

ACCOUNT OF THE RECENT SUCCESSFUL INTRODUCTION OF
THE SALMON OVA TO TASMANIA.

[Read by Mr. M. Allport, on the 10th May, 1864.]

At the request of Mr. William Ramsbottom, I have now the pleasure of giving to the Fellows of the Royal Society, a detailed account of the recent successful introduction of salmon ova to our waters, but before doing so, I wish to call attention to the fact that the Council and Fellows of this Society were the first to recognise the vast importance of this undertaking to the best interests of Tasmania, and to take practical measures to ensure its success.

In the year 1858, this Society appointed a sub-committee to enquire into and report upon the subject. That report is to be found amongst the transactions of the Society for the same year, and I need not, therefore, further allude to it, but, to show the continued interest taken by the Fellows in this question, I would call to your recollection the reception accorded to Mr. Black, after the disastrous attempt made in the *S. Curling*, and to Mr. William Ramsbottom, on the arrival of the *Beautiful Star*, two years ago. Indeed, as early as the year 1857, Mr. Marwedel, a Fellow of this Society, forwarded to our then Secretary a letter, in which he referred to an interview with M. Coste, who has made many valuable contributions to the science of pisciculture, and who then suggested the packing of salmon ova in damp moss, but did not in any way refer to the use of ice; which, as will be presently seen, is essential to success. Again, the full particulars of Mr. Ramsbottom's first voyage were published by the aid of this Society, and those particulars now form a valuable portion of our records.

Upon referring to the account of that first voyage, I became convinced that any person might well amongst all the discomforts and disasters of a passage such as that made by the *Beautiful Star*, have given up all hope, and never have turned his attention to the little box, which was broken open, and pitching about loose in the ice-house on board that vessel. Not so Mr. Ramsbottom, however, for he carefully removed the broken lid and moss, and examined the ova, which, to his amazement, were still at the end of some 80 days, alive and well, and to this circumstance alone is to be attributed our present success.

Upon receiving Mr. Ramsbottom's first report, the present Commissioners, who were appointed several years ago by the then government, decided upon sending Mr. Ramsbottom to England expressly to try the experiment of packing ova in ice, with a view to retarding their development, and this experiment was accordingly tried in London, under the direction of Mr. Youl, during the winter of 1862 and 1863. The wonderful success of that trial, showing that ova may be hatched safely after being buried in ice 150 days, has been fully published to the world, but I have never yet seen a good explanation of why this was likely to prove successful. Even Mr. Frank Buckland, in his book on fish-hatching, speaks of freezing the ova, and thereby greatly misleads his readers. It was long ago shown that actually to freeze ova, was to kill them in a few days, or at most, weeks. The question then was, how could they be kept at an equable temperature, just above the freezing point? If a block of ice (the sensible temperature of which is 32° Fahrenheit) be immersed in water of a higher temperature, a portion of the ice will melt until the heat of the water falls to 32°, but no more of the ice will be afterwards melted until the temperature of the water is again raised. If the ice could cool the water below 32°, a portion of the water would be frozen, but to effect this a further portion of the ice must be melted, and water at 32° is not capable of melting ice. If vessels containing creams be immersed in ice for a month, no change would take place in their contents, but convert a portion of the surrounding ice to water by the admixture of any deliquescent salt, and the submerged creams are instantly frozen. Therefore, by this beautiful provision of nature any substance above the freezing point, buried in ice, can never fall to the freezing point till the ice next to it is converted to water, and so long as any ice remains, the buried substance will continue at a low temperature certainly, but above the freezing point, and to this principle we are indebted for our present success.

Now, to come to Mr. Ramsbottom's present voyage. After many interviews with the owners of various ships, Mr. Youl (to whom this colony is greatly indebted for his determined perseverance in this respect) received the munificent offer from Messrs. Money Wigram & Co. of 50 tons of room, gratis, in their clipper ship *Norfolk*, bound to Melbourne. An ice-house, capable of holding 30 tons, was built in a situation admirably chosen for the purpose, on the lowest deck amidships, and equi-distant from stem and stern; in the position

in which the motion of the vessel would be least felt. With much difficulty, and at the cost of great personal exertion on the part of all concerned, about 90,000 salmon ova, and about 1,500 trout ova were obtained, and safely packed in deal boxes, each a foot long, eight inches wide, and four inches deep. In some of the boxes, a layer of charcoal was first placed on the bottom, then a layer of moss damped in pure water, then ova were lightly placed on the moss, and the whole covered with another layer of damp moss—upon which the lid was screwed down. In the remaining boxes the charcoal was omitted, the packing otherwise being the same. Through the lid and bottom of each box several small holes were drilled, and all the ova were packed in 181 boxes. The boxes were next placed on the bottom of the ice-house, which was filled up with blocks of Wenham-lake ice, and the whole securely closed. All being complete, the vessel sailed from London towards the end of January last and left Falmouth on the 28th of that month. For some time before his arrival at Melbourne, Mr. Ramsbottom naturally felt very anxious as to the condition of his precious freight, or, as he expressed it, every time the vessel bumped against a sea he mentally ejaculated, "There goes another thousand of them!" On the 15th of April, the Norfolk arrived in Melbourne. On the next day, the ice-house was opened, and the small boxes unpacked. The lid of one box was then removed by Mr. Ramsbottom, with fear and trembling, but, to his great satisfaction, a large number of the embedded ova were found to be alive. Eleven of the small boxes were then left in Melbourne, and the remaining 170 were placed on board H. M. C. S. "Victoria," in large open packing cases, with holes drilled in the bottoms. Broken ice was spread on the tops of the small boxes in each packing case, larger ice was piled on the cases, and the whole were then covered with bags of sawdust and blankets. About half the ice had melted during the voyage. Mr. Ramsbottom speaks in very high terms of the prompt and efficient assistance afforded him by Captain Tonkin and the officers and men of the "Norfolk," to whom Tasmania therefore owes a large debt of gratitude. Captain Norman and the officers and men of the "Victoria" also evinced the most lively interest in all the proceedings, and seconded all Mr. Ramsbottom's efforts for the speedy transport of the ova to the Derwent in a manner beyond all praise. On the 17th April the "Victoria" left Melbourne and arrived at Hobart Town on the 20th. The packing cases and ice (of which latter there still remained more than ten tons) were then carefully placed on a barge, packed as before, and were towed to New Norfolk by the steamer "Emu" which was detained until a late hour on the night of the 20th for the purpose. From New Norfolk the barge was towed by boats to the Falls on the morning of the 21st, and the packing cases were then landed and slung on stout poles and carried by hand to the ponds already prepared at the River Plenty. The remaining ice was transferred to the ponds in carts, the contents of each being well covered with straw. The first batch of cases arrived at the ponds about the middle of the day on Thursday the 21st April last, 90 days after the placing of the ova on board the "Norfolk."

On their arrival Mr. Ramsbottom immediately proceeded to prepare the gravel beds for the reception of the ova. A slight description of the ponds is here necessary. These ponds were arranged in accordance with plans brought by my brother Mr. Curzon Allport from the Stormontfield establishment on the Tay, which he visited at my request for this express purpose. Water is led from the River Plenty by a race to a small plot of grass land above flood mark. Sluices are placed on this race to regulate the supply of water. From the main race a smaller one leads directly into the clearing pond, which is circular, about five feet deep, and forty feet in diameter. Thence the water is led by two covered wooden troughs into an open wooden trough at right angles with the covered troughs. From the open wooden trough small sluices let off the water in any quantity desired directly into the gravel hatching beds. These consist of wooden boxes about five feet long by two feet wide. There are 12 of them arranged in 4 rows. The water passes with a slight fall into the upper end of the first box in each row, over the lower end of that box into the upper end of the second box, and so on to the lowest, where the water from each row passes over a series of shallow gravelly pools to a pond, about 120 yds. long, and forty feet wide, varying in depth from 2 to 9 feet. All the surplus water from the clearing pond also finds its way into this larger pond by a covered drain, ensuring a permanent supply of clear cool water. All the entrances to and exits from the pond and hatching beds are carefully guarded by covering them with perforated zinc. As the day on which the first of the ova arrived at the Plenty was warm with a bright sun shining, a tent was erected over the gravel beds; the temperature of the water in which was found to be about 55° Fah.

Ice was then freely placed in the transverse open trough at the upper end of the gravel beds and the temperature thus reduced to 44° . About four o'clock on Thursday the 21st April the first box of ova was opened, and, to the dismay of Mr. Ramsbottom, a very large proportion of the eggs were dead; but in the second and third boxes affairs looked more hopeful, and by the time a dozen were unpacked, it was manifest a large proportion would be saved. In unpacking, as soon as the lid of each box was unscrewed, the top layer of moss was quickly removed and the lower layer of moss with the ova was then lifted out, and at once turned upside down on to the cool water running over the gravel beds. By this means the ova soon separated from the moss and distributed themselves amongst the gravel, after which the moss was carefully removed bit by bit. Mr. Ramsbottom and myself continued unpacking by candle-light through a great portion of Thursday night and renewed the work at daylight on Friday morning. By Friday night the last of the boxes were finished and Mr. Ramsbottom calculated that about 35,000 living and healthy ova were safely deposited. Of these only about 150 were trout ova, which were placed in a separate gravel bed constructed on purpose and enclosed at each end by perforated zinc.

The ova placed in the small boxes were obtained and packed by various persons in different parts of Great Britain; and it is a highly gratifying fact that the boxes packed by Mr. William Ramsbottom himself contained a far higher percentage of living ova than any of the others, thus proving that he had profited greatly by the experience gained in the experiment tried in London.

The percentage of living ova varied greatly in the different boxes; but the largest number were invariably found in the boxes in which the ova were more thinly scattered amongst the moss and were subjected to only just enough pressure to keep them steady.

During the unpacking on Thursday night several living ova were unavoidably picked out and left in the heaps of damp moss besides the gravel beds through the night. On searching the heaps of moss on Friday morning I recovered several ova from amongst the moss, and one or two from the stones underneath, and transferred them safely to the water.

Bedded in the moss of one of the boxes I found an English wasp which evinced slight signs of animation. On placing the insect in the sun for a few minutes it became quite lively and walked quickly away. It is true that wasps are scarcely desirable subjects for acclimatisation, but surely this circumstance ought to teach us a useful practical lesson as to introducing valuable insects or other low organisms especially in their embryonic stages.

A few of the boxes of ova had been placed in the vaults of the Wenham-lake Ice Company for six weeks before the "Norfolk" sailed; and in these boxes, though a larger percentage of the ova were dead, the eyes of the fish were distinctly visible in those which were living—the development of the embryo having reached a higher stage. The ova from one of the boxes were placed in an ingenious apparatus prepared by Dr. Officer close to the ponds. This apparatus consisted of two tubs of gravel upon which the ova were placed, the whole being so arranged that a small stream of iced water flowed from a cask through each tub.

Before the whole of the ice was used up the temperature of the water in the River Plenty fell to 42° and has averaged about 47° since. The only object in cooling the water with ice at first was to prevent the transition of temperature being too sudden. It speaks volumes for the arrangements here that the percentage of living ova now in our breeding ponds is larger than was obtained at the same stage in the experiment in London although they had not in that instance undergone a sea voyage. For several days after the deposition of the ova Mr. Ramsbottom was busily engaged in removing all dead ova and pieces of moss, charcoal, &c., from the gravel beds. For several days afterwards the average death rate was a mere fraction. During the last few days the rate has slightly increased, which was to be expected as the mortality is always greater when the ova are on the point of hatching.

The development of the bulk of the ova has been visibly progressing up to the present time and on the 4th instant Mr. Ramsbottom had the high gratification of seeing the first trout burst its egg in Tasmanian water, and, on the following day, the first salmon.

Up to the present time about 7 salmon and 23 trout have been seen free of the egg, but it is impossible to give any estimate of the number now hatched, as the instinct of the little creatures warns them to wriggle away out of sight under the gravel, and thus many escape detection for the first few weeks of their existence.

I have already mentioned that 11 boxes of ova were left in Melbourne. No one can feel more grateful than I do for the noble manner in which the sister colonies of Victoria and New Zealand (especially the former) have aided us in our experiments, and I am sure that my fellow commissioners will agree with me that it will be both our pleasure and duty if the present experiment goes on to a successful issue, to furnish those colonies with an ample supply of the first ova taken in Tasmanian waters; nevertheless, had I been aware that there was any intention of retaining a portion of these particular ova in Melbourne, I should have made a strong appeal to the Acclimatisation Society of Victoria to give up such intention, as the retaining them could only result in the certain loss of so many ova.

Suppose that of the 700 living ova now in Melbourne 50 per cent. should live to be smolts (a high average when we consider that they are to be subjected to the treatment of those who have had no practical experience in fish hatching), these 350 smolts will at the proper season be placed in a river ill adapted for them, and will be liable to the attacks of many unforeseen enemies, and to unforeseen difficulties in obtaining food, in a sea the temperature of which is probably too high.

Under these disadvantageous circumstances, the conviction is strong on my mind that not one of those 350 fish would ever be seen again. On the other hand 350 additional fish passing down the Rivers Plenty and Derwent to the sea would materially add to our chance of seeing and retaking a few spawning fish on their return from the sea.

We have recently seen how difficult it was to obtain spawn from many well stocked rivers in Great Britain containing hundreds of thousands of salmon, how much more difficult then will it be for us when we can only send a few thousand down to the sea, and how unwise to throw away a chance of success by withdrawing even 100 fish from our small stock.

