

## REPORT ON THE PRESENT STATE OF THE FRY OF THE SALMON AND SALMON TROUT AT THE PLENTY; AND OF THE TAKING OF THE FIRST SPAWN FROM THE BROWN TROUT.

I HAVE now to report that the hatching of the last batch of ova is complete, and that the young fish are progressing most favorably. Mr. Ramsbottom counted those which hatched from the salmon ova up to 5,000, and estimates the remainder at about 1,000, making 6,000 in all. The salmon trout safely hatched he estimates at about 1,000.

And I have further to report that spawn has been successfully taken from one of the common or brown trout, and is now deposited in a separate box prepared for its reception; in addition to the one trout that has spawned, several more have been examined, in which the ova are rapidly approaching maturity, and from which the spawn will probably be taken during this month.

An anonymous writer in the *Australasian*, of the 23rd June last, expresses great dissatisfaction at the discrepancy between the first estimates of the number of healthy ova and the subsequent numbers of fry actually counted, but a large number of Australian colonists are unable to appreciate the difficulties to be overcome, from their total ignorance of the subject, and it is quite possible that this writer may be included amongst that number.

There are two principal causes for the discrepancy complained of:—In artificial fish-breeding in Europe it has been invariably observed that the most critical time in the life of the young fish is when it is just at the point of hatching out; large numbers often die immediately before and at the time of the bursting of the egg. If this is the case when the ova have been carefully treated, and where every appliance is at hand to render the process of hatching as natural as possible, how much more certain is it that we must at the same critical period lose a far larger percentage here after the ova have been subjected to the unnatural packing in boxes, and to the tossing about of a sea voyage for more than one hundred days.

To explain the second cause of discrepancy I must call your attention for one moment to the wonderful process by which the ova in a state of nature are fecundated. When the ova are ripe for extrusion from the female fish and the milt from the male, the eggs are poured out in a continuous stream by the one, the milt by the other, the two streams mingling. The

microscope has revealed the fact that for some short period (probably not more than a minute) after the extrusion of each ovum from the female, there is a free communication from the surrounding fluid, through one or more minute apertures in the horny covering of the egg, to the germ in its interior. The milt consists of myriads of wriggling spermatozoa, animalcules so minute as to require a microscope of very high power to distinguish them; during the short period that the communication through the ovum of which I have spoken lasts, if one of these myriads of spermatozoa finds its way into the interior of the ovum the communication with the outer fluid at once ceases, the ovum is fecundated and the growth of the embryo commences. If, on the other hand, the ovum passes through the period during which the communication with the surrounding fluid lasts without coming in contact with any of the spermatozoa the egg can never be fecundated, and can never produce a fish, but remains for a great length of time beautifully translucent, and apparently healthy. In a state of nature large numbers of these unfecundated eggs are often found, and it is but reasonable to suppose, therefore, that in the natural deposition of spawn, many eggs escape contact with the milt or germinating fluid.

In the process of artificial fecundation the eggs and milt are expressed into a vessel of water, mingled for a few seconds, and then the surrounding fluid containing the excess of milt is washed off. Of course, there is but little fear in this case of any of the eggs escaping contact with the spermatozoa, and, in fact, in the hands of *skilled* manipulators, few eggs fail. Occasionally, however, a whole batch fails, thus, amongst our first successful shipment, no less than from 15,000 to 16,000 eggs, at first apparently the most healthy of all, had never been fecundated, and were of course useless. In this shipment about 10,000 must be placed in the same category. The eggs of the female and the milt of the male may each be expressed by a slight extra force, though not quite ready for natural extrusion, and in either case (both of which are likely to happen in comparatively inexperienced hands) I have no doubt every egg would fail. Another cause of failure might be the leaving the eggs a few moments too long before the admixture of the milt; many other causes may operate towards the same end of which, in our present state of knowledge, we are entirely ignorant, but I think I have said enough to convince you that so far from the discrepancy referred to being surprising, the wonder is that so large a number of fry may be looked upon as comparatively out of danger.

We must first reduce the rough estimate of 45,000 eggs (which I still believe was under the true number) by 10,000

for unfecundated eggs, and then the ultimate loss by all causes, from the deposition in the ponds to this time, will be rather more than 80 per cent., that is to say that nearly one-fifth part of the ova deposited (excluding unfecundated eggs) have been safely hatched out.

And here I should have concluded my report if the anonymous letter referred to had not been followed in the *Australasian* of the 30th June last by an editorial article, the writer of which suggests that the Council of the Victorian Acclimatisation Society should insist upon knowing who is really responsible for the absurd exaggerations which were put forward on this subject when the ova first arrived in Tasmania. And he finishes the article by a statement that the public are naturally and justifiably disgusted at the lame and impotent conclusion actually attained.

It is perhaps impossible for the editor of a large newspaper to read and consider everything inserted in it, and this may account for my finding in the *Australasian* of the 23rd June (the week before the editorial article made its appearance) an excellent paper on fish breeding establishments, extracted from the *Intellectual Observer*, which must have escaped the notice of the editor. In that paper the following apt paragraph occurs in reference to the establishment at Huningen, which establishment, be it remembered, is held up as a bright example to all the world:—

“They reckon that out of the fructified roe at least 15 per cent. is utterly worthless, but of that which comes well to hand 25 to 30 per cent. of fresh young fish can be calculated on.”

With that paragraph before him—if he ever read it—I wonder it never occurred to the writer of the editorial article that the statements as to the numbers of our apparently healthy ova might possibly have been made simply because they were true. If we analyse the last-mentioned figures for one moment what do we find? That out of the ova deposited excluding unfecundated or worthless eggs, they lose at Huningen from 70 to 75 per cent., our loss being slightly over 80 per cent.; in other words, they, with all their advantages, hatch out rather more than one-fourth, while we, with all our disadvantages, have safely hatched out nearly one-fifth. A marvellous discrepancy truly, but all in our favor, and one which must convince every thinking man that our estimate must have been under, rather than over, the actual number.

When our brown trout ova were hatched two years ago, the Commissioners estimated their number at 120. Months afterwards when they were removed and counted, the number proved to be 280, some were liberated, and from one we have

taken, and from others we soon shall take, a fresh supply of ova. About eight years ago fourteen tench arrived here from England, their progeny are now breeding in some dozens of pools, rivers, and lakes in Tasmania besides numbers having been sent to Melbourne, Ballarat, Sydney, and New Zealand. About four years ago 13 English perch arrived here (after many attempts to introduce them had failed), and they are now so numerous that their increase will be distributed in vast numbers throughout suitable waters in this colony and in Victoria during the coming summer. In the face of these facts can any man justly speak of the result of the present experiment as a lame and impotent conclusion?

I feel it due to Mr. Ramsbottom to mention one most significant fact which speaks volumes for the care and attention bestowed upon the young fish. When the last of the parr were removed from the large pond to the new ripples below it, a small deformed fish which had been from the time of hatching so doubled up as to be unable to swim, except in small circles, was found apparently in good health and considerably grown; if straightened this fish would measure about five inches in length, in a state of nature it would have been eaten by some water beast long ago, and even in our ponds without great care and an ample supply of food it must have come to grief.

In conclusion I beg to exhibit for the inspection of the Fellows some of the unfecundated eggs saved after each experiment.



1866. "Report on the present state of the Fry of the Salmon and Salmon Trout at the Plenty; and of the taking of the first Spawn from the Brown Trout." *Papers and proceedings of the Royal Society of Tasmania* 61–64.

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