

on the brain—on the 4th November, at the comparatively early age of forty-three years. His loss was irreparable. He was a man of unique accomplishment, developing his strong scientific bias somewhat late in life. He could turn his hand to almost any kind of work, and whatever he bent his energies to he carried out if it were possible to accomplish. He was conscientious and accurate, as a truly scientific man must always be, full of ingenuity, and careful of the smallest details. At the same time he had a vision of the great possibilities of the work he was so much interested in, and had a very well-balanced judgment.

The Board was faced with the appointment of a successor, and decided to offer the position to Mr. Wallace Adams, who had acted as assistant for some years and who possessed the confidence of the members. Mr. Adams took up his duties in full, though he had been in active charge for over three months, in January, 1917. At the same time Mr. Sydney Broadley was appointed assistant curator. Mr. Broadley is one of the most skilful fishermen in Otago; he knows the local conditions very thoroughly, and his skill and knowledge are of great assistance in the practical working of the station. Mr. Adams having resigned his position as Inspector of Fisheries for Otago, Mr. Broadley was appointed to the vacancy in May, 1917. It materially assists the station that one of its staff should have this official position, as it keeps it in touch with the fishermen on the coast, with whom the relations of the Board have always been of the pleasantest and most helpful.

At the time of issue of the last report the Board had disposed of its old launch the "Rautaiia," and had got a new one built by Messrs. Miller Bros., of Port Chalmers. This is an eminently satisfactory boat, and it is now completely fitted with trawl-nets, dredges, tow-nets, and other collecting-apparatus. She is a good sea-boat, and runs well both on her engines and under sail. The Board has named her the "Karoro," the native name of the black-backed gull.

During 1916 the Board resolved to instal a small windmill and pump to relieve the constant use of the oil-engine and pump formerly used to keep the large store-tank full of sea-water. One was procured from Messrs. A. and T. Burt, and its erection was completed on the 8th November of that year. This windmill has completely justified its existence, and has already saved its own cost in the greatly reduced consumption of oil. Whole weeks pass in which it is not necessary to use the oil-pump at all.

#### *Collection of Marine Fish-eggs.*

During the spawning season of the flat fishes, July and August of each year, a considerable number of sole and brill eggs have been collected and hatched out. About three million larvæ have been liberated each winter, but no attempt has been made to work out the development of these.

#### *Turbot.*

It will be remembered that in May, 1916, Mr. Anderton liberated 128 of these fish off Tautuku Bay. In September, 1917, Mr. Adams took down forty-two more—large fish—ranging from 15 in. to 22 in. in length, and liberated them at the same spot. The conditions were very different, for the first lot were set free on a still moonlight night, with the water smooth and clear, while the second lot were liberated with a south-easterly gale blowing, but all were let go without any loss or injury. The Board is indebted to the owners, captain, and crew of the "Kotare" for the assistance so willingly and readily given to facilitate this piece of work.

The number of turbot left in the pond (tank) is now sixteen; none have been lost during the last year. In the preceding five years only nine fish out of 195 landed here have been lost, of which three were turned out because they showed signs of not being well, one jumped out of the tank, and five have died. We feel sure that no other hatchery or aquarium station can show a better record, testifying as it does to the scrupulous care taken in their management.

In January, 1917, the largest fish measured 21 in. long. A 19 in. fish weighed a little over 6 lb. In March, 1918, the largest measured 22 in. long by 16 in. broad. On the 31st March of this year there is hardly any appreciable increase in size. Mr. Adams reports: "The rate of growth has not been so rapid as that of former years. The largest fish have become broader and thicker but have not increased in length. The smaller turbot are still increasing in length and breadth; the rate of growth is, however, slow. In noting the growth of flounders we have found that the rate averages  $\frac{3}{8}$  in. per month until the fish measures 11 in. to 12 in., and from then on the rate is not more than an inch in twelve months. Our experience with the turbot is the same as that of the flounders when kept in close confinement."

In this connection I have tried to obtain information as to the growth of pond-bred salmon (*Salmo salar*) in the ponds of the Otago Acclimatization Society at Clinton, to see if confinement retarded the growth. There is no doubt that it did so, though unfortunately no exact record has been kept. In 1889 there were 116 four-year-old salmon in the ponds (reared from imported ova), and were kept in confinement till 1895 as breeding-fish. At that date the last of them were liberated into the Waiwera, as they had become badly infested with fungus. These fish commenced to spawn at four years old. In 1892 the annual report stated that "the fish continue healthy in their confinement, although they do not grow to a large size." As a matter of fact I do not think they ever grew beyond 10 lb. in weight, while brown trout in the streams in the vicinity were found 18 lb. in weight. There seems no doubt that confinement in a limited space checks the full growth of all fishes.

The turbot have never shown any signs of spawning, although fish taken in the sea in Britain commence to spawn when 13 in. to 14 in. long. The shallowness of the water may also have to do with the spawning, as there is reason to believe that our spawning flat fish do not come into shallow water when spawning. It is not a question of temperature, for the water in our tanks has not been allowed to fall below 44° F. at any time in the last three years.