

BIOLOGICAL WORK.

The occurrence of whale-feed which is a pelagic stage in the life-history of the bottom-living crustacean *Munida gregaria*, is a matter for regular record, as it is for several months of the year the most abundant fish- and bird-food material found in these waters. This last season Mr. Adams reports that whale-feed were absent from the surface of the sea during the early part of the year (i.e., April) till early in November, when small specimens were seen in surface shoals. Yet in May they were found in the stomachs of red cod and of flat fishes taken outside the harbour. These were probably ground forms or specimens about to change from the pelagic to the ground form. In former years he has noted that they occurred in the harbour in immense shoals, but that for the past six years they have only been seen in greatly reduced numbers, and have remained in the harbour for only limited periods. These observations agree with my own, which extend for over thirty years. The life-history of this species wants working out with careful observation. As far back as September, 1898, immense numbers of the adult bottom-living form—a stout thick-set crustacean 3-4 in. long—appeared in immense numbers in the Upper Harbour, creeping over the stones and under the jetties. In the January following both the adult and the free-swimming forms were found in the stomachs of ling which were caught outside Otago Heads. In September, 1908, Mr. Anderton obtained newly hatched larvæ, but, curiously enough, at the same time met with free-swimming forms carrying ova, a condition also recorded by the late Dr. Chilton. In previous years I have notes of vast shoals both inside and outside the harbour from January to May, but especially in the month of February and March. In some seasons not only every fish taken was found to contain them, but the gulls and terns were gorged with them. Anderton's records, to be found in the Bulletin of the Hatchery (pages 104-5) require to be followed up with care.

The launch was out of commission during the months of July and August, and consequently the usual collection and examination of flat fish during the spawning season could not be carried out. But Mr. Adams was in touch with the local fishermen, who informed him that flat fish were far from plentiful during the whole period. By the end of August nearly all flat fish taken were found to have spawned. As spring advanced the supply of fish remained limited. While fishermen at the Nuggets were securing good hauls of trawl fish the area within ten miles of Otago Heads was but poorly supplied.

"In 16 fathoms common soles (*Peltorhamphus novae-zealandiae*) and lemon soles (*Pelotretis flavilatus*) were mostly taken in small numbers, but close inshore and near the harbour entrance sand flounders (*Rhombosolea plebeia*) of a small size were practically the only flat fish caught. The bottom on which the trawl worked appeared to be clean of the small crabs, worms, and brittle stars on which the fish principally feed. The past winter was a somewhat severe one." Mr. Adams reports that "early in June the temperature of the supply-water was down to 4° C., and on the 30th it was necessary to start the heater. As is usual a number of blue cod in one of the outside ponds died as a result of the low temperature. A few moki in the same pond were not affected, and throughout the coldest months were taking a small amount of food. Nor were they as sluggish as a number of kelp-fish in the aquarium tanks, where the water was seldom below 6° C.

"The set-net has been put down at regular intervals. The greater part of the fish caught were used as food for the lobsters and the fish in the tanks. A number of fish was sent to Dr. Benham and to the medical school, and several dozen dog-fish were preserved. Dredging was carried on both within and outside the harbour."

Since Mr. Young's appointment to a position in the Fisheries Department, the station has been without the services of a specialist to undertake the biological work. In November of last year the Board appointed Mr. David H. Graham to the position, and that gentleman entered on his duties on 1st January, 1930. Mr. Graham has been employed by the Mosquito Research Committee in Auckland for the past two or three years, and has done excellent work there, and shown himself a keen and observant naturalist. In making this appointment the Board stressed the importance of developing the economic side of the work, and particularly of following out, as far as possible, the life-histories of the more important food fishes which occur on the east coast of Otago—viz., the groper (hapuka), red cod, kelp-fish (or greenbone), and moki. Some research has already been done on the development of the blue cod and flat fishes—viz., brill, sand-flounder, greenback flounder, common sole, and lemon sole. The date and location of their spawning, the size and number of their eggs, &c., were worked out by the late Mr. T. Anderton.

Mr. Graham has already commenced to make a reference collection of the local marine fauna, a very useful piece of work, which will only be limited by the accommodation and resources of the station. He has only been at work for three months, but he is most enthusiastic in regard to it and its possibilities, and is inspiring enthusiasm in others. While making himself acquainted with the marine fauna of this region, he is collecting very extensively, and watching in the observation-tanks a great assortment of marine organisms, and is making the station known to numerous visitors by his discourses and explanations on the life of the sea. Many crustacea are being hatched and their development followed out, and he is examining the egg-cases and spawn of mollusca, especially Nudi-branches, which occur in this neighbourhood. In all this work he is able to count on the practical assistance of Professors Benham and Malcolm, of Otago University, and of Drs. Hercus and Watt, of the Medical School, all of whom are interested in problems of marine zoology, and have been associated with the biological work of the station for some years past.

Mud oysters (*Ostrea angasii*) are known to occur outside the harbour, and are frequently taken in the dredge. Mr. Graham will undertake a systematic survey of the area as soon as possible in order to discover whether the beds are of sufficient extent to be of economic value.