. Bush, head of the Romance language department of the State University of Iowa, presented a paper on "The Duel of Louis and Gormont," an episode in a chanson de geste of the early twelfth or late eleventh century. Critics agree that this epic fragment relates in a highly unhistorical manner the story of the battle of Saucourt, which occurred in 881, and Professor Bush presented internal evidence to show that the duel episode must have taken its form at about that earlier time. The poem recounts in detail how King Louis used his spear as a sword or battle-axe, cleaving his opponent to the waist with one mighty blow, but spears that might have been employed in that manner were not in use in the eleventh and twelfth century and could not have been used at that time on account of the style of armor then in vogue. On the other hand, Professor Bush pointed out that the sort of spear required by the narrative was common among the Scandinavians of the ninth century, the thrusting and hewing weapon called "hoggspjot." It therefore appears that this detail must date from the earlier time. This conclusion is in disagreement with Bedier's widely accepted view that the chansons de geste are generally of the eleventh and early twelfth centuries and are not reeditings of much earlier poems. But it is in agreement with Lot's recent contention that the account considered is really a more recent form of a Scandinavian poem of the time of the battle referred to. Professor Bush's paper is to appear in *Modern Language Notes*.

In a paper on "The Arab and His Pen," by A. D. Veatch, professor of Semitic languages and literatures in Drake University, the speaker dealt with Arabic culture and literature as far back as the year 800. This contribution emphasized how very much modern science and philosophy owe to the Arabs. Valuable informal discussion closed the session, which was regarded as highly successful.

SECTION M (ENGINEERING) AND RELATED ORGANIZATIONS

(Report from N. H. Heck and S. T. Hutchinson)

Section M held a joint session with Section K (Social and Economic Sciences) on Saturday, which

is reported above, under Section K. Section M held two Monday sessions, the programs for which were largely arranged by local engineers under the leadership of M. P. Cleghorn. The morning program covered a wide range, and that for the afternoon dealt with agricultural and industrial problems of Iowa and adjacent states. The retiring vice-president for the section, R. L. Sackett, developed the idea of a new science. Tracing the development of skill and the relation of science to special ability in the arts through the ages, he showed that skill is now adequate to supply the needed material and tools. The new science is the management of human energy in individual and group tasks. This necessary development must be by scientific methods and it is in the hands of the engineers. J. B. Davidson told of observations as a member of a special commission to Russia. He described the background resulting from complete substitution of new for old and discussed the five-year plan and its effects on manufacturing, communication and agriculture. The human element makes solution of the agricultural problem peculiarly difficult. C. C. Williams described the effect of vibrations on structures, separating them into harmless and harmful. J. S. Dodds, after pointing out the popularity of maps and their countless uses both in war and in peace, discussed the map-making program of the United States government. He showed that great benefit would result to the engineers and to the country if the recently announced plan, supported by the president and already authorized by Congress, to complete the mapping in eighteen years is carried out. N. H. Heck described the important practical uses of terrestrial magnetism in transportation, surveying and recently in aviation, radio transmission and geophysical prospecting. He showed that observations of high accuracy, made for these purposes, are fundamentally necessary.

Opening the afternoon session, M. P. Cleghorn described the excellent industrial progress of Iowa, which is primarily an agricultural state. He asked for the interest of engineers, especially those interested in research, in the problems confronting the state. O. R. Sweeny showed samples of materials developed from corn-stalks and other farm waste. These ranged in hardness from a substitute for teak-wood through wallboard to a substitute for cork. He stated that desired qualities could be closely controlled in manufacture and that various useful chemicals are by-products. The supply of raw material is practically unlimited. S. M. Woodward described important hydraulic problems being undertaken at the Hydraulic Research Laboratory of the University of Iowa. T. R. Agg gave valuable information on recent developments in highway economics. He described how various elements of road and vehicle operation cost can be combined into a transportation cost and used in the planning of highways for particular needs. The problems are very complex, and many agencies are at work upon them. Paul E. Cox showed that it is greatly to the interest of Iowa to develop ceramic products. Henry Giese discussed the application of engineering to the farm. The mechanization of agriculture has made the American farmer the most efficient in the world, and power per agricultural worker is higher in Nebraska than elsewhere, with vastly greater value of annual crop per worker. The planning of farm power use, machinery and land reclamation all come into the field of the engineer, through whose efforts the agricultural industry is now in the condition in which other industry was fifty years ago. Further progress will depend largely on engineers.

At noon on Saturday thirty members and guests of the Institute of Radio Engineers held a luncheon, followed by an afternoon session of the mid-west section of the institute. J. C. Jensen, of Nebraska Wesleyan University, presided at the luncheon, and short responses were given by B. B. Brackett, Paul C. Rawls, H. D. Hayes and A. E. Kennelly. There was an attendance of sixty-seven at the afternoon session. "Problems of Television" were presented by R. T. Brackett, of the college of engineering, University of Nebraska, who brought out the present difficulties of procuring uniform brilliance and eye response. A paper on "Locating Radio Interference with the Oscillograph" by J. K. McNeeley and P. J. Konkle, of Iowa State College, was ably presented by Mr. Konkle. Slides were exhibited, showing that different types of interference give characteristic patterns on the oscillogram. Paul C. Rawls, president of the Technical Equipment Company of Des Moines, spoke on "Building Radio Transmitters for the Chinese Government." Difficulties due to white ants and humid atmosphere were largely overcome by use of glass and teak-wood. Eight hundred Chinese characters were built into a code system to care for the many different Chinese dialects. Equipment was built for military uses and also for government educational use. A paper on "The Variation of the Resistance of a Radio Condenser with Capacity and Frequency" was given by R. R. Ramsey, of the University of Indiana. The same speaker gave a paper entitled "Should the Load Resistance of the Tube be Rp or 2 Rp for No Distortion?" A paper on "The Measurement of the Magnetic Field Intensity inside a Coil

Carrying Radio-frequency Currents" was presented by Roy H. Mortimore, of Graceland College, Lamoni, Iowa. This paper is to be published in the *Physical Review*. Mr. H. D. Hayes, U. S. supervisor of radio for the ninth district, Chicago, told of "The Activities of the Radio Inspection Service in the Middle West," explaining in clear and interesting terms many features of the work of the Federal Radio Commission and its branches.

The session closed with a symposium on "Educational Broadcasting," with papers on "Courses Needed and Audiences Available" and "Organization and Finance." W. I. Griffith, director of WOI, Iowa State College, showed that the demand for programs of informational character is large and is steadily increasing. A referendum on the desirability of changing from high-grade music to jazz brought forth emphatic protest from the rural audience, of whom 98 per cent. favored the better music. Professor Griffith emphasized the value of market reports and the public interest in serious discussions. B. B. Brackett showed by charts and figures how an "educational chain" of stations, owned by institutions of higher learning and capable of telephone connections, will be able to send out master lessons and other educational material of high quality. At present there are fifty-six such stations in the United States, with a coverage of practically the entire country at night, and a few minor power additions would make similar daytime service available. H. M. Crothers, director of KFDY, South Dakota State College, was unable to be present, but his paper on organization of broadcasting by educational institutions was read by the chairman. Dean Crothers called attention to the necessity for maintaining high standards in the material broadcast, which necessitates adequate time for preparation on the part of faculty members who are to speak before the microphone. Both Dr. Brackett and Dean Crothers pointed out that colleges have on their faculties some of the best radio engineers in the country and are in a position to do first-class broadcasting work, also that they have available many men who are specialists and authorities in their fields.

SECTION N (MEDICAL SCIENCES) AND RELATED ORGANIZATIONS

(Report from C. W. M. Poynter)

Section N held sessions of its own on Wednesday and joint sessions with the American Veterinary Medical Association on Tuesday. The Wednesday forenoon session was presided over by Dr. Walter L. Bierring, of Des Moines. David I. Macht, of the Johns Hopkins University, presented a review of his work in the application of phytopharmacology to medical problems, using plants as physiological indicators for pharmacological tests. This paper created the greatest interest and was followed by a very lively discussion. In the absence of A. W. Rowe, of the Evans Memorial, Boston, his paper on "Endocrine Factors in Human Sterility" was read by J. T. Meyers, of the University of Nebraska College of Medicine. A review of the progress of Roentgenology and its contribution to medical science, by P. M. Hickey, of the University of Michigan School of Medicine, was read by Carleton B. Peirce, of the University of Nebraska College of Medicine, because of sudden illness of Dr. Hickey. The paper reviewed the steady advance of the Roentgen ray and its fields of usefulness, also the difficult problems in its employment. It is interesting to note here that the American Roentgen Ray Society has recently become affiliated with the American Association. In the discussion of Dr. Hickey's paper there was repeatedly brought out the importance of this affiliation and the opportunity it will furnish for further conferences, through Section N, with biologists and physicists who are interested, with members of the American Roentgen Ray Society, in many problems in which the X-ray plays an important part. The retiring vice-president for Section N, A. J. Goldforb, of the College of the City of New York, was unfortunately unable to be present.

The Wednesday afternoon session was held for the public, with Dr. J. H. Peck, of Des Moines, presiding. William C. White, of the Hygienic Laboratory, U. S. Public Health Service, reported in detail on the procedure at present being adopted by students of tuberculosis. Dr. White's paper was very instructive and entertaining. J. W. Woodrow, of Iowa State College, described a new and exact method of evaluating vitamins in oil by means of the spectroscope, avoiding the long delays required to make the same determinations through animal feeding.

On Tuesday the entire day was devoted to a program arranged under the auspices of the American Veterinary Medical Association, recently affiliated with the American Association for the Advancement of Science. The meeting was very well attended, and gratifying discussion followed the reading of the papers. The contributions presented in the morning dealt with the menace of animal diseases to the human family. A paper by John R. Mohler, chief of the U. S. Bureau of Animal Industry, was read by Dr. Barger, in the unavoidable absence of the author. This paper presented a splendid résumé of the prob-

lems that were more specifically discussed in later papers. J. N. Shaw, of Oregon State Agricultural College, explained the poisoning of dogs by salmon, using a cinema film. M. C. Hall, of the U. S. Bureau of Animal Industry, reviewed our present knowledge of parasitology. A paper by William H. Feldman, of the Mayo Foundation, was devoted to an account of the production of experimental tuberculosis through intracerebral inoculation. C. H. Strange, of the Iowa State Veterinary College at Ames, discussed the general problem of veterinary education, and made the point, which was reflected in the atmosphere of this meeting, that the interests of veterinarians are much more closely associated with those of the medical fraternity than with the interests of the agricultural group, with which most veterinary schools have developed. This paper suggested a rather pessimistic outlook of the present status of veterinary education and urged the necessity of extended entrance requirements and closer organization with medicine. It was the general feeling, expressed in this discussion, that medical papers and veterinary papers should use common avenues of publication so that the compartmented literatures might become more easily available to both groups. It seemed to be the consensus of opinion that Section N might be peculiarly useful as a common meeting ground for these two groups.

On Tuesday afternoon the discussion centered around the problem of undulant fever. A paper by I. F. Huddleson, of the U. S. Public Health Service, presented the author's personal study in North Africa and Southern Europe. This was a very complete résumé and emphasized particularly the importance of contact in the extension of this disease to the human family. Dr. Jordan presented a paper by A. V. Hardy, of the U. S. Public Health Service, on "The Prevention of Undulant Fever," in which both the danger through contact and the possible extension of the disease through unpasteurized milk products were considered. The author concluded that contact is a more significant factor in the spread of the disease than milk products. Other papers of special interest can not be mentioned here because of lack of space.

SECTION O (AGRICULTURE) AND RELATED ORGANIZATIONS

(Report from P. E. Brown, O. W. Tinker, H. B. Tukey and Paul Moore)

On Saturday Section O held a joint session, morning and afternoon, with the American Society of Agronomy and the Geneticists Interested in Agriculture. The program consisted of a symposium on "Recent Developments in Research with Corn," arranged by John B. Wentz, of Iowa State College. The papers given dealt with genetics, morphology and physiology of the corn plant, diseases of corn, the utilization of corn products and the newer methods of corn breeding. The address at the annual dinner of Section O and related societies on Saturday evening was given by C. A. Mooers, of the University of Tennessee, retiring vice-president for Section O, who spoke on "Some Observations from Liming Investigations." A joint session with Section L on the "History of Agriculture" was held Saturday morning. A joint session with the Geneticists Interested in Agriculture, the Genetics Sections and the American Society of Agronomy was held on Monday at the Iowa State College, at Ames, the program dealing with the genetics of crop plants.

The Society of American Foresters held its twenty-ninth annual meeting on Monday and Tuesday, with an attendance of about one hundred members from all sections of the United States. About half of the time was devoted to a discussion of forestry and its relation to the public welfare. A proposed forest policy for the United States was submitted by a special committee, some of the phases considered being the question of idle land in relation to forestry, prospective future needs for forests and extension of public forests. These and other phases were discussed. Tuesday was devoted to discussions of many different topics, such as "Dissection of Wood Fibers by Chemical Means," "Environmental Controls for Game through Modified Silviculture," "Influences of the Forest on Erosion and Water Control," "Problems in Silvicultural Research." Announcement was made of the culmination of the plan of the Society of Foresters to employ a permanent executive secretary. The first award of the prize of $1,000, anonymously given to the society, for a paper covering the solution of the forest problem, was announced, Mr. Ward Shepard being the winner. Colonel H. S. Graves gave an account of progress made by the committee on educational survey, for which a gift of $30,000 was received from the Carnegie Corporation.

The twenty-sixth meeting of the American Society for Horticultural Science, on Monday, Tuesday and Wednesday, was the most successful yet held. In response to a special request the papers on the program were presented more clearly and with better illustrations than has been usual, and there was more discussion. A very successful banquet and social evening was an important feature, with an address by the retiring president, V. R. Gardner, of Michigan State College. A growing interest in vegetable prob-

lems was indicated by the fact that three half-day sessions were required for the papers presented in this sphere, and it was agreed that problems of ornamental horticulture were of sufficient interest to suggest a half-day session devoted to this field another year. Although breeding questions are still of great importance, only six papers out of the whole 107 on the program dealt with breeding. Pollination and self-sterility studies continued to exert wide appeal, especially the newer phases of caging, introduced bouquets and habits of pollinating insects. Propagation methods, one of the more recent fields of scientific attack in horticulture, likewise continued to be of interest. Fertilizer studies of a field nature, involving detailed plant nutrition work, dominated the program. Several reports from different regions were in general agreement that, while the composition of fruit was influenced by nitrogen fertilizers, the keeping quality was not affected. Several papers on small fruits discussed fruit-bud formation, cambial activity, runner formation in the strawberry, fruiting habits and methods of pruning, indicating a quickened interest in scientific attack upon small-fruit problems. It was shown that the six-cane Kniffin system of training grapes, as compared with the four-cane system, had increased the yield of grapes nearly 50 per cent. for a three-year period in Illinois. The problem of the physiological effects of sprays upon fruit plants, especially oil sprays, maintained its interest, although general spray problems have gradually become divorced from the program. Respiration and storage studies and problems of fruit ripening have, on the other hand, become of greater moment. Successful half-day joint sessions with the American Society of Plant Physiologists and with the Potato Association of America led to the decision that it will be desirable to hold similar joint sessions next year. A. T. Erwin, of Iowa State College, was elected president for 1930. The next meeting will be held at Cleveland, December 29, 30 and 31, 1930.

The Geneticists Interested in Agriculture held a symposium on Monday at Iowa State College, in joint session with the Genetics Sections and Section O, on "Genetic Experimentation with the Larger Domesticated Mammals." Papers were read by Jay L. Lush and Edward N. Wentworth, discussion being led by Bruce L. Warwick. The need of comprehensive records in connection with routine breeding operations was emphasized, to make possible the acquisition of new data in the field of reproduction physiology and in the study of character inheritance. Fred Griffee was elected secretary for 1930.

The sixteenth annual meeting of the Potato Association of America was one of the most successful yet held, with respect to general interest and large attendance. One and one half days were devoted to joint meetings with the Vegetable Section of the American Society of Horticultural Science and with the Iowa Vegetable Growers Association. Technical papers were presented on Tuesday and papers of a more popular nature were given on other days. A paper that aroused much favorable comment was on "The Potato as a Health Factor," by John Harvey Kellogg, of the Battle Creek Sanitarium. Dr. Kellogg cited results of experimental work to prove that the potato is an invaluable article of diet for the prevention of acidosis and other troubles of the blood. C. H. Metzger, of the Colorado Agricultural Experiment Station, reported that L. G. Schutte, of Monte Vista, Colorado, produced 1,145 bushels of potatoes from a single acre in 1929; this is the highest potato yield yet recorded for the United States. Papers on potato breeding were given by Wm. Stuart, of the U. S. Bureau of Plant Industry; Fred A. Krantz, of the University of Minnesota, and C. L. Vincent, of the State College of Washington. Dr. Stuart's paper, "An Historical Résumé of the Potato Since its Discovery," will be useful to plant breeders for many years. An exhibit of potato seedlings from different regions attracted much attention; many of the new seedlings seem to have great promise and some may replace varieties now generally grown.

The Association of Official Seed Analysts of North America held its twenty-second annual meeting on Tuesday, Wednesday and Thursday. There were round-table discussions on "Public Service Programs for Seed Laboratories," "Seed Law Enforcement," "Cooperative Service among Seed Laboratories" and "The Interpretation of Germination." There were reports of committees on public service, legislation, cooperative service and research.

The Crop Protection Institute had its annual dinner Monday evening. It was stated that while the income of the institute was less than $3,000 eight years ago, for the past two years it had averaged about $50,000. Paul Moore said that to many it would seem strange to be talking of crop protection when the topic of the hour was distress of thousands because of surplus crops. Yet, were there any stoppage of the effort to control plague and pest we should soon hear not just the cry of the farmer, "O Congress, give us a bonus," but a national prayer, "God, give us food." Mr. Moore urged the need of the institute for a small endowment that would provide for some "overhead" and some projects for which funds can not be secured from industry. W. C. O'Kane, chairman of the board of governors, indicated some of the work of the year.

Fifteen major research projects were continued or begun, carried on in seventeen states, with seventeen research men on the institute staff, of whom thirteen were full-time men. The projects ranged from plant breeding to the utilization of chemical by-products. Among the concrete accomplishments of the past year were mentioned: adaptation of an emulsified white oil to use against insects on domestic animals; a new method of wrapping fruit-tree grafts; a new material derived from petroleum products and adapted to extensive use in spraying; an efficient summer spray derived from petroleum oils; definite progress toward utilization of shale oils in plant sprays; a new combination fungicide and insecticide that is practical and efficient; utilization of a special form of sulphur in such a way as to meet extensive orchard needs. The institute unanimously adopted a resolution favoring an effort to eradicate the Mediterranean fruit-fly.

SECTION Q (EDUCATION)

(Report from W. L. Uhl)

Of the experimental studies in elementary education reported to Section Q, those by Ernest Horn, of the University of Iowa, and by Harry J. Baker, of the Detroit public schools, are of general significance. Dr. Horn showed that much effort has been misdirected in attempts to teach rules for spelling, which have but slight value. Dr. Baker illustrated the treatment of problems in character training by beginning with cases of maladjustment and then proceeding by diagnoses and remedial measures to the improvement of conduct. The relation of class size to the efficiency of teaching in high schools and colleges was reported upon by Everett Davis, of the Des Moines public schools, and by Earl Hudelson, of the University of Minnesota. The results point to the desirability of larger classes in some subjects if certain conditions other than size of class are satisfied. Difficulties in the education of the consumer were set forth by Rosamond Cook, of the University of Cincinnati, in a report upon the consumer's judgment of hosiery. Investigations on the effectiveness of learning and the significance of academic success were reported by D. A. Worcester, of the University of Nebraska, by G. C. Brandenburg, of Purdue University, and by Harl R. Douglass, of the University of Minnesota. Studies of the measurement of pupil and teacher growth and ability, as presented by S. A. Courtis, of the University of Michigan, by Herbert Sorenson, of the University of Minnesota, by S. L. Eby, of the University of Cincinnati, and by W. S. Bergman, of the Detroit public schools, attested progress in the refinement of procedures, the accuracy of measurement and the clearness of the presentation of data. Reports of studies on science teaching aroused much interest. Otis W. Caldwell, of Columbia University, presented evidence to indicate that the general policy of a school or the arrangement of its curricula may lead either the ablest or the weakest pupils toward science courses or away from them. Benjamin C. Gruenberg, of New York City, presented evidence to show that the alleged tyranny of science often has its roots in the hearts of propagandists and misguided enthusiasts for certain interpretations of science. Ways of avoiding such misconceptions were outlined by Florence G. Billing and S. R. Powers, of Columbia University, in their report upon a thorough and authentic professional course for teachers, a course planned to provide elementary teachers with training for their work no less sound than that now given to university teachers. Extended discussion followed papers read by Ralph K. Watkins, of the University of Missouri, by Elliot R. Downing, of the University of Chicago, and by Victor L. Noll, of the University of Minnesota, on the relative effectiveness of the laboratory and the demonstration in science teaching. The investigation of this problem has progressed so far as to warrant science teachers in trying courses with less laboratory work and more reading and discussion than is generally prevalent. Two sessions were held jointly with Section I (Psychology). F. N. Freeman, of the University of Chicago, summarized his study of twins with regard to the relation between nature and nurture. M. E. Haggerty, of the University of Minnesota, gave a paper on "The Incidence of American Psychology in the Problem of Learning." The address of T. L. Kelley, of Stanford University, retiring vice-president for Section Q, was on "The Scientific *versus* the Philosophic Approach to the Novel Problem." An empirical or theoretical approach, Dr. Kelley asserted, can be only a guess, and the rationalization of this guess may lead to disastrous and persistent dogma.

ORGANIZATIONS RELATED TO THE AMERICAN ASSOCIATION AS A WHOLE

(Report from Edward Ellery, Ellen Eddy Shaw, Ray M. Peterson, R. W. Babcock and Helen Jean Brown)

The thirtieth annual convention of the Society of the Sigma Xi was held at Des Moines, with President F. R. Moulton in the chair. The convention was the largest within the last five years; thirty-six of the fifty-one chapters were represented, each by one or more delegates, and twelve of the twenty-two Sigma

Xi Clubs were represented. The secretary reported that the total membership is now about 23,400 and that the chapter enrolment is between 7,000 and 8,000, a total of 804 members and 449 associates having been elected in 1929. He also stated that the committee on awarding Sigma Xi research grants had distributed, in 1929, approximately $4,000 among eight candidates. The convention unanimously voted charters for chapters to petitioning groups from the University of Wyoming, the University of Oklahoma, the State College of Washington, the University of Rochester and the Pennsylvania State College. Officers for the ensuing biennium were chosen as follows: *president,* George W. Stewart; *secretary,* Edward Ellery, Union College, Schenectady; *treasurer,* George B. Pegram; *member of the executive committee,* to serve five years, Leon J. Cole; *member of the alumni committee,* to serve five years, C. E. Davies. The annual Sigma Xi dinner followed the convention. The eighth annual address, presented under the joint auspices of the American Association and the Society of the Sigma Xi, was given by George H. Parker, of Harvard University, on "Some Aspects of Human Biology."

The American Nature-Study Society met on Friday and Saturday with an attendance of about seventy. Nineteen papers were read. An address of welcome to Des Moines was given by Agnes Samuelson, superintendent of public instruction for the State of Iowa. Miss Samuelson welcomed the organization in the name of the thirteen thousand schools in Iowa and three quarters of a million school children. Otis W. Caldwell, of Columbia University, spoke in memory of Alice Jean Patterson, of Normal, Illinois, who died in 1929. Papers on "The Evolution of the Nature Study Idea" were given by M. A. Bigelow, of Columbia University, and by Elliot R. Downing, of the University of Chicago. Dr. Bigelow said that the most successful nature study of recent years is simple observation of natural things, studied with reference to the children's interest rather than as illustrations of principles of organized natural science. Dr. Downing considered the centers of nature-study work in the United States, beginning with the Oswego Normal School, where Henry Straight, a pupil of Agassiz, took charge of science lessons in 1876. Later, in Cook County Normal School, Jackman did a piece of work similar to Straight's. L. H. Bailey and the Comstocks, at Cornell University, M. A. Bigelow, at Columbia University, and Clifton Hodge, at Clark University, established the present basis for American nature work. A paper by Florence Billig, supervisor of science, Sacramento, California, on "An Analysis of the Scientific Background of Students Enrolled in Courses in Science for Teachers in Elementary Schools," considered about nine hundred teachers and their science equipment when entering college or training classes. It was shown that less than 50 per cent. of these had studied even one science in high school and that many had no foundation in science, the entire responsibility for their preparation being thrown upon teacher-training colleges and normal schools. A most interesting science chart showing work for the first seven grades was presented by H. A. Beall, of the University of Iowa. Copies of the chart may be obtained upon request. A very excellent exhibit of pupils' work in nature study in the City of Des Moines was an important feature of the meeting. On Saturday evening, the annual nature-study banquet was held in honor of the presidents of the Nature-Study Society. Homer R. Dill, of the University of Iowa, gave the lecture of the evening. For 1930 the president is Bertha Chapman Cady and the secretary is Ellen Eddy Shaw.

The Honor Society of Phi Kappa Phi held its eleventh biennial convention on Tuesday, with an address by George W. Stewart, of the University of Iowa, on "Conservation of Talent." The secretary's report showed that 3,433 new members had been enrolled in the last two years, one new chapter having been installed. National officers were elected as follows: *president,* R. C. Gibbs; *secretary,* C. H. Gordon; *historian,* J. S. Stevens; *editor,* R. M. Peterson.

The Gamma Alpha Graduate Scientific Fraternity held its annual council meeting and convention on Monday and Tuesday. Seventy-one members were present at the breakfast, representing thirteen of the sixteen chapters. The officers for 1930 are: *president,* C. C. Murdock; *vice-president-secretary,* R. W. Babcock; *treasurer,* C. E. Mickel; *editor,* C. F. Scofield; *recorder,* S. S. Humphrey.

Sigma Delta Epsilon, Graduate Women's Scientific Fraternity, held its eighth annual convention following a breakfast on Tuesday morning, with about forty members present. The national officers elected for 1930 are: *president,* Helen Jean Brown; *vice-presidents,* Opal Wolf and Helen R. Johnson; *secretary,* Mary Dover; *treasurer,* Maude Bennot. About seventy-five members and guests were present at the breakfast, representing thirty-six institutions. Stella M. Hague gave a short history of the organization. Bertha Van Hoosen, editor of the *Woman's Medical Journal,* spoke on "Opportunity for Women to do Research in Medicine." Jane Leisenring, of the University of Minnesota, gave a talk on "Recent Advances in Nutrition."