

THE WORK AT THE SCRIPPS INSTITUTION OF OCEANOGRAPHY

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The Scripps Institution of Oceanography has, as known from previous articles in *THE COLLECTING NET* (No. 8, 1933; No. 5, 1936) a large resident staff and a research program which is conducted continually through the year. Visitors come to the Institution during every part of the year, but for obvious reasons the summer is the season in which the Institution has the greatest number of visiting scientists. These come after having made special arrangements with a member of the staff with whom they wish to work, or in order to take up a special problem of their own.

A summary of the biological research at the Scripps Institution was given by Dr. ZoBell in *THE COLLECTING NET* No. 5, 1936. Since no essential change has been made in this part of the Institution's program, it seems unnecessary to give an account of the studies which are in progress in the various divisions. One noteworthy expansion has, however, taken place. In cooperation with the U. S. Navy's Bureau of Construction and Repair a systematic study of the organisms which cause fouling of ships' bottoms is being initiated. The Bureau of Construction and Repair has secured the assistance of Mr. W. Forest Whedon and will take care of his direct expenses for instruments and materials, while the Scripps Institution will provide laboratory space for his work and place the facilities of the Institution at his disposal. Mr. Whedon will work in close contact with Professor W. E. Allen and Dr. Claude E. ZoBell, both of whom have conducted studies of the "fouling organisms." The Institution had to drop this special investigation from its program owing to lack of funds and the necessity of attacking other problems which appeared to be of greater interest to the whole program. Thanks to the cooperation of the Navy, it is now possible to take the problem up again and it is hoped that the cooperation will continue over a series of years and that the investigation will render results of practical application.

A new feature has been introduced in the summer activities of the Institution. Previously the instruction at the Institution has been limited to graduate instruction leading to a doctor's degree in oceanography. It was felt that it would be highly desirable that graduate students who come here for advanced work have a general knowledge of the whole field of oceanography. In order to fill this need a lecture course, "Introduction to Oceanography," is now being offered during the summer session of UCLA. The course is entered as an upper division undergraduate course, extended over six weeks with ten lectures a week.

It is being conducted by Drs. Fleming, Johnson and Sverdrup, who deal with the geographical features of the oceans, sedimentation, chemistry of sea water, the movements of sea water, and the organisms in the sea. This summer the attendance is small but we hope to obtain a larger number of students when the course is better known and we hope that it will be taken not only by students who wish to specialize in oceanography but by others who are interested in learning more about the sea.

In connection with the question of instruction it should also be mentioned that in the future students can work at the Scripps Institution towards a degree in fields of study offered by groups of departments of the University of California such as microbiology or comparative physiology.

The Institution's work at sea has been seriously handicapped during the last winter, since on November 13, 1936, the Institution's research vessel, the *Scripps*, was lost owing to explosion and fire. The Institution will not have any possibility for operations at sea during the coming summer but it is hoped that such operations can be continued on a larger scale from the beginning of the fall. In April this year Mr. R. P. Scripps, whose generous support has been invaluable to the Institution, bought the 104 foot long auxiliary schooner *Serena* and placed a substantial sum at the disposal of the Institution for remodelling this vessel and equipping it for oceanographic work. The remodelling, which includes installation of a 24 horse power diesel auxiliary motor, building of a small deckhouse with a deck laboratory, and re-arranging the quarters below deck in order to obtain laboratory space, is at present well under way. The boat will have sleeping accommodations for a crew of nine (if necessary) and a scientific party of six. On shorter cruises four more berths can be arranged. It will be equipped with three winches, one carrying 20,000 feet of $\frac{3}{8}$ inch wire to be used for deep-sea trawling, dredging and anchoring, one carrying 20,000 feet of $\frac{5}{32}$ inch wire to be used for obtaining water samples and temperatures, and one carrying 7,000 feet of wire to be used principally for vertical net hauls. All winches will be equipped with electric motors of sufficient power.

In the coming winter the new research vessel will be used for two different purposes. A systematic study of the waters off the coast of California will be commenced. The area which is to be covered will depend upon the experiences gained, but it is probable that we will concentrate our studies in the region between San Francisco

and San Diego and to a distance of two to five hundred miles from the coast. During the first cruises the emphasis will probably be placed on the physical-chemical investigations but gradually a survey of the marine life will be undertaken.

A second study will deal with certain features of the submarine geography off the coast of California. This will be conducted by Dr. F. P. Shepard who, for this purpose, has obtained a grant from the Geological Society of America and who will have the disposal of the Institution's new vessel during approximately six months of the coming year. Dr. Shepard will stay at the Institution from September 1.

Thanks to the cooperation of the California State Fish and Game Commission the Institution has been able to undertake a considerable amount of work at sea during this spring and summer. The Fish and Game Commission is interested in all questions concerning sardines and wished, in connection with certain studies, to obtain more definite information as to the character of the surface current in the offshore region between Point Conception and San Diego where great quantities of sardine eggs and larva generally are found in and after the spawning season. For this purpose the Commission proposed to undertake a large scale drift-bottle experiment during which sealed bottles should be thrown out from a number of stations scattered over the field. It was hoped that a number of these bottles would drift ashore and that the enclosed cards would be returned to the Office of the Commission. When these plans were discussed it was suggested that the SIO should cooperate and occupy about thirty oceanographic stations during each of the three cruises

which were planned. The stations should be located on four lines running nearly at right angles to the coast and to a distance of 140 to 160 miles such that the outer stations would be well beyond the continental slope. At all stations salinity, temperature, and oxygen should be determined at different levels from the surface and to a depth of 2000 meters, or to the bottom if the distance to the bottom was less than 2000 meters.

The three cruises have now been completed, one in the beginning of April, one in the middle of May, and the last in the beginning of July. The first two cruises have already given a great amount of interesting information. Bottles have been recovered only from stations near the coast and the drift of these bottles is in perfect agreement with the surface currents which have been computed on the basis of observed temperatures and salinities. At some distance from the coast but inside of the continental slope large irregular eddies occur in the area which has been assumed to be one of the major spawning grounds of the sardines. Eggs and larva will probably remain in this region for a long time. The results also throw light upon the mechanism of upwelling and upon the manner in which nutrient salts are brought to the surface. The present results indicate that the upwelling water which is rich in nutrient salts is not carried to any great distance from the coast but remains within a relatively narrow belt of water. If this is true it has great bearing on the biological problems off the coast. These results are very suggestive: they indicate a number of problems, some of which we hope to be able to attack systematically when our new research vessel is ready for work at sea.