

SCIENCE

No. 2249

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

The most concrete expression of cooperation among scientists with various interests was the many symposia that were organized. They ranged freely and widely across the usual boundaries of the sciences, enriching all that were included. Many of the leading scientists in the United States participated in these broad syntheses of science, several of them leaving meetings of their own special societies for the purpose. The opinion was frequently expressed that in integrating the sciences—physical, biological and social—and in examining the relations of all of them with society, the association is rendering its greatest service to science and to the world. In similar spirit were the

numerous joint luncheons and dinners, the broadening and stimulating effects of which permeated the meeting.

At Indianapolis there was no stratification of science or pride in rank. Two Nobel prize winners and a winner of the One Thousand Dollar Prize Award of the association were the speakers at the symposium on "New Knowledge of Matter" organized by the American Science Teachers Association, a large part of whose members are teachers in secondary schools, and the president of the association spoke at the luncheon which followed the symposium. Presidents of universities, of technological schools and of colleges mingled with the rank and file on terms of perfect equality and good fellowship. There was no jockeying among societies for advantages and no campaigning for office. The newly elected president is from one of the smallest sections of the association. The meeting was an example of democracy at its best.

At times some strange influence moves lower animals to migrate in masses. Something moved scientists and educators to converge on Indianapolis at the time of the meeting in wholly unexpected numbers. The result was that the facilities of the city were taxed to the utmost. Yet in spite of the congestion and the resulting inconveniences, the strong current of the meeting swept on with hardly a ripple. The citizens of Indianapolis caught the prevailing spirit and did everything within their power to accommodate their guests. They did not hesitate to give up plans for luncheons at clubs in order to provide conveniences for the scientists, and some of the large companies placed the clerical facilities of their offices at the disposal of the association.

In spite of the fact that copies of many of the strong papers were not received in advance of the meeting, the work of the representatives of the press was most excellent. Never have better reports of a scientific meeting appeared in the newspapers of this country. Never before did the great metropolitan dailies carry so many editorials commendatory of science and the association. Never before did the broadcasting companies provide facilities over national networks so generously. Never before did the public respond so enthusiastically to the radio programs of the association. Scientists have good reason to be grateful to the press and the radio.

In certain respects the climax of the meeting was the resolution passed by the council (see page 100 for the full text), inviting international cooperation of scientists in promoting international peace and intellectual freedom for the benefit of all mankind. In this resolution the association accepted the challenge to science for moral leadership in a disordered and puzzled world which was hurled by Dr. Conklin in his

retiring presidential address on "Science and Ethics." (See the December 31 issue of *SCIENCE*.)

A FEW STATISTICS

The march of science as expressed in the work of the association may be illustrated by a few comparative statistics of the three meetings that have been held in Indianapolis. The first of the three was in August, 1871, or 23 years after the organization of the association in 1848. All the sessions at this meeting were held in the state house. The second Indianapolis meeting was 19 years later in 1890. The recent Indianapolis meeting followed the second by 47 years. Important statistics of the three meetings are as follows:

Year	1871	1890	1937
Members	537	1,944	18,776
Persons registered	196	364	3,094
Papers presented	107	213	1,681
Population of U. S. (millions)	38	63	130

The total attendance at the recent meeting was much greater than the registration, probably about 5,000.

In addition to 144 registrations by exhibitors and 35 by members of the press, the registration by states was as follows: Alabama, 18; Arizona, 9; Arkansas, 11; California, 37; Colorado, 17; Connecticut, 34; Delaware, 5; District of Columbia, 72; Florida, 15; Georgia, 24; Idaho, 1; Illinois, 371; Indiana, 565; Iowa, 84; Kansas, 54; Kentucky, 56; Louisiana, 35; Maine, 8; Maryland, 58; Massachusetts, 81; Michigan, 152; Minnesota, 93; Mississippi, 10; Missouri, 93; Montana, 7; Nebraska, 12; Nevada, 0; New Hampshire, 7; New Jersey, 45; New Mexico, 6; New York, 231; North Carolina, 25; North Dakota, 10; Ohio, 232; Oklahoma, 29; Oregon, 5; Pennsylvania, 89; Rhode Island, 10; South Carolina, 4; South Dakota, 4; Tennessee, 41; Texas, 48; Utah, 5; Vermont, 0; Virginia, 38; Washington, 8; West Virginia, 19; Wisconsin, 88; Wyoming, 6; Canada, 26; Canal Zone, 1; Puerto Rico, 3; Hawaii, 3; Argentina, 1; Australia, 2; Austria, 1; China, 1; England, 2; Germany, 1; Japan, 1; Russia, 1. More persons were registered from Indiana for this meeting than were registered from the entire country at the two previous Indianapolis meetings combined. Every one of the 48 states, except Nevada and Vermont, appear to have given the administration a mandate.

Fifteen sections of the association and 47 affiliated and associated societies presented programs. The scientific sessions, 225 in number, were held in 48 rooms and three laboratories. All the 48 rooms except one were equipped with stereopticons and about 900 papers required their use. In every known case in which notice had been given in advance that a stereopticon would be required, it was available when

needed, with a man to operate it. All the rooms except those used for the evening general sessions were equipped with blackboards and chart hangers. Eight motion picture machines were provided for showing scientific films. For the use of the biological sciences 98 microscopes, each equipped with special microscope lamps, were made available at the time they were desired. It is probable that these microscopes, with a total value of more than \$12,000, exceeded in number, as well as in quality, all the microscopes in the United States when the association, in 1871, met in Indianapolis for the first time. A little staggering of the programs of the societies using microscopes would have reduced the number required and the expense of providing them. A total of 38 special group or joint breakfasts, luncheons, dinners and smokers were arranged for. There were 59 business meetings for election of officers and other purposes. At least 34 committees made reports to the various sections or to the affiliated and associated societies. In addition to the president of the association, about 125 other officers of the association and of its cooperating societies were elected. There were no casualties, temporary incapacities or restraints by the police, but it is rumored that several eminent scientists found themselves temporarily lost and straying in the Indiana metropolis.

SOME PROBLEMS

First among the difficulties to be noted is that of presenting within reasonable limits an understandable report of the 225 sessions of the meeting. Since the bare index of the names of the 1,968 speakers on the programs filled 20 pages, double column, of the General Program, it is evidently impossible to present any adequate digest of their papers. To print the names of the authors, including their degrees and positions, and the titles of their papers would be essentially a reprint of the General Program, a book of 273 pages. The first problem is consequently disposed of by not attempting to do the impossible.

There is another problem of more importance that merits the thoughtful consideration of the association and of its affiliated and associated societies, and that is the fundamental principles which should guide the organization of the meetings of all these societies. The association, although it is independently organized, has become more and more a federation of the scientific societies of the country. When science as a whole speaks to the world it speaks most effectively through the association, whether by means of the public press, the radio or by resolutions on matters of wide public interest. At such great meetings as that at Indianapolis science feels to the fullest the strong pulse and the solidarity of its own life and power, and also the deepest sense of responsibility to the civilization which it

is profoundly affecting. But each of the affiliated societies maintains its own autonomy and has functions of its own to fulfil. The problem is how best to obtain the great advantages of joint actions by scientists and the equally great advantages of concentrating at times on limited interests. To take the large view in order to guide the association and its affiliated societies along the road that is best for science and society requires statesmanship of a high order.

A serious difficulty in arranging joint meetings of the association is their size, as is illustrated in the foregoing statistics of the Indianapolis meeting. Moreover, the memberships of many of the affiliated societies are very large, so large they can only with difficulty meet jointly with other large societies. It is clear that only a few cities in the country can accommodate large joint meetings of the association. At the Boston meeting in 1922-3 it was decided to meet in Washington, New York and Chicago in four-year intervals, with a somewhat similar cycle for the years midway between these principal meetings. But this excellent plan has not been strictly followed. In the meantime the memberships of the association and of other scientific societies have greatly increased; the interrelationships among the sciences have become more and more numerous; the impacts of science upon society have become more and more important; and political and economic systems have steadily declined toward chaos.

In view of world conditions and the obligations resting upon science, the association and its affiliated societies might seriously consider a number of questions. (a) Should they hold one large joint meeting each year in spite of the physical difficulties? If so, should it be at the winter holiday season or in the summer? (The British Association holds one meeting a year, generally in the late summer.) (b) Should they hold a large joint meeting only once every two years or every four years? (c) Should the association hold simultaneous joint meetings in more than one city in spite of the difficulties in obtaining publicity, in awarding the annual prize, in hearing the president's address, in arranging other general addresses, in preparing for the annual science exhibition, in holding meetings of the executive committee and the council, in holding the academy conference and the secretaries' conference, in arranging joint luncheons and dinners, etc.? Such questions as these should be thought through by representatives of all interested societies and a decision should be reached within a year or two.

GENERAL SESSIONS

On Monday evening, December 27, Dr. Edwin G. Conklin, professor emeritus of Princeton University, delivered his retiring presidential address on "Science

and Ethics," which was published in the December 31 issue of *SCIENCE*. The large auditorium of the Murat Temple was filled to capacity with an audience which listened with eager attention to every word of Dr. Conklin's address from the first to the last. After the close of the address, the officers and members of the association and of its affiliated and associated societies were guests of the Local Committee at a reception in the Lounge of the Murat Temple, with Mr. and Mrs. Eli Lilly at the head of the receiving line.

The sixteenth annual Sigma Xi address was delivered on Tuesday evening by Dr. Irving Langmuir, of the research department of the General Electric Company. For more than an hour Dr. Langmuir held his audience spellbound with his discussion of "Biological Applications of Surface Chemistry." With admirable directness he explained a series of experiments that are as remarkable for their simplicity as for their promise of importance in exploring the nature of the metabolic processes in living organisms.

Wednesday evening was set aside for the annual Phi Beta Kappa address, which was delivered by Dr. George Lyman Kittredge, professor emeritus of Harvard University, on "Shakespeare and the Critics." Dr. Kittredge in a sparkling address fully sustained his great reputation as a brilliant speaker. The Indianapolis Symphony Orchestra honored Dr. Kittredge and delighted the audience by playing Tchaikowsky's Fourth Symphony preceding the address.

On Thursday evening, Dr. Thomas Parran, Jr., Surgeon General of the U. S. Bureau of the Public Health Service, delivered a public address as the climax of the symposium organized by the Section on the Medical Sciences. His subject was "Syphilis as a Public Health Problem."

There were several general sessions held at 4:30 in the afternoon, including the fourteenth annual Josiah Willard Gibbs Lecture by Professor Charles A. Kraus, research professor of chemistry at Brown University, on "The Present Status of the Theory of Electrolytes"; the address of the retiring vice-president of the association and chairman of the Section on the Medical Sciences, Dr. Esmond R. Long, director of the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis on "Tuberculosis, Leprosy and Allied Mycobacterial Infections."

WESLEY CLAIR MITCHELL, PRESIDENT-ELECT

(By *Harold G. Moulton*)

In the election of Dr. Wesley Clair Mitchell, the association, for the second time in its history, has chosen its president from the field of the social and economic sciences. The only earlier president of the

association from this field was Dr. Carroll D. Wright, who presided at the second St. Louis meeting in December, 1903-January, 1904. The title of his address as retiring president of the association was "Science and Economics."

Wesley Clair Mitchell was born in Rushville, Illinois, on August 5, 1874. He took his bachelor's degree at the University of Chicago in 1896, continuing as a graduate student for a year, after which he spent a year in the Universities of Halle and Vienna. He then returned to the University of Chicago, at which he received his doctor's degree in 1899.

Dr. Mitchell began his professional career in the U. S. Bureau of the Census in 1899. In 1900 he returned to the University of Chicago, in which he was an instructor in economics for two years, following which he was assistant professor of commerce in the University of California from 1902 to 1908, and then professor of political economy in the same institution until 1912. Since 1913 Dr. Mitchell has been connected with Columbia University. In addition he has been a lecturer at Harvard University (1908-09) and at the New School for Social Research (1919-21), George Eastman visiting professor at Oxford University (1930-31), Hitchcock professor at the University of California (1934), Messenger lecturer at Cornell University (1935), and director of the National Bureau of Economic Research since 1919.

Throughout his career Dr. Mitchell has devoted a large amount of time to public service, having served as chairman of the Social Science Research Council (1927-30) and as chairman of the President's Research Committee on Social Trends (1929-33); and having been a member of the National Planning Board, Federal Emergency Administration of Public Works (1933) and the National Resources Board (1934-35).

Dr. Mitchell's publications include "A History of the Greenbacks" (1903), "Gold Prices and Wages under the Greenback Standard" (1908), "Business Cycles" (1913) and "Business Cycles, the Problem and its Setting" (1927). He was editor of "History of Prices During the War" (1923) and "Business Cycles and Unemployment" (1923), and he has been a joint author of several publications. His lectures at Columbia University on the "History of Economic Theory" have perhaps had as important an influence on economic thought as his publications.

Dr. Mitchell brings to the service of the association ripe scholarship, broad experience in education and public affairs and deep interest in the problems which are at present of very great concern and importance to the world.

THE ASSOCIATION PRIZE AWARD

Each year the association awards a prize of \$1,000 for a scientific paper presented at its annual meeting. This year the committee on award, consisting of Dr. F. K. Richtmyer, *chairman* (physicist), Dr. Rudolph E. Langer (mathematician), Dr. Fernandus Payne (zoologist), Dr. Charles A. Shull (botanist) and Dr. Harold C. Urey (chemist), unanimously recommended the awarding of the prize to Dr. Philip R. White, the Rockefeller Institute for Medical Research, Princeton, New Jersey, for his paper on "Root Pressure—an Unappreciated Force in Sap Movement," which was presented before the Physiological Section of the Botanical Society of America on December 28.

In voting the award to Dr. White, the committee fulfilled the hope of the anonymous donor of the prize that it might be given to aid and encourage younger scientists, for Dr. White is in his thirty-seventh year. He was born in Chicago in 1901, received his A.B. degree in Montana in 1922; a certificate from l'Ecole normale d'Institut, Valence, France, in 1924; and the Ph.D. degree from Johns Hopkins University, in 1928. He spent one year in the Boyce Thompson Institute for Plant Research and one year in Pflanzen-Physiologische Institut, Berlin, before going to his present position.

(By Dr. Earl S. Johnston)

The prize award this year was not for a discovery in a wholly new and startling field, but for new information relating to an old problem—a problem concerned with the cause of the ascent of water in plant stems. Many theories have been advanced to account for the movement of sap in plants, and several seem to fit the facts when small, or low-growing, forms of vegetation are considered. However, the ingenuity of the theorist has been taxed to the limit in explaining the rise of sap in tall trees such as the redwood and eucalyptus. The old root-pressure theory, like many others, is inadequate in itself, for earlier measurements of it rarely indicate pressures in excess of 25 or 30 pounds per square inch.

Dr. White, on determining these pressures by connecting small manometers to small pieces of cultured root tips of the tomato plant growing in suitable media, finds pressures considerably greater than those obtained in the earlier classical experiments. These pressures, he finds, are produced by continuous and rhythmic basipetal secretion of sap. Even under opposing pressures of 90 pounds per square inch, no perceptible reduction of sap secretion is obtained. Theoretically such a pressure is capable of pushing a column of water to a height of nearly 200 feet. Dr. White considers that the past failure of investigators to discover

this great force was due to the small volume changes involved and also to a failure on the part of the experimenter to work with normal metabolizing plant tissue.

Dr. White has developed some very interesting methods of successfully culturing excised roots and growing them continuously for a period of years independently of any other portion of the living plants. Although the magnitude of the root, or exudation, pressure within such isolated root tissue is large, there are a number of difficulties which must be fully met before this or any other theory will be finally accepted as adequately explaining the ascent of sap.

RESOLUTIONS OF PUBLIC INTEREST

Since the association has been in existence for nearly 90 years, has an active membership of 19,000 and with its 165 affiliated and associated societies is representative of nearly all science, it appropriately from time to time passes resolutions expressing the attitude of science on questions of public interest. Such resolutions passed by the council at Indianapolis are:

RESOLVED, that the American Association for the Advancement of Science reaffirm its position on the status of federal land utilization agencies as expressed in the resolution adopted at its Pittsburgh meeting in December, 1934; namely:

That any reorganization of United States Government agencies should provide for the continuance in the Department of Agriculture of the land utilization agencies now there, including the Bureau of Agricultural Economics, Bureau of Chemistry and Soils, Soil Conservation Service, Forest Service, Bureau of Biological Survey, and the addition of other agencies concerned with renewable resources, such as the agricultural, forest or range use of the public domain or the protection thereof from erosion.

Be it further resolved that all positions in these Bureaus should be retained under the existing Classified Civil Service without exception because of their policy-determining nature.

The American Association for the Advancement of Science, recognizing the important rôle of animal experimentation in the study of diseases, especially those of childhood, and in the perfecting of those procedures and treatments to which no small part of our community owes its life and continued presence among us, regards with apprehension the activities of certain groups which are attempting to prevent the use of unclaimed animals for study in qualified institutions of medicine and research and which are endeavoring by direct and indirect means to cut off the supply of animals needed in the production of antitoxins and other biologic products.

This association is in accord with the practically unanimous and often expressed authoritative voice of

science and medicine that animal experimentation has conferred inestimable benefits upon mankind, as well as upon animals themselves, and is essential to the progress of the biological and medical sciences.

This association, with a membership of over eighteen thousand and representative of all the sciences of nature and of man, is confident that a fully informed public will not support legislation which would seriously interfere with the progress of preventive and curative medicine.

WHEREAS, science and its applications are not only transforming the physical and mental environment of men but are adding greatly to the complexities of their social, economic and political relations; and

WHEREAS, science is wholly independent of national boundaries and races and creeds and can flourish permanently only where there is peace and intellectual freedom; now, therefore, be it

RESOLVED by the Council on this thirtieth day of December, 1937, that the American Association for the Advancement of Science makes as one of its objectives an examination of the profound effects of science upon society; and that the Association extends to its prototype, the British Association for the Advancement of Science, and to all other scientific organizations with similar aims throughout the world, an invitation to co-operate not only in advancing the interests of science but also in promoting peace among nations and intellectual freedom in order that science may continue to advance and to spread more abundantly its benefits to all mankind.

PRESS SERVICE

(By Austin H. Clark)

In the program of the Indianapolis meeting there were delivered 1,681 papers and addresses. Copies or abstracts, or both, of 377 of these were sent in advance to the Press Service. Two copies and two abstracts of 221 papers were received. Of the remaining 156, there were represented by two abstracts only, 87; by a single abstract, 32; by a single copy, 30; by one copy and two abstracts, 6; and by two copies and one abstract, 1. Forty-nine papers were not received until after the close of the meeting, too late for use, largely through having been mailed with insufficient postage.

As each paper was received it was carded, the card giving the author, title, material available (number of copies, abstracts, etc.), date of delivery (the release date being the next half day), section in which it is to be delivered, disposition (whether mimeographed) and special notes (if a general session or a vice-presidential address, etc.). A card catalogue of this type was of great value during the meeting, and was constantly consulted by the press representatives.

Sixty-seven mimeographed papers and abstracts, covering a wide range of subjects, were sent in advance to the members of the National Association of Science

Writers and to others who requested them. The Indianapolis meeting was attended by most of the members of the National Association of Science Writers, including all five who last year shared the Pulitzer Prize for the best job of reporting done during the year—Messrs. Blakeslee, Dietz, Lal, Laurence and O'Neil. We were all much pleased to have as an associate in the press room Mr. J. C. Crowther, of the *Manchester Guardian* (England).

The association is deeply indebted to Mr. Marc G. Waggener, chairman of the Local Committee on Publicity, for his keen and active interest in the meeting and for the excellent and abundant advance publicity which he arranged. Moreover, the reports of the meeting in the local papers were abundant and excellent.

On Thursday evening, in anticipation of the first Virginia meeting at Richmond next winter, a dinner was held under the auspices of the Press Service which was attended by representatives of Virginia attending the meeting, a number of the members of the National Association of Science Writers, Mr. Crowther and the permanent secretary.

RADIO PROGRAMS

During the Indianapolis meeting members of the association delivered 16 broadcasts, most of them being over national networks.

A slight abbreviation of the presidential address of Dr. Edwin G. Conklin on "Science and Ethics" was made available to the entire country by the courtesy of the National Broadcasting Company. An extraordinary number of requests for copies of it have been received.

The address of Dr. Arthur H. Compton on "Some Physical and Biological Consequences of the Discovery of X-rays," delivered in the symposium on "New Knowledge of Matter," which was organized by the American Science Teachers Association, was distributed nationally by the Mutual Broadcasting Company. This broadcast was carried by wire from Station WOR in New York to the auditorium of the American Museum of Natural History, in which were assembled about 1,500 members of the School Science Clubs sponsored by The American Institute of the City of New York.

Dr. Otis W. Caldwell delivered, with the participation of students, a very interesting broadcast on "Teachers and the Science Youth Movement" over the facilities of the red network of the National Broadcasting Company.

The Columbia Broadcasting System carried over its network the introductory address to the first "Science and Society" conference of Dr. Harold G. Moulton on "Controlled Factors in Economic Development."

Among others who delivered 15-minute broadcasts over facilities provided by the National Broadcasting Company are: Dr. Rudolph E. Langer, professor of mathematics in the University of Wisconsin; Dr. Ernest Carroll Faust, professor of parasitology in Tulane University, New Orleans, La.; Dr. Geo. M. List, state entomologist of Colorado, Fort Collins, Colo.; Dr. A. F. Blakeslee, Carnegie Institution, Cold Spring Harbor, N. Y.; Dr. F. C. Bishopp, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C.; Dr. H. Landsberg, director of Seismograph Station, Pennsylvania State College, State College, Pa.; Mr. F. B. Colton, National Geographic Society, Washington, D. C.; Dr. Philip Fox, director of the Museum of Science and Industry, Chicago, Ill.; Dr. F. C. Brown, curator of the Department of Physics, Museum of Science and Industry, Chicago, Ill.; Mr. Baker Wingfield, National Bureau of Standards, Washington, D. C.; Dr. Harry Sobotka, chief chemist, Mount Sinai Hospital, New York, N. Y.; Mr. David Dietz, science editor of Scripps-Howard newspapers, Cleveland, Ohio; and Mr. J. L. Kennedy, fellow at Stanford University, Calif.

The association is greatly indebted to the broadcasting companies for their services to science and the country in carrying these many broadcasts.

FINANCIAL REPORTS

Audited financial reports of the treasurer and the permanent secretary for the fiscal year ended September 30, 1937, were presented and approved by the council. The following is a brief digest of them:

TREASURER'S REPORT

Balance Sheet—Assets at Sept. 30, 1937

Securities and mortgages	\$251,765.36
Cash—income account	6,161.95
Cash—reserve for current needs	13,159.76

Total assets

Balance Sheet—Liabilities at Sept. 30, 1937

Endowment—for research (1)	\$108,836.45
Endowment—for general purposes (2)	94,038.38
Endowment—dues of emeritus life members (3) ..	8,600.00
Endowment—dues of emeritus annual members (4)	500.00
Reserve fund	34,333.23
Permanent secretary's current fund	11,619.25
Annual \$1,000 prize fund	3,000.00
Unused grants to affiliated academies	435.00
Accumulated income unappropriated	9,724.76

Total liabilities

(1) Richard T. Colburn fund, \$87,186.45; fees of deceased sustaining members, \$6,000; fees of deceased life members, \$15,650.

(2) W. Hudson Stephens fund, \$4,381.21; Michael P. Rich fund, \$10,000; Hector E. Malben fund, \$31,448.17; friends of association, \$3,559; fee of living sustaining member, \$1,000; fees of living life members, \$43,650.

(3) Jane M. Smith fund, \$5,000; credits to fund from fees of \$100 each set up from income from the fund or from general fund reverting on deaths of emeritus life members.

(4) Luella A. Owen fund.

CASH STATEMENT

Receipts

Balance September 30, 1936	\$15,524.43
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Newcomb Cleveland gift to Grants Committee ..	2,000.00
Life membership fees	4,300.00
Reversion from grants	177.03
Redeemed bond (A. T. & T.) including premium ..	4,200.00
Income from research endowment	4,218.41
Income from general endowment	3,518.25
Income from reserve fund	1,250.37
Income from permanent secretary's current funds ..	441.26
Income from Jane M. Smith fund	322.89
Income from Luella A. Owen fund	19.45
Total receipts	\$35,972.09

Disbursements

Investment—Dallas P. & L. 1st, 3½s, '67	\$ 6,174.33
Grant to Biological Abstracts	150.00
Grants for aid of research	4,000.00
Grants to affiliated academies	2,765.00
Annual prize—to W. M. Stanley	1,000.00
For emeritus life members—Jane M. Smith fund ..	400.00
For emeritus annual members—Luella Owen fund ..	20.00
Life members' journal subscriptions	1,491.00
Fifty-year members' journal subscriptions	90.00
Malben lecture—Nevil V. Sidgwick	500.00
Safe deposit box and collection charges	60.05

Total disbursements	\$16,650.38
Cash on hand September 30, 1937	19,321.71

Total

PERMANENT SECRETARY'S REPORT

(Period October 1, 1936, to September 30, 1937)

Receipts

Annual membership dues and fees	\$ 84,237.85
Life membership fees	4,300.00
Miscellaneous receipts	2,313.90
Special journal subscriptions	2,628.00
Registration fees—Atlantic City Meeting	2,387.00
Registration fees—Denver Meeting	762.00
Receipts from exhibitors—Atlantic City Meeting ..	7,319.01
Advance receipts from exhibitors—Indianapolis Meeting ..	1,175.00

Total receipts	\$105,122.76
Cash in banks, Oct. 1, 1936	68.73
Reserve in Treasurer's hands	11,178.44

Total

Disbursements

Subscriptions to journals, including foreign postage	\$ 52,083.49
Allowance to Pacific and Southwestern Divisions ..	2,264.00
Expenses of Washington office	20,693.84
Expenses of General Secretary	612.20
Expenses of Treasurer	200.00
Circularizing for new members	2,403.67
General and travel expenses—Atlantic City Meeting ..	4,666.07
Expenses of exhibition—Atlantic City Meeting ..	4,910.56
Expenses of press service—Atlantic City Meeting ..	579.08
General and travel expenses—Denver Meeting ..	4,063.81
Expenses of press service—Denver Meeting	358.31
Preliminary expense—Indianapolis Meeting	178.14
Preliminary expense—Indianapolis science exhibition	1,490.41
Preliminary expense—Richmond meeting	25.65
Life membership fees to Treasurer	4,300.00
Miscellaneous expenses	1,604.30
Special journal subscriptions	2,664.00

Total expenditures	\$103,097.53
Cash in banks	1,652.70
Cash in Treasurer's hands	11,619.70

Total

MEMBERSHIP REPORT

	Sept. 30, 1936	Sept. 30, 1937
Sustaining members	1	1
Life members	496	532
Annual members, paid up ...	16,511	16,536
Total	17,008	17,069
Members in arrears one year ..	706	744
Members in arrears two years ..	528	490
New members in year	1,477	1,107
Reinstatements in year	36	35
New members Oct. 1—Dec. 31, 1937	—	1,209

THE ACADEMY AND SECRETARIES' CONFERENCES

At the annual Academy Conference Dr. Otis W. Caldwell presented a report on the uses made of research grants for the past three years; Dr. Frank E. E. Germann spoke on "The Peace and Reasons for Existence of State Academies"; and Dr. E. C. L. Miller spoke on "Cooperation Between the State Academies and the American Association." The conference was followed by a complimentary dinner at which the discussions were continued.

The annual Secretaries' Conference (reported by Dr. Ernest Carroll Faust) was attended by 28 secretaries and officers of the association and by Mr. F. E. Lathe and Mr. Howard L. Trueman, representing the Canadian Committee for the organization of the meeting in Ottawa from June 27 to July 2 this year. The chairman, Dr. Otis W. Caldwell, introduced Mr. Lathe, who presented valuable information respecting facilities and plans for the Ottawa meeting. Mr. Lathe introduced Mr. Trueman, secretary of the Canadian Organizing Committee, who spoke of the expected cooperation of Canadian scientific societies. Dr. Earl B. McKinley reported that the National Research Council is sponsoring a symposium at Ottawa on "The Genetics of Pathogenic Microorganisms." Dr. Malcolm H. Soule, secretary of the Section on the Medical Sciences, stated that the section expects to cooperate in the symposium. Dr. Henry B. Ward reported that a general symposium was being organized jointly by the Ecological Society of America and the association. After general discussion by several other persons who were present, the conference adjourned for a complimentary luncheon given by the association to the secretaries.

THE ANNUAL SCIENCE EXHIBITION

There were 69 exhibits at the Annual Science Exhibition, which was organized by Dr. F. C. Brown. Of these exhibits, 13 were by scientists in the fields of their own work, 22 were by scientific societies and institutions, 9 were by publishers of scientific books, and 25 were by manufacturers of scientific materials and equipment. The exhibits were interestingly presented and attracted large numbers of visitors throughout the period they were open to the public.

The association and its affiliated societies owe much to the scientists who went to the expense and great trouble of presenting exhibitions of their work on the frontiers of science. These scientists are: Max A. Bahr, M.D., and W. L. Buetsch, M.D., Indianapolis, Ind.; Paul L. Carroll, S.J., and Mr. James R. Neidhoefer, Marquette University, Milwaukee, Wis.; Dr. Arthur H. Compton, the University of Chicago; Dr.

J. Willard Hershey, McPherson College, Kans.; Dr. A. C. Ivy and collaborators, Northwestern University; Dr. Alfred C. Kinsey, Indiana University; Dr. Karl Lark-Horovitz, Purdue University; Mr. John R. Loofbourow, Institutum Divi Thomae, Graduate School of Scientific Research, Cincinnati, Ohio; Dr. R. A. Millikan, California Institute of Technology; Dr. H. M. Randall, University of Michigan; Professor J. A. Reyniers, University of Notre Dame; Professor W. A. Spencer, Armour Institute of Technology; Dr. Harold C. Urey, Columbia University.

Among the societies presenting exhibits were: The American Dietetic Association, American Medical Association, American Nature Study Society, American Pharmaceutical Association, Carnegie Institution of Washington, Indiana Academy of Science and Junior Academy of Science, Museum of Science and Industry (Chicago), National Geographic Society, National Tuberculosis Association, School Science Fair and Club Project of the American Institute of the City of New York, and U. S. Bureau of the Public Health Service.

SCIENTIFIC SESSIONS

SECTION ON MATHEMATICS (A) AND AFFILIATED SOCIETIES

(From reports by E. R. Hedrick, S. C. Kleene and Edwin W. Schreiber)

The sessions of the Section on Mathematics (A) were held jointly with the American Mathematical Society, the Mathematical Association of America and the Association of Symbolic Logic, with an estimated attendance of about 500. The section and these societies joined with the Econometric Society and the Institute of Mathematical Statistics for a session on Thursday afternoon to hear the address of the retiring vice-president, Griffith C. Evans, on "Mathematical Progress in Theoretical Economics." On Tuesday afternoon, the fourteenth Josiah Willard Gibbs lecture, sponsored by the American Mathematical Society, was delivered by Charles A. Kraus on "The Present Status of the Theory of Electrolytes." By invitation, Alonzo Church spoke on "The Constructive Second Number Class." There were 101 titles on the programs of the twelve sessions for papers on mathematics. At the Mathematicians' dinner on Wednesday evening there were 325 present.

The National Council of Teachers of Mathematics held two sessions on Wednesday at which seven papers were read. At the luncheon on the same day, W. D. Reeve presented a progress report of the work of the Joint Commission of the Mathematical Association of America and the National Council of Teachers of Mathematics on the Place of Mathematics in the Secondary Schools.

On Wednesday and Thursday mornings the Institute of Mathematical Statistics held two separate sessions in addition to the joint sessions with the American Mathematical Society and the Mathematical Association. At the luncheon on Thursday, H. L. Rietz delivered an address on "The Future of the Institute in Relation to Mathematical Statistics."

SECTION ON PHYSICS (B) AND AFFILIATED SOCIETIES

(From reports by Henry A. Barton, Thomas D. Cope and Charles F. Brooks)

The section on Physics (B) as usual held its sessions jointly with the American Physical Society and at this meeting also with the American Association of Physics Teachers. At this joint session, George B. Pegram delivered his retiring vice-presidential address on "Neutrons: A Review." Two other papers at this session were the address of the president of the American Physical Society, H. M. Randall, on "Spectroscopy of the Far Infrared" and an invitation address by G. Breit on "Some Recent Progress in the Understanding of Nuclei." The first and last papers were complementary in covering the new physics of the atomic nucleus. Dr. Randall's paper dealt with a difficult technique which promises to yield much information concerning atomic and molecular structure.

The 63 papers of the American Physical Society dealt with practically all aspects of current physical research. The important fields in each of which several researches were reported include: (1) properties of unimolecular and multimolecular layers, (2) the location and behavior of atoms in crystal lattices as revealed by x-rays and by alpha-particle emission from polonium contamination, (3) nuclear transmutations, (4) induced radioactivity, (5) photoelectricity and ionization, (6) cosmic radiations and their secondary effects, (7) Zeeman effect and other spectroscopic studies, (8) nuclear moments, (9) scattering, diffraction and absorption of x-rays, and (10) ionization counters. Some of the groups of papers referred to were large, indicating active investigations in the subjects in many institutions. One whole session was devoted to the atomic nucleus. Another session was devoted to cosmic rays. Throughout the sessions there were papers signaling the many ways physics is being applied to other sciences and technologies.

The American Association of Physics Teachers presented a program of 20 papers. Outstanding features were a lecture by Harold K. Schilling on "Acoustic Experiments in the Teaching of Optics," reports on "The Training of Physicists for Industry" and on "The Teaching of Geometrical Optics," and a symposium on "College Physics in its Relations to Pre-college Education." The award for outstanding contributions to

the teaching of physics and honorary membership in the society were conferred on Emeritus Professor E. H. Hall, of Harvard University.

The joint dinner for all physicists was held on Wednesday evening. The attendance of physicists at the sessions was estimated at 350.

The program of the American Meteorological Society consisted of three individual sessions and one joint session with the Section on Astronomy (D), at which 19 papers were presented. One session was devoted to radio-meteorographs, chiefly on results in comparison with simultaneous airplane flights. Two sessions were held on such miscellaneous subjects as floods, climate, cooperation in international meteorology, cooperation in extending the use of radio-meteorographs and college training for teachers of meteorology. The fourth session, held jointly with the Section on Astronomy, was largely devoted to astronomical papers, although meteorology was touched upon in all the papers. About 70 were in attendance at the sessions.

A pleasant feature of the meteorologists' luncheon was the introduction of Mr. Elwood Kirkwood, who for 57 years has served as cooperative observer of the U. S. Weather Bureau at Rushville, Indiana.

Plans were made for symposia at the Richmond meeting on atmospheric environment in relation to health, disease and life, with representatives participating from the meteorological, medical and ventilation engineering fields.

The Physics Honor Society, Sigma Pi Sigma, met for luncheon on Wednesday.

SECTION ON CHEMISTRY (C)

(From report by Neil E. Gordon)

The Section on Chemistry (C) held five sessions, one of which was devoted to an important symposium on "The Applications of Surface Chemistry in Biology" and two to a symposium on "Recent Advances in Chemical Physics." The papers of these symposia are to be published together in the near future by the association as a monograph under some such title as "Surface Chemistry and Chemical Physics." The address of Irving Langmuir, the retiring vice-president for this section, was on "Overturning and Anchoring of Monolayers," the first paper of the surface chemistry symposium. Dr. Langmuir, in an amazingly simple manner, has been able to deposit on glass plates films of oil which are only one molecule thick; and he has built some of them into multiple layers which have attraction for water only on one side, and this side may be made to turn over or it may be anchored with ions. The oil layers exhibit considerable electrical potentials which, together with other properties, make them of great importance in biology. Other papers in

this symposium were read by W. D. Harkins, L. H. Germer, Harry Sobotka and G. H. A. Clowes, emphasizing the great biological significance of the multi-layers of oil.

In the symposium on "Recent Advances in Chemical Physics," the first paper was read by Harold C. Urey on "The Separation of Isotopes," in which he described various ways isotopes can be concentrated. Enriched isotopes can now be produced in larger quantities by chemical means than by physical means. Deuterium, or heavy hydrogen, has been prepared in the pure state, and recently concentrations of heavy nitrogen, heavy potassium and heavy carbon have been obtained in sufficient quantities for use in tracer experiments. F. G. Brickwedde showed how deuterium is proving useful in the investigation of interatomic forces and the structure of polyatomic molecules. He presented the results of his investigations at low temperatures on the pressures of various compounds in which hydrogen has been substituted by deuterium. He showed that in this way it is possible to study intramolecular forces and zero-point energies.

The structure of molecules and the various chemical applications were stressed from several different points of view. The structure is revealed, for example, through measurements of electron diffraction, dipole moments, infrared spectra and Raman spectra. By measuring the diffraction patterns of electron beams shot through the vapors of various substances, J. Y. Beach and Linus Pauling determined the distances between atoms in complex molecules. When these distances are found to be "abnormal" a resonating or shifting structure is indicated. Six other papers on this symposium reviewed the progress of the study of dipole moments. Charles P. Smyth reviewed the progress in the study of dipole moments since its initiation by Debye. H. Sponer described the analysis of typical band spectra and their relations to fluorescence and reactivity. Oliver R. Wulf showed how infrared absorption can be used to identify molecules and to determine their concentration. James H. Hibben explained how the technique of Raman spectra can be applied to solids, liquids, gases and solutions. Merle Randall spoke on the importance of recording and standardizing data with the help of thermodynamics and using cross checks.

One session was devoted to eleven papers reporting on work now in progress. The activities of the section included a dinner in honor of Dr. Langmuir, the retiring vice-president. About 300 were in attendance at the sessions.

SECTION ON ASTRONOMY (D)

(From report by Harlan T. Stetson)

The Section on Astronomy (D) held three sessions,

one of which was a joint session with the American Meteorological Society. Nineteen papers were presented, including six read at the joint session. The address of the retiring vice-president, Frederick H. Seares, was on the subject "Magnitudes Again." This address was published in *SCIENCE* for January 7, 1938.

While most technical papers on astronomy are not connected with the sciences that bear directly upon the welfare of mankind, three papers touched upon subjects that may ultimately suggest developments which concern terrestrial sciences. One of these announced the discovery of a new constituent of the earth's atmosphere, nitrogen pentoxide. The discovery was made possible through the recent identification in the laboratory of the absorption spectral band which is characteristic of the molecule N_2O_5 . The unusually dry climate of Arizona was necessary in order to separate this band in the earth's atmosphere from the broad water vapor band that obscures it when the atmospheric water vapor content is low. Since nitrogen pentoxide appears to be formed in the ozone region of the earth's atmosphere, its formation may well be associated with ionization in the ionosphere near the radio ceiling.

A paper by Dinsmore Alter, who has long interested himself in cycles of solar activity and rainfall, increased the hope of untangling the mysteries of a suspected short-period variation in solar activity by the discovery of a recent displacement in longitude of centers of solar eruptions. When allowance is made for these irregular displacements in longitude of solar activities, the possibility of a more nearly fixed 15-month period becomes evident.

Closely allied to the problem of solar and terrestrial relationships was a paper by Claude W. Bruce, which presented striking evidence for a marked correlation between river flow and the sunspot cycle. Correspondence was particularly striking for rivers like the Mississippi which cover a wide drainage area and whose level shows positive correlation with rainfall. These papers were presented on Wednesday morning at the joint session of the Section on Astronomy with that of the American Meteorological Society.

An informal dinner was held at the Lincoln Hotel on Tuesday evening, at which R. G. Aitken, recently elected president of the American Astronomical Society, was guest of honor.

There was an estimated attendance of 50 at the Tuesday sessions and about 25 at the joint session.

SECTION ON GEOLOGY AND GEOGRAPHY (E) AND AFFILIATED SOCIETIES

(From report by Howard A. Meyerhoff)

The Section on Geology and Geography (E) in joint meeting with the Geological Society of America

scheduled its sessions for December 31 and January 1 so that those interested might first attend the meeting of the Geological Society of America in Washington or of the Association of American Geographers in Ann Arbor. Although the time for the program was rather limited, the presence of many members who had attended one of the other meetings fully justified the time schedule adopted.

The eight general papers of the first program were stimulating and provocative. William A. Luby's suggestion that the earth's glacial climates coincided with epochs in which equatorial currents were free to circle the earth, undeflected by equatorial land barriers, was challenged and vigorously discussed. Lucien Beckner's hypothesis that the earth's continental masses represent unassimilated blocks which were added to the earth by meteoritic infalls met with a similar reception, even though the author partly disarmed potential critics by stressing the theoretical character of his suggestion. Interspersed with this stimulating theoretical fare were equally thoughtful and analytical papers of a factual nature on varve types and their characteristics by Lincoln R. Thiesmeyer; on the St. Peter sandstone in Kentucky by Willard Rouse Jillson; and on oil reservoirs by F. B. Plummer.

The address of the retiring vice-president, George R. Mansfield, essayed the difficult task of dealing with a subject with which his audience felt a certain degree of familiarity—"Geology in National and Everyday Life." His comprehensive treatment of this broad field left his hearers impressed with the importance and far-reaching influence of their profession; and to the layman who heard or who will read his address, it will prove a liberal education in the practical applications of geology. This address was published in *SCIENCE* for January 21, 1938.

The ten papers of the symposium on "Oil in the Pennsylvanian of the Eastern Interior Basin," which embraces parts of Illinois, Indiana and Kentucky, would be difficult to match in scientific competence, technical importance, practical significance and timeliness. Harold R. Wanless not only organized the symposium but brilliantly reviewed the stratigraphic features and problems of the Pennsylvanian strata in Illinois. Clyde A. Malott, who suggested the subject of the symposium, performed a comparable service for Indiana and L. C. Glenn for Kentucky. Special aspects of the Basin's stratigraphy and structure were presented in papers by L. M. Weller and W. A. Newton; Alfred H. Bell and George V. Cohee; and G. E. Ekblaw. C. J. Hares discussed current oil developments in the region, and C. O. Dunbar, L. G. Henbest and J. M. Schopf presented micropaleontological data which possess both scientific and practical value in the

economic development of the Basin's fuel resources. R. A. Smith's comparison of the Eastern Interior and Michigan Basins concluded the series of papers of the symposium.

A series of glacial papers by Karl Ver Steeg, W. D. Thornbury and M. M. Fidler presented many new and interesting facts and interpretations of Pleistocene developments in Western Ohio and in Indiana. An interesting aftermath of the Ohio River flood in Louisville was graphically pictured by Lucien Beckner; and an animated, three-cornered discussion of the relative importance of man and nature as causal factors in the soil erosion of southern Indiana may have left the participants, S. S. Visher, J. A. Walka and J. L. Rich, unconvinced, but it persuaded their listeners that soil erosion, whatever the primary cause, is an alarming problem of vast economic import in southern Indiana. Three papers by J. Harlan Bretz, Clyde A. Malott and H. A. Meyerhoff, concerned with the appearance and evolution of caverns and sinks in limestone regions, brought the program to a close.

SECTION ON ZOOLOGICAL SCIENCES (F) AND AFFILIATED SOCIETIES

(From reports by G. A. Baitsell, E. G. Butler, Clarence E. Mickel and O. R. McCoy)

The Section on Zoological Sciences (F) met in joint sessions with the American Society of Zoologists and other affiliated societies. The general program and the various symposia were not only interesting but of exceptional importance. The attendance throughout was unusually large. The annual biologists' smoker, as usual, proved to be one of the most profitable and one of the largest meetings of the entire week, with an estimated attendance of 800. The following evening the annual zoologists' dinner was held, with 246 persons attending. After the dinner, R. S. Lillie delivered his address as retiring vice-president of the section on "The Nature of Organizing Action."

The American Society of Zoologists held its thirty-fifth annual meeting in conjunction with the Section on Zoological Sciences and in association with other biological societies. Of outstanding significance were the joint symposia and the special programs, all of which were unusually well attended. A symposium on "Sex Differentiation," organized by B. H. Willier, was held in conjunction with the Genetics Society of America. Ethel Browne Harvey led a symposium on "Nucleus and Cytoplasm" and J. S. Nicholas on the "Essentials of Mammalian Development." A joint session, arranged by L. V. Heilbrunn, was held with the Society of Cellular Physiologists on "The Physical Study of Protoplasm." A symposium on "Hydrobiology," led by Professor Chancey Juday, was held with

the Limnological Society of America. In addition, the American Society of Zoologists cooperated with the American Society of Naturalists in sponsoring a symposium on the "Nature of Protoplasm."

Nine regular sessions for the reading of 107 miscellaneous papers were held and also a session of 31 demonstrations. Although no accurate figures are available, it was estimated that in all approximately 500 people were in attendance at the symposia and the regular sessions of the American Society of Zoologists.

At the annual business meeting held on Wednesday the following officers of the American Society of Zoologists were elected. *President*, M. H. Jacobs; *vice-president*, T. S. Painter; *new member of executive committee*, F. L. Hisaw.

At the thirty-second annual meeting of the Entomological Society of America 40 papers were presented at the regular sessions, having an estimated attendance of 175. These papers were concerned principally with the morphology, taxonomy, physiology and ecology of insects, though there were good papers on the methods of teaching used in presenting courses in entomology. A joint symposium was held on Tuesday afternoon with the American Association of Economic Entomologists on "The Relationship Between Insects and Plant Diseases." The papers presented at this symposium gave an up-to-date résumé of this particular field, in which both entomology and plant pathology are concerned. The subject-matter of the symposium was arranged according to crops. In place of a detailed paper on insects in relation to diseases of shade and forest trees, a motion picture showed in detail the relation of bark beetles and blue stain of the Norway pine. The final paper dealt with the problems involved in control of plant diseases and insects. The annual address of the society was delivered by P. J. Parrott at the entomologists' dinner, on "Loafing in Africa," an account of an extended trip through Africa beginning at Cape Town and ending at Cairo. He reported on the various types of entomological work now being conducted at the various laboratories in Africa and illustrated his talk with several reels of moving pictures which he took during the course of his journey.

The presiding officer of the society was its president, O. A. Johannsen. Officers for 1938 are: *President*, A. L. Melander; *first vice-president*, William D. Funkhouser; *second vice-president*, C. F. W. Muesebeck; and *secretary-treasurer*, Clarence E. Mickel.

The American Society of Parasitologists held its thirteenth annual meeting under the presidency of George R. LaRue. The program of the society contained 68 titles representing the field of protozoology,

helminthology and medical entomology. About 100 persons were in attendance at the sessions. A number of studies on trematodes were reported, following which George R. LaRue delivered his presidential address on the subject, "Life History Studies and Their Relation to Problems in Taxonomy of Digenetic Trematodes." The annual luncheon of the society was attended by over 100 members and guests. Fifteen papers were presented in a demonstration program during which tea was served. The concluding sessions, devoted to helminthological papers, were featured by a report by H. W. Stunkard that the larval stages of Anoplocephaline cestodes develop in free-living mites. The life cycles of this group of tapeworms which parasitize herbivorous mammals have heretofore been unknown.

At the annual business meeting of the society the following officers were elected: *President*, F. C. Bishopp; *vice-president*, E. R. Becker; *secretary* (to serve for two years), O. R. McCoy; *members of the council* (to serve for four years), E. C. Faust and H. J. Van Cleave; *members of the editorial committee* (to serve for four years), W. W. Cort, D. H. Wenrich and Benjamin Schwartz. W. W. Cort, having completed five years of service as chairman of the editorial committee for the *American Journal of Parasitology*, has been succeeded by N. R. Stoll, who will be assisted by W. H. Taliaferro and W. A. Riley, continuing members of the editorial committee.

The American Association of Economic Entomologists, at its fiftieth annual meeting, held fourteen sessions at which 110 papers were presented on miscellaneous topics. A symposium of five papers was held on "The Relation between Insects and Plant Diseases," in which the Entomological Society of America and the American Phytopathological Society joined. The registered attendance was 283. The presidential address, delivered by F. C. Bishopp, was on "The Relation of Entomology to Conservation."

At the Entomologists' Dinner, with an attendance of 236, P. J. Parrott delivered the public address of the Entomological Society of America. He followed his talk, "Loafing in Africa," with several reels of moving pictures of his trip.

SECTION ON BOTANICAL SCIENCES (G) AND AFFILIATED SOCIETIES

(From reports by J. T. Buchholz, George S. Avery, Jr., Paul Weatherwax, Paul R. Burkholder, C. A. Arnold, Winona H. Welch, Howard P. Barss, F. P. Cullinan and Edgar T. Wherry)

The Section on Botanical Sciences (G) met in joint session with associated societies with an attendance of about 500. J. M. Greenman delivered the retiring vice-

presidential address for the section on the subject "Taxonomy as a Field for Research." This address was followed by an invitation program in which K. C. Hamner gave a very penetrating discussion of photoperiodism in relation to nutritional and other environmental factors; J. N. Couch discussed some interesting symbiotic relationships between the fungus, *Septobasidium*, and certain scale insects; and W. A. Sisson, in summarizing the work of x-rays and cellulose, discussed some of the newest contributions in the application of x-ray diffraction analysis to plant constituents.

The Botanical Society of America held its thirty-second annual meeting from December 28 to 30, with its program organized under its four sections, before which 134 papers were presented. The annual dinner for all botanists was held on Wednesday evening at the Columbia Club, with a record attendance of 442. E. W. Sinnott, president of the Botanical Society of America, presided at the dinner and introduced C. Stuart Gager, retiring president, who spoke on "Pandemic Botany." Motion pictures of the giant *Rafflesia*, made in Sumatra by Mrs. C. T. Brues, were also shown at the dinner.

The following are officers of the society for 1938: *President*, Arthur J. Eames; *vice-president*, William J. Robbins; *secretary*, George S. Avery, Jr.; *treasurer*, F. E. Denny.

The General Section of the Botanical Society of America held four sessions, one jointly with the Ecological Society of America, at which 46 papers were presented on a great variety of subjects. The average attendance was about 125.

Several papers were devoted to problems of leaf anatomy, among which was A. S. Foster's report on the amount of periclinal division in the epidermal cells of the leaves of a species of *Rhododendron*, which was cited as evidence against the general applicability of the histogen theory. As a result of the comparative study of several species of trees and shrubs, taken from different positions on the plants, George H. Smith concluded that leaf size is determined more by cell number than by cell size, and that Lysenko's theory of a close correlation between the anatomy of the leaf and its position on the stem is not wholly tenable. As an addition to the published program, K. Miyake, Tokyo Imperial University, gave a brief account of sexual reproduction in the marine alga, *Caulerpa*.

Four papers dealt with different aspects of vegetative propagation. H. L. Dean reported the production of new dodder plants from fragments of haustoria which have been isolated from other parts of the parasite by growth of the host tissue. He suggested

that dodder might even become perennial in this way when the host is a perennial plant. Other papers discussed the wild food plants used by the Indians of New Mexico and Arizona and the methods employed by the Soil Conservation Service in surveying range lands.

The papers contributed by the general section to the joint session with the Ecological Society of America were concerned with such varied subjects as the diatoms of Bering Sea, a botanical survey of a county in southern Michigan, the roots and root hairs of grasses and photoperiodism in the grass family.

The morphological papers presented described the development of the embryo and the vascular anatomy of the seedling in several genera of the Ranales and gave a brief report on the correlation between chromosome structure and taxonomy in some species of *Anemone*; types of flower arrangement in the Betulaceae; the formation of the involucre in walnut, hickory and beech, and compared it with the structures surrounding the seeds in some of the gymnosperms. R. B. Thomson compared the cone scales of the cycads with those of the conifers, particularly those having large scales, and concluded that the male and the female scales of the conifers are homologous structures. O. J. Eigsti gave the details of a method for making permanent preparations of pollen tubes by germinating the pollen on agar-coated slides, and he demonstrated by this method some differences between the pollen tubes of a lily and those of a species of *Tradescantia*. A paper by Oera Christine Wilton and another by Burdeau E. Struckmeyer, presented by R. H. Roberts, showed a reduction in the amount of cambium and phloem in many species at the time of flowering. Evidences were cited to support the view that these histological changes precede flowering and that the reduced efficiency of the phloem may be instrumental in initiating flowering. L. C. Petry spoke of the periodic appearance of the gametophytes of *Lycopodium* in different localities in New York and New England, gave directions for looking for these rare structures, and urged that all finds be reported.

Officers of the General Section of the society, elected for 1938 are: *Chairman*, H. L. Blomquist; *secretary*, Edwin M. Betts.

The Physiological Section of the Botanical Society of America held three sessions at which forty-two papers were presented. A joint symposium on "Growth and Development of Meristems with Special Reference to Reproduction" was held in conjunction with the American Society of Plant Physiologists and the American Society for Horticultural Science. In the section meetings, important contributions to our knowledge of dormancy, seed germination, the light

relations of plants and the role of vitamins B and C in the growth of plants were presented. A paper describing a study of the rates of respiration in wheat mildew and its host revealed a striking increase in the respiration of host tissue near the site of the infection.

It was before this section that Philip R. White presented the technique and results of his work on the root pressure developed by pure cultures of tomato roots grown in nutrient solution, for which he received the American Association \$1,000 prize award.

One whole session of the section was devoted to the presentation of sixteen papers dealing with plant growth substances. P. W. Zimmerman and A. E. Hitchcock described a series of experiments dealing with the effective use of root-producing substances. Kenneth V. Thimann reported on the increased respiration of oat coleoptiles when treated with indole acetic acid. Many additional substances promoting growth of the *Avena* coleoptile were reported by G. S. Avery, P. R. Burkholder and H. B. Creighton. These same workers further demonstrated the essential rôle of light in the maintenance of a high level of growth hormone in tobacco plants. H. W. Popp and H. R. C. McIlvaine offered evidence for the destruction of naturally occurring growth substance in turnip seedlings under the influence of blue and ultra-violet radiations.

Papers on terminology, inhibitions due to growth hormones and hormone action in sexual reproduction of *Sapromyces* were presented also.

New officers elected by the Physiological Section of the society for the coming year are: *Chairman*, H. S. Reed; *vice-chairman*, H. W. Popp; *member of the Plant Physiological Board*, W. J. Robbins.

At the sessions of the Systematic Section, which were attended by about 200 persons, 30 papers were read on new species of plants, new localities and extension of distribution ranges of numerous species, endemic species, state floras and the revision of the taxonomy of certain difficult genera and tribes. Throughout the sessions the close relationships of taxonomy and morphology with comparative anatomy, genetics, biochemistry and ecology were very evident. Papers presented by authorities in two symposia contributed to the formation of a clearer concept of the genus, and additional facts were presented in support of theories pertaining to the origin and distribution of the flora of the Middle West.

The new officers of the Systematic Section are: *Chairman*, Ivey F. Lewis; *secretary*, Robert F. Smart.

The newly organized Paleobotanical Section held its first meeting at Indianapolis at which nine papers were presented, dealing with fossil plants from formations ranging from the Mississippian to the Pleistocene.

At the business meeting following the scientific pro-

gram, plans for the next meeting of the section were discussed and the following officers for 1938 were elected: *Chairman*, L. C. Petry; *secretary*, W. C. Darrah.

The American Phytopathological Society presented a scientific program of 126 papers. About 200 members were present at the scientific sessions and the annual dinner was attended by approximately 300. The election of 124 new members brought the active enrolment for the first time above the thousand mark to 1,053. Special conferences were held on problems relating to plant quarantines and seed-borne diseases and on extension methods in plant-disease control and their results. Group attack on important plant-disease problems was advanced in special meetings held by members of the Tobacco Disease Council and the Cotton Disease Council. Arrangements were made for a symposium program in connection with the Ottawa meeting in June, 1938.

The necessity for close cooperation among different groups of scientists in solving important problems of agriculture was recognized in a joint symposium in which entomologists and plant pathologists discussed the manifold relationships of insects in the spread of many diseases of fruits, truck crops, grain crops, trees, etc., and the joint responsibility of the two professions in working out effective means of control. Joint sessions were held with the Section on Botanical Sciences, the Mycological Society of America, the Potato Association of America and the Floriculture Section of the American Society for Horticultural Science.

That new plant diseases are continuing to appear as threats to American crops or other forms of vegetation and are receiving energetic attention by plant pathologists was evidenced by papers dealing with several destructive new potato diseases found in various parts of the country, a new sugar beet root rot in Iowa, a new tobacco disease in North Carolina, a new foot rot of squash in California, several new diseases of ornamental plants in different localities and a new and dangerous disease discovered killing out native persimmon trees in Tennessee. That variant physiologic forms of parasitic microorganisms complicate the problem of developing effective plant resistance against different crop diseases was emphasized by the facts presented in some nine papers dealing with biological races.

Virus diseases of plants again received a large amount of attention, and encouraging progress was reported in the technique of isolating and studying the virus proteins, as well as of accurately distinguishing different virus diseases from one another.

Perhaps the most interesting trend in phytopathological research, disclosed by as many as 10 different papers, was the present-day emphasis on growth-

promoting and growth-inhibiting substances and their influence on the relations between host plants and parasites, which affect the course of the disease process and the phenomena of aggressiveness on the one hand and susceptibility or resistance on the other.

That plant pathologists are patiently laying the ground work for the biological control of certain baffling plant diseases by the use of natural enemies was shown in several papers, one of which reported that under experimental conditions root knot nematode injury, seriously destructive to many types of plants in the South, may be greatly reduced by nematode-trapping fungi and predacious soil organisms.

Among interesting papers throwing new light on the behavior and spread of plant diseases were those reporting that within one year the microscopic spores of the disastrous red rot of sugar-cane were able to travel distances up to three feet in the stem, and that the spores of the dread Dutch elm disease up to 62 feet in a 65-foot elm tree, in each case by passing through the water-conducting vessels of the plant. The importance of upper air winds in transcontinental as well as local spread of plant disease spores was convincingly brought out in papers discussing this means of starting epidemics of stem rust of wheat and of onion mildew.

The increasing search for and study of chemicals for use as sprays, as dusts and for seed and soil treatments against plant diseases, was reflected in the 15 or more papers dealing with various fungicidal materials. On the other hand, a number of papers described progress in breeding up plant varieties that will resist certain important diseases which can not now be controlled satisfactorily in any other way. Altogether the program gave encouraging evidence of effective research progress in applying science to the reduction of hazards, wastage and loss due to plant diseases.

Officers elected were: *President*, H. W. Anderson; *vice-president*, R. W. Goss; *councilor*, J. J. Christensen. R. S. Kirby was appointed secretary, G. H. Coons having resigned; H. A. Edson was reappointed treasurer and business manager of *Phytopathology*; and H. B. Humphrey was reappointed editor-in-chief of *Phytopathology*.

The fourteenth annual meeting of the American Society of Plant Physiologists was one of the best attended meetings that the society has held. Forty-eight individual papers and nine others in joint sessions were presented, in addition to one at a session of the American Society for Horticultural Science and the Physiological Section of the Botanical Society. One session consisted principally of papers dealing with plant pigments and photosynthesis. Another was devoted to papers concerned with the effect of

light on plant growth and plant behavior. In addition, papers dealing with the effect of growth-promoting substances, including auxin and vitamin B₁ on the growth of roots, were of particular interest. The papers at two other sessions dealt principally with studies on the mineral nutrition of plants and the determination of chemical substances and products of synthesis in the plant and plant parts. An evening session was devoted to a symposium on the teaching of plant physiology. Papers by four professors of plant physiology dealt with the subject-matter and methods of teaching elementary and advanced courses in their respective universities. About 80 members of the society remained over for this evening program and to take part in the discussion which proved to be one of the most interesting sessions of the meeting.

In an interesting social hour and reception preceding the annual dinner of the society, its members had an opportunity to examine the excellent collection of portraits of world-famous plant physiologists which was loaned by R. B. Harvey, retiring president of the society. The formal program of the dinner consisted of the Stephen Hales address, "Hormones and the Analysis of Growth," by Dr. Kenneth V. Thimann. Dr. Thimann's scholarly paper, dealing with the present knowledge of hormones in their relation to growth response of plants and plant parts, was heard by a record attendance at the dinner. This paper will be published in full in a forthcoming number of the *Journal of Plant Physiology*.

Dr. Harvey spoke on the future field of plant physiology with special reference to industrial development and social progress.

Announcement was made at the dinner of two Charles Reid Barnes life membership awards for 1937, the recipients being Homer L. Shantz and Alexander P. Anderson. Announcement was also made of the election of Frank M. Andrews as a patron of the society and of the election of two new corresponding members, Dr. Henry H. Dixon, Trinity College, Dublin, Ireland, and Professor Alfred Ursprung, of Fribourg, Switzerland.

The Mycological Society of America held three sessions for its own papers, one joint session with the Section on Botanical Sciences (G) and one joint session with the American Phytopathological Society. Nineteen papers were read at the society sessions. Reports of the joint sessions will be found under the section or society above listed. The members of the society joined in the dinner arranged by the phytopathologists.

The program of the session of the Sullivant Moss Society consisted mainly of reports pertaining to species and habitats of mosses, liverworts and lichens in

Arctic America and the Antarctic, the Appalachian Mountains and the Rockies and in various parts of the United States. In addition to the discussions concerning the taxonomy and morphology of the bryophytes and lichens, bryocoenological studies were reported. About 50 persons attended this session.

The American Fern Society held a meeting on December 31, at which there was a lively discussion of problems of distribution and relationship of various native ferns, but no formal papers were presented. Plans for future development of the society and its journal were considered.

SOCIETIES RELATED TO THE SECTION ON ZOOLOGICAL SCIENCES (F) AND THE SECTION ON BOTANICAL SCIENCES (G)

(From reports by A. M. Banta, Orlando Park, M. Demerec, J. E. Ackert, Paul S. Welch and A. I. Ortenburger)

The symposium of the American Society of Naturalists on "The Nature of Protoplasm" was, as far as attendance is concerned, the most successful in recent years. About 700 persons listened to the papers by W. M. Stanley, S. C. Brooks and Robert Chambers. The address at the dinner, attended by 90, was delivered by D. H. Tennent on "Some Problems in the Study of Photosensitization." At the annual business meeting the following officers were elected: *President*, R. M. Yerkes; *vice-president*, J. H. Bodine; *secretary*, R. E. Cleland; *treasurer*, R. A. Brink.

The Ecological Society of America held six sessions, including joint sessions with the Limnological Society of America, the Society of American Foresters and the Botanical Society of America. The first session was devoted to a series of papers on plant ecology, several of which dealt with the problem of soil erosion. At the joint session with the Limnological Society ten papers were read in a symposium on "Hydrobiology," which covered the various general aspects of the subject. At the joint session with the Society of American Foresters nine papers were read dealing with forest ecology. Ten papers in one session were devoted to the general subject "Terrestrial Animal Ecology." At the joint session with the Botanical Society of America twelve papers dealt with such varied subjects as diatoms in the Bering Sea and Bering Strait, plant associations, relation of corn yield to rate of growth data and available soil moisture, and the ecology of some rare plants, while at another simultaneous session eleven papers dealt with general subjects in the field of ecology.

The annual dinner for ecologists, with the largest attendance for a number of years, was followed by the address of the president, R. E. Coker.

At the annual business meeting of the Ecological

Society of America, which was very well attended, the following officers were elected for 1938: *President*, H. C. Hanson; *vice-president*, L. R. Dice; *secretary*, Orlando Park; *treasurer*, S. A. Cain.

The annual winter field trip of the Ecological Society was held on Friday under the sponsorship of the local committee of the society, M. S. Markle, *chairman*. The field party, under the direction of J. E. Potzger and F. R. Elliott, left at 9 o'clock in the morning and covered a number of diverse forests in Brown and Bartholomew Counties, returning in the late afternoon.

The Genetics Society of America this year again omitted short-papers sessions from its program and substituted for them demonstration sessions, thus continuing the experiment instituted three years ago. It has seemed more advantageous to conduct the meetings as informal gatherings with plenty of opportunity for personal contact and informal discussions rather than as a series of formal lectures. Demonstration sessions, held in a large room where members can meet and talk, come close to being an ideal for such a meeting. At two sessions 35 demonstrations were presented by means of charts, microscopes and living animals and plants. L. J. Stadler and F. M. Uber presented evidence indicating that chromosomal deficiencies can be induced by treating maize pollen with ultra-violet rays within the range of 235–302 μ , while changes showing as germless seeds can be induced only by radiation of wave-lengths of 280 μ and shorter. Barbara McClintock described a new technique for analyzing genetic potentialities of short regions of maize chromosomes by which small adjacent sections of a chromosome may be dropped out and the hereditary effect of such induced deficiency observed. Problems related to species formation were discussed by R. E. Cleland, E. W. Shrigley and W. P. Spencer, and from the serological standpoint by M. R. Irwin and R. W. Cumley. Photographs, charts and microscopic demonstrations were used by G. A. Lebedeff to demonstrate a series of intersexes in *Drosophila virilis* induced by a single gene. In addition to the demonstrations, the society held a special session for invitation papers, a joint symposium with the American Society of Zoologists on "Sex Differentiation" and a symposium on "Breeding to Meet Economic Needs." The society also held a luncheon followed by a business meeting, at which the election of L. J. Stadler as president, M. Demerec as vice-president and E. W. Lindstrom as secretary was announced. A resolution was passed registering opposition to restrictions of the use of animals in experimental procedures.

At the meeting of the American Microscopical Society, the following officers were elected: *President*, C. W. Dodge; *first vice-president*, F. E. Eggleton;

second vice-president, Harold Kirby; *treasurer*, A. M. Chickering; *elective member of executive committee*, R. Chester Hughes. The members chosen to represent the society on the council of the American Association for the Advancement of Science were J. E. Ackert and A. M. Chickering. The society voted to meet next year with the American Association for the Advancement of Science at Richmond, Va. About 35 were in attendance at the Indianapolis session.

In commemoration of the sixtieth anniversary of the founding of the society in Indianapolis in 1878, a paper was read by Henry B. Ward, who reviewed the early history of the society. The first president was the late R. H. Ward, of Troy, New York, father of Henry B. Ward, and the first secretary was H. F. Atwood, of Chicago. The society has held regular meetings and published its *Proceedings and Transactions* continuously throughout the sixty-year period. At present, its quarterly *Transactions* include more than 500 pages of original biological and microscopical material, and its membership and subscription lists include many of the leading biologists and microscopists in this and other countries. Six past presidents participated in the program and greetings were presented from charter members Edward Bausch, of Rochester, New York, and H. F. Atwood, of St. Petersburg, Florida; and from an early member, Edward Pennock, of Philadelphia, who joined the society at the second meeting (Buffalo, New York) in August, 1879.

The Limnological Society of America held four sessions, one of them being a joint meeting with the Ecological Society of America. This session included six papers from members of the Limnological Society and four papers from members representing the Ecological Society. Papers dealing with plankton, chemical constituents of bottom deposits, dissolved oxygen distribution, distribution of fresh-water sponges, microstratification, temperature measuring apparatus, growth indices in certain marine mollusks and ecological succession in certain marine situations were included in this program. Two more sessions were devoted to papers in limnology, at which 22 papers were presented and four additional ones were read by title. As a part of this program, Ira T. Wilson presented a memorial paper entitled "Review of the Limnological Work of the Late Professor Will Scott, Indiana University." The Limnological Society also joined with the American Society of Zoologists in a symposium on "Hydrobiology." This program included six papers which dealt in general with marine phytoplankton, light penetration into lake water, marine productivity, ecology of aquatic insects, water flow through certain mollusks and the relation of limnology to game-fish production.

The Phi Sigma Society held two business meetings,

two scientific meetings and a dinner. There were present 30 official delegates from its chapters and a total attendance of members of at least 50. Thirty-three papers were presented by members at the scientific sessions. At the dinner President A. G. Ruthven, of the University of Michigan and president of the society, spoke on "Some Remarks on the Organization of Research in Universities." At the meetings it was decided to present annually a scholarship medal for excellence in biological work to a student on each campus where there is a chapter of Phi Sigma. P. A. Warren and E. H. Stewart were re-elected chancellor and treasurer, respectively.

SECTION ON ANTHROPOLOGY (H)

(From report by Wilton Marion Krogman)

The sessions of the Section on Anthropology (H), with an average attendance of 60, were devoted largely to problems of midwestern archeology and to race-biology. The central theme of both major topics was correlation in time and relation of results to present-day problems. Twenty-seven papers were read. At the dinner the retiring vice-president, Ralph Linton, delivered his address on "The Present Status of Anthropology," and motion pictures were shown by T. M. N. Lewis on "Archeological Work in Tennessee." Four papers on archeological correlation were presented, covering studies of Illinois Valley pottery of Hopewellian type and noted relationships to Ohio Hopewell, Marksville and Central Basin, Hopewellian pottery from Crystal River in Florida, and tentative surveys of the protohistoric cultures of Nebraska and their relation to historic Plains Indians groups, notably the Pawnee.

An important phase of archeological research is interpretation in terms of historic relationships. Three papers elaborated on this theme. The development of archeological techniques was described in three papers: (1) by using tree-ring dating methods, Florence Hawley showed that a continuous record back to 1588 A.D. has been achieved in the Middle West; (2) by the analysis of adobe bricks from the seventeenth century Volney Jones proved that Arizona has become a source of information concerning early agricultural patterns; and (3) Glenn Black indicated that soil chemistry studies are yielding new ideas concerning time-elements and are also throwing light on the preservation of archeological material. The establishment at Ohio State Museum of a central study-unit for prehistoric flint objects was announced.

Midwestern archeology envisions as its goal the interpretation of early peoples in terms of their successors. Archeology thus becomes a re-creation of basic life-patterns; the correlation of early and late cultures is the best possible method of assessing cul-

tural change. In support of this statement two papers offered a critical analysis of dance symbolism in the Yaqui Indians of the Southwest; cultural disintegration, as measured by the loss of original import and the accretion of meaningless ritual, was clearly portrayed. A third paper outlined the cultural pattern of war tactics among the early historic American Indians; the socio-economic background was analyzed, and it was concluded that, at least in the present study, war is founded on basic economic pursuits.

The sessions throughout focussed upon the interpretation of results in terms of present-day application. The historical approach in archeology, the development and acceptance of new techniques, the analysis of cultural change and progress, the study of the human body as a biologic and dynamic entity, were all elaborated, in accordance with anthropology's avowed purpose—the study of man.

SECTION ON PSYCHOLOGY (I)

(*From report by Leonard Carmichael*)

The Section on Psychology (I) held parallel sessions on five half-day periods. One of these sessions was held jointly with the Section on Education (Q). At the dinner, also held jointly with the Section on Education, the addresses of the two retiring vice-presidents were delivered. The title of A. T. Poffenberger's address was "Some Unsolved Problems in Human Adjustment," and E. S. Evenden spoke on "Factors Affecting the Salaries of College and University Teachers." Seventy-five papers were presented at the various sessions, four of which were read at the symposium on "Endocrines and Behavior." A series of papers was devoted to the scientific study of learning, another dealt with various forms of tests and a third was devoted to theoretical psychology. One session of eight papers was devoted to the topic of electroencephalogram or brain wave. One of the most striking papers of this session was that by Hallowell Davis in which the human brain potentials during the onset of sleep were clearly described.

The final session, held jointly with the Section on Education, was devoted to educational psychology. The papers presented were on subjects ranging all the way from a study of attitudes to a specific consideration of the nature of learning. The last paper on this program, entitled "Our Changing Concept of Intelligence," by B. L. Wellman, was voted by most of those who attended the meetings as one of the most significant presentations of the entire session. The conclusions of this paper, based upon very elaborate studies, seemed to be that the I.Q. of a child at a given age does not necessarily indicate what his future I.Q. will be or what his past I.Q. was. Indeed, certain specific environmental changes, according to the speaker, are

effective, for example, in rather strikingly increasing the predicted I.Q. of an individual. The further development of the point of view presented in this paper may have wide implications for psychological theory and practice.

It is estimated that 300 persons were in attendance at the several sessions of the Section on Psychology.

SECTION ON SOCIAL AND ECONOMIC SCIENCES (K) AND AFFILIATED SOCIETIES

(*From reports by E. P. Hutchinson, Alfred Cowles, 3rd, and Howard Richards*)

The first in a series of conferences on the subject "Science and Society," organized by H. G. Moulton, of the Brookings Institution, and designed to explore the problems created by scientific progress, was presented at the Indianapolis meeting. The general subject of this first conference was "Fundamental Resources as Affected by Science." In the opening address Dr. Moulton, retiring vice-president and chairman of the section, outlined the series of conferences and introduced the Indianapolis symposium. In conclusion, he stated that "We shall require all the aid which science can render for decades yet to come before we need seriously to worry about the problems of life in an age of plenty. Meanwhile, the great necessity is to make science and economic organization work with increasing effectiveness in the service of society."

In the following sessions, Gove Hambidge, of the U. S. Department of Agriculture, spoke of the aid of science in the development of agricultural and forest resources and of the possibility of solving present-day problems through the further application of science and scientific methods. John W. Finch, of the U. S. Bureau of Mines, outlined the advances in the utilization of mineral resources made possible through scientific progress.

The third session was devoted to a discussion of power resources by A. A. Potter. The use of power and machinery was presented as the basis of contemporary civilization, freeing man in large measure from the slavery of physical labor and providing him with a higher average standard of living. The increased use of power, however, creates new problems and should be coupled with a greater recognition of social responsibilities.

The final session of the conference was concerned with human resources and their utilization. In a paper on "Man Power" by Frederick Osborn, a tendency toward a cessation of population growth and a progressive aging of the population were reported as significantly affecting the human resources of the United States. E. C. Lindeman discussed the problem of more complete utilization of our human resources.

The attendance at the several sessions ranged from 60 to 300.

The Econometric Society scheduled only one session, which was a joint session with the Section on Mathematics (A) and associated societies and the Section on Social and Economic Sciences (K). At this session the address of the retiring vice-president, G. C. Evans, was delivered on the subject "Mathematical Progress in Theoretical Economics."

The Metric Association held all its sessions on one day, including an evening session when the metric play, "The New Assistant," was presented. The attendance averaged 35.

The use of metric measures in the electrical industry was demonstrated by exhibits. Various reports were presented indicating increased use of metric measures in diverse fields. An excursion was arranged to inspect the practical use of metric weights and measures at the Indiana University School of Medicine and Hospitals. The trip was continued to a local hosiery mill where there are large machines designed, made and maintained in millimeters. Dr. A. E. Kennelly was awarded the prize for accomplishing most for the progress of the metric movement during 1937.

The following officers were elected for 1938: *President*, J. T. Johnson; *vice-president*, Theodore H. Miller; *treasurer*, James F. Martin; *secretary*, Howard Richards.

SECTION ON HISTORICAL AND PHILOLOGICAL SCIENCES (L)

(From reports by Joseph Mayer, Eleanor Waite and Chauncey D. Leake)

The Section on Historical and Philological Sciences (L) and the History of Science Society joined for two sessions. More than 80 persons attended the first session and about 40 the second session. Ten papers were read, two of these at the symposium on "Social Implications of Modern Science." The first paper gave a clear survey of the historical relations between science and society and pointed out the factors contributed by scientific efforts to the development of cooperative enterprise. The second paper discussed factors interfering with the free spread and development of science, which were traced to popular ignorance, fear and superstition. A vigorous discussion followed and was continued at a luncheon. It was agreed to endorse the activities of the appropriate groups of the association in attempting to get over to the public the intangible general attitude and spirit of science. It was recommended that efforts be made to introduce reading and presentation of the history of science early in elementary schools, through cooperation with progressive educational associations and

book publishers. At the symposium on "Maya Civilization" two papers were presented, one of which was illustrated by a series of beautifully colored pictures showing various phases of Maya culture. It was seen that the remarkable scientific achievements of these people were chiefly applied in superstitious ways. The second paper presented an initial survey of Maya medicine. Like the Egyptian medicine, that of the Mayans was largely a matter of empirical applications of the gross effects of plant materials observed in the process of trial and error for food. It has survived through Spanish commentaries and is followed to-day. Six other papers were read on topics related to the history of science.

SECTION ON ENGINEERING (M) AND AFFILIATED SOCIETIES

(From reports by George A. Stetson and Lester D. Gardner)

The Section on Engineering (M) held one session for the purpose of hearing the address of the retiring vice-president, William E. Wickenden, who spoke on "The Social Sciences and Engineering Education." About 60 persons attended this session. At the conclusion of the address, the section adjourned to meet with the Section on Social and Economic Sciences (K) in the Wednesday session of the first of a series of conferences on "Science and Society."

Serving for Dean J. W. Barker as chairman was M. R. Keefe, president of the Indiana Engineering Council, and for Secretary F. M. Feiker, George A. Stetson, editor of *Mechanical Engineering*.

The Institute of Aeronautical Sciences held two sessions, with about 75 in attendance, for presenting eight papers. These papers discussed problems of the stratosphere, investigations in the icing of aircraft, photoelasticity in the study of stresses, unsolved problems in aerodynamics, and aviation medicine and some of its current problems.

The local chapter of the Institute of Radio Engineers held a luncheon, attended by about 30. Following the luncheon five papers were read relating to radio and television. H. A. Wheeler, of the Hazeltine Service Corporation, was invited to give a paper on "The Fine Structure of Television Images."

SECTION ON MEDICAL SCIENCES (N) AND SUBSECTIONS

(From reports by Malcolm H. Soule and Thomas J. Hill)

The Section on Medical Sciences (N) held six sessions for a symposium on syphilis, with 29 papers arranged by a special committee, and a joint session with the Subsection on Pharmacy, with 14 papers. An average of about 100 persons were in attendance. An

address by Dr. Thomas Parran, Jr., Surgeon General of the U. S. Bureau of the Public Health Service, on the subject "Syphilis as a Public Health Problem" served as a climax to the symposium.

Two papers dealing with the antiquity of syphilis introduced the symposium. Richmond C. Holcomb, a distinguished scholar of this subject, presented evidence from incunabula and other sources to show that this human malady is apparently as old as man himself and has plagued humans in one form or another since the beginning of history. However, the fact that a very extensive literature came into being shortly after the return of Columbus from his voyages of discovery and exploration and the apparent absence of syphilitic bones in the large accumulations of human specimens in Europe were used by Wm. Allen Pusey to support the contention of the American origin of syphilis.

During the course of the intensive campaign that has been recently waged to inform the lay public about syphilis, the venereal aspects of the disease have been repeatedly emphasized. However, there exist in other parts of the world, particularly the tropics, two maladies that are generally recognized as closely related to syphilis, namely, yaws and bejel. It is also agreed among those familiar with these entities that they are certainly not venereal in nature. Their relationship to syphilis is a question of considerable importance. The causative agents of all three diseases are spirochaetes, and all are primarily afflictions of man. In order to throw some light on this problem many workers have striven to transmit the diseases to laboratory animals, but the experimental infections do not simulate human syndromes. Nevertheless, the rabbit and the monkey can be infected and the artificial disease observed under controlled conditions. While the spirochaetes can not be differentiated on the basis of morphology, animal work suggests that there are differences in the species as well as differences in strains within the species. The animal infections also offer workers an opportunity to evaluate the anti-syphilitic drugs, although it was repeatedly stated by a large number of the workers that results obtained with laboratory animals can not be interpreted in terms of human infections, the course of the disease, the outcome of the disease or the stimulation of immunity. Following a most exhaustive consideration of the biology of the spirochaetes and their virulence, attention was directed to various manifestations of human syphilis, neurosyphilis, syphilis in pregnancy, congenital syphilis and cardio-vascular syphilis. Each phase of these clinical manifestations of the disease was shown to present special problems that might, if unrecognized, lead to erroneous diagnoses. A summa-

tion of the clinician's obligations then led to the aids that the diagnostic laboratory has available. It was pointed out that the clinician must assume all responsibility for the recognition of the disease, but it was also recognized that the sensitivity and specificity of several laboratory tests are of inestimable value for the early detection of infection and for evaluating the efficiency of therapy. The subject of therapy was approached from the results of carefully studied records of several well-developed centers for the treatment of this disease. The value of arsenicals and mercurials, as well as their dangers, were enumerated and it was agreed that all the available methods for the treatment of syphilis leave an untoward injury on the host. The scientific papers were summarized by U. J. Wile, and the concluding paragraph of this summation expresses the spirit of the symposium: "It is an outstanding triumph of courage over timidity that the shadow of syphilis has at last been lifted and that the public is at last in possession of facts to which it has always been entitled. With due consideration to the incompleteness of our knowledge, we must necessarily proceed to the fullest extent of our present equipment in the hope and belief that the unsolved problems will soon find their elucidation."

The Subsection on Dentistry registered 55 in attendance who were the guests of the School of Dentistry at a luncheon at the Riley Hospital. Two sessions of five papers each were held under the chairmanship of Harry Semans, president of the American Association of Dental Schools, and Paul Kitchen, president of the International Association of Dental Research.

The societies participating in this meeting were: The American Division of the International Association of Dental Research, the American College of Dentists, the American Association of Dental Schools and the American Dental Association.

Joseph L. Volker investigated the factors involved in the reduction of clotting time of blood by the presence of saliva. He demonstrated that the greatest acceleration in coagulation is brought about when the proportion of saliva to blood is in the ratio of slightly less than 1:2. Also the ingredient in the blood capable of producing the greatest reduction in clotting time is ether soluble fraction found in the form of phospholipid. Raymond E. Myers reported the construction, design and operation of a device by which the characteristic behavior of liquid metal flowed into a mold could be studied. William H. G. Logan reported the histological study of completely and partially erupted teeth for the presence of inflammatory reaction and for bacteria. He concluded that in these respects they had no pathological significance. He further found that the presence of pulp stones and calcifica-

tions occurred in the same high percentage as in corresponding erupted teeth. E. W. Skinner and W. J. Turbyfill showed that in soldering with gold alloys there is an atomic diffusion between the solder and the wire and also between the wire and the solder. As the composition of the soldered joint will vary according to the composition of the parts of the solder the selection of a heat treatment becomes complicated. Isaac Schour and Rudolph Kronfeld reported on pre-natal and postnatal enamel and dentin in cases of premature birth or birth injury. The neonatal ring in human deciduous teeth consists of an accentuated Retzius line in the enamel and a corresponding contour line in the dentin. In cases of premature birth or birth injury the neonatal ring is particularly pronounced and often indicates actual arrest in growth. The postnatal enamel and dentin are hypoplastic or missing. Leonard S. Fosdick and Edward H. Hatton gave a preliminary report on the susceptibility or the immunity to dental caries as evidenced by their chemical tests of the saliva when the diet was augmented by additions to the diet of Vitamin A, Vitamin D plus calcium phosphate and Vitamin A plus Vitamin D. The group receiving Vitamin A and Vitamin D was the only one associated with a decrease in caries susceptibility. P. B. Taylor presented data to indicate that in wax patterns used in casting there is a mechanical distortion of the wax in addition to the thermal expansion of the wax. This mechanical expansion was apparently due to the setting expansion of the investment. Hamilton B. G. Robinson and W. R. J. Wallace presented confirmatory evidence to substantiate the conclusion that solid, solid and cystic, and cystic forms of ameloblastoma exist and apparently represent degenerative changes in the neoplasm; that the tumor is homologous with the normal enamel organ up to the functional point but is not analogous. From this point on a degeneration takes place in the epithelial follicles and at the expense of the stellate reticulum-like cells. Harold H. Hansen reported on the oxidation-reduction potentials of oral micro-organisms from the view-point of dental caries. The complexities of the bacterial systems added to the difficulties of interpretation but gave some evidence that there was some relationship between oxidation-reduction potentials, growth and acid production. Smith Freeman and Edward H. Hatton showed that in gastrectomized dogs bones including the jaws undergo retrograde changes. Only teeth that are not fully formed are affected. Teeth that are fully developed do not change in form, structure or weight.

During this meeting an announcement was made by the American College of Dentists of the establishment of the William J. Gies fellowships in dental research. These fellowships are available to men who wish to

work in chemistry, biological or such other fields as the committee in charge of the fellowships may deem worthy.

The Subsection on Pharmacy held two sessions, one a joint session with the Section on Medical Sciences (N). A total of twenty-seven papers was read at these sessions.

SECTION ON AGRICULTURE (O) AND AFFILIATED SOCIETIES

(From reports by Victor R. Boswell, H. B. Tukey and W. H. Martin)

The Section on Agriculture (O) held one session for a symposium on "The Rôle of Minor Element Fertilization in Economic Plant Production."

The dominant notes of the program consisted of additional evidence of deficiencies of several of the so-called secondary- and minor-element plant nutrients, under commercial conditions, and their correction. Consistent and phenomenal responses in some cases are obtained as in the correction of pecan rosette and of little-leaf of fruit trees by zinc salts. On the other hand, some crops exhibiting specific symptoms have shown erratic responses to a given treatment, and sometimes a wide variety of "minor-elements" may each produce partial correction of symptoms. Indiscriminate application of "minor-elements," especially boron and others that may be highly toxic, was emphasized as hazardous and unwarranted. The extremely varied manifestations of minor- and secondary-element deficiencies and their possible relation to modern field and greenhouse methods were discussed, but the speakers recognized that at this time too little is known about the problem as a whole to permit general recommendations for correcting many of these troubles.

The program of the American Society for Horticultural Science this year carried 265 papers as compared with 199 a year ago, making it necessary to conduct the meetings in fifteen sessions in addition to the five evening round-table discussions and the banquet, at which the presidential address was delivered. At the joint sessions there were as many as 500 in attendance, over 300 of them being horticulturists.

From the major emphasis upon pomology of a few years ago, there has developed a greatly increased activity in the fields of vegetable crops and in floriculture and ornamental horticulture, three sessions having been devoted to each group. The further subdivision of pomology is shown by sections designated "Tree Fruits," "Rootstocks and Propagation," "Photosynthesis," "Soils and Fertilizers," "Small Fruits" and "Breeding and Pollination." The close tie-up of horticultural research workers with related fields is clearly shown by the three joint sessions held. (1) A

joint session of the vegetable crops section with the Section on Agriculture (O) and the Potato Association of America on "The Rôle of Minor Element Fertilization in Economic Plant Production"; (2) a joint session with the section of floriculture and ornamental horticulture and the American Phytopathological Society; (3) a joint session with the Physiology Section of the Botanical Society of America and the American Society of Plant Physiologists on "Growth and Differentiation of Meristems with Special Reference to Reproduction."

The further broad interests of the society are indicated by round-table discussions on (1) extension problems, (2) educational methods, (3) floriculture, (4) spray residue and (5) vegetable varieties. The society maintains an interesting relation to the practical and applied problems and to the more specialized divisions of the natural and physical sciences. The close cooperation of individuals working in such distinctly different fields is one of the valuable contributions from the society.

An interesting feature of this year's program was the inclusion of morphological problems, evidenced notably in the symposium on "Growth and Differentiations of Meristems," which brought out the general thought that physiology and structure are inseparable and that workers in these two fields need a more common understanding. Morphological papers on the program showed the development of apple blossoms, narcissus bulbs, the histology of abscission, root formation and development of onions, flower types of Papaya, the histology of bitter pit of apples, flower bud development in gardenia, and the effect of growth-promoting substances upon various plant structures. Mineral nutrition is also an active field of investigation covering tree fruits, small fruits, various vegetables, ornamentals and flowering plants. That fundamental science finds a ready expression in horticultural plants, thus directly affecting society, is one of the satisfying and significant features of the present horticultural research program.

The Potato Association of America held two individual sessions, one joint session with the American Society for Horticultural Science and the Section on Agriculture (O) and one joint session with the American Phytopathological Society. Altogether 43 papers were presented at these sessions.

The following officers were elected for 1938: *President*, F. A. Krantz; *vice-president*, Ora Smith; *secretary-treasurer*, William H. Martin.

SECTION ON EDUCATION (Q)

(From the program of the section)

The Section on Education (Q) held two simultaneous sessions on each of three half-day periods. About

100 were in attendance at the sessions. The papers submitted were classified under suitable headings as follows: Problems in Teacher Training, 5 papers; Reading Ability, 7 papers; Problems in Educational Administration, 2 papers; Measurement of Intangibles in Education, 6 papers; Guidance and Personnel, 8 papers. The program included a session for eight papers of a general nature and a joint session with the Section on Psychology (I). At the joint dinner of the Section on Education (Q) with the Section on Psychology (I), the addresses of Retiring Vice-presidents E. S. Evenden and A. T. Poffenberger, respectively, were delivered. Dr. Evenden spoke on "Factors Affecting the Salaries of College and University Teachers." The subject of Dr. Poffenberger's address was "Some Unsolved Problems in Human Adjustment."

ORGANIZATIONS RELATED TO THE ASSOCIATION AS A WHOLE

(From reports by Edward Ellery, Margery C. Carlson and Lawrence R. Guild)

The Society of the Sigma Xi, the society for the promotion of research, numbers over 40,000 members and associates scattered in 55 different countries. Because of its numbers and because of the spirit of companionship that characterizes it, the Society of the Sigma Xi effectively joined with the American Association for the Advancement of Science in bringing to reality the high note struck at Indianapolis, namely, an active participation of science and scientists in the great social movements of our time, the improvement of living conditions for the underprivileged and the strict preservation of freedom of thought and its expression. Up to the thirty-eighth convention held on December 28 in connection with the meetings of the association, Sigma Xi numbered 72 chapters in universities, colleges and research institutions, and 34 clubs in educational institutions and cities. The convention authorized four additional chapters (Rice Institute, Wellesley College, Massachusetts State College and the University of Florida) and two additional clubs (Utah State College and Brigham Young University). There are now 112 distinct units of the organization, lively and enthusiastic, meeting frequently, interested in social as well as scientific progress. Fifty-seven of the 72 chapters and 10 of the 34 clubs were represented at the convention. The existence and constant activity of these units present most promising conditions in which to initiate the enormously important policy of an intimate union of "Science and Society," voiced with such definiteness and power at Indianapolis. The officers of the society are distinguished men of science with large human outlook. Those elected

at Indianapolis were: *President*, George A. Baitsell; *member of the executive committee*, Harlow Shapley; *member of the alumni committee*, Donald H. Sweet. The treasurer of the society, George B. Pegram, and the secretary, Edward Ellery, continue in office, as do the other members of the executive committee: Lewis J. Stadler, Dayton C. Miller, Ross A. Gortner, E. J. Lund and W. F. Durand.

The society sends distinguished lecturers to educational institutions to present the latest advances in scientific endeavor. Five lecturers in 1937 (E. O. Lawrence, California; H. C. Urey, Columbia; L. O. Kunkel, Rockefeller Institute; T. S. Painter, Texas; Edgar Allen, Yale) gave 27 lectures at as many institutions. The series for 1938 is on new phases of biochemistry as related to prevention of disease and preservation of health. The lecturers are: W. M. Stanley, Rockefeller Institute; R. R. Williams, Bell Telephone Laboratories; K. E. Mason, Vanderbilt University; F. G. Benedict, Boston Nutrition Laboratory; E. N. Harvey, Princeton University.

The Society of the Sigma Xi, splendidly organized with all units active, financially sound, ever forward-looking toward greater usefulness, pledges to the association enthusiastic cooperation in all the important work it is doing, and especially in its recently expressed plan for an intimate application of science to and the effective participation of the scientist in human betterment.

The Honor Society of Phi Kappa Phi held two business sessions. At the breakfast for delegates, attended by 42, Frederick D. Kershner gave an address on "A Journey through Utopia."

The Sigma Delta Epsilon annual luncheon was attended by 94 members and guests. The address on "Brucellosis" was delivered by Dr. Alice C. Evans, senior bacteriologist of the National Institute of Health. The annual convention, at which the business for the year was transacted, was held in connection with the breakfast. Fifty-five members, including delegates from thirteen of the fourteen chapters, were present.

(From the Programs of the Societies)

The American Nature Study Society held four sessions for reading 20 papers. At the dinner Edwin H. Reeder spoke on "The Lure of Science for the Modern Child in Our Schools."

The American Science Teachers' Association held two sessions. The first session was devoted to a symposium on "New Knowledge of Matter," and the second to a symposium on "The Need for a Twelve Year Science Program for American Public Schools." The luncheon speaker was George D. Birkhoff, president

of the American Association for the Advancement of Science.

REPORT OF THE COMMITTEE ON GRANTS

Upon recommendation of the Committee on Grants, consisting of Dr. J. G. Lipman, chairman, Dr. McKeen Cattell, Dr. Arthur H. Compton, Dr. Moses Gomberg, Dr. C. C. Little, Dr. A. T. Poffenberger, Dr. Joel Stebbins and Dr. Sam F. Trelease, the council of the association awarded grants in aid from the \$2,000 fund appropriated by the association for the year 1938 as follows:

Reina Albagli, for completion of a study of the allowed cone of cosmic radiation, in particular of the so-called penumbra, \$300.

Austin B. Chinn, for a study of the deposition of Vitamin B₁ in the cardiac muscle of rats, \$150.

Louis Nelson Katz, to complete development of a flow-meter for measuring blood flow in the living animal based on the principle of electromagnetic induction and its application to blood flow in the living animal, \$200.

J. C. Krantz, Jr., the synthesis and pharmacological study of a series of halogenated hydrocarbons containing nitrite groups, with special reference to dilation of the coronary vessels and their possible use in the treatment of angina pectoris, \$150.

Aline Underhill Orten, for a study of the part played by dietary protein in the growth, development and physiological activity of certain of the endocrine glands, especially the pituitary and the ovary, and with the rôle of protein in hemoglobin formation, \$200.

Eric Ponder, for a study of the conditions under which hemolysis occurs *in vivo*, \$200.

Roland C. Travis, for an experimental determination of the antagonistic and the facilitory influences of cortical and subcortical neural patterns in motor learning, \$50.

G. Robert Coatney, for a critical study of experimental malaria in pigeons with special reference to the effect of vitamins on the course of the infection, \$200.

Arthur P. Black, for the continuation of unpublished studies of the virus of measles, \$300.

Charles E. Lane, for a study of the physiology of the individual Graafian follicle as regards its utilization of pituitary gonadotropic hormones, \$150.

Ludvig G. Browman, for a study of the effect of light on the reproductive phenomena in the albino rat, \$100.

From the gift of \$1,000 by Mr. Newcomb Cleveland to the association for aid in research, the council made the following grants:

David E. Davis, for a study of the social behavior of *Crotaphaga ani*, a communal nesting, polyandrous bird, \$150.

Calvin S. Hall, for a study of the inheritance of emotionality in rats, \$50.

Robert E. Hungate, for an investigation to determine by analytical microchemistry the nature and quantities of

materials liberated by the protozoa in the alimentary tract of the termite genera *Zootermopsis*, *Kaloterms* and *Reticulitermes*, \$200.

J. H. Simons, for a study of gaseous organic free radicals by a molecular beam technique, \$150.

John Geldart Aston, for an investigation to determine heats and rates of Grignard, magnesium alkyl and zinc alkyl addition reaction calorimetrically, \$150.

Francis R. Hunter, for a study of the relationship between permeability and respiration, \$150.

Walter H. Peck, for an investigation to thoroughly explore bad lands located in Twp. 2-3-4-5, South in both ranges of 55 and 56 E., MPM., a total of eight townships, or approximately 288 square miles, \$150.

Respectfully submitted for the committee,

(Signed) J. G. LIPMAN,
Chairman

SCIENCE FOR HUMANITY'S SAKE

As the American Association for the Advancement of Science meets in Indianapolis, hope is once more raised for the organization of some agency that can turn the light of known truth upon the current problems of mankind.

Progress toward that objective has been made in several directions. Scholars assembled at the Harvard Tercentenary celebration in the summer of 1936 heartily approved a movement to coordinate the world's knowledge and thus translate it into moral force. In turn, that suggestion met with enthusiastic indorsement of the informed public. More recently a distinguished group of British scientists recommended the creation of a democratic world association of science. The meeting at Indianapolis may determine, in large measure, whether that idea is to take firm root and grow into a powerful world force.

It is especially appropriate for leading scientists of the world to turn their thoughts in this direction. For science has made an enormous contribution to the forces that to-day are threatening to wreck our civilization. Men in laboratories have unloosed powers that mankind is not yet able to control intelligently. New inventions intended to relieve drudgery and toil have been perverted into instruments of destruction. Our greater facilities for the production of goods have, paradoxically, accenuated the problem of economic instability for millions of families.

In these circumstances the scientist and the scholar acquire a moral responsibility for the labor of their heads and hands. It is not enough for the world's leading thinkers to provide the tools of progress. A much bigger task is to teach mankind to use those tools. And since that responsibility has been so grossly neglected in recent years, the current movement toward

greater diffusion of light, understanding and consequent good will assumes a place of commanding importance.

There is a growing awareness in the world that the successful search for truth does not assure the advance of civilization. If the findings of science should lead only to economic changes, without any comparable development of social, cultural and spiritual qualities, the ultimate result might be only disillusionment and chaos.

In other words, knowledge is of value only so far as it is utilized for the ultimate benefit of mankind. The goal to be sought is not so much expansion of the volume of abstract truth known to the few, but rather a fuller and more satisfying life for the many. If science is to fulfill its most important mission, therefore, it must give sober attention to the effects of its discoveries and to the general trend of world events, as well as to the pursuit of abstruse learning.

The current movement might be described as an effort to shift from science for science's sake to science for the sake of humanity. Leaders see the very great opportunity of mobilizing the knowledge of the world as a moral force to counteract stupid and vicious political movements. It is hoped that "truth" and "wisdom" carefully gleaned from the experience of the past and research of the present may be made an active instead of a passive force.

Scientists alone can scarcely hope to accomplish that task. It calls for executive leadership as well as the technique of fact-finding. Moreover, there are many thinkers outside the immediate realm of science who might well participate in this effort to make right instead of might—understanding instead of blind force—the governing power of the world.

If the American Association can initiate the move in cooperation with scientific bodies in other countries, it will by that action alone be performing a needed task. Such an organization, once set up, ought to comprehend all fields of learning. Its resources should be as broad as human intelligence. And no country willing to permit independent investigation should be excluded from participation.

Of course, no intelligent person would expect any such group of scholars to come forth with a ready-made solution for the problems of the world. Perhaps its chief task would be gradual enlightenment of mankind as to the nature of its difficulties. But after all the greatest hope for a stable and peaceful society lies in that very process.

Viewed from any angle, it is evident that the sponsors of this idea have one of the greatest opportunities for service to humanity that has confronted any group at any time.—*The Washington Post*.