

The representatives of the genus in Britain are the *vandace* of Loch Mabin and Lake Windermere, the *powan* of Loch Lomond, the *pollan* of the Irish lakes, and the *gwyniad* of certain lakes in Wales.

In America there are several species, some of which ascend rivers from the sea, while others, of which *Coregonus albus* is one, are chiefly confined to lakes. The American Commissioners express the opinion that few fish will better repay efforts for their multiplication than this white-fish, and large sums are being spent in the propagation and introduction of this species to the various northern and winter stations, where they are not found naturally.

The excellence of the white-fish as an article of food is described by all travellers in the northern regions of America, where it forms the staple diet of the Indians and trappers during a large part of the year. It is a plump-bodied fish, free from small bones, with firm delicately-flavoured flesh in large white flakes. It is highly nutritious, but at the same time free from the rich oil which renders the salmon so cloying to the appetite when constantly used as food.

The size of the full-grown fish is pretty uniform if caught in the same locality; but in some places they reach a weight of 20 lbs. and even 40 lbs., while in others the average is about 2 lbs. weight, the difference being no doubt due to the paucity or abundance of their favourite food, which consists of small crustaceans and shell-fish. They grow rapidly, the weight increasing about $\frac{1}{2}$ lb. for each year's growth, the fish of the first season, or about eighteen months old, generally weighing $1\frac{1}{2}$ lbs. They are very fertile, the number of eggs deposited by the female being about 10,000 for every pound-weight of fish. They have the great advantage of being in season and procurable at all times of the year, although they have regular migrations from the shallow to the deeper waters of the lakes, and to the shoals at the outlets of the lakes for the purpose of spawning. This takes place in the month of November, or just before the winter sets in. At this time the temperature of the surface water is about 43° in the larger lakes. When owing to the shallowness of the water in which the ova are deposited the temperature falls to 34° to 35° during winter, they do not hatch out until April, but the usual period is 100 days between the spawning of the ova and the emergence of the young fish.

In the case of the ova recently imported, the period seems to have been under eighty days, as they were spawned about 15th November, and the young fish hatched out in Christchurch on the 3rd February, which goes to prove that the low temperature in their native waters only retards the development of the ova, and that it is not essential that they should remain dormant for so lengthened a period. This is a very important question as affecting the propagation of this fish in New Zealand, as, if the continued low temperature of the great lakes of North America is essential, there is no lake in New Zealand where there is a chance of this fish being successfully reared. But if the absence of the extreme cold will only lead to a more rapid development of the embryo, there is no reason to doubt that some at least of the larger and deeper lakes, such as Wakatipu and Wanaka, and especially Te Anau, will prove suitable. The waters of Lake Erie attain a surface temperature in summer of 75°, at which season the white-fish return to the cool deep waters; but in other lakes, which are deeper and without undercurrents, at that season the white-fish run to the shores, and especially to the entrance of rapid rivers or a broken rocky coast, where the splash of the waves favours more thorough aeration of the water.

The surface water of the above-mentioned New Zealand lakes has rarely a higher temperature in summer than 52°. On the 6th instant Mr. Worthington ascertained the temperature of the embayed surface water at Queenstown, Lake Wakatipu, to be 53° at sunrise and 55° at 2 p.m. In winter I found the surface temperature at the same place to be about 46°, and, although we have no information on this point, it is probable that much colder water is to be found at all seasons in the profound depths of this and all the great lakes of the South, so that, as far as mere temperature is concerned, the white-fish would feel at home, provided the winter temperature on the gravelly banks where the rivers enter the lakes is sufficiently low for the proper development of the ova.

It is very desirable, however, that the experiment should be tried under the most promising conditions.

The first shipment having been hatched out at Christchurch, I recommend that the whole of the young fish obtained should be placed in Lake Coleridge as soon as they can be removed, and that the shipment expected by next mail steamer should be forwarded, with a sufficient quantity of ice, to the Makarewa Ponds to be hatched, and the young fish transferred to the Te Anau and Wakatipu Lakes. As the shipment will, no doubt, arrive, like the last, in one parcel, and the chance of success in the South is so much greater provided there is a sufficient supply of ice available, I cannot recommend that this second consignment of ova should be intrusted to the Auckland Acclimatization Society.

Their application is for the purpose of stocking Taupo Lake, but I find that the water at the outlet of Taupo Lake only varies from 54° in winter to 63° in summer, which differs so materially from the conditions that control the natural distribution of the fish, that there would be very small chance of their thriving.

The chief difficulty in propagating the white-fish arises from the circumstance that the ova are coated with an adhesive mucus, that renders their manipulation more difficult than in the case of the salmon ova. The young fish are also more difficult to rear, and it has never been successfully done yet except by turning them adrift in suitable water at a very early age to shift for themselves, as their food consists of minute infusoria, or similar diet, that cannot be artificially imitated. The minced meat on which the young salmon thrive so well will not answer for the white-fish, according to the evidence quoted by the American Commissioners.

JAMES HECTOR.

No. 19.

Dr. HECTOR to the Hon. SPENCER F. BAIRD.

Colonial Museum, Wellington, New Zealand,
9th February, 1877.

DEAR PROFESSOR BAIRD,—

You will be glad to hear of the safe arrival of the first case of white-fish ova, though I fear the experiment in this instance will only be a partial success. This is owing to the new arrangements