

Research Facilities
at the
Scripps Institution of Oceanography



CORRECTION

The descriptive matter under the views of the
Institution's buildings should be transposed.

Dr. Thomas Wayland Vaughan
Director of the Institution

RESEARCH FACILITIES AT THE SCRIPPS INSTITUTION OF OCEANOGRAPHY

DR. THOMAS WAYLAND VAUGHAN

Director of the Institution

The development of the Scripps Institution of Oceanography has been slow, having extended over fully forty years. The events which led to the establishment of the Scripps Institution for Biological Research and the early history of that Institution have been excellently presented in a bulletin entitled, "The Marine Biological Station of San Diego, its history, present conditions, achievements, and aims," by Dr. W. E. Ritter¹.

Subsequent to the publication of the article by Dr. Ritter and prior to my succeeding him as director of the Institution there were two notable improvements in the Institution. One was the erection of a library-museum building, 60 ft. x 60 ft., which contains two floors and about a three quarter basement. Two tiers of book-stacks can be installed on each of the two main floors of the building, giving a library capacity of about 50,000 volumes.

The other improvement was the construction of a re-enforced concrete pier, 1,000 ft. long and 20 ft. wide. Therefore, at the time when I became director of the Institution on the first of February, 1924, the land of the Institution consisted of a 177-acre tract on the sea front about two miles north of the village of La Jolla. There were, on this land, one laboratory building, two floors, 75 x 48 ft.; the library-museum building and the re-enforced concrete pier, which have been mentioned; a wooden aquarium, 24 x 48 feet, with 18 tanks; several service buildings and garages, temporary structures, and 24 wooden cottage residences. In September, 1925, the Institution purchased a boat of the purse-seiner type, 64 ft. long, 18 foot beam, about 50 tons gross, and it was equipped to work to a depth of about 1,000 fathoms. The boat is supposed to have a cruising radius of about 1,000 miles, but no attempt has been made to use it for cruises of more than about 200 miles radius.

Nearly all of the expense of the acquisition of the land and the construction of the buildings on it was borne by Miss Ellen Browning Scripps. Mr. E. W. Scripps, however, helped defray the expenses of some of the construction, and he donated the boat to the Institution.

The expenses of operation were divided between the Scripps family and the State of California. Miss Scripps contributed \$9,000, and Mr. E. W. Scripps, \$5,000, per year. Revenue of

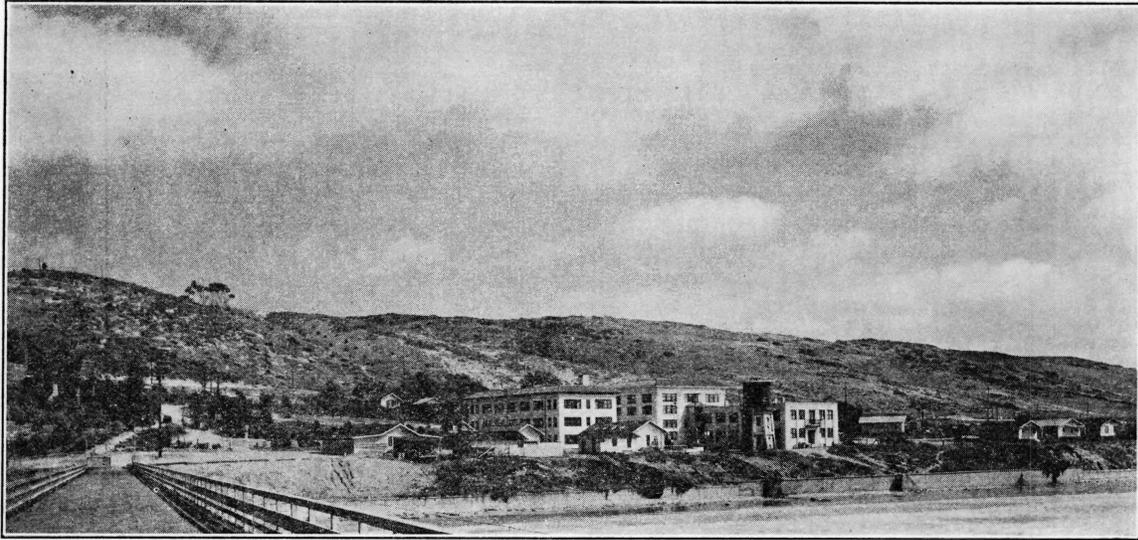
about \$7,500 per year was derived from the Institution's houses and its supply department. The University of California contributed \$22,500 per year.

The general set-up of the Institution when I became its director was as has been indicated. President Campbell proposed to Miss Scripps that, beginning July 1, 1925, she and the University of California jointly make an annual step-up of \$5,000 a year in the income of the Institution, each to contribute \$2,500. This policy was continued until there had been an increase of \$35,000 per year in the Institution's income. Besides the income above indicated the Institution has received a considerable number of special contributions of significant size. The principal of these was a fund for the meteorological investigations, raised cooperatively by the organizations interested in hydro-electric power development in the State. These contributions were from the Department of Water and Power, City of Los Angeles, and a number of commercial corporations.

In 1929 it was decided to add a new laboratory building to the Institution's equipment, and for this purpose \$120,000 were raised by \$40,000 contributions from each of the following: the State of California through the University, Miss Scripps, and the Rockefeller Foundation. Work on the building was begun in March, 1931, and during September of the same year it was ready for use. This building is a three-story fire-proof re-enforced concrete structure. It is 100 ft. long and 46 ft. wide. For the biennium which began July 1, 1931, the State of California made to the University a special appropriation of \$40,000 for the renovation and improvement of the old buildings and grounds of the Institution.

The statements above made indicate the general nature of the physical set-up of the Institution at present, how the set-up was brought about, and what the present resources of the Institution are. But nothing has been said regarding the scientific purpose which was behind the development.

The Institution at first was primarily one for biological research, but very soon after its establishment important investigations in dynamical oceanography, particularly those of Dr. George F. McEwen, were undertaken, because it was recognized that knowledge of the physical features of the environment was necessary in order to under-



THE SCRIPPS INSTITUTION OF OCEANOGRAPHY

View of the three principal buildings looking northwest. In the center is the Library-Museum building; at the right is part of the new laboratory, Ritter Hall; at the left behind the Museum-Library building is the old George H. Scripps Laboratory. At the extreme left may be seen part of the pier.

stand the conditions of life of the various marine organisms. The lower floor of the old laboratory building, the George H. Scripps Laboratory, was supplied with running salt water, gas, and electricity, and it was adapted for general morphological work and experimental work which did not require controlled conditions. As is known by everyone who is familiar with the history of the Institution, numerous important scientific researches were conducted at the Institution during the incumbency of Dr. Ritter.

Before Dr. Ritter's retirement on June 30, 1923, the administrative officers and regents of the University of California and the interested members of the Scripps family decided to convert the Institution from one for biological research into one for oceanographic research. Therefore, when I came to the Institution on February 1, 1924, a change in the Institution's policy was initiated. An endeavor was made to develop a broad program of oceanographic research which would be in line with the generally recognized scope and functions of an oceanographic institution. In the lines of research which had been pursued under the incumbency of Dr. Ritter, it was decided to make only one significant change. Although it was recognized that the investigations of geographic races and heredity in the deer mice, *Peromyscus*, by Dr. F. B. Sumner were of great importance, really an honor to the Institution with which Dr. Sumner was connected, the research was scarcely germane to an oceanographic institution. Dr. Sumner himself suggested that, after

his work on *Peromyscus* had been brought to a logical stopping place, he should transfer his activities to problems in fish biology, which had been subjects of investigation by him before he undertook the *Peromyscus* project. Dr. Sumner's suggestion was adopted by the appropriate University officials. The investigations in dynamical oceanography under Professor McEwen, the studies of phytoplankton by Professor W. E. Allen, and the work on the zooplankton, especially copepods, by Professor Esterly, were continued. As soon as it was practicable to do so, the work in marine meteorology was expanded, and investigations of the chemistry of sea water were established as one of the definite projects of the Institution, with Dr. E. G. Moberg in charge. The study of marine bottom deposits and the complex of associated physical and chemical problems in the ocean, in charge of T. W. Vaughan, was undertaken as soon as circumstances permitted. Since micro-organisms, bacteria and the lower forms of plant life, perform important rôles in the metabolism of the sea, investigation of those organisms was initiated, first in charge of Dr. A. H. Gee, later in charge of D. C. E. ZoBell. Investigations of the physiology of marine organisms with reference to their oceanic environment, in charge of Dr. D. L. Fox, were added. It is generally recognized that the adaptations of organisms to their environment are fundamentally physiological. Therefore, in order to get at the more fundamental principles of such adaptation it is necessary to know the organism structurally,



VIEW OF THE THREE PRINCIPAL BUILDINGS LOOKING SOUTHEAST FROM THE PIER

At the left is the new building, Ritter Hall; in the center is the Museum-Library building; at the right behind the Museum-Library building is the George H. Scripps Laboratory.

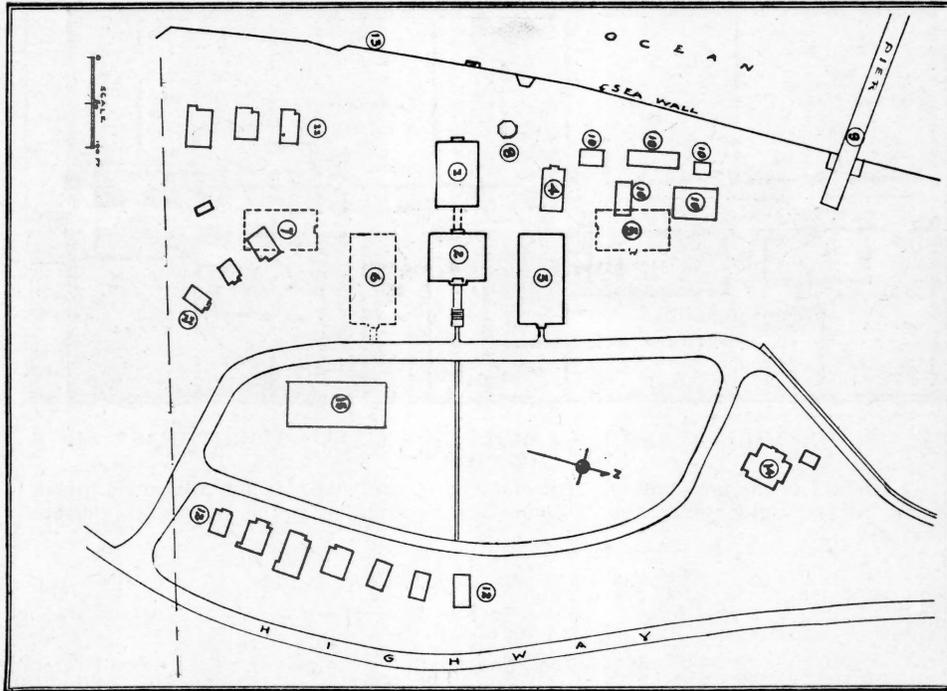
the environment in which it lives, and the organic processes which are necessary for the organism to continue its existence.

The lines of research being prosecuted at the Institution may, therefore, be categorically stated as follows: dynamical oceanography and marine meteorology, including solar radiation and the penetration of radiant energy into sea-water; the chemistry of sea-water; biology (bacteriology; phytoplankton; foraminifera, their life history and relation to marine sediments; biology of fishes, largely physiological; physiology of marine organisms, with special reference to adaptation to the marine environment); geological processes, especially marine bottom deposits. The Institution has on its grounds one of the seismological stations established in connection with the study of seismology in southern California under the auspices of the Carnegie Institution and the California Institute of Technology. Each line of oceanographic work interlocks with other lines. Therefore, although it has been necessary more or less to sectionize the work of the Institution, because of the need for skill in the use of special disciplines, the work of the Institution is really set up as a series of interlocking projects.

In addition to what is done by the resident members of the staff of the Institution and by several non-resident assistants, the Institution derives great benefit from cooperative relations with a number of other institutions, especially various governmental organizations. The assistance received from the United States Navy, the Coast and Geodetic Survey, and the Bureau of Lighthouses, has been invaluable. It includes the collection of data and samples of water and bottom deposits from a large part of the northeastern Pa-

cific. The Institution has also received aid from the Grace and Los Angeles Steamship Lines and from many other sources.

The account of the purpose and organization of the Institution has been rather fully stated because they have influenced the recent construction and other improvements of the Institution's facilities for scientific research. The new laboratory building, which has been appropriately named Ritter Hall, has provisions in it for several different kinds of research. On the top floor, east end, there are three research chemical laboratories, a nitrogen room, an alcove for colorimetric work, and a small laboratory for routine determinations, such as salinity and hydrogen ion concentration. There are also one rather large office, a drafting and computing room, two store rooms, and one room in which the temperature may be kept constant as desired, from 0° to 40° Centigrade. At the west end of the top floor there are rooms for dynamical oceanography and marine meteorology, including a large computing room extending the whole length of that section of the building. In connection with the work in marine meteorology there are in the rooms on the top floor the recording devices of instruments, such as for solar radiation, which are exposed on the roof of the building. On the roof there is also a pent-house, in which the water distilling and ventilating fans are installed. On the second floor, east end, there are for the bacteriological investigations five rooms, in addition to a constant temperature room. Just west of the bacteriological suite there is a long room intended for spectrometric purposes, and a large laboratory which was intended as a special physics room. At present this room is being used as a biological laboratory, but such



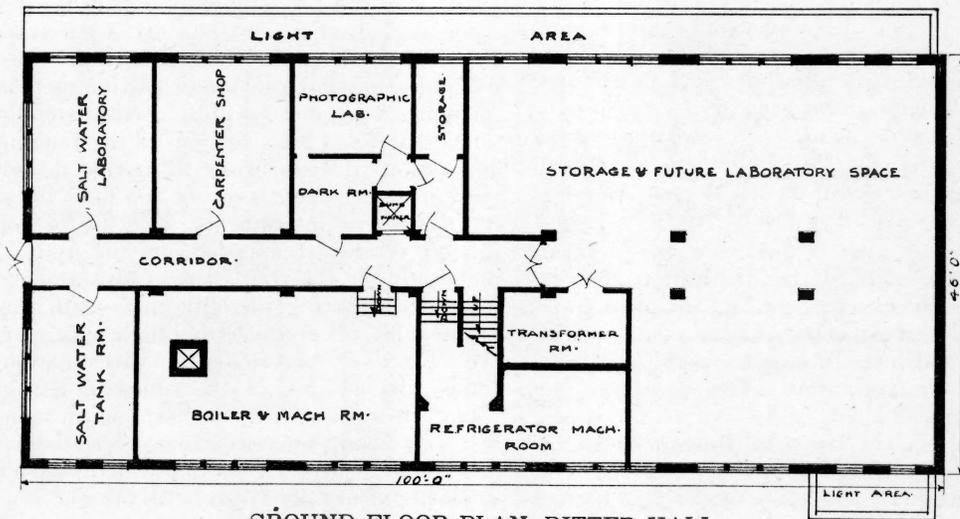
PLAN OF BUILDINGS AND GROUNDS

use is not intended to be permanent. At the west end of the second floor is the physiological suite. It comprises, besides the office, one large experimental laboratory supplied with salt water, a large chemical laboratory, and a large microscope room. There is also in this suite a dark room and a large constant temperature room.

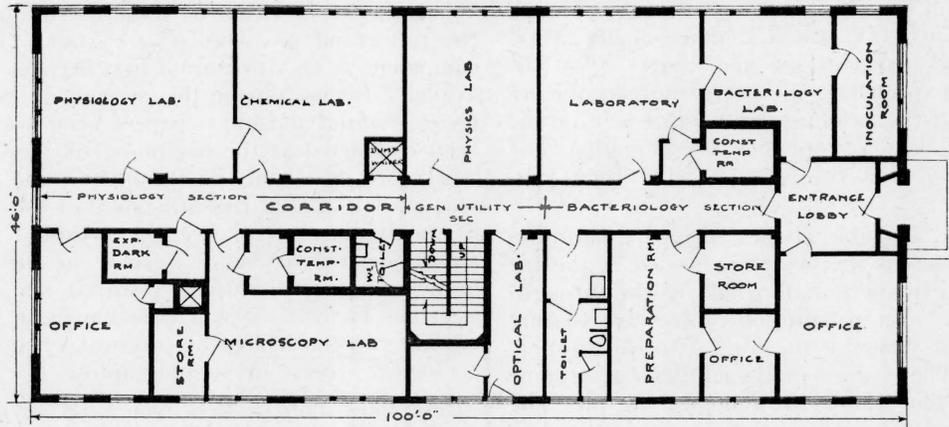
On the ground floor, there are two rooms intended for the large-scale cultures of marine organisms; a photographic suite composed of four

rooms; the machinery room and transformer vault; and a room for the storage of oceanographic equipment. On this floor, there remains considerable unassigned space, a part of which at present is in use as a receiving room and another part, as a carpenter shop.

By means of the special State appropriation of \$40,000, the George H. Scripps Laboratory, 75 x 48 ft., has been remodelled. A little less than half of the lower floor is devoted to fish biology, and



GROUND FLOOR PLAN, RITTER HALL



FIRST FLOOR PLAN

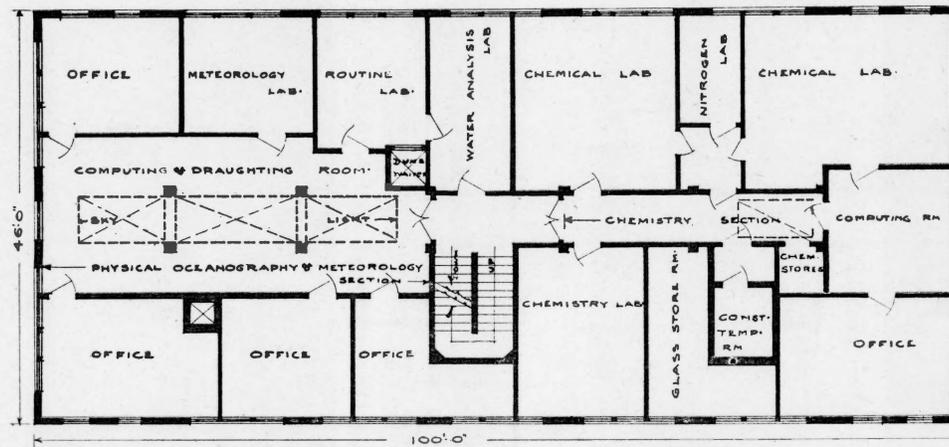
about three and a half unit rooms are devoted to marine sediments. There are on the lower floor three unassigned rooms which may be used by visiting investigators or by staff members. These rooms are supplied with running salt and fresh water, compressed air, gas, and electricity. On the upper floor, there are the Director's offices, the seminar room, and an unassigned room which may be used either as an office or as a laboratory for work which does not require experimentation. On this floor there are also the laboratories for phytoplankton, the offices of fish biology, and two laboratories for those studies on foraminifera which do not require experiments on living organisms.

As a part of the renovation and improvement made possible by the special State appropriation of \$40,000, the old salt water system of the Institution was replaced by a new system which consists of a 60,000 gallon re-enforced concrete tank,

the concrete and covering cement being designed to prevent rusting of the re-enforcing. The water for the tank is brought from the west end of the pier, nearly 1,000 ft. from the beach line, through pure lead pipes, and from the tank water is distributed through pure lead pipes to the physiological section of Ritter Hall, the aquarium, and the lower floor of George H. Scripps Laboratory. The system appears to be excellent.

Ritter Hall is intended for investigations in dynamical oceanography, the physical properties of sea water, the chemistry of sea water, biochemistry, bacteriology, and general physiology. The laboratory is primarily one for physics and chemistry for those kinds of biological investigation which require either biochemical or biophysical methods. The equipment of George H. Scripps Laboratory is, for the kind of work which has been indicated, at present adequate.

Since library facilities are essential for re-



SECOND FLOOR PLAN

search, it will be said that the Institution's library now contains 13,000 bound volumes, about 23,000 reprints, and many atlases and charts. An improvement expected in the near future is the replacement of the gasoline engine at present on the Institution's boat *Scripps* by a Diesel engine. The funds needed for this change have been subscribed.

The space available at the Scripps Institution purposely exceeds that which is needed by the Institution's permanent staff which works throughout the year. The Institution can receive visiting scientists for virtually any kind of oceanographic research. There are special facilities for a number of different kinds of biological work. The number of visitors who can be accommodated is

approximately 25, that is, about 25 in addition to the residential members of the staff. The new equipment at the Institution first became partially available for use during the summer of 1932. The reconstruction and improvement program had not been completed at the beginning of the summer. Therefore, it is only at the end of the summer season of 1932 that full utilization of the facilities of the Institution has become possible. The Institute desires to be of service to the various branches of oceanographic research and, insofar as it has facilities, it will welcome those who are working on the biological, physical, chemical, and geological aspects of oceanography.

¹ Univ. Calif. Publ. in Zool., vol. 9, pp. 137-248, pls. 18-24, two maps, March 9, 1912.