

THE UNIVERSITY AND THE PACIFIC

**The Story of Scripps Institution
By Professor George F. McEwen**

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MANY VISITORS COME TO THE Scripps Institution of Oceanography and ask questions like the following: What work is being done here? Of what general use or interest is it? How many students are attending this school? How is it supported? In outlining a few of the highlights of the Institution's history I hope to contribute something towards the answers to these questions.

In 1891, a young professor, Dr. W. E. Ritter, was called to the newly formed department of biology at the University of California. He was an enthusiastic student of life and its natural environment—a true naturalist interested in what living animals did and how they lived in nature.

His was a very different attitude from that of the "closet naturalist," working in a museum or laboratory either with animals taken out of their natural surroundings or even with pickled specimens. Only a meager beginning had then been made toward biological research in the West, and the Pacific Ocean with its teeming life had been least studied. What an opportunity for the pioneer work of a naturalist! Dr. Ritter immediately organized various groups of scientists for collecting and studying the marine life, at first in the most accessible region of San Francisco Bay which, however, did not contain many of the plants and animals most characteristic of the open ocean. Accordingly numerous collecting trips were made along the coast north to Alaska and as far south as San Diego from 1896 to 1901. Since this experience pointed to San Pedro as an especially favorable center from which to carry on marine investigations, a seaside laboratory was temporarily established there, and considerable dredging of the sea bottom and collecting of floating life by means of nets was carried on in the southern California region. These experiences pointed definitely to the need of establishing a permanent, well-supported seaside station. And among other considerations contributing largely to making a serious attempt to do this was the great interest of Dr. C. A. Kofoid, an experienced investigator in marine biology who came into the department of zoölogy in 1900. Strenuous efforts then made to secure sufficient funds in Los Angeles for a permanently established station properly equipped for carrying on such marine investigations failed, and that community lost its opportunity of being a center for such researches. In 1903, better accommodations were found at Coronado near San Diego, a local organization was formed, with Dr. Ritter as director, for the purpose of making a biological and hydrographic survey of the waters of the Pacific adjacent to the coast of southern California, and a resident naturalist, Mr. B. M. Davis, was employed.

Advantages and disadvantages of several possible

locations for a permanent station were carefully compared, major considerations being accessibility to typical ocean conditions, and a supply of good ocean water for aquaria. This study led to the selection in 1905 of the village of La Jolla, which was the home of the enterprise from 1905 to 1909. Under the leadership of Dr. Fred Baker of San Diego, who more than any other individual deserves the credit of having the laboratory located in the San Diego region, one thousand dollars was raised for erecting a laboratory in La Jolla. Another resident naturalist, E. L. Michael was employed, and at times more than a dozen investigators were accommodated at this new, though temporary, wooden laboratory. The location of the present home of the enterprise on a 170 acre "pueblo" fronting the ocean about two miles north of La Jolla, was selected to satisfy considerations of sea and weather conditions most favorable for collecting operations, abundance of pure water from a large area uncontaminated by industries or populous cities, and room for growth. The purchase at a nominal price of this pueblo was made possible by the coöperation of the council of the city of San Diego, owner of the property. Here the first permanent building, the George H. Scripps Memorial Laboratory, was constructed in 1910. Thus, during this pioneering period from 1891 to 1912 Dr. Ritter translated his vision into a concrete reality. The enterprise developed from the precarious, uncertain conditions characterizing its earlier years into a recognized institution established on a permanent basis.

The second period began in 1912 when the local organization was turned over to the University of California, and the name was changed from the Marine Biological Association of San Diego to the Scripps Institution for Biological Research of the University of California. At this time Captain W. C. Crandall, who had assisted in the work at sea since 1905, assumed his duties as business manager of the Institution. On August 6, 1916, occurred the formal dedication of two important additions to the first plant,—a concrete pier and a second permanent building to house the library, public museum, and administration offices.

Financial support for the earlier activities came in part from the department of zoölogy of the University, and in part from private subscriptions obtained in the various communities from which the work was carried on. From 1905 to 1912, during which the first buildings of the present plant were erected and extensive field work was carried on, Miss Ellen Scripps and Mr. E. W. Scripps, actuated by an abiding faith in the benefit to mankind of natural knowledge, provided all of the funds. Since 1912, the Institution has been supported mainly by the State and the Scripps family, and partly by various smaller gifts made



A view of the three principal buildings and the pier on the University's La Jolla campus.

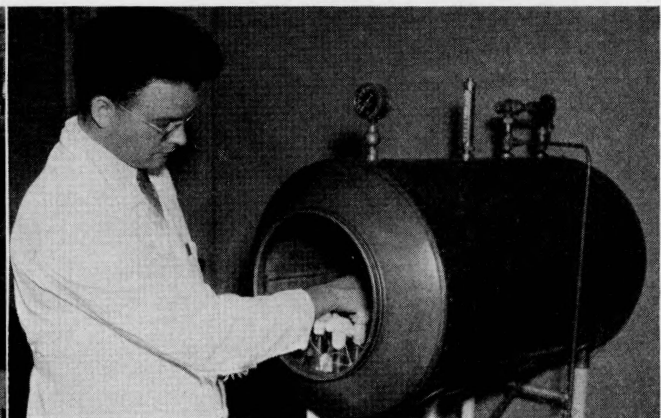
from time to time for special purposes.

When in 1905 the Institution was moved to La Jolla, its program was based largely on problems suggested by the general question of the seasonal variation of individual species of marine life, their food and reproduction, distribution in the sea, horizontal and vertical migration, and relation to surrounding conditions, such as light intensity, temperature, salinity, and other physical and chemical factors. Problems of this kind were necessarily attacked by studying the results of quantitative field collections and observations in nature where control of conditions was not possible. These investigations have shown that even the very small marine animals, so abundant in the sea, do respond, each in its own orderly way, to changes in their surroundings. But such field investigations alone do not suffice. Supplementary laboratory experiments on living material are needed to help interpret results obtained in the field and to try to get as much knowledge and understanding as possible of the almost infinitely rich and varied marine life of the San Diego area.

The need of giving special attention to the environment, that is, to the physical and chemical conditions in the sea, led to the addition to the staff, in 1908,

of the author, a physicist. Since then considerable attention has been directed not only to making observations relative to the water, but also to problems of physical oceanography and meteorology suggested by these observations. Certain results of these studies have proved of value in interpreting the biological data and, in agreement with evidence from other regions, have clearly shown the close relation between oceanic and atmospheric phenomena. Coöperation among members of the staff in these various undertakings has been successfully realized throughout the Institution's existence. Recognition of the essential unity, physical, chemical and biological, in the field of oceanography has served to unite the interests of all.

Although the Scripps Institution has been engaged primarily in research in pure science, it has coöperated at various times in attacking certain economic problems pertaining to the sea. Continuous investigations of kelp in coöperation with the Federal Bureau of Soils was carried on for a ten-year period beginning in 1914. There has also been coöperation with the Bureau of Fisheries, and with the State Fish and Game Commission, and since 1918 advance indications of seasonal rainfall have been furnished.



Professor F. B. Sumner (left) preparing for an experiment with sample fishes, and Dr. C. E. ZoBell studying ocean-dwelling bacteria.



Looking toward the south-west over the sea from the Scripps Institution on a winter evening.

Formal elementary instruction is not carried on by the Scripps Institution, but, since it is a department of the University of California, opportunities are offered to graduate students for advanced work pertaining to the fields of investigation in which the Institution is engaged. Ten students have already received the doctor's degree for graduate work done at the Institution. Through the efforts of two teachers of biology and with the aid of the Institution's facilities, the first reliable handbook of the marine life of the Pacific Coast was prepared, "Sea Shore Animals of the Pacific Coast," by Johnson and Snook, McMillan 1927. Before the publication of this text it was necessary for teachers of biology in the West to try to adapt books dealing with Atlantic Coast forms to the similar though not identical local ones of the Pacific region. The numerous illustrations and the simple descriptions and accounts of habits and life histories of the common marine invertebrate fauna serve also to adapt this book to all who are interested in sea life. On the basis of many years work, Mr. P. S. Barnhart, curator of our museum, prepared another illustrated book, "Marine Fishes of Southern California," published by the University of California Press in 1936. This book should prove

of great value to all interested in our local marine fishes.

The members of the Scripps Institution staff recognize the increasing need of continuing education throughout the life of each citizen of our democracy and have devoted considerable effort towards the worthy object of providing such educational advantages. In addition to publishing technical reports of their researches, they have given many public lectures and radio talks, prepared numerous scientific articles for newspapers and popular magazines, and, through the University of California Extension Department, have given courses in various subjects involved in the research work of the Institution. An especially important educational project was initiated in 1921 by Dr. Ritter and Mr. W. E. Scripps, who carried on the pioneer work of organizing what is now known as Science Service, in Washington, D. C. This valuable organization publishes every week the *Science News Letter*, a widely circulated source of popular authoritative, current scientific material, and serves in other ways to keep the public in touch with current progress in all fields of science. Thus, another of Dr. Ritter's visions has become a reality.

Dr. Ritter's retirement in 1923 marked the close of



Dr. D. L. Fox (left), authority on physiology of marine organisms, and Professor W. E. Allen examining microscopic marine plants.

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this second period of the Institution's development. But before that, the administrative officers and Regents of the University of California had decided to convert the Institution for Biological Research into one for Oceanographic Research, and the name was changed accordingly. With this in mind, Dr. T. W. Vaughan, a research geologist who was especially interested in marine aspects of geology and who had been with the U. S. Geological Survey since 1894, was invited to succeed Dr. Ritter as director. Under Dr. Vaughan's able leadership, beginning early in 1924, important changes in the Institution's policy were initiated. A broad program of oceanographic research was developed corresponding to the generally recognized scope and function of an oceanographic institution. Of the four major divisions of work, (1) physics of the ocean and marine meteorology, (2) chemistry of sea water and of the small organisms that float in the sea, (3) marine biology, (4) study of the sea in its relation to geology, the first three had been initiated by Dr. Ritter, and the last was added after Dr. Vaughan became director. The marine researches already in progress before Dr. Ritter's retirement were strengthened and expanded. The work in marine meteorology under Dr. G. F. McEwen was expanded with the help of special contributions from organizations interested in hydroelectric power and water supply. The chemistry of the sea was established as a definite project under Dr. E. G. Moberg. The work in phytoplankton continued under Professor W. E. Allen. Dr. Martin Johnson was called to resume investigations in zooplankton. Dr. F. B. Sumner, after twenty years of work on the ecology and heredity of certain land animals, began his studies of fish biology. Investigations of marine bacteria under Dr. C. E. ZoBell were initiated and established on a basis comparable to that of the other divisions. In line with the recognized fact that adaptations of organisms to their environment are fundamentally physiological, a division of physiology under Dr. D. L. Fox was also added. Each of these diverse lines of oceanographic work interlocks with the others, in accordance with the recognized interrelations between marine organisms and their environment. Thus the spirit of the Scripps Institution's program is in accord with the idea of looking upon science as a tool to aid us in securing better human living in the broadest and best sense. It stands for maintaining the true natural history point of view held by its first director, Dr. Ritter, and for bringing in from every direction, as aids in studying the ocean, the training, methods, facts, and ideals of diverse fields of science.

Notable improvements in the Institution's facilities during this period 1924-36 were realized. First, among them was the completion in 1932 of a new laboratory building appropriately named Ritter Hall, and designed especially for the divisions of physics, chemistry, bacteriology, and physiology. Second, was the extensive remodeling of the George H. Scripps Laboratory in order to better accommodate the work

in marine sediments, fish biology, and phytoplankton, the construction of the salt-water system for furnishing an adequate supply of pure sea water, the purchase in 1925 of a 64-foot gasoline boat of the purse-seiner type, and its later remodeling and the replacement of the original gasoline engine by a diesel engine. Third, were the important additions to the instrumental equipment and to the scientific library. Finally, notable developments of the Institution's grounds were realized. Dirt roads were realigned and paved, and an extensive planting program transformed the almost barren grounds into a series of picturesque gardens of trees, shrubs, and flowers adapted to the locality.

Last September, when Dr. Vaughan retired after more than twelve years of distinguished service, marked the close of the third period and the beginning of the fourth. Then Dr. H. U. Sverdrup, coming from Norway, that famous center of pioneering and leadership in oceanography, assumed his duties as director. He has won international fame in the field of theoretical meteorology and oceanography, and has shown a broad interest in all phases of the Institution's work. Shortly after he assumed his duties, the Institution had the great misfortune to lose its boat, the "Scripps," by an explosion and fire. Thus the program of intensive work at sea which depends upon the use of its own boat was abruptly ended. This loss seriously handicaps the Institution's work at present, and it is imperative that a new and larger boat be obtained, thus enabling the Institution to extend its oceanographic work to greater distances from the coast and to attack larger problems. Earlier work of the Institution has made us realize that we cannot arrive at a clear understanding of the character of coastal waters, their physical and chemical properties, and their function as an environment of marine life without observations in the more distant deep-sea regions. Moreover, it is especially desirable to undertake a systematic investigation of the cold California Current, since virtually nothing is known as to the amount of water carried by this current or its seasonal variations or its changes from year to year. This investigation should also include the warmer water to the south and possible shifts in the boundary between typically different water masses which are found off the coast of southern California. It is hoped that such additional information will prove of value in fishery problems and in problems of weather forecasting. However, the undertaking of such practical applications must await the accumulation of a large amount of fundamental oceanographic knowledge. This is all in accord with progress toward our ideal of well-rounded comprehensive oceanographic research. On the broad foundations already laid, in consideration of the notable growth and development achieved in the past, and from our good fortune in securing so worthy and able successor to Dr. Vaughan, we at the Scripps Institution look forward to a continued increase in service to our community and state and to important scientific contributions to the world-wide science of oceanography.