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THE BERKELEY MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Edited by Dr. HENRY B. WARD

PERMANENT SECRETARY

THE association has held previously three meetings on the Pacific Coast; the first in San Francisco from August 2 to 7, 1915, was the sixty-seventh meeting of the association. On this occasion Stanford University, the University of California and the Panama-Pacific International Exposition were hosts, and the general meetings were held in San Francisco and on the grounds of the exposition. Many of the societies held meetings on the campus of the university in Berkeley, and the entire program of one day was given on the campus of Stanford University. At this meeting seven sections and twenty societies took part. This was a noteworthy meeting and drew to it an unexpectedly large number of scientific societies and of leading scientists who participated in their programs.

The second meeting was held at Portland, Oregon, from June 17 to 20, 1925, and was the eighty-first meeting of the association. At this meeting 16 societies took charge of the program, and the sections held no independent meetings. All sessions were held on the campus of Reed College.

The third meeting on the Pacific Coast, the eighty-eighth meeting of the association, was held in Pasadena, California, from June 15 to 20, 1931, and the meeting was characterized by a large attendance and by important scientific programs. The general sessions were held in the Greek Theater, Los Angeles, and other meetings in the California Institute of Technology.

The Berkeley meeting, which extended from June 18 to 23, 1934, was the ninety-fourth meeting of the association. There were 15 sections and 37 societies presenting programs on this occasion.

To the University of California the association was indebted for the extensive facilities which had been placed freely at its disposal; most of the meetings were held on the campus, and the attractive surroundings gave an exceptionally fine environment for the work of the various sections and affiliated societies meeting in Berkeley.

The attendance at the various sessions in Berkeley exceeded expectations. Naturally, the largest number came from Berkeley and the Pacific Coast and mountain states, but other regions were well represented and even from outside the United States a gratifying number of persons was registered. The grand total of registration was 1,164. A considerable number of persons through one cause or another was not formally entered at the registration bureau. The reports from sections and societies indicated that the total number of persons in attendance on the sessions was from 1,600 to 1,800. The attendance at individual sessions and societies so far exceeded the original estimates that it was necessary to find new rooms in order to accommodate some of the groups which assembled. Details of registration are given in the table below.

Stanford University contributed to the meeting important features that were highly appreciated by the considerable number participating in them. The university distributed a booklet containing views of the campus and outlining the history and development of the institution. On Thursday the Engineering Section went *en masse* to the Stanford Campus, where both the sections on hydraulics and aeronautics held sessions in the morning and in the afternoon made a tour of the university and the Sunnyvale Air Base, and were given an autogyro demonstration at the Palo Alto Airport. On Friday afternoon members of other sections visited the university and inspected the laboratories, the Hoover Memorial War Library and other points of interest. They were given a concert of Beethoven quartettes most artistically rendered by the Pro Arte String Quartette in the famous Memorial Church.

An item worthy of special mention was the presentation of the Daniel Guggenheim Medal for Achievement in Aeronautics. This was bestowed on William Edward Boeing of Seattle at a formal dinner of the Engineers' Club in San Francisco on Wednesday evening, June 20.

THE PACIFIC DIVISION

All the meetings on the west coast have been general meetings held in conjunction with the Pacific Division and have served to make the association acquainted with the strength of this part of its organization. The Pacific Division of the association had been most active in arranging for attendance, and in providing the program for the Berkeley meeting. Frequent opportunity was afforded for joint discussion and action. The Pacific Division was by invitation represented at sessions of the council and of the national executive committee. Members of the latter body were present as guests at the luncheon meetings of the executive committee of the Pacific Division on Monday, Tuesday and Wednesday. Plans were made for more frequent and intimate contacts.

The division agreed to join with the association in the prospective summer meeting in Denver in 1937 in furtherance of a plan to hold joint meetings with the association once every three years, if practicable.

REGISTRATION AT THE BERKELEY MEETING

East of the Mississippi		Center and South		Pacific Coast and Mountains		Outside of the United States	
District of Columbia	12	Colorado	7	California	557	Canada	6
New York	11	Texas	7	Berkeley	335	Hawaii	4
Massachusetts	10	Minnesota	4	Washington	41	China	4
Ohio	7	Kansas	3	Oregon	39	England	3
Pennsylvania	5	Missouri	2	Utah	27	Japan	2
Maryland	3	Wisconsin	2	Arizona	18	Africa	1
Illinois	2	Alabama	1	Nevada	16	France	1
Indiana	2	Florida	1	Montana	9	Belgium	1
Connecticut	1	Iowa	1	Idaho	7	Sweden	1
Michigan	1	Nebraska	1	New Mexico	5	Holland	1
Vermont	1	Oklahoma	1				
		Virginia	1				
Totals	55		31		1,054		24
						Grand total:	1,164

At the business meeting of the Pacific Division, Dr. Bailey Willis, since 1922 emeritus professor of geology in Stanford University, was elected president, succeeding Dr. Joel H. Hildebrand, professor of chemistry in the University of California. Dr. Wm. V. Houston, professor of physics in the California Institute of Technology, was elected to the executive committee, succeeding Dr. S. J. Barnett, professor of physics in the University of California at Los Angeles.

GENERAL SESSIONS

In the enforced absence of the president of the association, Dr. Edward L. Thorndike, the committee was fortunate in securing Dr. W. W. Campbell, president of the National Academy and past president of both the American Association and the Pacific Division, as well as president emeritus of the University of California, to preside on Monday and Tuesday evenings. On Wednesday evening Dr. C. A. Kofoid, representing the University of California, was the presiding officer. On Thursday evening Dr. R. A. Millikan, president of the California Institute of Technology, and on Friday evening Dr. Ray Lyman Wilbur, president of Stanford University, graced the occasions by serving as presiding officers.

Monday evening was devoted to the retiring address of the president of the Pacific Division of the association, Dr. Joel H. Hildebrand, who spoke on "The Liquid State" and illustrated the results of recent research on the intimate relations in the structure and properties of fluids by a series of slides and demonstrations projected upon the screen.

Tuesday evening was devoted to the Maiben lecture. Heretofore these lectures, established two years ago under the terms of the bequest made by the late Hector E. Maiben, have been given only at the annual meeting in the winter. In consideration of the great interest in the Berkeley meeting, including jointly the Pacific Division and the general association, the executive committee secured as Maiben lecturer Dr. L. Dudley Stamp, geographer and economist on the faculty of the University of London and chairman of the British Commission on Land Utilization. Dr. Stamp spoke on "Planning the Land for the Future," and also participated later in the symposium and discussions on land utilization.

The address on Wednesday evening was given by Dr. John C. Merriam, of the Carnegie Institution of Washington, who took as his topic the "Responsibility of Science with Relation to Governmental Problems."

The Thursday evening session was addressed by Dr. Edwin B. Wilson, Harvard University, on the topic "Are There Periods in American Business Activity?" The speaker for the Friday evening general session was Dr. Karl T. Compton, president of the Massachusetts Institute of Technology. His subject was "Science and Prosperity." All the sessions were attended by large audiences and the addresses aroused interest and active discussion subsequently.

BUSINESS SESSIONS

The council of the association held two sessions at Berkeley at which were considered items of immediate importance for the conduct of the meeting, and also certain general business matters looking toward the future. The following deserve mention here:

A report by the permanent secretary on meeting places was presented and after discussion the following assignments for meetings were approved; included therein were those which had already been published. The list is as follows:

Pittsburgh—Winter of 1934, Thursday, December 27 to Wednesday, January 2.

Minneapolis—Summer of 1935.

St. Louis—Winter of 1935, Friday, December 27 to Thursday, January 2.

Rochester—Summer of 1936.

Washington, D. C.—Winter of 1936, Monday, December 28 to Saturday, January 2.

Denver—Summer of 1937.

Indianapolis—Winter of 1937, Monday, December 27, to Saturday, January 1.

The council approved the general plan of arranging for joint meetings of the Pacific Division at intervals of approximately three years.

After discussion with the executive committee of the Pacific Division, it was arranged that the summer meeting of 1937 at Denver should be a joint meeting of the Pacific Division, and the Southwestern Division has also been invited to cooperate on that occasion.

An application for affiliation from the Mycological Society of America was presented and after discussion approved. The society has a total enrolment of 314 members, of which number 171 are fellows and 14 members of the association or a total dual membership of 185 members. The Mycological Society is accordingly entitled to two representatives in the association's council, who will be *ex-officio* members of the Section Committee of the Section on Botanical Sciences.

Amendments to the constitution of the association proposed at the April meeting of the executive committee were laid before the council for the especial information of the western members and the occasion for a change fully discussed. It was the opinion that the preferable form of the amendment was as follows:

Article 2—Membership—of the Constitution of the Association is hereby amended by omitting the clause,

"the annual dues are $5," and substituting therefor the clause, "the Council shall fix the annual dues."

The entire matter was then referred for the consideration of the council at the annual meeting at Pittsburgh.

Letters from foreign scientific societies nominating representatives for the Berkeley meeting were presented, including the following nominations:

Royal Society of London:
Professor J. W. McBain, F.R.S., Stanford University.
Academy of Sciences of France, Paris:
Dr. W. W. Campbell, president emeritus of the University of California.
Bohemian Royal Society of Science, Praha:
Dr. Henry B. Ward, professor emeritus of zoology, University of Illinois.
Royal Society of South Africa, Rondebosch, Cape Town:
Dr. B. F. J. Schonland, University of Cape Town.

Other organizations which had replied to the request submitted but expressed their appreciation of the invitation without being able to arrange for delegates for the Berkeley meeting were the following: Royal Society of Canada, Ottawa; Academy of Sciences in Vienna; Society of German Naturalists and Physicians, Leipzig.

The phraseology of the plan originally adopted for the Maiben lectures was discussed and approved as recast in the following form:

A lecture shall be given each year to be known as the Hector Maiben lecture to be provided for from the income of the Hector Maiben Fund and to be arranged by the Executive Committee.

The Indiana Academy of Science announced that the semi-centennial of that organization would be celebrated from November 15 to 17, 1934. The academy invited participation from the American Association and steps were taken to arrange for such participation.

The following expression of appreciation of the services of Dr. William Morris Davis (deceased) was presented and ordered spread upon the minutes of the council:

A Tribute to William Morris Davis

By John P. Buwalda

It is appropriate that the American Association for the Advancement of Science should express and record in its minutes the deep sense of loss suffered by the association and by both scientific men and the public, not merely of this country, but of the entire world, when Professor William Morris Davis died on February 5 of this year at Pasadena, California. A former vice-president (1903) of the association, he also held many important offices in other scientific societies, among them the presidency of the Geological Society of America (1911) and of the Association of American Geographers (1905, 1909).

Professor Davis was one of the best-known scientific men of this country. Trained as a geologist, with leanings toward geography, his great contributions lie mainly in the field of physiography or geomorphology. In this field he was the acknowledged leader for nearly a half century; his scientific work extended over a period of about six and a half decades. Deep interest, vigor in constructive work and boundless zest marked his life even in his last or eighty-fourth year. His former students all regarded him as a great teacher who, while exacting in his demands, was eminently fair and always desirous of furthering their intellectual welfare. Thousands enjoyed his public lectures and profited from them, for he was a master of popular exposition.

Beginning his teaching career at Harvard in 1877, he continued until retirement in 1912; then followed some years of intensive research, and from 1924 until his death he lectured at universities in Oregon, California and Arizona, continuing actively meanwhile his physiographic investigations.

In response to an invitation from the association, Professor Davis went to Boston last December to deliver the Hector Maiben lecture. His address, later published in the *Scientific Monthly*, attracted wide-spread attention for its scholarly and idealistic character. This occasion was his last public service. Coming as it did in the period of extraordinary severe weather, the trip was undoubtedly a strain, but the service was gladly rendered as a contribution to science and humanity, to which he was ever sincerely devoted.

His scientific contributions were large in number, important in wealth of new ideas, and marked by clarity in writing and forcefulness and thoroughness throughout. As indicated by his numerous popular articles and public lectures he was constantly conscious of the obligation of scientific men to make their knowledge useful. His deep desire, as indicated often in his writings, that the scientific method be applied to the solution of social questions was another expression of the ethical side of his nature. May American science produce many more men of his stamp.

Before adjournment, members of the council expressed their appreciation of the arrangements that had been made and the conspicuous success of the meeting. The following resolutions were adopted and ordered spread upon the minutes as well as transmitted to the persons and organizations concerned:

General Resolutions

The council of the American Association for the Advancement of Science, before closing its final session at the Berkeley meeting, wishes to express its deep appreciation of the many courtesies extended to it and of the general cooperation of the University of California in placing at its disposal the facilities of the institution. The abundant resources of the university so attractively located and admirably adapted to the holding of a scien-

tific meeting have served to make the occasion a memorable one in the history of the organization and the council feels its deep indebtedness to President Robert Gordon Sproul and to the Regents and members of the faculty and scientific staffs for the numerous evidences of hospitality and thoughtfulness that contributed throughout the sessions to the comfort and convenience of the membership of the association and its affiliated organizations.

The association is indebted in significant fashion to the officers and members of the Pacific Division for their interest and activity which served to enrich the program and provide high standards for the scientific work of the session. To them are unquestionably due the large attendance and enthusiasm manifested in the sessions which have served so well to carry out the fundamental purpose of the organization.

The local committee under the leadership of Dr. Roy E. Clausen, chairman, and Dr. A. R. Davis, secretary, worked assiduously and thoughtfully to provide for the needs of the association and the other organizations meeting with it on this occasion. The council desires to express its thanks to the officers and members of this committee for the care with which all arrangements were perfected so that the program was carried out with unusual ease and effectiveness in the numerous sections and separate societies.

For the extensive cooperation offered by the communities of the Bay Region and particularly by Alameda County and the City of Berkeley, both of which generously participated in providing the financial assistance necessary to meet the expenses of the meeting, the association desires to recognize specifically its indebtedness and to register its appreciation.

To the numerous cooperating institutions, Stanford University, Mills College, Lick Observatory, the California Academy of Sciences, the San Francisco Chamber of Commerce, the Berkeley Chamber of Commerce, and many other institutions and organizations which have joined to make the meeting an occasion long to be remembered by the participants, the association tenders its grateful thanks.

To the press the association is grateful for the effective handling of scientific work announced at the sessions and for bringing these results to the attention of the public over a region larger than otherwise could have been reached.

SCIENTIFIC EXHIBITS AND DEMONSTRATIONS

IN connection with the scientific meeting, various departments of the University of California held open house with exhibits and demonstrations that proved of marked interest to the individual sections and societies. All these items were well explained in the general program of the meeting and members of the association not privileged to attend the sessions at Berkeley may secure copies of the program by sending a request to the office of the permanent secretary in Washington, D. C.

Particular mention should be made of the Special Exhibit of Old Books. A series of more than 300 books and other publications considered to have been epochal in the history of science were arranged through the efforts of the University Library, the History of Science Society, the History of Science Club and the members of Section L of the association. Of these only 112 books were displayed in glass cases in a special room set aside for the purpose by the library. A brochure descriptive of the collection was prepared by Professors Herbert McLean Evans and James Westfall Thompson. The exhibit included portions of the Hearst Medical Papyrus, which was the special subject of symposium at the joint session of Sections L and N. Included were also a number of portraits of scientific worthies, chiefly in the form of engravings, from the private collection of Professor Evans. The books were taken from the University Library and from the private collections of Professors Evans, Kofoid and Thompson. About 1,200 visitors inspected this exhibit.

Through the cooperation of Mr. Ansel F. Hall, of the National Parks Service, an extensive exhibit of relief models to scale was installed in the foyer of the Hearst Memorial Mining Building. This included especially models of Sequoia, Crater Lake, Mesa Verda, Rocky Mountain, Grand Teton, Zion and Acadia National Parks.

ENTERTAINMENT AND SOCIAL FEATURES

The president of the University of California, Dr. Robert Gordon Sproul, tendered a general reception to the officers and members of the association and distinguished guests. This was given in the Hearst Gymnasium for Women immediately after the opening general session on Monday evening. In the receiving line were Dr. and Mrs. W. W. Campbell, Dr. C. B. Lipman, Dr. and Mrs. J. H. Hildebrand, Dr. and Mrs. A. O. Leuschner and Dr. and Mrs. R. E. Clausen.

All members and visitors were recipients of special attention on other occasions also. Tea was served by the Women's Faculty Club on Tuesday afternoon. On Wednesday afternoon at the International House the distinguished Japanese artist, Chiura Obata, lecturer in art in the University of California, held an informal exhibition of Japanese paintings, and Mrs. Obata gave a demonstration of Japanese flower arrangements. Some Japanese ladies in native costumes served tea, and others entertained with Japanese music and dancing. On Thursday and Friday afternoons individual teas were given in a number of private homes by various members of the faculty.

The trustees and officers of Mills College provided a trip to visit that institution on Friday with luncheon at noon and later a drive through the attractive residential area in Berkeley and Oakland.

Visiting ladies were conducted on a tour of private gardens in the Bay Region on Thursday morning and were welcomed at an open house at the College Women's Club that afternoon. During an all-day tour of Chinatown, conducted on Friday by Mrs. R. E. Clausen, various points of interest were visited under the direction of Chinese guides and with special privileges to see schools, temples and art treasures. Various other clubs extended courtesies to the visiting ladies, as did also the men's clubs to the men in attendance at the meeting. All these events were largely attended and thoroughly enjoyed.

EXCURSIONS

The trip to Mount Hamilton and Lick Observatory on Friday afternoon and evening, made mostly in private cars by many members, furnished an opportunity duly appreciated to see the buildings and equipment and in the evening to get a glimpse of selected objects through the great telescope.

On Saturday one group spent the entire day at the Branch of the College of Agriculture at Davis, California, and were conducted through the experimental laboratories and fields where extensive work on a wide variety of subjects commanded special attention.

Another party visited the various departments of the California Academy of Sciences, where they were received by the administrative and scientific staffs of the academy and enjoyed a demonstration of the extensive natural history collections and of the famous Steinhart Aquarium. A luncheon was served at noon in the Simson African Hall through the courtesy of the trustees and council of the academy. Following this the San Francisco Chamber of Commerce took the visitors on a sight-seeing tour through Golden Gate Park, the Presidio and other points of interest in that city.

Still other members made a speed boat trip around the bay, visiting the new Transbay and Golden Gate bridges under construction, the Mare Island Navy Yard and other points of interest. Individual trips were made at various times to Mt. Tamalpais and Muir Woods, and some were able to extend their trips to the Yosemite and more distant points.

LOCAL COMMITTEE

Thanks to the energy and foresight of the local committee under the leadership of Dr. R. E. Clausen, chairman, and Dr. A. R. Davis, secretary, arrangements had been thoroughly worked out, and the material which was sent in combined in a very attractive program. The extent of this may be well indicated by the fact that no less than 866 papers were listed for the 15 sections meeting at that time and the 37 societies cooperating with the association.

The press service for the meeting, which was cared for by Mr. G. A. Pettitt of the University News Service, was successful in securing much space in papers on the coast and also in the various services reaching other regions.

The details of the work in the various sections and societies are presented by the officers and local representatives in the concluding portion of this report. Evidently a program of the extent indicated could only be imperfectly reported by the brief statement which it is possible to publish in connection with this report. The marked success of the meeting was the subject of outspoken comment on all sides.

SCIENTIFIC SESSIONS

SECTION ON MATHEMATICS (A)

(Report from E. R. Hedrick)

The meeting of Section A was held in conjunction with that of the American Mathematical Society, on Wednesday, June 20. The attendance was gratifyingly large; over one hundred persons, including forty-five members of the society, were present. At the first session, which was held on Wednesday morning, some forty-two short papers were presented either by title or in person. The full account of these is to be published in the July number of the *Bulletin of the American Mathematical Society.*

At the noon recess, a luncheon for mathematicians was served at the Men's Faculty Club.

In the afternoon, Section A and the American Mathematical Society met in joint session with Section K and the Econometric Society. At this session, papers were read by invitation only. Abstracts of these papers will be found in the report of Section K.

SECTION ON PHYSICS (B) AND ASSOCIATED SOCIETIES

(Report from L. B. Loeb and Thomas R. Reed)

The 192nd regular meeting of the American Physical Society was held in affiliation with the meetings of Section B from June 19 to June 23. The program consisted of three symposia, the first being a joint symposium on spectroscopy in astrophysics, in conjunction with the Astronomical Society of the Pacific. The second was a symposium on nuclear structure, and the third was a symposium on fundamental physical constants. In addition, the regular program of ten-minute papers was held on Friday and Saturday. The meetings were exceptionally well attended, over three hundred auditors being present at the nuclear symposium sessions.

The Physical Society met at luncheon at the Faculty Club on the days on which the meetings were held, with an average attendance of about fifty. The dinner was held on Wednesday evening, at which Pro-

fessor R. W. Wood, vice-president of the American Physical Society, spoke informally on "The Physicist as a Detective."

Both the invited papers on the symposia programs and the ten-minute papers were of an exceptionally high caliber. It is impossible to do more than mention certain of the outstanding papers. The paper on "Diffraction Gratings and their Application to Astronomical Problems," by Professor R. W. Wood, which was accompanied by demonstrations, gave an inspiring picture of the triumph of mechanical technique over almost insurmountable difficulties in the perfection of adequate gratings. Particularly notable was the development of an accurate type of transmission grating, throwing most of the light into the first order, applicable to astronomical observation on large telescopes, which will greatly simplify the studies of star clusters and nebulae. Another feature of the astrophysical session was the summary of the spectroscopic evidence of galactic absorption, by Dr. R. J. Trumpler, of the Lick Observatory, who gave an analysis of the means by which this evidence has accumulated and the conclusions to be drawn therefrom.

The discussions in the nuclear symposium were introduced by an excellent paper by Professor R. J. Van de Graaf, in which he summarized the various methods which had been perfected for the production of high energy particles for nuclear disintegration, and indicated the different ways in which these methods were being applied. Perhaps one of the most notable papers presented gave the results obtained by Dr. M. A. Tuve on the work of his group in the Department of Terrestrial Magnetism of the Carnegie Institution. These investigations were carried on at about one million volts energy and had differed in the results yielded from the investigations carried on at the California Institute and at the University of California. As a result of intensive discussion, Dr. Tuve was able to show that the previous outstanding discrepancies in the findings were almost entirely to be ascribed to the difference in energies of the incident particles utilized in the respective laboratories, together with the measuring techniques used in the identification of the disintegration products. It appears that the results are not contradictory in the least, but rather supplementary, and that the behavior of the nuclei under different modes of excitation and detection is very much more complex than had been previously anticipated, there being marked differences in the nature, energies and yields of the disintegration products, depending on the energy of the incident particles. The papers of Professor Lawrence and Professor Lauritsen further detailed the differences obtained under different conditions and made a consistent picture with the findings of Dr. Tuve.

The essential element of the very important paper of Professor Carl D. Anderson on disintegrations with positron ejection, most of which were carried out with cosmic ray secondaries, led to the conclusion that many of these phenomena require the creation of large numbers of gamma rays as secondary products, in addition to the very large yield of positive and negative electrons. Another important feature brought out was that the major proportion of high energy incident particles in these cosmic ray phenomena are of masses far smaller than the hydrogen atom, and are probably of the order of the mass which is ascribed to the negative electron. Dr. Thomas Johnson summarized his recent investigations on the nature of the cosmic ray by stating the belief that the large majority of the primary cosmic ray particles have a positive charge and are of prodigious energy.

The symposium on fundamental physical constants included a paper by Dr. Felix Bloch, of Stanford University, who developed the complete equation for the Compton shift, which enables one to bring the values of the fundamental physical constants, determined from the Compton effect, into agreement with the e/m and other measurements. In addition, Dr. C. D. Shane presented a notable contribution to the accurate evaluation of the physical constants, notably e/m, as a result of the very beautiful investigations made by himself and Dr. F. H. Spedding on the fine structure of the Hα line. These results were made possible through superb experimental technique, aided by a fine interpretation of the results obtained. In addition, the paper by Professor Millikan on the value of the electronic charge constituted a valuable feature of the program, connecting the present-day knowledge with the earlier historical findings.

The whole problem of the values of the fundamental constants was summarized by Professor R. T. Birge, and served to tie together the very complex mass of data on physical constants in such a fashion that a reasonable interpretation as to the most probable values could be gained. From the data of Professor Birge, it appears that his recently published values of e, h and e/m are the most reliable and that the correct value of e is 4.768×10^{-10} es units, with $h = 6.547 \times 10^{-27}$ erg.sec, and e/m 1.7574×10^{7} em units, and $1/\alpha = 137.41$.

Among shorter contributed papers are: One by Robert N. Varney, who described the measurement of the ionizing energies of positive ions in gases obtained by the balanced space charge method, which appears to be the most sensitive method of detection used today; a paper by Dr. Otto Beeck, of the Shell Development Company, who was able, through the use of the method of molecular beams, to show that the dehydrogenation of hydrocarbons in impact with a heated platinum surface proceeded at a critical tem-

perature (in analogy to the ionization potential measurements) and that in this process both the dehydrogenated hydrocarbon and molecular hydrogen rebounded from the hot surface without being adsorbed and without any heat of activation; the paper of Dr. Franz N. D. Kurie on disintegrations by neutrons in air in which the exploding atom was observed in rare instances to emit a proton of exceedingly long range. Finally, a most interesting paper concerning the general interpretation of cosmic ray effects was given by Professor R. A. Millikan, who drew the following conclusions: (1) Practically all cosmic-ray ionization is due to the passage of electrons (+ and −) rather than protons, alpha-rays or heavier nuclei, through the atmosphere. (2) More than 70 per cent. of this ionization, probably 80 or 90 per cent., is due to secondary electron-rays produced within the atmosphere by incoming photons and electrons (+ and −). (3) There is no evidence that anywhere on the earth more than 3 or 4 per cent. of the ionization found at sea level is due directly to incoming electrons; their number is therefore very small. They are responsible, however, for the latitude effect, the longitude effect and the east-west effect. (4) Photons in general interact only with electrons (+ or −), whether in the nucleus or out of it. A photon colliding with a nucleus detaches one or many free electrons (+ and −) from it but not protons. (5) The earth's magnetic field separates the low energy incoming secondary electrons formed outside our atmosphere from the high energy, letting the former in near the poles but only the latter near the equator. These latter are predominantly positive, since they necessarily come from the nuclei of atoms and these have an excess of *positive* electrons. (6) The greater part of the ionization of our atmosphere is due to photons of energy of the order of 130 ($\pm$ 100) million e.-volts.

The meeting of the American Meteorological Society was given distinction by the attendance of Mr. W. R. Gregg, newly appointed chief of the Weather Bureau. Mr. Gregg, a charter member of the society and its treasurer for many years, opened the sessions with a report of plans for carrying out the recommendations of the President's Science Advisory Board looking to the adoption by our national weather service of Norwegian methods of air mass analysis. This was the first time a western meeting of the society has been dignified by the attendance of a national weather chief, and the significance of his message, marking perhaps a new era in the history of the Weather Bureau, enhanced the uniqueness of the occasion. Due to the unusually crowded program (34 papers having been scheduled) it seemed doubtful that the six half-day sessions would be sufficient to permit all to be heard. A limit of one-half hour to each was therefore prescribed, and the sessions were brought to an end exactly on time. A wide range of meteorological subjects was covered, those dealing with fire-weather relations predominating—and frost problems suffering total eclipse. This proportionality, although unstudied, was quite appropriate, the West having just passed through a relatively frostless winter, while being faced with a fire situation in the forests which is not without its ominous aspects due to the subnormal precipitation in many areas.

SECTION ON CHEMISTRY (C)

(Report from G. K. Rollefson)

Section C met in conjunction with the Pacific Intersectional Division of the American Chemical Society for a series of six half-day sessions. The opening session on Tuesday morning was devoted to a selected group of papers on physical chemistry. Professor J. W. McBain discussed the methods of measurement and magnitude of surface conductance. Professor Gilbert N. Lewis presented some results dealing with the change of vapor pressure caused by replacing hydrogen by deuterium in certain compounds. He also discussed the effect of such a substitution on the dissociation constants of acetic acid and ammonium hydroxide. The next paper by W. F. Giauque and D. P. MacDougall described the methods which have been employed in the University of California to obtain temperatures below 1° K. In the two succeeding papers Professors Badger and Pauling discussed a number of problems of molecular structure. The session closed with a paper by Professor W. M. Latimer on "Ionic Entropies and Their Uses."

The Wednesday morning session was devoted to a selected group of papers on biochemistry. Professor Roger T. Williams discussed the significance of pantothenic acid, particularly with reference to yeasts. Then Professor K. V. Thimann presented a summary of some recent advances in the study of plant hormones. Professor J. Murray Luck traced the steps followed in some cases of intermediary protein metabolism. Professors D. M. Greenberg and Harold Goss dealt with some phases of the animal biochemistry of calcium, magnesium and phosphorus.

The Tuesday afternoon and Thursday sessions were taken up by contributed papers in physical and inorganic chemistry, with organic and biological chemistry papers on Wednesday afternoon. At the latter session Dr. H. H. Strain presented an interesting experimental demonstration of the separation of carotenes by selective adsorption. One group of papers dealt with the application of quantum theory to organic chemistry both from the standpoint of the structure of molecules and the mechanism of reactions. Another group dealt with electron-diffraction deter-

minations of the structure of molecules. Other groups dealt with thermodynamics, photochemistry, determinations of fluorine and iron in small quantities, radioactivity and miscellaneous papers in organic chemistry. In addition to these scientific activities a chemists' dinner was held on Wednesday evening, and Phi Lambda Upsilon had a luncheon on Tuesday.

SECTION ON ASTRONOMY (D) AND ASSOCIATED SOCIETIES

(Report from C. D. Shane and H. H. Nininger)

Sessions of the Astronomical Society of the Pacific were held at the Students' Observatory on Thursday morning and afternoon and Friday morning. They were well attended, the average number present being about seventy. Forty papers were presented, of which only a few can be discussed here.

The Thursday morning session was devoted to papers on variable and binary stars and the spectrum of stars and nebulae. Dr. W. F. Meyer presented the results of a careful analysis of the radial velocity variation of *Beta Canis Majoris,* in which it was shown that the numerous observations can be explained completely on the basis of two slightly different periods with unequal amplitudes. One of these periods is the same as the period of variation of line width in the star. Dr. W. H. Wright discussed his recent discoveries of new nebular lines in the ultraviolet. These discoveries were made possible largely through the use of aluminum on the Crossley reflector. He reported on a number of identifications of these lines made by Dr. I. S. Bowen and on Bowen's suggestion that certain oxygen and nitrogen lines owe their origin to excitation by the resonance line 303 of ionized helium.

On Thursday afternoon the papers dealt with stellar and solar spectra. Dr. R. F. Sanford presented a paper on the interpretation of the radial velocities of class N stars in terms of galactic rotation. It was shown that the main features of the rotation are reflected in these radial velocities.

Dr. J. H. Moore discussed the appearance of the Fraunhofer lines in the spectra of the corona with reference to their displacement and widening. No theoretical explanation seems to account fully for the observed properties of these lines. It was also pointed out that the wave-length of maximum energy in the coronal spectrum agrees approximately with that of the solar spectrum.

Messrs. Harold D. and Horace W. Babcock presented the results of their studies of the solar spectrum in which a number of new features had been found. Most interesting among these are the observations of coronal lines in the spectrum of the sun's limb.

The Friday morning session contained papers on sun-spots, planets and theoretical astronomy. Dr. E. C. Slipher described the studies of himself and Drs. V. M. Slipher and Arthur Adel on the giant planets. His remarkable photographs of Jupiter and Saturn were shown to illustrate changes in appearance of these planets and in particular the numerous white spots discovered on Saturn. The work of V. M. Slipher and Arthur Adel in identifying the absorption bands in the outer planets with bands of ammonia and methane was described. It was pointed out that only a few weak bands remain unidentified.

On Thursday evening a dinner at the Claremont Country Club was attended by about twenty-five members of the section and their wives. The final feature of the meeting was an excursion to the Lick Observatory on Friday afternoon and evening.

A joint session on the subject of the application of spectroscopy to astronomy was held with the Section on Physics and reported by the latter.

At the Berkeley meeting the science of meteoritics for the first time occupied a special place on the program of the association. Representatives of the newly organized Society for Research on Meteorites presented papers on various phases of this subject before sessions of that society which were held in the Students' Observatory on Monday and Wednesday at both forenoon and afternoon sessions.

Dr. Frederick C. Leonard, of the University of California at Los Angeles, president of the Society for Research on Meteorites, presented a brief résumé of the society's accomplishments during the first year of its organization. He pointed out several lines of activity along which the society has already succeeded in stimulating action and suggested several other lines of investigation which he hopes to see undertaken in 1934. He also reported a very encouraging growth in the membership of the society from the time of its organization to the present date.

Among the more important papers were the following: Professor H. H. Nininger, of the Colorado Museum of Natural History, presented an illustrated discussion of the "Surface Features on Meteorites." This paper included a résumé of accepted beliefs concerning the aerial shaping of meteorites and the presentation of numerous facts pointing to a much more rapid surfacal erosion than has been assumed by older writers.

The writer believes he has ample evidence to prove that the ordinary meteors of nightly occurrence must be occasioned by much larger bodies than has usually been assumed to account for them.

An outstanding feature of the program was an address by Dr. Robley D. Evans, of the University of California, on "Radioactivity and the Age of Meteor-

ites." This lecture illustrated very graphically how the science of meteoritics may contribute to the solution of geological problems. The radium content of about one hundred specimens of meteoritic material has been determined by various workers. Radium is found in somewhat smaller quantities than in terrestrial rocks; it is least abundant in iron meteorites and most abundant in stony meteorites. Age measurements based on the helium-radium ratio in meteorites were made by Paneth, Urry and Koeck, who found ages between 100 and 2,800 million years for 22 specimens. Since these values are not clearly greater than the ages assigned to terrestrial rocks, it is concluded that the meteorite specimens tested were of the same age as the earth and hence had their origin in the solar system, not outside it.

Apparatus is now being perfected with the aid of which it may be possible to determine the age of meteorite specimens by measuring the ratio of the uranium isotopes in the meteorite. Such a method has the advantage of avoiding errors due to loss of helium gas from the specimen. It is, however, very difficult from the experimental standpoint.

SECTION ON ZOOLOGICAL SCIENCES (F) AND ASSOCIATED SOCIETIES

(Reports from S. F. Light, Arthur Svihla, J. M. Linsdale, Stanley B. Freeborn, H. A. Scullen, C. A. Kofoid and Mrs. Alvin Seale)

The Western Society of Naturalists furnished the only medium for the presentation of zoological papers, as well as those of a wider biological nature. The symposium on "The Protozoan Life Cycle" was especially stimulating and well attended. Professor C. V. Taylor, of Stanford University, discussed protoplasmic reorganization and suggested that the more or less complete redifferentiation following dedifferentiation which occurs at critical periods in the protozoan life cycle is equivalent to the embryonic development of the metazoan, hence its completeness. Dr. A. G. Giese, of Stanford University, discussed the influence of environmental factors on the cycle, particularly on conjugation. Dr. E. H. Myers, of the Scripps Institution of Oceanography, presented by means of a moving picture the essential features in the life cycle of the foraminiferan *Patellina corrugata,* the first completely known life cycle of the group, based on cytological evidence. Significant was the absence of a flagellate phase. Dr. C. A. Kofoid, of the University of California, stressed the similarity, in essential features, of the protozoan and metazoan life cycles. He pointed out that in the lower Protozoa the cycle is asexual only, but in the higher Protozoa a sexual phase intervenes with maturation of haploid gametes, the diploid zygote starting the asexual phase with cleavage but without formation of germ layers or differentiation in structure and division of labor, as in the Metazoa.

Aside from the symposium, some 35 papers were presented in four sessions, one for papers on experimental morphogenesis, one for general papers and two for papers dealing with physiological problems. Joint sessions were held with Section G for the presentation of papers on genetics and for a symposium on "Genes in Relation to Characters."

Some 225 biologists attended the Biologists Dinner at the International House, sponsored by the Western Society of Naturalists, at which Dr. Albert F. Blakeslee, of the Carnegie Institution of Washington, gave a talk and demonstrations on inheritance and variation in taste and smell.

The Committee on Oceanography of the Pacific and the Western Society of Naturalists had a joint luncheon on Tuesday noon, at which reports of the advances made in the field of oceanography were presented, especially from the Scripps Institution of Oceanography at La Jolla and the Department of Oceanography of the University of Washington.

The American Society of Ichthyologists and Herpetologists (Western Division) held its sixth annual meeting on Wednesday, June 20. Dr. F. B. Sumner, of the Scripps Institution of Oceanography, discussed the mechanism of color changes in fishes. Dr. L. M. Klauber, of the San Diego Museum of Natural History, described the formation of the rattle in the rattlesnake and showed a series of lantern slides of the various forms of rattlesnakes of the United States, Mexico and South America. Dr. Vasco M. Tanner, of Brigham Young University, showed the changes which have occurred in the fish fauna of Utah Lake since the advent of the pioneers in that region, due to the utilization of the waters entering the lake for irrigation purposes. The lake itself has changed from a fresh-water lake to a salt-water lake affecting the original fish life. This, together with excessive commercial fishing, has so depleted the fish fauna that during the past eight years only 19 specimens of the salmon trout have been taken, whereas during pioneer days it occurred in myriads. Other papers covered a wide range of topics, but particular emphasis was given to life histories, adaptation, disease and general problems of taxonomy. A number of live western reptiles was exhibited by Sherwin F. Wood, of the University of California.

The following officers were elected for the coming year: *President,* Dr. L. M. Klauber, San Diego Museum of Natural History; *Vice-president,* Dr. L. P. Schultz, University of Washington; *Secretary-Treasurer,* Dr. Arthur Svihla, State College of Washington.

The Entomological Society of America held its

meeting on Friday morning, June 22, in conjunction with the Lorquin Entomological Club, the Pacific Coast Entomological Society and the Pacific Coast Branch of the American Association of Economic Entomologists.

A variety of interesting papers was presented which dealt with insectan life histories, structure and ecology. Considerable interest was created by a critique of the prevailing theories concerning the multiple generations of leafhoppers which was presented by Dr. E. D. Ball, of the University of Arizona, in a paper entitled "The Number of Generations in a Season in the Leafhoppers."

On Saturday morning, June 23, the members enjoyed an open house program at the Entomological Section of the California Academy of Sciences in San Francisco.

The American Association of Economic Entomologists (Pacific Coast Branch) discussed citrus insects, insects of dried fruit and mosquito control and many other subjects of special interest to California. Over fifty papers were presented by members from most of the western states and the Hawaiian Islands. The attendance was well over one hundred.

Some of the other subjects which proved of interest to those in attendance were codling moth control, several papers relating to beekeeping, the beet leafhopper, which transmits the serious curly-top disease of sugar beets, various problems relating to spraying, dusting and other forms of insect control. A joint meeting was held with the California State Veterinary Medical Association, at which time a number of papers of interest to both groups was presented. The sessions closed on Thursday evening with an informal dinner.

The following officers were elected for the ensuing year: *Chairman,* H. E. Burke, Palo Alto, California; *Vice-chairman,* William Moore, Azusa, California; *Secretary-Treasurer,* H. A. Scullen, Corvallis, Oregon.

The American Society of Parasitologists held two sessions, the first in conjunction with the Western Society of Naturalists and Section F, and the second in conjunction with Section N. A total of fourteen papers was presented in the fields of trypanosomiasis of the wood rat, the hydrogen-ion concentration of the mammalian intestine with reference to the incidence of protozoans, the leucocytic formula of the gecko with haematozoan infections, the distribution of helminth parasites in California amphibia, the relation of diet to amoebic infections in man, the pathogenicity of *Trichomonas vaginalis* and experimental infections therewith, the eye worm of the dog in a human case, the tick and mammalian sources of relapsing fever in man in the Sierra Nevada Mountains, and the incidence of human intestinal Protozoa in five thousand persons from one to twenty-one years of age.

The San Francisco Aquarium Society held morning and afternoon sessions on Tuesday, June 19, for the presentation of papers. A dinner held at the Women's City Club on the same evening was well attended. The society's exhibit of tropical fishes and methods for their culture aroused much interest.

SECTION ON BOTANICAL SCIENCES (G) AND ASSOCIATED SOCIETIES

(Report from Richard M. Holman)

The program of the Botanical Society of America consisted of three half-day meetings, with two sessions, a general and a plant physiological session, going on simultaneously. Eighteen papers on anatomical, mycological, taxonomic, cytogenetic and morphological subjects were presented. The plant physiological sessions included thirty-five papers contributed by members of the Botanical Society, of the American Society of Plant Physiologists and others introduced by members of these societies.

Under the auspices of the section there were held on Thursday morning two symposia, one on "The Origin and Development of North Pacific Floras" and one on "The Absorption and Accumulation of Mineral Elements by Plant Cells." The former included eight invitational papers. The symposium on absorption and accumulation of mineral elements consisted of a series of five invitational papers.

On Thursday afternoon, on invitation of Section G, Dr. Göte Turesson, of the Botanical Institute of the University of Lund, Sweden, presented an illustrated address entitled "Ecotypic Constitution and Geographic Distribution," and Professor H. C. Thompson, of Cornell University, gave an address, also illustrated, on the "Relation of Temperatures and Length of Day to Reproduction in Certain Plants."

At the business meeting of the Pacific Section of the Botanical Society of America, on Wednesday afternoon, by-laws presented first at the Salt Lake meeting were discussed and adopted. Dr. O. L. Sponsler was elected president and Dr. Flora Murray Scott secretary-treasurer for the year 1934–35.

At the meeting of the American Phytopathological Society, Pacific Division, forty-two papers were presented, abstracts of which will be published in *Phytopathology.* As indicated by the papers, research this past year has been confined largely to diseases of fungus and virus origin as well as to mycological studies. Thirteen papers dealt with fungus diseases, and ten were concerned with viruses. Nine papers were essentially mycological in scope. The remaining

reports were concerned with bacterial diseases, disinfectants and nematode control.

At a business meeting the following officers were elected: *President,* C. O. Smith, Citrus Experiment Station, Riverside, California; *Vice-president,* C. W. Bennett, U.S.D.A., Riverside, California; *Secretary-Treasurer,* B. A. Rudolph, University of California Deciduous Fruit Station, San Jose, California; *Councilor,* T. E. Rawlins, University of California, Berkeley.

The meetings were exceptionally well attended; seventy-one signed the register. An elaborate Italian dinner at a café in Oakland at the close of the meetings was enjoyed by virtually all members.

SECTIONS ON ZOOLOGICAL SCIENCES (F) AND BOTANICAL SCIENCES (G)

(Reports from E. B. Babcock and A. W. Sampson)

The Genetics Society of America held its first summer meeting on June 20, convening jointly with the Western Society of Naturalists and the Botanical Society of America. Abstracts of the papers presented in these two half-day sessions will be published in the proceedings of the society. Three of the nine papers presented were mainly cytological. These dealt with heteromorphic chromosomes in the tomato, the nature of chromosome association in tobacco and the nature of chiasmata localization in two species of onion, a hybrid between them, and backcross progeny. In the last paper the first evidence ever to be reported was presented, indicating the existence of a genic difference between the two species controlling chiasmata localization. Two papers treated of rodents; one of these reported a recent mutation in the rat called curly; the other considered coat color inheritance in *Peromyscus* in relation to subspecific relations. Other papers dealt with crossing-over in the X-chromosomes of attached X triploid females in Drosophila; the relation of adult body size to rate of cell division in the chicken embryo; the turkey as an experimental animal; and the occurrence of new genes in Datura plants grown from aged seeds. A symposium on "Genes in Relation to Characters" included four papers in which evidence was presented from Drosophila, rabbits, Datura and chickens. Although few generalizations are possible as yet, it is certain that promising beginnings have been made and lines of future research suggested in this important field. On June 21 the society met jointly with the Western Branch of the American Society of Agronomists, by which the papers there presented are reported. On June 21 about 30 geneticists, many of whom are members of the society, met informally at luncheon.

The Ecological Society of America presented a program in two sessions: the first consisted essentially of subjects in forest ecology; the second was more varied. The program was started with a review by A. E. Wieslander of the progress of the cover type mapping in California. The primary object is to provide basic data for the use of foresters and engineers in perfecting a state-wide land-planning program. This paper was followed by a review of a root system study of *Sequoia sempervirens* by Professor E. Fritz. The findings are revolutionary with respect to the reaction of roots of these "mammoths of the woods" to soil filling. A tree 1,200 years old, which survived seven flood deposits of a total depth of 11 feet, developed seven new systems of laterals. Not less interesting was the report by C. J. Kraebel of the "snail's rate" of revegetation of a 200,000 acre area in northern California denuded of higher plants by smelter fumes. The great systems of gullies formed in the absence of vegetation are still enlarging. Planting of native willows is correcting the erosion evil. Rodents, as pointed out by E. E. Horn, greatly curtail invasions of conifers in parts of the California pine belt. Since the seedlings of some tree species are ravenously eaten by rodents, only those of low palatability are regenerating. The rodent population must therefore be controlled. This suppression of certain plant species should find application of the new technique for deriving plant frequency indices, as reported by Dr. W. G. McGinnies. The Raunkiaer law of frequency appears to be generally useful in determining stages of succession. The first session was concluded with a review of water consumption by riparian vegetation in a typical canyon bottom in southern California. Such cover, because of its long growing season, uses much water compared with that of the dry adjacent slopes.

The second session was started with a review by Dr. Edith A. Purer of a study of ecological requirements of plants on Silver Strand of southern California. The greater radiation and evaporation of the dunes proper, compared with the lee of the dunes, evidently accounts for the presence of distinct plant forms. Illuminating color slides were shown. Variation in growth habit and in anatomical structure of the highly plastic *Atriplex semibaccata* was interestingly shown by Dolores M. Bullock. Size and thickness of leaves is largely determined by edaphic factors. Typical communities of widely divergent habitats were pictured by Dr. Forrest Shreve in presenting his progress report on the vegetation of the Sonoran Desert. The fact that dunes near the Salton Sea may shift 50 feet or more in a month, as painstakingly measured by M. J. Rampel, clearly accounts for the ever-changing vegetation of such areas. A second paper, by Mr. Rampel on the phytogeographic features of the Colorado Desert, reported heretofore unknown

vertical ranges of several species of divergent growth requirements. The final discussion was left to Dr. A. M. Johnson whose studies revealed conspicuous differences in length of growing season of chaparral species in the Santa Monica Mountains of southern California.

On the day preceding the meetings, visiting ecologists inspected various laboratories and special physical instruments used in ecological studies on the University of California campus. Of greatest interest, perhaps, was the trip to Strawberry Canyon, where several erosion plots, automatically operated, were functioning.

SECTION ON ANTHROPOLOGY (H) AND ASSOCIATED SOCIETIES

(Report from W. M. Krogman and R. L. Beals)

Section H met jointly with the Pacific Division of the American Anthropological Association. The meetings were in general devoted to archeological and ethnological problems of the Southwest and the Pacific Coast. The Wednesday morning session dealt with problems of chronology and contact in time. Dr. E. B. Renaud reported that prehistoric arrowhead types in Colorado and Nebraska revealed significant differences in succeeding periods and in contiguous areas. Dr. W. S. Stallings, Jr., and Dr. A. B. Reagan reported on pueblo sites examined by them. Mr. F. S. Setzler outlined investigations of the prehistoric "Cave Culture" of southwestern Texas. Dr. Byron Cummings outlined prehistoric textile-types from the caves of Arizona. Dr. Donald Brand offered a very thorough analysis of pottery-type distribution in Northwest Mexico (Sonora and Chihuahua). Dr. Florence Hawley presented a very interesting account of the application of the tree-ring method of chronology. A process of dating the refuse heaps with great accuracy by means of charcoal fragments was described. Dr. Arthur Woodward discussed cremation burials of the Hohokam and stated that three types of cremation were sequential and hence of aid in chronology. Dr. R. L. Beals then summarized the important problems inherent in possible cultural contacts between the Southwest and Mexico.

The Thursday morning session focussed upon ethnological problems with special reference to the elucidation of historical cultural elements. Dr. V. F. Ray traced the history of the Kolaskin cult, a Messianic movement which arose in 1870 in northwestern Washington. Dr. Cora A. DuBois then reported on the 1870 Ghost Dance and subsequent religious movements in northern California. Dr. Erna Gunther reviewed the spread of Messianic cults, noting especially the Indian Shaker religion of Washington, in 1882. Dr. Stanislaw Klimek offered a preliminary account of the relationship between groupings of California tribes made on the basis of economic traits and kinship series. Dr. Isabel T. Kelly presented the results of her study of Southern Paiute bands; fifteen distinct tribal units were recognized. Dr. Peveril Meigs, III, reported on his study of the aboriginal population density of Lower California. Dr. J. W. Hoover then gave a very instructive paper on the development and sites of Papago villages in Arizona and Sonora. Dr. E. W. Gifford discussed the cultural position of the Yavapai, pointing out the diverse cultural contacts of the several divisions of this group. Dr. L. S. Cressman spoke on the pictographs and petroglyphs of Oregon. Dr. Melville Jacobs then reported the preliminary results of his study of Coos ethnology. Miss Edna Fisher presented a report on 88 shell mounds of the Monterey Peninsula.

The Thursday afternoon session was devoted to physical anthropology. Dr. D. Rubin de la Borbolla discussed tooth mutilation in ancient Mexico. Dr. W. M. Krogman then outlined methods of skeletal study. Dr. W. W. Greulich presented a paper on the heredity of human twinning, based on family histories of 988 parents of twins. Dr. E. W. Count, in a preliminary report, offered the suggestion that the angle formed by the intersection of the coronal and sagittal sutures in primates might have taxonomic significance. Dr. Horace Gray presented a discussion of the body-build in convicts, based on a study of 587 male white convicts, aged from 20 to 80 years, at Joliet, Illinois. Dr. F. S. Hulse offered a preliminary report of his study of Japanese children born in Japan, in Hawaii and in California.

The Friday morning session centered upon the discussion of specific ethnological features and upon theory and method in anthropology. Dr. A. O. Bowden discussed the rôle of prestige among primitive peoples as a powerful force for social contact. Dr. W. H. Davis gave a very interesting analysis of figures of speech in every-day English as an index to social memory. Dr. J. H. Steward presented data from a number of primitive tribes to demonstrate that the patrilineate has an ecological basis. Dr. C. W. Bishop then offered material to elucidate his thesis that China has always been an integral but archaic and slightly aberrant subdivision of the ancient world of culture. Dr. F. Clements presented a preliminary report on the mound cultures of eastern Oklahoma. Dr. Florence Hawley outlined very briefly the proposed adaptation of oak and cedar tree-ring dating of prehistoric mounds in the Mississippi Valley. Mr. Willard Z. Park concluded the session with a discussion of the masked clown dance in the Great Basin as an example of diffusion of a cultural trait-complex.

SECTION ON PSYCHOLOGY (I) AND ASSOCIATED SOCIETIES

(Report from Warner Brown and John A. McGeoch)

The joint sessions of Section I and the Western Psychological Association were held from Thursday to Saturday. On Thursday morning these two organizations joined with Section Q in a symposium on "Guidance." Professor Truman L. Kelley outlined a method for applying scientific analysis to the problems of guidance; Professor E. K. Strong dealt with interest, particularly as measured by the Strong Interest Test, as a factor in guidance; and C. G. Wrenn reported on a personnel program at Stanford with students of high intelligence. The same three organizations joined on Thursday afternoon in a symposium on the topic "Can Personality Be Measured?" The contributions were primarily concerned (1) with the problem of systematic definition of personality and (2) with the value of some of the recent attempts, such as the Bernreuter test, to measure personality.

The Friday morning session was devoted to reports of experimental studies of personality and to social psychology. On Friday afternoon there were two parallel sessions, one upon experimental problems in learning and perception and the other mainly upon testing and child psychology. The joint dinner of Section I and the Western Psychological Association was held on Friday evening at the International House. Professor Edwin R. Guthrie, president of the Western Psychological Association, gave an address, entitled "Skill and Associative Learning," in which he surveyed critically some of the current conceptions of learning and reinterpreted the systematic relations of skill, habit and association.

Parallel sessions were held, also, on Saturday morning, one mainly upon child psychology and one upon comparative and physiological psychology. The Saturday afternoon program dealt with a variety of experimental problems not readily classifiable under a single rubric. The program closed with the showing of motion pictures of infant tests made at the University of California Institute of Child Welfare. Abstracts of the papers read at the joint sessions of Section I and the Western Psychological Association are to be published in the *Psychological Bulletin* within a few months.

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

(Report from John B. Canning)

Recent developments in monetary theory and in national monetary policies were the general subject of discussion at the Wednesday morning meeting. Professor T. J. Kreps, reporting progress on a statistical study, presented evidence that the received equations of exchange hold only for limited portions of the range between extreme deflation and extreme inflation. He suggested that further study may disclose critical points in bank credit supply, in currency supply, and in rate of currency turnover at which monetary behavior undergoes phase changes corresponding roughly to those found in chemical behavior at the points of change from solid to liquid and from liquid to gaseous states in chemistry.

Dr. Carl A. Landauer explained the mechanism of financing Germany's recent public works programs. He suggested that the appearance of comparative stability in German exchange rates and price levels may turn out to be illusory. The investment of banking reserves in public works bills and in the special issues of treasury public works notes (which thus far have served the ordinary purposes of money) may, he thinks, result disastrously unless Germany's transfer problems can be better adjusted to the internal financial policy.

Dr. Frank A. Waring discussed the need for unified reserve requirements, based partly on deposits and partly on mean daily debits to deposit accounts, if bank reserves are to be employed as a device for credit control and for price stabilization. He suggested several minor changes in the recommendations made on this subject by the committee on bank reserves of the Federal Reserve System.

The Wednesday afternoon program was devoted to the problems of consumer protection in a planned economy. Professor E. T. Grether reported several tendencies observed under legalized price maintenance in Great Britain and California (1) the growth of hidden price-cutting expedients; (2) the merchandising stress upon dealer "services"; (3) the increase in numbers of dealers; and (4) the widening of spreads between manufacturers' prices and prices to customers at retail.

Mrs. M. G. Luck discussed the problem of regulating industry in the interests of the consumer. She disclosed some of the tremendous technical and administrative problems of precise labeling for consumer goods and of formulating standards of quality in the case of those goods in which knowledge is not a sufficient protection to consumers. She also raised the knotty question of how far the government (or the code authorities) ought, ideally, to go in attempts to remodel consumer purchasing habits in their own "best interests."

Section K sponsored jointly with Section O a program on "Land-Use Planning." The report of these sessions will be made under the latter section.

Section A, the American Mathematical Society, the Econometric Society and the American Statistical Association met jointly with the section on Wednesday afternoon. Professor E. B. Wilson presented a

simplified, complete solution of Boole's "Challenge Problem"—an indeterminate problem in probabilities in two independent variables. The solution was obtained, in part, by means of Yule's fourfold association tables. In his discussion of this paper Professor James V. Uspensky suggested that the solution might also be obtained by identifying and solving the fundamental inequalities within the system of simultaneous inequalities presented by the problem. This method leads to defining a polygon within which all points satisfy the conditions of the problem.

John M. Thompson presented a mathematical formulation of the theory of production stages found in Hayek's writings and specified conditions under which Hayek's conclusions would be valid.

Professor Dunham Jackson segregated certain portions of the theory of small samples that are amenable to routine demonstration not involving the special difficulties of probability and of statistical interpretation. The characteristic operations consist of the calculation of secondary frequency functions from given frequency functions and of evaluating integrals involving these functions. By this means he obtained such quantities as the standard deviation of a mean and the mean of the squares of the standard deviations of samples drawn from arbitrary distributions.

Mathematical investigations of demand for a commodity, expressed as a function of a system of unit prices, have for some time been on the verge of becoming practically useful. Professor Harold Hotelling illustrated, by means of imposing the condition of a limited budget, the possibilities of developing this branch of mathematical economics into a working tool in realistic economic problems.

Detailed notes on the Thursday and Friday programs of the American Statistical Association and of the Econometric Society will be published in the October numbers of the journals of these societies.

In the "Land-Use Planning" conference, a joint meeting of Sections K and O, from 70 to 90 persons listened to and discussed papers by L. C. Gray, of the U. S. Department of Agriculture, L. Dudley Stamp, of London, W. C. Lowdermilk, of the U. S. Department of Agriculture, M. R. Benedict, of the University of California, C. L. Alsberg, of Stanford University, C. R. Ball, of the University of California, Paul A. Eke, of the University of Idaho, David Weeks, of the University of California, Rex Willard, of the University of Washington, C. F. Shaw, of the University of California, and S. B. Show, of the U. S. Department of Agriculture.

Gray traced the objectives of land policy in the United States and pointed out that the objectives of the present policy are not entirely clear cut. They embody not only surplus control at the moment but such long-time objectives as reduction of soil erosion, improvement in the social and economic status of the human beings involved, reduction of costs of local government and the promotion of land-use planning in a broader way.

Stamp outlined the British land-use survey, which "aims to find out how every acre is now used" and is basic for later planning activities.

Lowdermilk pointed out that erosion is wasting soils at an alarming rate as the natural vegetation of thousands of years is removed, and discussed research under way to combat erosion.

Benedict pointed out that we need studies of comparative advantage, studies of a sociological nature, if people are to be shifted to new occupations, and studies of costs of government.

Alsberg pointed out that geniuses capable of original work can not usually be "organized," that they work best under a *laissez-faire* policy, that "universal education increases the number of those from whom the leaders . . . of intellectual endeavor may be recruited," but that for some types of work requiring no new and original ideas "research may be organized cooperatively or autocratically."

Ball pointed out that political science problems of land-use planning "involve the entire question of the rights of the individual as compared with the right of society . . . ," including all that is involved in such phrases as *laissez-faire* and "rugged individualism." They involve also types of local government to be used and degree of responsibility of state and federal governments.

Eke raised the question of where families now stranded in poor areas are to go. A second problem is how to induce them to leave friends, relatives and associations, even if a place to go is found. Another obstacle to shifting populations is "local pride, local business houses and public institutions."

Weeks described a study of the Sierra Nevada foothills and showed how cooperative effort was needed and obtained both in the research and in planning to maintain a satisfactory combination of agriculture and industry in the area.

Willard outlined the land-use program of the state of Washington. Its objectives are: First, "a determination of land quality . . . so that a reliable basis for permanent rural rehabilitation may be brought about"; second, "a determination of the best ultimate use of the land"; third, "to give assistance and direction to government officials . . . leading to some solution or improvement in the tax problem."

Shaw described the make-up of an index of soil productivity and its use in land classification.

Show explained the need for zoning in land-use planning.

SECTION ON HISTORICAL AND PHILOLOGICAL SCIENCES (L) AND ASSOCIATED SOCIETIES

(Report from Chauncey D. Leake)

Sections L and N (Medical Sciences) held a joint session on the morning of June 22. A symposium on the Hearst Medical Papyrus, which was exhibited in the University of California Library, was given under the chairmanship of Professor C. D. Leake. Professors A. L. Kroeber and E. W. Gifford, of the University of California, gave a physical description and discussed the methods of preservation of the papyrus. Dr. H. F. Lutz, of the University of California, discussed the philological position of the papyrus and its significance in the introduction of Egyptian sciences. Dr. S. V. Larkey, of the University of California Medical School, discussed the relation of the Hearst Medical Papyrus to other medical papyri and its position in the history of medicine. Following this symposium Dr. A. W. Meyer, Stanford University, presented an illustrated paper on Harvey's "de Generatione" (1651).

In the afternoon Section L combined with the History of Science Society and the Linguistic Society of America in a joint program, under the chairmanship of Professor C. D. Leake, vice-president of the History of Science Society. Dr. F. E. Brasch, of the Library of Congress, was in attendance at the meeting. Professor James Westfall Thompson, of the University of California, discussed "The Influence of Science in the Nineteenth Century on the Writing of History." Professor Olaf Larsell, of the University of Oregon, gave an illustrated biographical sketch of Berzelius. Professor C. A. Kofoid, of the University of California, discussed the question, "To What Extent Did William Charles Wells Anticipate the Ideas of Charles Darwin on Natural Selection?" Thomas Cowles, of the University of California, offered a paper on "Malthus, Darwin, and Bagehot: A Study in the Transference of a Concept." F. R. Johnson, of the Johns Hopkins University, discussed "The Relation of Thomas Digges to Astronomy in Sixteenth Century England." Dr. Elmer Belt, of Los Angeles, spoke on "The Influence of Edison's Cold Electric Lamp on the Progress of Urology." Peveril Meigs III, of Chico, presented a paper on "The Scientific Observations of the Dominican Missions of Lower California." The last part of the program was devoted to a symposium on linguistics in which the following papers were offered: "The Speech Consciousness of the Ancient Near Eastern Peoples and Its Significance in the History of Culture," by Professor H. F. Lutz, of the University of California; "Analysis and Synthesis and the Use of Greek Words in Natural Knowledge," by Professor W. E. Ritter, of the University of California; and "Every-day Figures of Speech," by Professor W. H. Davis, of Stanford University.

In connection with the joint meeting of Section L and the History of Science Society, Professors Herbert McLean Evans and James Westfall Thompson, with the assistance of Mr. and Mrs. Thomas Cowles, arranged an exhibit of first editions of epochal achievements in the history of science which was displayed at the University of California Library. Professor Evans prepared a special check list of the volumes shown in the exhibit, copies of which may be obtained from the University of California Press for thirty-five cents.

SECTION ON ENGINEERING (M) AND ASSOCIATED SOCIETIES

(Report from B. M. Woods)

The value for engineering societies of affiliation with the American Association for the Advancement of Science probably lies chiefly in the opportunities afforded at the large summer and winter meetings for engineers to come into direct contact with those who are in large measure responsible for the progress of the sciences upon which engineering depends. This was exemplified in the Berkeley meeting in many ways, most obviously, perhaps, in the opening lecture by Professor Joel H. Hildebrand on "The Liquid State." Since the aeronautic and hydraulic divisions of the American Society of Mechanical Engineers planned to devote the two sessions of the following day to joint consideration of problems of fluid mechanics, Professor Hildebrand's timely review of the current state of our knowledge of the liquid state proved an admirable introduction.

The activities of Section M consisted of joint meetings of the aeronautic and hydraulic divisions of the American Society of Mechanical Engineers, sponsored also by the Institute of the Aeronautical Sciences, and of meetings of the section of hydrology of the American Geophysical Union, of the Pacific Coast Section of the American Society of Agricultural Engineers and of the Western Inter-State Snow Survey Conference.

The plan to devote the opening day to joint sessions on the subject of fluid mechanics marked a new development. As an examination of the program will show, the papers covered many types of flow and the problems associated with them. For example, Professor von Kármán reviewed the technical aspects of the turbulence problem, Professor Bakhmeteff the investigation of dynamical similarity in open channel flow. Other speakers discussed such widely varying topics as special characteristics of mud fluid flow,

capillary potential theory of flow in soils, recent progress concerning the aerodynamics of wing sections and experimental cavitation studies at the Massachusetts Institute of Technology. The synthesizing influence of fluid mechanics in the treatment of these many-sided problems was apparent and was recognized throughout. Parallel sessions in aeronautics, hydraulics, hydrology and snow survey were the order for the remaining days of the meeting.

As a matter of general interest, Elmer A. Sperry delivered a public address on "The Automatic Pilot," which was enthusiastically received. This was arranged in response to the general interest of the contributions of the gyroscope to ships as well as to airplanes. It was intended to present the latest developments as well as the problems remaining unsolved.

On Wednesday evening, June 20, the Daniel Guggenheim Medal for achievement in aeronautics was presented to William Edward Boeing, of Seattle, at a formal dinner at the Engineers' Club of San Francisco. The formal presentation was made by Major E. E. Aldrin, president of the Daniel Guggenheim Medal Fund, Incorporated, and chairman of the Committee on Awards. Among the many outstanding achievements in aviation, due to the pioneering and leadership of Boeing, the following may be mentioned as most significant. Fifty-six different types of airplanes have been built by his company during the seventeen and one-half years just past for commercial, private and military use—a total of more than eighteen hundred airplanes. The company was in many ways a pioneer. It was the first to use air-cooled engines for commercial and defense planes and the first in the United States to adopt the steel-tube fuselage developed by Fokker. The Boeing Transport Company was the first to fly passengers at night on regular schedule over long distances, the first to operate tri-motored passenger transports over long distances at night and the first to be fully equipped with two-way radio telephones. Further, the Boeing plant has built the greatest number of pursuit aircraft produced by any manufacturer since the war. These army and navy fighting planes have incorporated features of design and construction which, according to air corps officers, have enabled this country to possess the fastest single seater standard military aircraft. The citation read, "For successful pioneering and achievement in aircraft manufacturing and air transport."

A significant feature of the professional meeting was the whole-hearted cooperation of Pacific Coast sections of the American Society of Mechanical Engineers and of universities in the Pacific Coast area. It will be noted in the program that prominent universities of Washington, Oregon, California, Arizona, etc., are represented. In the same spirit the aeronautic-hydraulic programs of the first two days were held on the Berkeley campus of the University of California, those of the third day on the campus of Stanford University.

The important excursion of the meeting was that to the Sunnyvale Air Base and the *Macon* on the afternoon of June 21, following the morning sessions at Stanford University.

The program committees are especially to be congratulated on their success in preprinting and binding in a single cover the entire set of papers presented at the aeronautic and hydraulic division meeting. The papers so prepared, with illustrations, amount approximately to a 750-page book, condensed by the offset printing process to approximately 200 pages. The availability of the papers made both presentation and discussion easier and more profitable.

As a possibility for a future meeting, it is suggested that consideration be given to a joint session between some one of the engineering societies or divisions and the sections on physics, chemistry or mathematics, at which consideration of both the theoretical and applied aspects of some important division of fundamental science can be undertaken.

SECTION ON MEDICAL SCIENCES (N) AND ASSOCIATED SOCIETIES

(Reports from Earl B. McKinley, John N. Force, M. L. Tainter and C. M. Haring)

The program of Section N consisted of four general fields of interest—(1) endocrinology, (2) nutrition, (3) hygiene and epidemiology and (4) parasitology. Joint sessions were held with the American Society of Parasitologists and the Historical and Philological Sciences (Section L). The first session was preceded by a memorial service in honor of the late Dr. William H. Welch, who was chairman of Section N in 1902, was president of the association in 1906 and served for some time as a member of the executive committee of the association. Dr. J. McKeen Cattell presided at the memorial service, and Dr. Ray Lyman Wilbur, president of Stanford University, gave an address on the life and work of Dr. Welch.

The first session on endocrinology was a symposium on the general subject, "A Survey and Evaluation of the Present Status of Endocrine Investigations." Dr. E. M. K. Geiling, of the Johns Hopkins University, discussed "Present Problems in Endocrinology," Dr. Vincent du Vigneaud, of the George Washington University, discussed "The Present Status of the Chemistry of the Hormones from a Structural Standpoint," and Dr. J. M. Luck, of Stanford University,

spoke on "Inter-relationships of the Endocrine Glands."

At the second session on endocrinology, papers were presented on the normal variation of estrin in the blood of women and on the growth of intraocular endometrial transplants in the rabbit during pregnancy. The relationship of the pituitary gland to ketonuria was also discussed. That depancreatized dogs could be maintained for as long as three years with insulin without the feeding of raw pancreas was shown. It was found, however, that the incidence of cataract was very high in these animals and that lipid metabolism was affected. The relationship of the parathyroid hormone to the calcium and magnesium in the blood stream was also considered.

In the session on nutrition a number of very interesting papers was presented. It was shown that there was a decrease in retention of calcium and phosphorus with the ingestion of fluoride. Vitamin A deficiency in cattle confined to dry range feed, dietary deficiency in planaria and vitamin C deficiency in guinea-pigs were considered in a series of presentations. Progress in the preparation of potent vitamin G concentrates from liver was reported. The vitamin and mineral deficiencies in the diets chosen by a group of families on relief was considered. Significant deficiencies in iron, vitamin C and vitamin B predominated in these diets. Work tending to show separate mechanisms for gastric motility and gastric secretion was also presented in this session. The theory that blood sugar level controls gastric hunger contractions was questioned. The probable accuracy of the prediction of basal metabolic rate calculated from surface area, pulse pressure and pulse rate was presented. Evidence that estrin of pregnancy urine in mares is derived from fetal placenta was also reported.

At the first session of Section B on "Epidemiology, Parasitology and Biometry," papers were presented on the recent advances in the study of whooping cough, transmissibility of the common cold, the epidemiology of psittacosis and the bacillary dysentery. A paper on the thermal death point of growing and functioning cells was also presented.

At the second session papers were presented on equino-encephalomyelitis virus, pneumococcus infection, the plague, vaccinia virus and on secondary cases of certain communicable diseases among non-immune family contacts.

At the joint session with the American Society of Parasitologists, the pathology and transmission of *Trichomonas vaginitis* and inoculation experiments with *Trichomonas vaginalis, Trichomonas hominis* and *Trichomonas buccalis* were presented. Papers concerning the nematode eye worm of dog and man, American trypanosomiasis, argasine ticks and intestinal protozoan were also reported. A joint session was also held with Section L for a symposium on the Hearst Medical Papyrus.

The Pacific Coast Branch of the Society for Experimental Biology and Medicine met on Thursday afternoon and evening with a dinner intervening. A total of 25 papers was presented which will be published in the *Proceedings* of the society and other scientific journals.

The California State Veterinary Medical Association held several sessions. Contributions to pathology and related sciences were contained in papers by Professor L. R. Vawter and Professor Edward Records, of the University of Nevada, on the "Transmission and Dissemination of Equine Encephalomyelitis"; by H. A. Hoffman, of Petaluma, California, on "Poultry Mortality as Reflected in Three Years of Diagnostic Records"; and by E. E. Houchin and T. J. Niemeyer, of Los Angeles, California, on the "Blood Picture in Small Animal Diseases."

Recent contributions of entomology to veterinary science were given in papers by Professor W. B. Herms, of the University of California, on "Mosquitoes as Vectors of Equine Encephalomyelitis"; Professor Stanley Freeborn, of the University of California, on "The Field of Veterinary Entomology"; and Charles R. Schroeder, of San Diego, California, on "The Snake Scale Mite."

A paper on the "National Control of Bang's Disease" by Professor C. P. Fitch, of the University of Minnesota, presented recommendations for standardizing the technique of the agglutination test. This, with discussion by Dr. F. M. Hayes, University Farm, Davis, J. G. Townsend, of Los Angeles, A. G. Gierke, of Sacramento, and Professor K. F. Meyer, of the Hooper Foundation for Medical Research, constituted a symposium on Brucella infections in man as well as in cattle, swine and goats.

Papers on the economic, educational and historical aspects of veterinary science were given by F. A. Taylor, of Sacramento, on the "Activities of the Bureau of Vocational Standard"; M. J. O'Rourke, of San Francisco, on the "Practice of Veterinary Medicine as an Art and as a Business"; and Joseph M. Arburua, of San Francisco, on "The Early History of Veterinary Education in the United States."

A contribution chiefly of biological interest was that by Donald R. Skillen, of Los Angeles, on "Ornithology and the Veterinarian."

SECTION ON AGRICULTURE (O) AND ASSOCIATED SOCIETIES

(Report from J. C. Martin and Frank N. Briggs)

The Western Society of Soil Science held six half-day sessions. During the first two days, papers dealt with soil physics, soil chemistry and soil-plant-mois-

ture relationships. Papers on soil-plant-moisture relationships centered around the question as to whether there is a definite wilting point or a wilting range. Two papers dealt with the solid phase-liquid phase equilibria of bases, notably the calcium-sodium relationship; one paper with the exchangeable bases of soil colloids in relation to grinding. The direct application of anhydrous ammonia to the irrigation water was reported as a source of nitrogen fertilizer. The last two half-day sessions were devoted to a symposium on soil phosphate, eight papers on this subject being given. One paper dealt with fixation of added phosphate in soils generally. Two papers discussed the question from the standpoint of the calcareous soils of Arizona, the reaction of which is about pH 8.1 to 8.5. The important factor of CO_2 evolution by plant roots and its reduction of the pH in the root-soil contact zone was emphasized. Determinations of inorganic phosphate in green plant tissue as a measure of available phosphorus in soils was discussed. During the vegetative stage a striking direct relationship was seen between plant content and available supply in the soil. In four species of fruit trees application of nitrogen over a five-year period has reduced the phosphorus content of the leaves. In Montana application of phosphate to soil has served the twofold purpose of providing phosphorus and aiding the legumes in fixing atmospheric nitrogen.

The dinner of the society, held on Monday evening, and well attended, was devoted to business. The following officers were elected for the coming year: *President,* T. F. Buehrer, University of Arizona; *Vice-president,* D. S. Jennings, Utah Agricultural College; *Secretary-Treasurer,* H. D. Chapman, University of California, Citrus Experiment Station.

The eighteenth annual meeting of the Western Branch of the American Society of Agronomy was held in four sessions. The first session consisted of contributed papers dealing with soil and soil moisture in relation to the production and quality of crops.

Wednesday morning some papers related to the growth and handling of alfalfa in relation to yield in quality; others dealt with the injuries of seed by thrashers in relation to germination and growth of crops.

The Thursday morning meeting was a joint session with the Genetics Society of America. Contributed papers on genetic and plant breeding methods in relation to crop improvement are reported elsewhere.

The last session was a symposium on weed control, arranged as a joint meeting with Section O, Agriculture. This was the first symposium on weed control held under the auspices of the American Association for the Advancement of Science. It gave opportunity for a discussion of the principal investigations on weed control which have been conducted in the western states. The states most active in weed control investigations are Utah, Idaho and California.

Up to a few years ago there had been no well-grounded fundamental studies of weeds and methods of control. Nearly every experiment station in the country has issued weed circulars and bulletins, but these have dealt with little else than descriptions of weeds and with only very general and sweeping suggestions as to methods of control and eradication. Field plots have been established by the thousands, but in the final analysis of the data derived therefrom nothing definite was forthcoming. The fight against weed pests has not made the progress that entomologists and plant pathologists have made in their struggle against insects, fungi and the various other causal agents of plant diseases. The latter have recognized the necessity for life history investigations and for basic morphological and physiological researches as a guide to methods of control and eradication. Real progress in weed control will result only from such fundamental, scientific investigation.

Papers by Professor D. C. Tingey, of the Utah State Agricultural Experiment Station, show various tillage methods were more efficient in the eradication of morning-glory, Canada thistle and perennial sow thistle than chlorate methods. In most of the western states too much emphasis has been placed upon the use of chemical means of weed control, to the exclusion of economic cropping methods.

In all the plot work using chemicals pronounced variations were noted in the results obtained. Carefully controlled greenhouse experiments by Dr. A. S. Crafts, of the University of California, showed that soils vary greatly in fixing power. There is great variation in the toxicity of these chemicals in different soil types, which exists not only for the chlorates but also for the arsenicals. Moreover, there are great differences in the loss of toxicity with time in the different soil types. Dr. Crafts has employed a biological test which gives a direct measure of the toxicity of the reagent without resort to chemical analyses.

Margaret K. Bellue, of the California State Department of Agriculture, Sacramento, described a new means of dissemination of nut grass. The rhizomes of nut grass penetrate the tissues of developing potato tubers and within the tissues of the tuber full-grown, viable nuts are formed. Thus this weed is disseminated in shipments of potatoes.

On Saturday morning the society met at Davis for an inspection of the agronomic experiments on the University Farm.

The following officers were elected: Professor B. A. Madson, University of California, *president;* J. F. Martin, U. S. Department of Agriculture, *secretary.* The 1935 annual meeting will be held at the Agricultural Experiment Field Station, Pendleton, Oregon.

SECTION ON EDUCATION (Q)

(Report from Noel Keys)

Four half-day sessions, each devoted to a common theme, were followed by two joint sessions with Section I and the Western Psychological Association, reported elsewhere. In the Wednesday morning symposium on "Difficulties in Reading" four papers were presented. Professor Peter L. Spencer, of Claremont Colleges, reported the failure of seventeen tests to disclose any consistent tendency in kindergarten to second grade children to favor the use of one hand, eye or foot over the opposite member. He did, however, find superior reading discrimination on the part of the exophoric child. Sixteen hundred seventh grade children tested over a fourteen-month interval showed better than average progress in reading on the part of the myopic and below normal progress for those suffering from hyperopia or strabismus, according to Principal L. P. Farris, of Oakland High School. Dr. Grace Fernald, of the University of California at Los Angeles, in presenting the remarkable result obtained with extreme cases of reading disability through utilization of motor imagery, suggested that the current practise of requiring reading in advance of writing instruction is accountable for many of the difficulties of this problem group. Dr. W. M. Danner, Jr., of Stanford University, testified to the striking improvement in reading skill of university students resulting from the provision of individual observation and tuition periods for those below standard.

The Tuesday afternoon session was devoted to investigations in subjects other than reading. Irving Melbo, of the University of California, reported senior students in small California communities equalling if not excelling those in metropolitan high schools in information on current social issues, with boys excelling the girls. Dr. L. C. Gilbert, of the University of California, summarized experiments evidencing the significant rôle of reading in the improvement of spelling on high-school and college levels. Miss Velma Woods and Mr. Wyman Olson, both of the University of California, analyzed, respectively, the arithmetic errors of teachers of college students in four states and the inability of university students in education to interpret critically the experimental literature in their field.

In the Wednesday morning session on problems of maturation Professor E. A. Lincoln, of Harvard University, presented an admirable account of the Harvard Growth Study, now completing its twelfth year, with a résumé of the seventeen doctoral dissertations which have already resulted. His conclusion was that growth and growth curves are highly specific, so that the individual differs not only from others of his kind, but from himself at other periods. This thought was carried further by Mr. Hubert Armstrong, of the Oakland Department of Child Welfare, who called attention to certain fallacies in the indiscriminate application of the mental age concept. Dr. Helen Pryor, of the University of California, then presented data as to physiological aspects of adolescent development in girls, as obtained from the California Adolescent Study. The close association of the broader body build with early onset of catamenia was particularly striking.

Wednesday afternoon was given over to investigations bearing on leadership and responsibility in school pupils, with Superintendent E. A. Lee, of San Francisco, presiding. Professor Floyd Caldwell, of the Chico State Teachers College, made clear the tendency for prestige to spread far beyond the limits of the individual's special competence. College students, for example, rated General Pershing not far below Einstein as an authority on mathematics. Dr. Marion Brown, of the University of California, pointed out that the more prominent leaders in student activities of University High School were characterized by superior intelligence, scholarship and appearance, and younger than the average of their group. Professor Noel Keys, of the University of California, in reporting on some three hundred students who have entered the university over a nine-year period under the age of sixteen and a half, showed these not only to have excelled in scholarship and attendant honors, but to have participated in more than the average number of activities and made generally favorable adjustments. The wide variety of practises prevailing with regard to the extent of freedom allowed, and the opportunity afforded for the exercise of responsibility on the part of students in different types of schools was revealed by a survey conducted by Dean Grayson N. Kefauver, of Stanford University.

OBITUARY

RICHARD THORNTON FISHER

RICHARD THORNTON FISHER, head of the Harvard Forest School and director of the Harvard Forest since their inception in 1903, died suddenly of a heart attack on June 9.

Dr. Fisher was graduated from Harvard University in 1896. Shortly thereafter he entered the Bureau of Forestry where, under Gifford Pinchot, he greatly furthered the Napoleonic campaign of setting aside the vast areas which now form the bulk of the Na-