

SCIENCE

Vol. 90

FRIDAY, NOVEMBER 17, 1939

No. 2342

<i>The Sixth Pacific Science Congress: PROFESSOR ROY ELWOOD CLAUSEN</i>	449
<i>The Structure of the Pacific Basin as Indicated by Earthquakes: PROFESSOR B. GUTENBERG</i>	456
<i>Scientific Events:</i>	
<i>The City and Rural Health Conservation Contest; The Expedition to Hudson Bay of the University of Minnesota; The Importation of Foreign Books and Periodicals; Lectures in the Department of Physics at the University of Wisconsin; Award of the John Fritz Gold Medal; Recent Deaths and Memorials</i>	458
<i>Scientific Notes and News</i>	461
<i>Discussion:</i>	
<i>The Allowed Directions of Cosmic Rays as an Existence Problem of Mathematical Analysis: DR. I. OPATOWSKI. Revision of Dental Symbols: DR. BRUNO OETTEKING. Possible Implications of Repetilian Thermal Tolerance: DR. RAYMOND B. COWLES</i>	463
<i>Scientific Books:</i>	
<i>The Carnegie Institution of Washington and Dr. Merriam: PROFESSOR WILLIAM K. GREGORY</i>	466
<i>Reports:</i>	
<i>Work of the Canadian National Research Council</i>	468

<i>Special Articles:</i>	
<i>Effect of Ultra-short Radio Waves on Plant Growth: DR. J. VAN OVERBEEK, DR. L. REED BRANTLEY and PROFESSOR G. W. POTAPENKO. Bio-electric Potentials of the Hen's Egg: PROFESSOR ALEXIS L. ROMANOFF and DR. CASPER L. COTTRELL. Implants of Embryonic Tissue Inhibit Parturition in the Rat: DR. ALFRED TAYLOR</i>	470
<i>Scientific Apparatus and Laboratory Methods:</i>	
<i>Apparatus for the Isolation of Monochromatic Light of High Intensity: DR. LAWRENCE J. HEIDT</i>	473
<i>Science News</i>	8

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal

Lancaster, Pa.

Garrison, N. Y.

Annual Subscription, \$6.00

Single Copies, 15 Cts.

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

THE SIXTH PACIFIC SCIENCE CONGRESS

By Professor ROY ELWOOD CLAUSEN

UNIVERSITY OF CALIFORNIA; SECRETARY-GENERAL OF THE SIXTH PACIFIC SCIENCE CONGRESS

THE sessions of the sixth Pacific Science Congress were held in the San Francisco Bay region from July 24 to August 12, 1939. The University of California, Stanford University and the Golden Gate International Exposition acted jointly as hosts to the congress. Most of the technical sessions were held either at the University of California or at Stanford University, but many of the social functions and public lectures were held at the Golden Gate International Exposition on Treasure Island.

The sixth Pacific Science Congress was organized under the auspices of the National Research Council, specifically under the general supervision of its Committee on Pacific Investigations, of which Dr. Herbert E. Gregory is chairman. The details of organization of the congress, however, were delegated to a local committee, the Committee on the Sixth Pacific Science

Congress, with Dr. C. B. Lipman, of the University of California, as chairman; Dr. Roy E. Clausen, of the same institution, as secretary, and with representatives of Stanford University, the University of California and the Golden Gate International Exposition as members. Dr. Ross G. Harrison, chairman of the National Research Council, was president of the congress, and Dr. Roy E. Clausen, secretary-general. Dr. Frank R. Lillie, retiring president of the National Academy of Sciences, was honorary chairman; Dr. Robert Gordon Sproul, president of the University of California; Dr. Ray Lyman Wilbur, president of Stanford University, and the presidents of previous congresses were honorary vice-chairmen.

The sixth Pacific Science Congress was the first meeting of the Pacific Science Association to be held on the mainland of the United States of America.

The fifth congress was held at Victoria and Vancouver in 1933, and in the normal course of events, the sixth congress would have been held at some far eastern center; in fact, provisional arrangements had been made to hold it in French Indo-China, but unfavorable circumstances prevented the fulfillment of these plans. In this predicament, it seemed desirable to take advantage of the Golden Gate International Exposition, with its emphasis on Pacific relations and cultures, to continue the series. Accordingly, arrangements were made rather hurriedly to convene the sixth congress in the San Francisco Bay region during the time of the exposition.

Despite the short time available for preparation and the unsettled conditions, the sixth congress drew a small but representative attendance from countries of the Pacific region. The registered attendance at the congress was 492, about the same as that of the fifth congress, and twenty-eight countries were represented. Attendance at the congress was particularly satisfactory in view of the almost continuous procession of meetings in the San Francisco Bay region during the past summer. In a number of instances, when other meetings occurred concurrently, arrangements were made for joint sessions or for informal cooperation, without the requirement of registration for the congress, which no doubt contributed materially to the gratifying attendance at the technical sessions. Thus the tenth annual meeting of the Western Branch of the American Public Health Association was held in Oakland from July 23 to 28, 1939. Sessions of the section on public health and nutrition were arranged so as to permit participation by their membership, and abstracts of the papers to be presented in this section were made available to them. Similarly, the summer meetings of the Geological Society of America, the Paleontological Society, the Seismological Society of America and the Society of Economic Geologists were held in Berkeley from August 8 to 10, 1939. The sessions of the section for geophysics and geology of the congress were held in the previous week, in order to permit members of the congress to join in their activities. By special arrangement, members of the congress were also permitted to participate in a number of excursions organized for members of these societies. The Oceanographical Society of the Pacific suspended its usual summer meeting in order to cooperate fully with the section on oceanography, fisheries and marine biology.

PUBLICATIONS

Before the congress opened, a number of announcements containing various kinds of information about the congress were circulated to a mailing list made up of institutions and organizations having some interest in the Pacific area and of individuals from lists

obtained from section chairmen and other sources. The first of these, a preliminary announcement, setting forth the general purposes of the congress and outlining its organization, was issued in January, 1939. A second, supplementary announcement, containing chiefly a tentative outline of the program and the names and addresses of section chairmen, was issued in March. Finally, an advance announcement, containing information about accommodations, a detailed outline of the program, etc., was issued in June.

On registration, members received a copy of the General Program, a booklet of 160 pages, containing general information about the congress and full details of the technical sessions, including names of authors and titles of papers to be presented. They also received, on request, mimeographed sets of abstracts of the sections in which they were interested, as well as other miscellaneous material designed to acquaint them with some of the features of the San Francisco Bay Region and with activities and events in progress during the meeting. Ten sets of abstracts were issued; *viz.*, Geophysics, Pre-Tertiary Geology, Tertiary Stratigraphy, General Geology, Oceanography, Fisheries and Marine Biology, Pacific Climates Past and Present, Anthropology, Epidemiology, Industrial Hygiene and Nutrition.

As with previous congresses, the general records of the congress and the papers presented in its sessions will be published in a set of volumes under the title, "Proceedings of the Sixth Pacific Science Congress," which will be distributed by sale and subscription only. Copies of the General Program may be obtained, as long as they are available, on request to the Secretary-General, 205 Hilgard Hall, University of California, Berkeley, California.

THE INAUGURAL SESSION

The formal opening of the congress was held on July 24, at the University of California. At the inaugural session, Dr. Herbert E. Gregory, president of the first congress and chairman of the Committee on Pacific Investigations of the National Research Council, introduced the president of the congress, Dr. Ross G. Harrison, chairman of the National Research Council. Messages of welcome were extended in behalf of the host institutions by Dr. Ray Lyman Wilbur for Stanford University and the Golden Gate International Exposition, and by Dr. Monroe E. Deutsch for the University of California. A message to the congress from Dr. Frank R. Lillie, retiring president of the National Academy of Sciences, was read, and the president of the congress delivered an address of welcome to the visiting delegates. Responses to the address of welcome were made by representatives of fourteen countries.

BUSINESS SESSIONS

The congress held two plenary sessions for a consideration of business matters, the first dealing with organization of the congress and the second with matters referred to it by the Pacific Science Council, the executive committee of the Pacific Science Association. The council consists of one representative each from fourteen countries included in the Pacific region or having dependencies therein. For the present congress its membership consisted of Ross G. Harrison (United States of America), *chairman*; E. C. Andrews (Australia); R. C. Wallace (Canada); Y. R. Chao (China); Jules Rouch (France and French Indo-China); V. H. Blackman (Great Britain); C. Montague Cooke (Hawaii); Shinkishi Hatai (Japan); H. A. Brouwer (Netherlands); H. J. Lam (Netherlands Indies); Patrick Marshall (New Zealand); Walfrido de Leon (Philippine Commonwealth); and H. E. Gregory (United States of America). R. L. Pendleton (Thailand) was present by invitation, and only the Union of Socialist Soviet Republics was not represented.

THE SEVENTH CONGRESS

The congress accepted an invitation extended by the Commonwealth of the Philippines to hold the seventh congress in Manila in 1943. In the absence of any permanent secretarial staff for the Pacific Science Association, informal arrangements were made to have Dr. Patrocinio Valenzuela, secretary of the National Research Council of the Philippines, act as interim secretary of the association for the period between the sixth and seventh congresses.

STANDING COMMITTEES OF THE PACIFIC SCIENCE
ASSOCIATION

The council gave special attention to the reorganization of its standing committees, looking towards more effective activity in the intervals between congresses. The list of committees and their chairmen, as approved by the congress, follows:

Oceanography: Dr. Thomas G. Thompson, University of Washington, Seattle, Washington.

Protection of Nature: Dr. Carl Skottsberg, Botanic Gardens, Gothenburg, Sweden.

Volcanology: Dr. Patrick Marshall, Public Works Department, Wellington, New Zealand.

Soil Survey and Classification: Dr. R. L. Pendleton, Bureau of Agriculture and Fisheries, Bangkok, Thailand.

Classification and Utilization of Land: Dr. J. W. Coulter, University of Hawaii, Honolulu, Hawaii.

Mountain Structure: Dr. H. A. Brouwer, University of Amsterdam, Amsterdam, The Netherlands.

Forestry: Dr. Arthur F. Fischer, Bureau of Forestry, Manila, Philippine Islands.

Economic Entomology: Dr. C. E. Pemberton, Hawaiian Sugar Planters' Association, Honolulu, Hawaii.

Blood Groups: Dr. Tanemoto Furuhashi, Tokyo Imperial University, Tokyo, Japan.

Distribution of Terrestrial Faunas in the Inner Pacific: Dr. C. Montague Cooke, Bishop Museum, Honolulu, Hawaii.

Pacific Plant Areas: Dr. H. J. Lam, University of Leiden, Leiden, The Netherlands.

RECOMMENDATIONS OF THE CONGRESS

The council also gave extended attention to the need for coordination of efforts in successive congresses and drew up a number of recommendations, which were adopted by the congress, on ways and means of promoting scientific research in the Pacific region. These proposals, as outlined herewith, are to be brought to the attention of the proper authorities by the interim secretary, Dr. Patrocinio Valenzuela: (1) advocating the establishment of additional seismological stations in the Pacific area; (2) advocating extension of observations of gravity values within the Pacific; (3) advocating the construction and operation of non-magnetic vessels for a more complete magnetic survey of the Pacific region; (4) advocating the extension of coastal surveys to inadequately charted coasts of the Americas and of the Pacific Islands; (5) recommending continued study of the configuration of the floor of the Pacific Ocean by sonic sounding; (6) recommending continuation and extension of the oceanographic program of the International Fisheries Commission; (7) recommending further studies of the nature and origin of coralline deposits; (8) recommending that island stations and ships in the Pacific be required to provide full synoptic weather reports four times daily; (9) recommending preparation of large-scale exhibits of geological columns of each country of the Pacific; (10) advocating preservation of a number of unique natural areas within the Pacific region; (11) recommending appointment of a Standing Committee on Plant Areas; (12) recommending prosecution of an extensive project of soil classification and survey to be coordinated with the activities of the Fifth Commission of the International Society of Soil Science; and (13) recommending inclusion of discussions on public health and nutrition in the seventh Pacific Science Congress.

PUBLIC LECTURES

While the main emphasis of the congress was placed upon the technical sessions, arrangements were made for a number of illustrated lectures which were open to the public. Two of these lectures were given at the University of California in connection with the program on public health and nutrition, a series of seven was given at the Conference Room of the Pacific House on Treasure Island, and three were given at Stanford University. The names of speakers and the titles of their addresses follow:

At the University of California:

"The Present Status of Health Conditions in Canada." Dr. C. P. Brown, Canadian Department of Pensions and Public Health.

"The Progress of Health Work and Social Services in the British Colonies." Sir William McLean, representative of the British Colonies at the New York World's Fair.

At Treasure Island:

"Ocean Currents of the Pacific and Their Bearing on the Climates of the Coasts." Dr. H. U. Sverdrup, Scripps Institution of Oceanography.

"Public Health Conditions in China." Dr. A. Stampar, professor of public health, Zagreb.

"The Origins of Cultivated Plants in Relation to the Origins of Civilizations." Dr. Elmer Drew Merrill, Harvard University.

"Explorations in the Lesser Sunda Islands." Dr. H. A. Broutier, University of Amsterdam.

"The Structure of the Pacific Ocean as Indicated by Earthquakes." Dr. Beno Gutenberg, California Institute of Technology.

"On Mimicry in its Relation to Other Forms of Protective Coloration." Dr. G. D. Hale Carpenter, Oxford University.

"The Government Botanic Gardens at Buitenzorg and the Mountain Garden at Tjibodas, Java." Dr. H. J. Lam, University of Leiden.

At Stanford University:

"Pithecanthropus and Sinanthropus and Their Relationship to Later Stages of Human Evolution." Dr. Franz Weidenreich, Peiping Union Medical College.

"The Biology of the Great Barrier Reef." Dr. C. M. Yonge, University of Bristol.

"The Flora of the Hawaiian Islands and the History of the Pacific Basin." Dr. Carl Skottsberg, Gothenburg Botanical Gardens.

RADIO BROADCASTS

A number of radio broadcasts were arranged through the courtesy of Dr. Milton Silverman, director of the Hall of Science at the Exposition. A series of three round-table broadcasts under the general title, "Meet the Scientists," was given on Monday evenings, over W6XBE (now KGEI), the General Electric short-wave station and over the Blue Network of the National Broadcasting Company, through KGO. In this series, on July 24, Dr. Karl F. Meyer, of the Hooper Foundation, and Sir William McLean, representative of the British Colonies at the New York World's Fair, discussed with Dr. Silverman international aspects of the public health problems of the Pacific area; on July 31, Dr. E. D. Merrill, of Harvard University, and Dr. Carl Skottsberg, of Gothenburg, discussed botanical problems of the Pacific, and on August 7, Mr. E. C. Andrews and Dr. H. C. Richards of Australia participated in a discussion of geological problems of the region.

Besides these programs, which were released over a national hook-up, fifteen-minute broadcasts were arranged over W6XBE after each of the seven public addresses at Treasure Island. At these broadcasts Dr. Silverman interviewed the speaker of the evening in the general field of his subject.

SOCIAL EVENTS

The social program of the congress included a variety of events, some arranged by the congress through the services of Dr. Chauncey D. Leake and some by the officers of the Golden Gate International Exposition, particularly through the courtesy of the Women's Board of the Exposition and also through the active interest of Mr. and Mrs. Philip N. Youtz of the Pacific House. The congress is deeply grateful to the many persons who assisted in the preparation of these events, for they were all enjoyable, well-attended affairs which provided an unusual opportunity for members of the congress to meet and become acquainted with one another.

At Berkeley, the officers of the congress tendered a reception to members of the congress on Monday afternoon, July 24, at the university in the Women's Club Rooms of Stephens Union. On Wednesday afternoon, July 26, a short sight-seeing trip through the Berkeley Hills was followed by a reception and tea at the Women's Faculty Club of the university. On Saturday, July 29, an international tea and program was given at the Berkeley Women's City Club. On Wednesday afternoon, August 2, a sight-seeing trip through Marin County, including visits to the Muir Woods redwood grove and Mount Tamalpais, was followed by a reception and tea at the Pacific House on Treasure Island.

The formal banquet of the congress, in honor of visiting foreign delegates, was held at the Claremont Hotel on Friday evening, August 4. Dr. C. B. Lipman was toastmaster, and the speakers were Dr. Ross G. Harrison, president of the congress; Dr. Patrick Marshall (New Zealand), Dr. Y. R. Chao (China), Dr. Walfrido de Leon (Philippine Islands), Dr. Luis Patiño-Camargo (Colombia), and Dr. Carl Skottsberg (Sweden).

At Treasure Island, an elaborate special program of hospitality arranged by exposition officers began on Thursday afternoon, July 27, with a reception in the lounge of the San Francisco Building. Mayor Angelo J. Rossi and other officers of the city government extended greetings to members of the congress. On Friday afternoon, July 28, Mr. Koiti Tenniti, the Japanese Commissioner to the Exposition, tendered a reception to members of the congress at the beautiful Japanese Pavilion. A musical program was given and *tenpura* refreshments were served in the Japanese style. On Monday afternoon, July 31, Mr. George

Creel, United States Commissioner to the Exposition, tendered a reception to officers and delegates of the congress at the Federal Building, and on Tuesday afternoon, August 1, coffee was served to members of the congress at a number of pavilions in the Latin American Court, particularly in those of Brazil, Colombia, El Salvador and Guatemala. The Committee of the Pacific Area tendered a reception to members of the congress on Wednesday afternoon, August 2, at the Balcony of the Pacific House, following the sight-seeing trip to Marin County. Finally, on Thursday afternoon, August 3, the Women's Board of the Exposition received members of the congress at the Yerba Buena Club. Besides these events, arrangements were made by members of the Women's Board for individual entertainment of the speakers, together with invited guests, at Treasure Island at dinner preceding their evening addresses, and many smaller parties were entertained at week-end affairs. After each evening address, Mr. and Mrs. Youtz served refreshments in the Balcony at the Pacific House.

At Stanford University, a tour for ladies was given on Monday afternoon, August 7. Mrs. Herbert Hoover received the ladies at her home on the campus, and at the conclusion of the tour, tea was served at the home of Professor and Mrs. F. M. MacFarland. On Tuesday, August 8, many of the members of the congress participated in the excursion to Pacific Grove, which included a visit to the Hopkins Marine Station, a trip over the famed Seventeen-mile Drive on the Monterey Peninsula and a luncheon at the Peninsula Country Club arranged through the courtesy of Dr. W. K. Fisher, director of the Hopkins Marine Station. On Wednesday afternoon, August 9, a sight-seeing tour through the Peninsula District was followed by a reception and tea in the Patio of the Women's Gymnasium. On Thursday afternoon, August 10, Professor and Mrs. Bailey Willis entertained the members of the congress at their home on the campus.

THE TECHNICAL SESSIONS

Only the briefest attention can be given to the technical sessions, which constituted the most important feature of the congress. About 125 sessions were held, and over 700 papers were listed for presentation. In some instances excursions, motion picture films, laboratory demonstrations and luncheons and dinners were scheduled as part of these programs.

The program was organized into eight sections with eighteen major subdivisions. In general a committee appointed by the National Research Council on nomination of the Committee on the Congress was placed in charge of each major subdivision, and to it was delegated the details of organization of the program and the duty of extending invitations to participate in it. In view of the short time available for this pur-

pose, invitations to participate were extended not only to the national organizations of the countries of the Pacific but also directly to individual scientists in these countries who were known to have made significant contributions in the fields under discussion.

The program committees were allowed a considerable degree of freedom in conducting their activities. Usually, however, a program outline was set up, enumerating general topics for consideration, and then invitations to participate were extended to individuals who had made notable contributions to the subjects in question.

Geophysics: Beno Gutenberg, Perry Byerly, A. L. Day and N. H. Heck, in charge. On July 27, the subsection was invited to participate in a program on earthquake resistant design, arranged by the Structural Division of the American Society of Civil Engineers and held at the St. Francis Hotel in San Francisco. Sessions were held on magnetic data and the structure of the Pacific area; on shallow earthquakes in the Pacific area and structure; on deep focus earthquakes in the Pacific area; on gravity, tilt and displacement in the Pacific area; and on hypotheses on the development of the Pacific basin. One session was devoted to a general conference on geophysical problems concerning the Pacific area, and the subsection participated in sessions dealing with Pacific climates, as based on the fossil record, and with causes of climatic change. The standing committee on seismology also held a meeting under the *pro tempore* chairmanship of James B. Macelwane, of St. Louis University.

Geology: Eliot Blackwelder, Herbert E. Gregory and W. C. Mendenhall, in charge. The committee in charge of the subsection on geology outlined a number of topics and delegated the preparation of programs for these subjects to specialists in the fields. A program of six sessions on the Pacific basin and lands in pre-Tertiary times was arranged by C. E. Weaver, of the University of Washington. H. G. Schenck, of Stanford University, arranged a program of four sessions on Tertiary stratigraphy, paleontology and history of the islands in and the continents bordering on the Pacific Ocean. A fifth session was devoted to a round-table conference on procedure in stratigraphy; and two field trips were conducted; one to the south side of Mount Diablo, under the leadership of B. L. Clark, of the University of California, and another to inspect the southwest flank of the Pacheco syncline near Martinez, under the leadership of the chairman.

A one-session program on Antarctic Pacific, continental and marine problems was arranged by L. M. Gould, Carleton College; and a two-session program on the bottom deposits of the Pacific Ocean and processes of marine sedimentation by Parker D. Trask, of the U. S. Geological Survey. One-session programs

were devoted to Pleistocene and Recent changes around the Pacific border, under the leadership of Eliot Blackwelder, of Stanford University, to changes of ocean level in the Pacific basin under J. E. Hoffmeister, of the University of Rochester, and to volcanoes of the Pacific region under the direction of Howel Williams, of the University of California.

Oceanography and Marine Biology: The section was organized under the general supervision of a committee consisting of Thomas G. Thompson, Martin W. Johnson, H. A. Marmer, Robert C. Miller, H. U. Sverdrup and W. F. Thompson. It was divided into three subsections—oceanography, fisheries and marine biology—for development of the program. General activities of the section included consideration of an extensive report drawn up by the Standing Committee on Oceanography of the Pacific, of which Thomas G. Thompson was chairman. The Oceanographical Society of the Pacific held its annual luncheon and business meeting in connection with these sessions on July 27, at the Berkeley Women's City Club.

Oceanography: H. U. Sverdrup, in charge. The first session was devoted to oceanographic reports from various portions of the Pacific region. It was followed by two sessions devoted to currents of the Pacific Ocean, their physical and chemical characteristics, and concluded with a session devoted to contributed papers.

Fisheries: W. F. Thompson, Harry A. Dunlop, Roger W. Harrison, George S. Myers, Paul R. Needham and W. L. Scofield, in charge. Seven sessions were held. The first dealt with the distribution and relationship of marine species, stressing those features which make them of international importance. The second was devoted to the life history of important species of fishes and the factors in their exploitation and conservation which make them of international importance. The third session dealt with the evolution of methods of exploitation and utilization, the scientific and practical principles involved and their relation to conservation or the national economy of the countries of the Pacific area. The fourth session considered management methods for inland waters, and the fifth discussed fisheries research programs. Two following sessions contained miscellaneous contributions on fisheries biology and technology.

Marine Biology: Robert C. Miller, Martin W. Johnson, Frederick H. Davidson, C. McLean Frazer, Trevor Kincaid, S. F. Light and Irene A. McCulloch, in charge. Two sessions were devoted to the distribution of plant and animal life in the Pacific and one each to the productivity of the sea, the microbiology of the sea, the tropical Pacific and the physiology of marine organisms. Round-table discussions in connection with the sessions were scheduled to deal with the present status of distributional studies in the north

Pacific area, the utilization of "indicator" organisms in marine biological investigations, the objectives of future biological investigations in the tropical Pacific and the present status of investigations of the morphology and physiology of Pacific invertebrates.

Past Climates of the Pacific: Ralph W. Chaney, in charge. Two sessions were devoted to a consideration of Pacific climates as based on the fossil record in which evidence from the response of modern organisms to climate as well as evidence from the fossil record were considered. A third session was devoted to a discussion of causes of climatic change.

Present Climates of the Pacific: Charles F. Brooks, E. H. Bowie and J. B. Leighly, in charge. Two subsections, one dealing with meteorology and the other with climatology, were organized.

Meteorology: E. H. Bowie, N. E. Bradbury and E. C. Haynes, in charge. Five sessions were scheduled for a consideration of the synoptic meteorology of the Pacific. During these sessions a movie film on the artificial production of snow crystals, prepared by Professor Ukitiro Nakaya, of the Hokkaido Imperial University, and brought to the congress by Dr. K. Hidaka, was shown. Another feature of the program was a daily air-mass-frontal analysis of the weather chart of the north Pacific Ocean, presented by Messrs. H. B. Byers, R. C. Counts, Jr., and E. M. Vernon, of the U. S. Weather Bureau.

Climatology: John B. Leighly, in charge. Three one-session programs were arranged dealing with the maritime climatology of the Pacific, climatic fluctuations in California and climatic features of the western United States.

Anthropology: A. L. Kroeber and T. D. McCown, in charge. The program was divided into six sessions with the following topics of discussion: culture history; acculturation; regional contributions; ethnobotany; earliest man, his remains, his tools and the times in which he lived; and racial migrations in the Pacific region.

Zoology: F. M. MacFarland, H. Burrington Baker, Ernst Mayr and Karl P. Schmidt, in charge. Two sessions of the subsection, dealing with the general subject of faunistic studies of the Pacific area, were organized.

Entomology: E. O. Essig, C. P. Clausen, W. B. Herms, D. B. Mackie and E. C. Van Dyke, in charge. The several portions of the program were organized by different members of the committee. A two-session program on the faunal relations of the insects of the Pacific area was arranged by E. C. Van Dyke. A session dealing with economic problems was held under the leadership of D. B. Mackie. Four sessions under the leadership of C. P. Clausen were devoted to the general problem of biological control of insect pests; and one session on the terrestrial arachnids of

the Pacific area which may affect the health and well-being of man and animals was organized by W. B. Herms.

Botany: E. B. Copeland, in charge. The general topic of discussion was the terrestrial floras of the Pacific area, to which three sessions were devoted. A fourth session was devoted to contributed papers on economic applications dealing particularly with plant breeding and forestry. The subsection also participated in a discussion of reports of the Standing Committee on Forestry, presented by F. W. Foxworthy and of the Standing Committee on the Protection of Nature, prepared by Carl Skottsberg.

Plant Pathology: E. C. Stakman, in charge. The program consisted of four sessions; one devoted to virus diseases of plants with a round-table discussion of virus problems led by Eubanks Carsner; a second dealt with variation in plant pathogens, with a round-table discussion on variation in pathogens and its importance, led by M. W. Gardner; a third considered the problem of dissemination and distribution of plant pathogens including physiologic races, led by J. H. Craigie; and the fourth, devoted to plant diseases caused by nutrient deficiencies, included a round-table discussion on diseases caused by nutrient deficiencies and mutual relationships between organisms in relation to pathogenicity.

Public Health and Nutrition: K. F. Meyer, L. S. McClung, F. A. Carmelia, L. R. Chandler, W. M. Dickie, C. E. Dolman, J. C. Geiger, Ira V. Hiscock, C. H. Kellaway, J. F. Kessel, C. D. Leake, G. W. McCoy, Agnes F. Morgan, R. R. Parker, Langley Porter, A. C. Reed, R. R. Sayers, W. P. Shepard and R. P. Strong, in charge. The inclusion of the section on public health and nutrition represented, in a sense, an innovation in the program of Pacific Science congresses, since the fifth congress, after considering the matter, abandoned plans to organize such a section, and previous congresses had laid little emphasis on the field. However, through the active services of Dr. K. F. Meyer and Dr. L. S. McClung, chairman and secretary, respectively, of the organizing committee, together with the associated efforts of a large group interested in the subject, an extensive program was prepared and presented. The section was so successful in its efforts that the congress endorsed its request for continuation of the section in subsequent congresses.

General activities of the group included arrangements for the three public lectures previously listed, given by Dr. C. P. Brown, Sir William McLean and Dr. A. Stampar. A dinner in honor of officers of the section and visiting participants was given at the Faculty Club of the University of California on Thursday evening, July 27. Moving picture films in color were shown on Tuesday evening, July 25, "A Trip to Panama; Possibilities for Nutrition Research in the

Tropics," by Dr. George R. Cowgill, of Yale University, and on Saturday afternoon, July 29, films were exhibited by Dr. R. R. Parker on the "Life History of the Rocky Mountain Spotted Fever Tick, and Methods of Preparation of Rocky Mountain Fever Vaccine."

The technical sessions were organized under four subsections; epidemiology, industrial hygiene, nutrition and health education. As previously mentioned, the program was so arranged as to permit attendance of members of the Western Branch of the American Public Health Association, which met in Oakland from July 23 to 28. Members of the congress were also invited to attend the annual banquet of the association, which was held on Wednesday evening, July 26, at the Hotel Oakland.

Epidemiology: K. F. Meyer, in charge. The program consisted of sixteen sessions organized around specific topics, with 172 papers listed for presentation. An attempt was made to secure reports on these topics from as wide a territory as possible. One session dealt with the enteric infections; dysenteries, cholera and typhoid fever. It was followed by two sessions on insect-borne diseases; one covering tularemia and relapsing fever; the other, yellow fever and plague. Two sessions dealt with neurotropic virus infections; one with poliomyelitis, equine encephalomyelitis, St. Louis encephalitis and rabies; the second with undulant fever and leptospirosis. Two sessions on animal-borne diseases covered undulant fever, leptospirosis and psittacosis. One session was devoted to food poisonings and one to the history and influence of geographic and climatic factors on disease. Three further sessions on insect-borne diseases dealt with rickettsia and bartonella infections. A session was given over to fungus infections, another to newer knowledge on trachoma and two to leprosy.

Industrial Hygiene: Dr. R. R. Sayers, in charge. The program consisted of four sessions, with 34 papers listed for presentation. One session was devoted to a consideration of the present status of industrial hygiene; a second to public health problems relating to transportation and changes in barometric pressure; and two to organic solvents, insecticides, pest control agents and spray residues in relation to public health.

Nutrition: Agnes F. Morgan, C. L. Alsberg, L. S. McClung and K. F. Meyer, in charge. Eight sessions were held at which 64 papers were listed for presentation. The group also gave a luncheon at the Women's Faculty Club, University of California, on Tuesday, July 25. Two sessions dealt with the probable nutritional inadequacies of diets in common use by Pacific populations; the first with the white bread, sugar and meat diet of the Occident, and the second with the polished rice and fish diet of the Orient. These were followed by a session on vitamin requirements and vitamin content of foods of the Pacific area. One

session was given over to the value of the soybean in supplementing deficient diets; one to the avitaminoses and alcoholism and metabolism; and one to fortification of foods with vitamins and hypervitaminoses. A further session dealt with nutrition as a factor in the geographical distribution of dental caries and parodontosis; and a final session was given over to a discussion of defective nutrition and public health.

Health Education: Dr. Ira V. Hiscock and Dr. W. P. Shepard, in charge. The sessions on health education were all joint sessions arranged by the Western Branch of the American Public Health Association. The sessions were opened by a symposium on health education at which addresses and reports upon various aspects of health education were presented. Following this session the program was divided into five sessions meeting simultaneously; three dealing with school health education (health instruction in the classroom, health service in schools and physical education and recreation), and two with health education of the public. The sessions continued with a résumé of the discussions on school health education and with further sessions on health education of the public. The sessions concluded with a general symposium on health education at which Dr. Walter H. Brown summarized the discussion on school health education, Dr. W.

Ford Higby that on health education of the public, and Dr. Ira V. Hiscock discussed health education in the U. S. A.

Soil Resources: C. F. Shaw, S. W. Cosby, M. H. Lapham, R. E. Storie and W. W. Weir, in charge. This section, under the leadership of the late C. F. Shaw, was somewhat differently organized from the other sections. The main emphasis was laid on informal discussion of topics rather than upon formal presentation of papers. Included in the program were two two-day field trips; one to Placerville and way stations and one to Watsonville and Santa Cruz and way stations to inspect projects dealing with land use and methods of conservation and to serve as a basis for discussions at following sessions. Sessions were devoted to natural factors determining land use; soil, climate, water supply and topography, and to methods of study and mapping of the natural factors determining land use. A series of sessions were devoted to soil conditions and land use in various localities; in the foothills and interior valleys of California, in Oregon, in Washington, in the western Canadian provinces, in Central America, in Mexico, in China, in the tropical Pacific, in Australia and New Zealand, and in the Pacific coastal regions. The sessions closed with a general discussion of soil problems of Pacific lands.

THE STRUCTURE OF THE PACIFIC BASIN AS INDICATED BY EARTHQUAKES¹

By Professor B. GUTENBERG

CALIFORNIA INSTITUTE OF TECHNOLOGY, PASADENA

OUR earth originated about 2,000 million years ago. Great changes must have occurred in its early history, but even yet both gradual and sudden changes show us that it has not gained complete equilibrium. The sudden movements, which we call earthquakes, give us important information about the constitution of the earth.

The main features of earthquakes are fractures and displacements which occur usually at some depth, the focus of the earthquake, but which occasionally may extend to the surface and be visible there in the form of cracks, displaced roads or fences, etc. Such displacements frequently recur for long intervals in time and space in the same direction. A well-known example is the fault system in California, especially the San Andreas fault. The movements there occur in such a way that the eastern (continental) side moves south-eastward relative to the western (Pacific) side. The same fact is proved by geologic measurements in

Japan.² As mentioned already, movements occur gradually as well as during earthquakes. If in a certain region a block along one side of the fault moves gradually in one direction relative to the block on the other side, strains will be set up along the fault which finally lead to an earthquake at the time when the strain exceeds the breaking strength of the material and a break occurs. At this moment the material on one side of the fault "snaps" towards the unstrained position in one direction, that on the other side of the fault in the opposite direction. On both sides there is a compression in the direction in which the "snapping"

² During the meeting of the Pacific Science Congress Professor Ch. Tsuboi stated that in Japan, along all faults without exception, the continental (western) side is moving southward relative to the Pacific side; and, according to a statement by Dr. Bailey Willis, movements along the major fault in the Philippines occur in the same way, the continental side moves southward relative to the Pacific side. These results suggest the possibility of a general movement of Eastern Asia and Western North America to the south relative to the Pacific Basin. However, many more observations are needed before this can be considered a fact.

¹ Abstract of a public address at the Sixth Pacific Congress, Berkeley, Calif., August 1, 1939.