

Dr. Gray's advice, however, on another point is well worth consideration. As the result of long attention to the subject, he is of opinion that New Zealand is in every way better adapted to the introduction of salmon than any part of Australia. The existence of snow rivers in the South Island he deems of the very first importance, and he wishes particularly to direct Dr. Hector's attention to the desirability, if possible, of transporting the ova to a subalpine region, so that the salmon, immediately on being hatched, may be placed in the cold back waters with gravelly bottoms, in places where there is little or no strength of current. The young fish will instinctively keep within such a ground, and feed there till they are robust enough to take to the open current of the stream.

In connection with a remark in Dr. Hector's memorandum of 29th February, to the effect that the handling of the young salmon might perhaps jeopardize the whole experiment, I may state, on the authority of Mr. Buckland (who speaks from his actual experience), that the young salmon is quite as hardy as the common trout, and may be handled with impunity. No fear of damage need be apprehended, provided there is no rough usage of the young fish, nor too long an exposure out of water.

5. Finally, I have consulted Dr. Hooker, who takes an active interest in everything relating to New Zealand, and is ever ready to give his assistance. He is of opinion that the further north the point of departure the better our chance of success. On this account, he would give the Clyde the preference over London as a port of shipment, inasmuch as the ova would then be taken, and the packing operations conducted, in a much cooler atmosphere than in any of the London docks.

I called on Mr. Francis Francis (of the *Field* Office), who is known to take considerable interest in the hatching and rearing of salmon, and I have arranged to see Mr. Gould, another reputed authority, but both of these gentlemen are at present out of town.

Before the next mail leaves, I hope to lay further information on the subject before the Agent-General. In the meantime nothing can be done beyond consulting all who have had any experience bearing on the question, and making the necessary arrangements in anticipation of the salmon-breeding season, six months hence.

W. BULLER.

No. 25.

Dr. J. E. GRAY, F.R.S., to Dr. HECTOR.

SIR,—

British Museum, 21st June, 1872.

I had some conversation with Mr. Buller, by which I hear you have thoughts of trying to introduce salmon in New Zealand. My advice to you is, to take warning and avoid doing all that Australia has done in this business, which has been an utter failure, and very expensive. Here our attempts to breed salmon and other fresh-water fish, have not been conducted as wisely as they might have been. I first brought before the Zoological Society the successful way in which Dr. Davy (Sir Humphry's brother) had sent trout and other *Salmonidæ* from Cumberland to Devonshire, and my belief that the eggs of fish might be carried in the same way, more especially as I had observed that the eggs of fresh-water fish and frogs were retarded and yet kept alive when they were in places that were frozen; but the Australians who attended the meeting laughed at me, and attempted to ridicule the idea. I only asked that the system should be tried, and I believe that the only case where it was fairly tested was the only one where the eggs arrived alive; that is to say, a small box of eggs that was put in the icehouse and forgotten by the Commissioners, and found when the icehouse was cleared out to be refilled on the ship's return. The other box which they took out in ice they opened—as a child does a seed, to see if it has grown—while on the road; the eggs hatched and the young fish soon died. I have more trust in individual skill than in large works conducted by Commissioners; there were no Commissioners when the monks introduced various fresh-water fish into England.

I should recommend that a number of small boxes of eggs be enclosed in one larger box; that these should be kept in the icehouse till the ship reached the port; that a large quantity of ice in a conveyance should be ready to carry the boxes of eggs to the upper part of some of the subalpine rivers, and the boxes and contents be at once transferred and deposited in some streamlet, and the fish allowed, when they get strength, to find their way into the larger streams and rivers. By all means follow nature as much as you can, and avoid breeding-ponds. It is very well for people who want to make a show of it and interest the legislators who have the funds at their disposal, but fish, when they want to breed, know better. They deposit their eggs where they are out of sight, not liable to the interference of man or animal, and where the fish gradually get into larger streams as they become strong enough to compete with their enemies. Their food is also more abundant and more easily obtained in these small out-of-the-way streams. I must remain very incredulous of the success of past experiments, though it might be very dangerous to say so in Australia, or even before some of the gentlemen who have handled so much money in attempting to introduce salmon into Australia, until I have heard of people having eaten some of the fish, or seen them in the market! In New Zealand, where you have such magnificent rivers and snowy mountains, you are more likely to be able to breed salmon, and even Van Diemen's Land has much better rivers for the purpose than Australia; but the Van-Diemen's-Landers seem to have suffered in the same way as the Australians. They had breeding-ponds, put their fish near the large rivers, so that the young fish were too soon in the mouths of the rivers and sea, and became the prey of numerous predacious fishes which infest that coast.

Dr. Hector, F.R.S.

Ever yours sincerely,
JOHN EDW. GRAY.