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THE BIOLOGICAL LABORATORY OF THE BUREAU OF FISHERIES AT WOODS HOLE, MASS.

REPORT OF THE PAST YEAR'S WORK, AND ANNOUNCEMENT FOR THE COMING SEASON

IN the spring of 1908 two of the larger rooms of the laboratory were equipped for chemical investigations, and during the succeeding summer these rooms were occupied by five chemists who were engaged upon various problems of organic analysis. The purchase of books for the library has been continued, and five new periodicals have been added to the list of those which will henceforth be received here. These are the *American Journal of Physiology, American Journal of Anatomy, Journal of Experimental Zoology, Anatomischer Anzeiger* and *Centralblatt für Physiologie.* A considerable number of volumes, including the back numbers of several important journals, were loaned for the season by the library of the Bureau at Washington, and it is hoped that this profitable arrangement will be continued in the future. The entire library of the Woods Hole laboratory has been transferred to glass cases, and will henceforth be more effectively protected against the summer fogs.

Thirty-one investigators were occupied with various researches in marine biology or biochemistry during the past season. Of these eighteen received salaries from the bureau, either as investigators or as scientific assistants. In addition nine other assistants were comprised in the laboratory staff. The subjects of research were as diversified as in past seasons, though problems of economic importance perhaps received a rather larger share of attention.

Among the topics of investigation may be mentioned: chemical analyses of the tissues and the eggs of certain marine organisms, the natural history of the sea-mussel and other mollusks, the reactions of marine organisms to light and to chemical stimuli, hybridization in fishes, the parasites of fishes, taxonomic studies of cœlenterates, bryozoa and crustacea, and various other problems in general physiology, ecology, cytology and embryology.

The season was marked by an endeavor to bring about more intimate social relations among the investigators of the Fisheries Laboratory themselves, and between the latter and those of their neighbor, the Marine Biological Laboratory. With this object in view, several informal "smokers" were held in the course of the summer, and by general agreement these occasions were regarded as highly successful, both in the furtherance of friendly cooperation among the local scientific colony and the stimulus given to individual efficiency. At the close of September, Woods Hole was visited by a considerable delegation from the Fourth International Fisheries Congress, which had just concluded its formal session at Washington. The visitors were conveyed to Woods Hole from Wickford, R. I., upon the steamer *Fish Hawk*, leaving for Boston by rail on the same day. The delegation included some distinguished fisheries experts and men of science from Europe, Asia and North and South America.

At the present writing, the long-heralded report upon the local biological survey is very nearly completed and with little doubt will be ready for publication by the close of the present summer. The following sections of this laborious work are now finished: (1) The list of organisms (so far as identified) which were taken at each of the 424 dredging stations. This station record covers over 750 manuscript pages and includes about 450 species of animals and about 90 species of plants. (2) Maps showing the distribution of all of those species which were taken at ten or more of the dredging stations.[1] There are more than 200 of these representing the fauna, about 40 representing the flora. Other charts have been prepared, showing character of bottom, water temperature and density at various seasons, geographical relations, etc. (3) The census of the local marine fauna and flora, based upon the survey dredgings and upon all other available data. The resulting annotated list occupies about 700 manuscript pages and records the occurrence of some 1,400 species of animals and over 250 species of plants. (4) The general account of the project, with summarized results, discussion, etc. This has only been finished in the rough. A final draught will be made during the next few months, thus completing the report. A brief discussion of the work, containing some of the more important general conclusions, was prepared by the writer for the Fourth International Fisheries Congress, and is being published in the proceedings of that congress.

In response to an appeal from the health board of Salem, Mass., the director of the laboratory was instructed by the commissioner to detail one of the investigation staff to visit that city for the purpose of inquiring into the cause of a serious mortality among the fishes in that neighborhood. Dr. C. L. Alsberg was chosen for this mission, and proceeded at once to the seat of the trouble. He found that enormous numbers of fishes, chiefly herring and whiting, had been stranded along the waterfront of the city, causing serious discom-

[1] This basis of selection has not been adhered to strictly either for animals or for plants. In the case of the plants the number of such species would in reality considerably exceed that given.

fort to the inhabitants, if not actually menacing their health. There was no evidence of an epidemic among the fishes, as had at first been feared. Great schools of them had come into dangerously shoal water, perhaps as the result of pursuit by predaceous species, and had been stranded by the receding tide. There was thus nothing to be done but to remove the offal, and to pray that the catastrophe might not be repeated.

A few notes seem worth while regarding certain species of animals which have been taken at Woods Hole, during the past year. *Orthopristis chrysopterus,* a fish belonging to the family Hæmulidæ, which is common farther south along our Atlantic coast, was taken for the first time in the vicinity of Woods Hole. A specimen of the "flasher" or "triple-tail" (*Lobotes surinamensis*) was captured at Nantucket. There have been very few previous records of the occurrence of this fish locally. A small crab, *Dissodactylus mellitæ,* which lives in association with echinoids of the "sand dollar" type, was taken in Vineyard Sound, though probably not for the first time. A curious case deserves mention of one fish becoming encysted within the body of another. In May, 1908, Mr. V. N. Edwards chanced to open a large hake (*Urophycis tenuis*) in the course of his search for parasitic worms. The hake seemed to be in perfect health and its stomach was nearly filled by a whiting, which had been recently swallowed. Upon examining the body cavity, a long slender object was found, completely inclosed within a fold of the peritoneum. This proved to be a dead fish, having a decidedly "mummified" appearance. Its body was 25 cm. in length. Skin, and for the most part finrays, were lacking, and the flesh was much shrunken and extremely hard. From the general bodily proportions of this fish, and the presence of a frontal spine, it is believed by the writer to belong to the genus *Leptophidium.* Several members of this genus have been taken off the coast, at great depths, and it seems likely that the present specimen came from a considerable distance. It had probably been swallowed by the hake, escaping subsequently through the wall of the stomach, perhaps by using the frontal spine as a perforating organ. The stomach of the hake had evidently healed completely after this adventure.

The fact does not seem to have been hitherto recorded that the "hawk-bill" or tortoise-shell turtle (*Eretmochelys imbricata*) not infrequently reaches the coast of southern New England. Its occurrence has not been mentioned in any list of the reptiles of Massachusetts, and I have found no reference to its having been observed north of North Carolina. Small specimens of both the loggerhead and hawk-bill are, however, occasionally taken in local fish traps, and one or two of the latter have been preserved in the museum of the laboratory. A specimen ten or twelve inches long was taken among floating *Sargassum* by Mr. Edwards in August, 1908, and was kept for some time in the shark pool of the station. I learn from Mr. Edwards that individuals as large as eighteen inches long are not infrequently captured. This species is readily distinguished from the loggerhead (*Caretta caretta*) by the presence of four costal shields, instead of five as in the latter, and from the green turtle (*Chelonia mydas*) by the presence of two prefrontal plates on each side of the head.

The following is a list of the investigators present during the season, together with their subjects of research:

Carl L. Alsberg, Ph.D., instructor in biochemistry, Harvard University:[2] (1) chemical composition and food value of certain marine organ-

[2] Now pharmacologist in the Bureau of Plant Industry.

isms; (2) investigation of death of fishes at Salem, Mass. (*Salaried investigator.*)

Charles B. Bennett, graduate student in Brown University, assisted Dr. Alsberg in chemical investigations above mentioned. (*Scientific assistant.*)

William M. Clark, A.M., assistant in chemistry, Williams College, likewise assisted Dr. Alsberg. (*Scientific assistant.*)

Edgar D. Congdon, A.M., Austin teaching fellow in zoology, Harvard University: a comparison of the marine and the brackish-water representatives of certain species of mollusks. Mr. Congdon also acted as librarian of the laboratory.

Bradley M. Davis, Ph.D., Cambridge, Mass.: (1) botanical section of the biological survey; (2) cytological studies of marine algæ. (*Salaried investigator.*)

Donald W. Davis, professor of biology, Sweet Briar College: the effect of conditions acting at the time of the fertilization of the fish egg upon the subsequent size and proportions of the organism. (*Scientific assistant.*)

Irving A. Field, professor of chemistry and biology, Western Maryland College: (1) the utilization of the dogfish and mussel as food; (2) the life history of the sea mussel. (*Salaried investigator.*)

A. J. Goldfarb, graduate student in Columbia University: the influence of the nervous system upon the regeneration of various organisms.

Charles W. Hargitt, Ph.D., professor of zoology, Syracuse University: the morphology and taxonomy of local cœlenterates. (*Salaried investigator.*)

George T. Hargitt, A.M., Austin teaching fellow, Harvard University: the embryology of hydromedusæ.

George W. Heimrod, Ph.D., assistant in Rockefeller Institute of Medical Research: (1) studies of the enzymes found in marine organisms; (2) preparation of the flesh of fishes for future analysis.

Edwin Linton, Ph.D., professor of biology, Washington and Jefferson College: the helminth parasites of fishes. (*Salaried investigator.*)

Samuel O. Mast, Ph.D., Johnston research scholar, Johns Hopkins University:[3] the reactions of certain marine organisms to light. (*Scientific assistant.*)

James W. Mavor, graduate student, Harvard University: the development of the coral, *Agaricia fragilis.*

Jesse F. McClendon, Ph.D., instructor in zoology, University of Missouri: the chemistry of the echinoderm egg. (*Scientific assistant.*)

William J. Moenkhaus, Ph.D., professor of physiology, University of Indiana: the development of certain fish eggs, after fertilization with spermatozoa from other species or genera. (*Salaried investigator.*)

R. C. Mullenix, Ph.D., professor of biology, Yankton College: the development of the neurofibrillæ in the eighth cranial nerve of *Fundulus heteroclitus.*

Raymond C. Osburn, Ph.D., instructor in zoology, Barnard College, Columbia University: a systematic study of the bryozoa of the Atlantic Coast. (*Salaried investigator.*)

George H. Parker, Ph.D., professor of zoology, Harvard University: (1) the sensory reactions of the dogfish; (2) tests of the hearing of various fishes. (*Salaried investigator.*)

Fernandus Payne, graduate student, Columbia University: studies of chromosomes.

Henry F. Perkins, Ph.D., assistant professor of zoology, University of Vermont, spent a few days in quest of early stages of *Gonionemus.*

Alice Robertson, Ph.D., instructor in zoology, Wellesley College: identification and classification of bryozoa collected by the steamer *Albatross,* in the northwest Pacific in 1906.

A. P. Romine, instructor in biology, State Normal School, Bellingham, Wash.: a study of local crabs.

George G. Scott, A.M., instructor in the College of the City of New York: changes in the specific gravity of the blood of fishes, resulting from changes in the density of the water. (*Scientific assistant.*)

R. W. Sharpe, M.Sc., instructor in biology, DeWitt Clinton High School, New York City: systematic studies of marine entomostraca.

Ralph E. Sheldon, Ph.D., assistant in anatomy, Chicago University: the reactions of fishes to chemical stimuli. (*Scientific assistant.*)

Bertram G. Smith, instructor in zoology, Syracuse University: the embryology of *Cryptobranchus.*

Francis B. Sumner, Ph.D., director of the laboratory: (1) report upon the biological survey; (2) studies of the ecology of the native periwinkle, *Litorina palliata* (with Jas. W. Underwood).

[3] Now instructor in the Woman's College of Baltimore.

James W. Underwood, teacher of biology, high school, Negaunee, Mich.: color variation and other features of the natural history of *Litorina palliata*. (*Scientific assistant.*)

Donald D. Van Slyke, Ph.D., assistant in Rockefeller Institute for Medical Research: the action of enzymes.

Edward M. Weyer, Ph.D., professor of philosophy, Washington and Jefferson College: the behavior of the remora.

The facilities of the laboratory have likewise been utilized to a considerable extent during the months not comprised in the regular summer session. Dr. B. M. Davis and Mr. George T. Hargitt occupied tables during the spring of 1908, and Dr. Davis has enjoyed the privileges of the laboratory throughout the entire winter of 1908–9. For the past three years the director has resided almost continuously at Woods Hole, occupied primarily with the report upon the biological survey. In the compilation of this report he has been assisted, first by Mr. J. W. Underwood and later by Miss E. M. Chapman. From time to time requests have been received from investigators at various institutions for materials for embryological or other studies, or specimens of marine plants and animals. Some of these persons have come to Woods Hole for this purpose. While it is far from the policy of the bureau to operate a supply department for the free distribution of marine specimens, such requests for materials have in special cases been granted. In general it may be said that the demand for a marine laboratory which shall be operated continuously throughout the entire year is increasing, and it is the frequently expressed hope of many persons that the Bureau of Fisheries will in time be able to make provision for the maintenance of such a station at Woods Hole.

During a portion of the coming season the director will be relieved of all administrative duties in connection with the laboratory, in order that he may complete several pieces of unfinished work. During this period, Dr. Raymond C. Osburn, of Columbia University, will serve as acting director.

It is requested that applications for laboratory tables shall be submitted at the earliest possible date.

FRANCIS B. SUMNER

WOODS HOLE, MASS.,
April 30, 1909

THE PLANS AND WORK OF THE GEORGE WASHINGTON UNIVERSITY

THE discussions in the public press seem to call for an authoritative statement of the educational work and condition of the University.

1. Prior to 1902, when the present administration assumed charge, there was a day college, with less than a hundred students, and a faculty of eleven professors and teachers. There was also the Corcoran Scientific School, doing undergraduate work in the evening, which was conducted by the professors of the day college. These professors received salaries in the day college ranging from one thousand to eighteen hundred dollars a year, and seventy-five per cent. of the students' fees for the evening work. This arrangement was made between the faculty and the university to prevent any liability on the part of the university for the expenses of the evening college. In this college there was some work given in engineering and architecture. The Law School was conducted by lawyers in practise and judges in service, no one giving his entire time and attention to its management or to teaching. The Medical School was conducted in the same way, by practising physicians, there being no professional teachers employed giving their whole time to the educational work.

2. The first change adopted under the present administration was to discontinue the Corcoran Scientific School, merge it with Columbian College, and require all class-room