elimination in all this? What the rôle of mating, of biparental reproduction? The problem of the relation of environment to changes in stocks is one on which depends the answer to many pressing human problems; at the same time it is the one that contains the key to the unity of biological science. This question alone might well constitute the program of a great experimental institution.

H. S. JENNINGS
THE JOHNS HOPKINS UNIVERSITY

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE MILLS COLLEGE MEETING OF THE PACIFIC DIVISION

MILLS COLLEGE proved to be an ideal place to hold the tenth annual meeting of the Pacific Division of the American Association. The accommodations were excellent in every respect. Large auditoriums for the general sessions, well lighted and ventilated class rooms for the meetings of affiliated societies well met the purely physical needs of the convention. The cordial hospitality and thoughtful attention of the faculty and officers of the college, combined with the delightful environment of trees and glades, quaint architecture, flowers and sequestered paths made the occasion one to be very pleasantly remembered. The spirit of aspiring young womanhood seemed indeed to pervade the place. While the sciences figure prominently in the instruction offered at Mills, the inscription over a monumental doorway in its beautiful art gallery perhaps sounds the keynote for the harmony which prevails throughout the campus, "Art remains the one way possible of speaking truth"—a sentiment which at first thought might give a scientist pause, but with reflection and in such surroundings would be sure to win his assent.

The total registration was 402. While the attendance was largely drawn from the membership in the Bay region, including Berkeley, Oakland, San Francisco and Stanford, analysis of the balance shows a geographic distribution as follows: Northern California, outside of Bay district, 47; Southern California, 65; Canada, 2; Hawaii, 2; Mexico, 2; Nevada, 9; Oregon, 16; Philippines, 1; Utah, 3; Washington, 4. Besides, attendance was registered from Delaware, Illinois, Iowa, Massachusetts, Michigan, Minnesota, New Jersey, New York, Vermont, Washington, D. C., China, Egypt, England, Germany, Ireland, Russia and Sweden.

RESEARCH CONFERENCE

The general sessions in which the entire convention participated opened with the research conference at luncheon on June 16. The relation of the college to research was discussed. President Aitken presided and introduced the following speakers:

Professor Howard E. McMinn, Department of Botany, Mills College.

Professor Albert Schneider, dean of the School of Pharmacy, North Pacific College, Oregon.

Professor Vernette L. Gibbons, Department of Chemistry, Mills College.

Professor Philip A. Munz, Department of Botany, Pomona College.

Stress was laid upon the importance of inciting interest in research work among undergraduates, and various methods by which this could be done were advanced by the speakers.

SYMPOSIUM ON THE CONSTITUTION OF MATTER

Following the luncheon, adjournment was taken to Lisser Hall, where the symposium on "The Constitution of Matter" was presented. The various phases of this fascinating subject were discussed and recent contributions to the solution of the problem were described and interpreted in a series of four papers as follows:

(1) "The Elements and their Composition." DR. T. R. HOGNESS, of the University of California, Chemistry Department, Berkeley, California.

(2) "Atomic and Molecular Structure." DR. HERTHA SPONER, of the Physical Institute of the University of Göttingen, Germany.

(3) "The Nature of the Atom as explaining and as exhibited by Lines in the Stellar and Solar Spectra." DR. H. H. PLASKETT, of the Dominion Astrophysical Observatory, Victoria, British Columbia, Canada.

(4) "The Structure of Matter as elucidated by X-Rays." MAURICE L. HUGGINS, Department of Chemistry, Stanford University, California.

ADDRESS OF THE PRESIDENT

The address of the retiring president, Robert G. Aitken, was given on the evening of June 16.

Following a graceful address of welcome by President Aurelia Henry Reinhardt, of Mills College, to which response was made on behalf of the membership by Vice-president Joel H. Hildebrand, President Robert G. Aitken, associate director of Lick Observatory, delivered a scholarly address on the "Solar System: Some Unsolved Problems."

Prefacing his remarks with a plea for better instruction in astronomy in the secondary schools, urging that "every child has a right to be introduced to the stars as ever present friends" the speaker advanced to his theme, in which he showed a fine appreciation of the requirements and limitations of a popular address on an abstruse subject. He spoke of the

emphasis which had been placed upon stellar research during recent years as a natural consequence of the development of spectroscopy and photography. The inference which might be drawn that there was little more to learn about the solar system had led him to call attention to the many unsolved problems pertaining to the sun and its satellites. Dr. Aitken's entertaining and instructive presentation of this subject will be read with interest by the entire membership when published in SCIENCE.

Following the address of the president, a public reception was held in Mills Hall.

The lecture of Dr. L. O. Howard, Thursday evening, June 17, on "Insects and Human Progress" was well attended and his films, illustrating the depredations of insects and the method of combatting them by aeroplanes, proved to be a feature of the meeting.

DR. ARTHUR A. NOYES ELECTED PRESIDENT OF THE PACIFIC DIVISION

At the annual meeting of the members held immediately following the lecture of the evening on June 17, announcement was made of the election by the executive committee of Dr. Arthur A. Noyes, director Gates Chemical Laboratory, California Institute, as president of the Pacific Division for the ensuing year.

The election of a member of the executive committee being then in order, it was proceeded with and resulted in the selection of Dr. Leonard B. Loeb, professor of physics, University of California.

The general sessions closed Friday evening, June 18, with an address by Dr. W. F. Durand, president, American Society of Mechanical Engineers, on "Science and Civilization." It is hoped that Dr. Durand's very significant address may find early publication in SCIENCE. The dependence of civilization on the progress of science and the necessity as the great aggregate of scientific knowledge accumulates for some super science, some science of the use of science to correlate the ever-increasing body of information, so that discoveries of nature's operations in one sphere of research may be fully interpreted in their applicability to the solution of problems in apparently unrelated spheres; this organization of "a science of the use of science" was Dr. Durand's main thesis in this very thoughtful paper.

Before the adjournment of the Mills College meeting the executive committee canvassed the question of where the next annual meeting should be held. Tentative agreement was reached that Reno, Nevada, would be an appropriate location, providing the necessary arrangements could be made. Subsequent correspondence has brought a cordial invitation from President Walter E. Clark, of the University of Nevada, which has been definitely accepted. Announcement of the date of the Reno meeting will follow in due course.

Fourteen affiliated scientific societies held meetings at Mills College under the auspices of the Pacific Division as follows:

American Association of Economic Entomologists, Pacific Slope Branch
American Chemical Society, California Section
The American Physical Society
American Phytopathological Society, Pacific Division
Astronomical Society of the Pacific
Botanical Society of America, Plant Physiological Section
Cooper Ornithological Club
The Ecological Society of America
Pacific Coast Entomological Society
San Francisco Aquarium Society
Society of Experimental Biology and Medicine, Pacific Coast Branch
Western Psychological Association
Western Society of Naturalists
Western Society of Soil Science

Reports of these meetings are presented herewith so far as they have been received from the secretaries.

AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS, PACIFIC SLOPE BRANCH

(Roy E. Campbell, *Secretary*)

The eleventh annual meeting of the Pacific Slope Branch, American Association of Economic Entomologists, was held on June 16 and 17, 1926, at Mills College, California. The meeting was very successful, not only in excellence of papers and wide range of subjects discussed, but also in attendance. A total of seventy-nine members and visitors registered, which exceeds any previous meeting.

Thursday's sessions were held at the University of California in Berkeley. In the afternoon there was a symposium on "The Fundamental Value of Life History Data," being a joint session with the Pacific Coast Entomological Society. The value of life history data was emphasized to the systematist, in biological control and in economic entomology. A motion picture on the Mexican bean beetle was shown by Dr. L. O. Howard, and one on malaria by Professor Herms.

Friday's sessions were held at Mills College in Oakland. The outstanding session of the entire meeting was the symposium on "Petroleum Oil Sprays in Insect Control," at which papers were read by H. J. Quayle, R. S. Woglum, E. R. de Ong and E. J. Newcomer. Some very interesting data were presented, not only on the effectiveness of the highly refined oils

as insecticides, but also the possibility of injury to foliage and fruit, especially the danger of lowering the quality and delaying ripening and coloring of the fruit.

The meeting concluded with a dinner Friday night, at which the principal speaker was our president, Arthur Gibson.

Officers elected for the ensuing year were: *Chairman,* R. W. Doane, Stanford University; *Vice-chairman,* R. S. Woglum, Los Angeles, California; *Secretary-Treasurer,* Roy E. Campbell, Alhambra, California.

AMERICAN CHEMICAL SOCIETY, CALIFORNIA SECTION

(George S. Parks, *Secretary pro tem*)

The California Section of the American Chemical Society held a session at 2:00 P. M., Thursday, June 17, 1926, in the Chemistry Lecture Room, Mills College. Professor W. H. Sloan presided. A total of about forty attended the meeting.

The following eight papers were given:

The Activity Coefficient of Soap Solutions. By MERLE RANDALL, J. W. MCBAIN and A. M. WHITE.

The Transport Numbers of Protein Solutions in Dilute Alkali. By DAVID M. GREENBERG.

Studies in Creatine and Creatinine Excretion. By VERNETTE GIBBONS.

The Equilibrium between Isopropyl Alcohol, Acetone and Hydrogen. By KENNETH M. KELLEY.

The High Temperature Equilibrium between Zirconium Oxide and Carbon. By C. H. PRESCOTT, JR.

The Constitution of Ramie Cellulose. By W. H. DORE.

Action of Bacteria on Mineral Oils. By JOHN W. BECKMAN.

The Crystal Structure of Resorcinol. By M. L. HUGGINS.

The papers proved to be very interesting and provoked a good deal of discussion. On the whole they indicated a marked trend toward the more general employment of physico-chemical methods, especially in the study of problems in organic and biological chemistry.

THE AMERICAN PHYSICAL SOCIETY

(P. A. Ross, *Acting Secretary*)

The 140th meeting of the American Physical Society was held at Mills College, Oakland, California, on June 17, 1926. At the morning session Dr. Evelyn Aylesworth, professor of physics, Mills College, presided. The attendance was about fifty. In the afternoon a joint session was held with the Astronomical Society at the Chabot Observatory. Professor P. A. Ross presided.

ASTRONOMICAL SOCIETY OF THE PACIFIC

(C. H. Adams, *Secretary*)

By the courtesy of Director Linsley, the three sessions of the Astronomical Society of the Pacific (one, a joint session with the American Physical Society) were held in the convenient lecture room of the Chabot Observatory, which stands on the hill just above the college grounds. Professor Linsley described the educational work of the observatory, which belongs to the Oakland City School Department, in the opening paper on the first morning, Thursday, June 17, 1926.

The other papers presented covered a wide range, but dealt chiefly with stellar problems, only five of the twenty-three relating to bodies in the solar system, four of these to the sun itself.

The attendance averaged forty, including representatives of all the Pacific Coast observatories from Victoria, B. C., to Pasadena, several eastern astronomers and a number of amateurs. While all the papers were good and led to more or less animated discussion, particular interest attached to Dr. Hubble's two papers presenting the results of his investigations of the Non-Galactic Nebulae on the basis of photographs taken with the 100-inch reflector at Mount Wilson; to Mr. Pease's paper dealing with the possibility of constructing reflecting telescopes of much greater aperture than any now existing; and to Dr. Trumpler's paper on "Spectral Types in Open Clusters."

BOTANICAL SOCIETY OF AMERICA, PLANT PHYSIOLOGICAL SECTION

(O. L. Sponsler, *Secretary*)

The Plant Physiological Section of the Botanical Society of America held three sessions at Mills College, Oakland, California, on June 17 and 18. The sessions were well attended, about forty people being present at each session. Over thirty titles were presented, only a few of which were not read for one reason or another. Those which were read indicated a preponderance of interest in the more fundamental types of problems and displayed a critical attitude towards the more generally accepted notions in plant physiology. For example: (1) L. B. Becking, of Stanford, pointed out in "The Physical State of Protoplasm" that Brownian movement showed a heterogeneous state as regards viscosity of protoplasm and therefore quantitative statements of viscosity were meaningless; (2) W. Newton, Carnegie Institution Laboratory at Carmel, California, showed that absorption of CO_2 by the green leaf can not be interpreted on the basis of the Siegfried carbamino reaction, but that the absorption is due to the formation

of bicarbonates; (3) H. L. Van de Sande Bakhuyzen, of the Food Research Institute, Stanford University, from his investigations has decided that Robertson's formula for "autocatalytic reactions" does not hold for the growth of annuals, that the "relative growth rate" of Briggs is a variable product of two independent variables, and that the dry-weight ratio in plants, especially annuals, is dependent upon the stage of the life cycle in which it is determined; (4) studies of sap were reported by J. P. Bennett, Y. Milad and F. G. Anderssen on "Methods of obtaining Tracheal Sap," by F. G. Anderssen on "Analyses of Tracheal Sap," and by D. R. Hoagland, P. L. Hibbard and R. R. Davis, all of the University of California, on "Adsorption of Ions by Nitella cells"; (5) other attempts at gaining an understanding of protoplasmic activity were reported by George J. Peirce, of Stanford, by observations of "One-celled Algae living in Saturated Brine," "Support for the Electrostatic Theory of Permeability," by Oran Raber, University of Arizona (not read), "Fatigue of Chloroplasts," by R. M. Holman, University of California (not read), "Hydrogen Ions and Osmotic Pressure of Cell Sap," by Floyd W. Gail, University of Idaho (not read).

A number of papers were presented bearing more or less upon immediate practical application by the agriculturist or horticulturist. Among these were (1) studies on "Sterility of Developing Seeds," Katherine G. Bitting, and "Germination of Lettuce Seed," H. A. Bosthwick and W. W. Robbins, University of California; (2) influence of pruning on "Viability of Grape Pollen," A. J. Winkler, on "Quality and Quantity of the Wood of Resistant Vines," by L. O. Bonnet, on the "Composition of Dormant Pear Branches," by A. H. Elswy, all of the University of California; (3) of a somewhat similar nature are "Determination of Starch in Woody Tissues" by S. H. Cameron, "Changes in Pears indicated by Electrical Resistance," by L. P. Latimer, "Temperature Effects on Composition of Dormant Pear Branches," by F. E. Gardner, "Presence of Phloridzin in the Pear Tree," by F. B. Lincoln, "Lime-induced Chlorosis," by Y. Milad, all of the University of California; (4) salt requirements of plants were discussed with relation to the growth phase and to varietal characteristics by W. F. Gericke, University of California; "Soil Moisture in Relation to Growth of Fruit Trees," by F. J. Veihmeyer and A. H. Hendrickson, University of California. (5) "Effect of Smoke, Dust and Fumes on Vegetation" was discussed by H. de Forest in the absence of H. Severence, of the University of Southern California. "Ring Density of Sugar Beets as a Character for Selection" was presented by Karstner, of Riverside, for Dean A. Pack, B. P. I., Salt Lake City. "Relation of Storage Temperature to Dormant Period in the Potato Tuber," by J. T. Rosa, University of California, and "Extension of Pollen Longevity and Its Importance" by R. M. Holman, University of California (not read), conclude this group of papers.

Several other papers less readily classified complete the investigations reported. These are "Behavior of Oxidase System in Fruits," by W. V. Cruess, University of California, and two which were not read, "Water Relations of Bog Plants," George B. Rigg, University of Washington, and "Studies of Xerophytic Ferns" by F. L. Pickett, State College of Washington.

The retiring chairman and secretary are W. W. Robbins and O. L. Sponsler. The latter was elected chairman for the ensuing year. J. P. Bennett, University of California, Berkeley, was elected secretary. The meetings next year are to be held at Reno, Nevada.

COOPER ORNITHOLOGICAL CLUB, NORTHERN DIVISION

(Hilda W. Grinnell, *Secretary*)

The June meeting of the Cooper Ornithological Club, Northern Division, was held on Thursday afternoon, June 17, 1926, at two o'clock at Mills College, California. President Amelia S. Allen presided, and forty members and guests were present. The reading of all minutes was omitted. The first paper of the afternoon was read by Mr. Ralph Hoffmann upon "Courtship Performances of Birds." Mr. Hoffmann has recently spent much time in the field and presented to his hearers many original facts concerning the spring activities of the following thirteen birds: the western grebe, pigeon Guillemot, black tern, Forster tern, Beal petrel, ruddy duck, Wilson phalarope, Wilson snipe, sage grouse, marsh hawk, Texas nighthawk, three-toed woodpecker and the sage thrasher.

Dr. Tracy Storer's paper was upon "Range Extension by the Western Robin." A definition of the former range of the robin in California, supplemented by records taken during the last ten years, showed a very decided increase in summer range. A review of conditions necessary for the successful rearing of broods of young robins pointed, according to Dr. Storer, toward the increased area of well-watered lawns in city parks and private gardens as the main factor concerned in the increased summer population, robins nesting always by preference near damp meadows containing an abundance of soft food for the young.

At the close of the meeting, a brief business session was held.

PACIFIC COAST ENTOMOLOGICAL SOCIETY

(Roy E. Campbell, *Secretary pro tem*)

The first session of the meetings of the Pacific Coast Entomological Society was held on Wednesday morning, June 16, at Mills College, California. In the absence of both the president and secretary, Professor W. B. Herms and Mr. Roy E. Campbell were elected to temporarily fill these offices. Mr. O. H. Swezey gave an informal talk on insect problems and entomological work in the Hawaiian Islands, mentioning particularly the efforts to prevent the introduction of injurious insects, and to introduce beneficial parasites. Mr. C. J. Drake spoke of the entomological problems of Iowa, mentioning in addition to troubles from insects the difficulties encountered because of the large number of fake remedies offered to the public.

Dr. G. Steiner, of Washington, D. C., gave a very interesting talk on the nematode parasites of insects, mentioning especially those of grasshoppers and mosquitoes. Possibility of controlling injurious insects by these nematodes was indicated.

On Thursday afternoon there was a joint symposium at Berkeley with the Pacific Slope Branch, American Association of Economic Entomologists, on the subject "The Fundamental Values of Life History Data." Papers were presented by E. C. Van Dyke and H. S. Smith.

The sessions closed on Friday night with the entomological dinner, which was attended by thirty-five persons. Talks were given by Mr. Arthur Gibson, of Ottawa, Canada, Mr. C. J. Drake and Mr. O. H. Swezey.

SAN FRANCISCO AQUARIUM SOCIETY

(Ethel Seale, *Secretary*)

A meeting of the San Francisco Aquarium Society was held at Mills College, June 17, 1926. The meeting was well attended. An address was given by Perry Clark, president of the society, on "The Care and Planting of Balanced Aquariums," and was demonstrated by a number of the most important water plants. President Clark also told of his treatment of sick fish with various antiseptics. The talk was especially valuable to people who have aquariums in their homes. An address was also given by Alvin Seale, superintendent of the Steinhart Aquarium, on the subject "Outdoor or Garden Pools." The address was illustrated with very fine lantern slides taken in various parts of California. Mr. Seale spoke on methods of construction, planting and care of garden pools and told of their value from an educational standpoint and the pleasure to be derived in building one.

The program closed with a moving picture reel, entitled "In a Drop of Water," illustrating the lower forms of animal life to be found in a drop of stagnant water.

SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE, PACIFIC COAST BRANCH

(T. D. Beckwith, *Secretary*)

It was reported by G. J. Peirce, of Stanford University, that the heliotactic response of organisms living in saturated brine varies with the species. Studies are under way dealing with the resistance of these organisms to the crushing forces of crystallization. It is hoped these will give results regarding the ability of this protoplasm to withstand such physical forces. There is a very definite relationship of the pituitary body to growth of the animal. In addition, the removal of the hypophysis produces serious atrophy to the thyroid, parathyroid, adrenals and testes. Growth in animals which have lost the pituitary by operation may be restimulated by daily injections of material derived from the gland from normal animals of the same kind. The basal metabolism of these animals also varies from that of normal animals. These facts were reported by P. E. Smith and G. L. Foster, of the University of California.

C. A. Kofoid, E. H. Wagener and E. A. Allen, of the University of California, stated that cultures of Entamoeba dysenteriae, which is the organism of amoebic dysentery, may be maintained readily upon a medium composed of egg albumin plus certain nutrient salts. One strain has been carried through 286 generations to date. Blood should be added to the medium, but this must be derived from an animal which may be experimentally infected with the organism, as for instance, the rabbit. Cultures thus derived contain many bacteria, but the protozoan forms thrive among these. Inasmuch as certain human individuals give a Schick negative reaction which indicates that they are immune to diphtheria, even though no antitoxin may be demonstrated in their blood serum, evidence is presented that immunity to diphtheria in part, at least, is not antitoxic. Cellular immunity thus seems to play a part according to W. H. Kellogg, of the California State Hygienic Laboratory and University of California.

The enamel of the tooth does have within it a small amount of organic material, as has been demonstrated by T. D. Beckwith and A. Williams, of the University of California. By means of a technique which has been elaborated sections of guinea pig enamel matrix may be cut. A number of points regarding the morphology of these structures based on this method of attack were brought out by means of lantern slides. The Ehrlich theory of immunity is no

longer tenable, according to the researches of W. H. Manwaring, of Stanford University. This appears to be demonstrated by means of various perfusion experiments carried out by him. C. H. Danforth, of Stanford University, says that the Y-gene of the mouse produces fat and yellow hair. By genetic methods this action may be controlled. The genes do not interact to produce a specific type of protoplasm.

That tyramine has a muscular component in its effect upon the rabbit, cat and dog was stated by M. L. Tainter, of Stanford University School of Medicine. Hitherto, its action has been considered to be sympathetic only. Experiments are being carried on by F. DeEds, L. W. Empey and W. H. Farr, Stanford Medical School, in an endeavor to determine the nature of the changes induced by anaphylactoid agents in the blood in vitro. Acacia or gelatin added to blood in the test tube lower the surface tension. Viscosity is increased and the albumin globulin ratio increases. The red blood corpuscles sediment with increased ease. C. H. Thienes, of Stanford University, reported that curare, a poison for which hitherto no remedy has been known, may be opposed in the body by use of Congo Red. The action of the dyestuff upon the poison is not chemical but is physiological in nature. C. H. Thienes and P. J. Hanzlik state that the results on excised intestine and uterus of different species and under different conditions generally indicate pure muscular actions of cocaine and procaine. The responses vary with the degree of tonus. Therefore, these drugs are not sympathominetic.

A. Schneider, of the North Pacific College at Portland, believes that respiration tests may be used as a substitute for the usual basal determinations and that the pulse rate reduction has a certain value in measuring the action of digitalis.

L. B. Becking, Janet Plowe, Bing Moy and John Sapero, School of Biology, Stanford University, have measured the spectrum characteristics of some of the purple bacteria. A new form, also, was described by them. Their researches show that the present classification of this class of organisms is as yet very incomplete.

Convicts at San Quentin Penitentiary have been used as the basis of a survey of mouth protozoa carried on by C. H. Hinshaw, of the University of California. As the depth of a pyorrhoeal pocket increases, the likelihood of infection by Entamoeba gingivalis is increased. This form and the Trichomonas of the mouth have been cultivated in many different instances. It is interesting that the Trichomonas is definitely antagonistic to the entamoeba. F. Eberson, of the University of California School of Medicine, has shown the presence of heat sensitive skin reaction substances in the blood serum of tuberculous patients and guinea pigs and is not found in the normal animal. These do not behave like tuberculin. Titrations may be made by skin reactions and apparently the test has definite clinical value.

WESTERN PSYCHOLOGICAL ASSOCIATION

(Warner Brown, *Secretary*)

About sixty persons were in attendance at each of the four sessions of the sixth annual meeting of the Western Psychological Association. One session was devoted exclusively to animal psychology and one to clinical and test work. The papers presented at the two remaining sessions were of general interest to psychologists. A luncheon talk by Dr. Grace Fernald on the use of psychology in education was received with lively interest. A second luncheon talk which was to have been delivered by Superintendent Nelles, of the Whittier State School, had to be omitted on account of the illness of Mr. Nelles. On Friday evening the association received a word of greeting from the parent organization, the American Psychological Association, through its president, Dr. H. A. Carr. On that evening the retiring president, Dr. W. R. Miles, of Stanford University, presented a series of highly interesting motion pictures of the behavior of rats in a maze, demonstrating the advantages of motion photography in preserving records of actual behavior. He showed also pictures of the behavior of monkeys being experimented upon by Mr. O. L. Tinklepaugh at the University of California.

At the annual meeting officers were elected for the ensuing year: *President,* Dr. Kate Gordon, University of California, Southern Branch; *vice-president,* Dr. Karl T. Waugh, University of Southern California; *secretary-treasurer,* Dr. Warner Brown, University of California.

It was decided to accept the invitation of the University of California, Southern Branch, to hold the next meeting there, and probably in the latter part of June, 1927.

WESTERN SOCIETY OF SOIL SCIENCE

(H. S. Reed, *Secretary*)

The fourth annual meeting was held on June 15 at the University of California and on June 16 in conjunction with that of the Pacific Division of the American Association for the Advancement of Science at Mills College. The officers for the meeting were M. B. Thomas, *president;* R. E. Neidig, *vice-president;* and W. V. Halverson, *secretary-treasurer.*

A brief description of the papers read at the meetings follows in so far as abstracts could be obtained.

W. P. Kelley discussed the problem of ion exchange in soils with respect to base-unsaturation. It is evident that a soil in which part of the bases have been replaced by hydrogen ions must have a deficiency of bases. This condition affects the composition of the soil solution, the physical and other properties of the soil. The author mentioned made a study of methods for determining the base-unsaturated condition of the soil. Hissink's method of using $Ba(OH)_2$ gave unreliable results, but the electro-metric titration method, using the neutral point as the endpoint, gave a reasonably accurate measure of the replaceable hydrogen ions. Satisfactory results were also obtained by determining the amounts of NH_4 absorbed from NH_4Cl before and after treating the soil with $Ba(OH)_2$ or $Ca(OH)_2$. The exchange capacity of various American clay soils is low and not in proportion to their clay content.

J. F. Breazeale and P. S. Burgess presented the results of studies on the problem of phosphorus supply of the plant. It has been found that applications of acid phosphate result in better plant growth, but applications of insoluble phosphates, such as bone meal or floats, do not increase plant growth. The solubility of the latter was increased by the presence of CO_2 in the solution, but in calcareous or "black alkali" soil this factor is inoperative. If the soil contained hydroxides of iron or aluminum, there was a slow formation of ferric or aluminum phosphates from which the plants had more success in obtaining their supply of phosphate.

The effects of saline irrigation water upon the exchange complex of the soil mass were discussed by S. M. Brown. A degree of salinity sufficient to injure fruit trees may not affect the base exchange complex of the soil. The extent of the reaction is influenced not only by the concentration but by the relative amounts of the respective ions present. The reaction has very definite time and temperature coefficients and appears to be strictly chemical.

A. R. C. Haas and H. S. Reed described a characteristic foliage injury observed where citrus trees were grown in sand cultures receiving nutrient solutions of pure salts and irrigated with pure distilled water. As time went on the leaves were shed and the young twigs died back to the trunk. The condition appears to be due to the lack of some element not hitherto regarded as essential for tree growth. The affected trees recovered when a mixture containing small amounts of manganese, boron, titanium, strontium, ammonium, lithium, bromide, iodine and aluminum was included in the nutrient solution. The injury did not occur when trees were grown in soil, or in sand cultures irrigated with tap water.

Nitrification experiments made by W. V. Halverson showed the favorable effects of lime, sulfur, superphosphate and potassium sulfate. The most nitrate was found where the largest application of lime was made, even though that application was excessive. Soils on which crops were growing failed to show more than a trace of nitrate until the crop was harvested. The disparity in the efficiency of the nitrifying flora of different soils was pronounced but the rate of nitrification was also dependent upon soil conditions.

The recovery power of a soil after depletion of the plant food elements was described by J. C. Martin. A favorable moisture content was maintained and the soils held at a temperature of 27° to 29° C. The method seems promising for studying the potentialities of soils to restore the equilibrium after they have been cropped. The concentration of the soil solution increased more rapidly after corn or turnips than after oats had been grown. Continued incubation for five months showed that the concentration and composition of the soil solution reached levels which were very close to that attained in that soil after eight years' fallow in a container in the field.

The rôle of iron-depositing bacteria in the formation of hard-pan was discussed by C. S. Mudge, who has found the organisms in all specimens examined. Upon incubating samples for a period of two months in a medium consisting essentially of ferric ammonium citrate a typical precipitation of iron hydroxide was found. Examination of the sample under the microscope disclosed minute cavities within the pan structure itself, in which there were filaments of a microorganism resembling crenothrix. Such findings suggest the possible formation of insoluble iron salts within the soil which later might cause the pan formation.

The effect of paper mulches on soil temperatures was shown by experiments reported by Dr. Alfred Smith. During hot weather the soil one half inch from the surface of a bare plot was 10 degrees warmer during the day and 5.6 degrees cooler at night than on a plot covered with perforated black paper. The differences were less as the distance from the surface increased. The average night temperatures at the twelve-inch depth were highest under the black non-perforated paper and lowest under the gray perforated paper. The warmest soil during the week was that covered with black non-perforated paper and the coolest was that covered with gray perforated paper. The highest soil temperature found was 143 degrees Fahrenheit at a depth of one half inch in the soil of the bare plot. The maximum temperatures at a three-inch depth occurred two hours after the maximum

air temperature of the day, and the minimum soil temperatures also lagged about an hour and forty minutes behind the minimum air temperatures. At a twelve-inch depth there was a lag of eight hours in the case of the maximum and of six hours in the case of minimum temperatures.

The importance of the soil profile was emphasized by several speakers. C. F. Shaw discussed its importance as a basis for soil classification. He called attention to the necessity for recognizing the individual layers or horizons in drawing samples for any kind of analytical work. Plant roots range through the soil to a considerable depth; therefore the characteristics of the horizons in the root zone must be known and recognized.

C. F. Shaw and Alfred Smith presented results from which they conclude that surface evaporation can not pull water from an indefinite distance in the soil. It seemed that a soil like those they employed would lose no water by evaporation if the water table lay at a depth of ten feet or more from the surface.

An interesting session on Tuesday evening was devoted to "Research Methods on Soil and Plant Interrelationships." The more or less informal discussion was led by J. S. Burd and D. R. Hoagland and elicited many important suggestions.

At the business meeting, the following officers were elected: *President,* J. S. Burd, University of California, Berkeley; *vice-president,* R. E. Neidig, University of Idaho, Moscow; *secretary-treasurer,* H. S. Reed, Citrus Experiment Station, Riverside, California.

Following are the officers of the Pacific Division, American Association for the Advancement of Science, for 1926–1927:

President: Arthur A. Noyes, director, Gates Chemical Laboratory, California Institute of Technology, Pasadena, California.

Vice-President: Joel H. Hildebrand, professor of chemistry, University of California, Berkeley, California.

Secretary-Treasurer: W. W. Sargeant, California Academy of Sciences, San Francisco, California.

Executive Committee of the Pacific Division

Joel H. Hildebrand, chairman, professor of chemistry, University of California, Berkeley, California.

Arthur A. Noyes, director, Gates Chemical Laboratory, California Institute of Technology, Pasadena, California.

Walter S. Adams, director, Mount Wilson Observatory, Pasadena, California (1928).

Bernard Benfield, consulting engineer, Kohl Building, San Francisco, California (1929).

Leonard B. Loeb, assistant professor of physics, University of California, Berkeley, California (1931).

Ernest G. Martin, professor of physiology, Stanford University, California (1929).

Emmet Rixford, professor of surgery, Stanford University, 1795 California Street, San Francisco, California (1928).

J. O. Snyder, professor of zoology, Stanford University, California (1930).

O. F. Stafford, professor of chemistry, University of Oregon, Eugene, Oregon (1930).

W. W. SARGEANT,
Secretary

THE INTERNATIONAL CONGRESS OF PLANT SCIENCES

IT is now possible to make a more definite announcement regarding the program of the congress to be held in Ithaca the third week in August. Since interest centers largely in the speakers, a list of these will suffice to indicate the general character of the program.

At the opening meeting, to be held on the evening of Monday, August 16, it is expected that the entire congress will be welcomed by Livingston Farrand, president of Cornell University, and addressed by W. M. Jardine, United States Secretary of Agriculture. On Wednesday evening Professor F. A. F. C. Went, of the University of Utrecht, will deliver a public address on the subject "Plant Movement," and on Friday evening Dr. Erwin F. Smith, of the Bureau of Plant Industry, will speak similarly on "Fifty Years of Phytopathology."

Following is a fairly complete list of those who will participate formally in the programs of the various sections. Those whose names are starred are not expected to present their papers in person.

A. *Agronomy.* Zavitz (Guelph), Tulaikov (Saratov), McCall (U. S. D. A.), Marcello (Venice), Prianishnikov* (Moscow), Arrhenius* (Stockholm), Stoklasa (Prague), Love (Cornell), Christie* (Norway), Stadler (Missouri), Kiesselbach (Nebraska), Hayes (Minnesota), Leighty (U. S. D. A.), Holbert (U. S. D. A.), Jones (Conn. Agr.), Vavilov* (Leningrad).

B. *Bacteriology.* Winogradsky (Paris), Bergstrand (Stockholm), Mellon (Rochester), Henrici (Minnesota), Löhnis* (Leipzig), Buchanan (Ames), Waksman (Rutgers), Clark (U. S. Hyg. Lab.).

C. *Cytology.* Tischler (Kiel), Nemec (Prague), Seifriz (Pennsylvania), Guilliermond* (Paris), Taylor (Pennsylvania), Levine (New York), Goodspeed (California), Blackburn (Newcastle-upon-Tyne), Heilborn (Stockholm), Svedelius (Upsala), Harper (Columbia), Sakamura* (Sapporo), M. Nawaschin (Moscow), Ishikawa (Tokyo), Cleland (Goucher), Allen (Wisconsin), Sax (Maine), Randolph (Cornell).