FURTHER NOTES ON THE SALMON EXPERIMENT.

By Morton Allport, F.L.S., F.Z.S., &c.

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Since our last meeting, namely, on 19th October last, the handsome fish, now exhibited, was taken by a seine net in lower Sandy Bay. This specimen, though rather larger, is in every minute particular identical with that sent to Dr. Günther early in 1870, and by him pronounced to present all the characters by which the true salmon (*Salmo salar*) is distinguishable from its nearest allies. Of course all the arguments used to prove that the fish of 1870 was bred in the colony, and could not have been the produce of an English egg, apply with much more force to the present specimen.

When this fish was first brought to me I supposed it to be an unusually large smolt of this season, but upon consideration and after dissection, I am inclined to believe that it is one of last year's smolts, which would in December next have returned as a grilse to the upper waters of the Derwent. The size of the fish, which weighs nearly a pound, is greater than that of any smolt just from fresh water of which I can find any record, and upon dissection the deep red colour of the flesh and the layers of fat about the pyloric cœca were indicative of a longer residence in salt water than would have been possible for a smolt of this season. Unmistakable evidence of its having been captured low down the estuary of the Derwent was afforded by the presence in the stomach of the remains of three anchovies, which fish are not to be found in the bays above the town till later in the season. If I am right in my conjecture that this is one of last season's smolts, approaching grilsehood, it is almost certain that the migration of the smolts during the first season does not extend to any great distance seaward, unless some untoward circumstance, such as a failure in the supply of food, may cause them to move to more remote waters.

On the 28th October last, a school of twenty-five fish made their way out of the River Plenty into the race which supplies the breeding ponds, and of these fish one was at once forwarded to me by Sir Robert Officer, who, struck with its brilliant silvery colour, and bearing in mind that the fish were clearly gregarious, and were taking advantage of a spring fresh to travel from the Plenty to the Derwent, and from thence probably to the salt water, came to the very natural conclusion that it was a salmon smolt, but from which conclusion, I regret to say, I differ. The remainder of the twenty-five fish were detained in one of the breeding rills at the

Plenty for several days, during which they exhibited the migratory instinct very strongly, and several died. After carefully examining the survivors, my fellow-commissioner (Mr. Robert Read) and myself, let the school follow their own instincts, and proceed down the River Plenty. Three of the specimens which died are now in the Museum, and two of these I have carefully dissected. Before giving the results of these dissections, I desire to remind the Fellows of the Society that within a week of this same date last year a school of fish were observed in a millrace running from the Bagdad rivulet, that one of those fish (now in the Museum) was sent to me for determination, and that I then expressed my belief that it was an immature specimen of the large silvery variety of the brown trout (*Salmo fario*) which are now numerous in the brackish water of the Upper Derwent. Mr. John Buckland, who assisted me in the examination, concurred in this view as to the species of the Bagdad fish.

Upon placing the Bagdad and Plenty fish side by side, it will be evident to the most casual observer that they are identical in species, and the dissections confirm me in my belief that both schools are the progeny of the silvery variety of *Salmo fario*. One marked peculiarity of the smolts of the true salmon (*Salmo salar*), and of the salmon trout (*Salmo trutta*), is the deciduousness of the silvery scales, for some time after they are first assumed the slightest touch removes them, and when the fish are handled the fingers get silvered over with the brilliant scales, but the Bagdad and Plenty fish bore considerable rubbing without losing their bright covering. Again, the smolts of the true sea-going species, even for some time after they reach the sea, show the original parr markings distinctly whenever the scales are removed, but on removing the scales of one of these fish no trace of parr markings could be found. In one of the tests given by Dr. Günther, as most constant, namely, the number of scales between the last dorsal fin, and the lateral line, the Bagdad and Plenty fish all failed, the numbers in every instance being those of the brown trout, while the smolts from the lower Derwent have always exhibited the number typical of the true salmon. In one of the Plenty specimens the spawn was found more developed than it is usually seen in the smolt of the true salmon before it has reached the sea.

The result of counting the pyloric cœca has been to shake my belief in the value of that test for specific distinction. In the Bagdad fish the number was rather more than the average given by Dr. Günther for the brown trout (*Salmo fario*). In one of the Plenty fish the number was more than the maximum for brown trout, and above the average for salmon

trout, while in the other Plenty fish dissected, the number fell below the average for brown trout, and was under the maximum for true salmon.

The twenty-five fish from the Plenty differed somewhat in size, though not more than salmon smolts under the same circumstances, but one noticeable feature was that the smallest were the most salmon like, the larger and more developed fish evidently approaching the more trout like aspect of the parents and this is exactly in accordance with Dr. Günther's observation, when speaking of the whole genus salmo, " that specimens which have not attained to maturity retain a brighter silvery colour, being more similar to the female fish."

Nothing to be found in the various works on the subject would lead anyone to suppose that the brown trout (*Salmo fario*) ever exhibited a true migratory instinct, though Dr. Günther expressly says that brackish water has the effect of giving them a bright silvery coat without, or with comparatively few, spots, none of which are ocellated. Yet these fish do exhibit a migratory instinct, although the original parent fish were detained in the ponds, and debarred from following such instinct.