

he has already trained to the work, and the services of these men would not be available at a distance from London unless at a considerable outlay. Every successive operation, from the netting of the salmon for the purpose of taking the ova to the ultimate closing in of the icehouse in which the ova is packed for the sea voyage, requires the careful personal superintendence of some responsible person possessing the requisite knowledge and experience. Mr Youal offers to undertake this duty himself, but declines to go out of London. He states, however, that should the Agent-General decide on making the shipment from the Clyde, as at present instructed, the services of his assistant, Mr. Ramsbottom, would be available at a cost of 30s. per diem, exclusive of expenses. Mr Ramsbottom (as Mr. Youal assures me) is perfectly skilled in the several processes of taking, artificially impregnating, and packing the ova, but he would nevertheless require constant supervision, the whole operation requiring the utmost care and delicacy. So sensitive are the salmon ova at this stage, that the slightest rough usage, even the trundling of the box containing it in a wheelbarrow, or any sudden vibration, would be fatal to the success of the enterprise. Mr. Youal has determined all these points by frequent experiments, of which he furnished me with full particulars. He estimates the cost of a single shipment at from £700 to £800, and he recommends a bonus of £200 (in addition) to a good shipping house to send out a fast sailing vessel. He is of opinion that if the passage exceeds ninety days, there is little or no hope of succeeding with the ova. He thinks that a less quantity of ice than he has been accustomed to use (*i.e.* fifteen tons instead of twenty-five) would be more manageable and quite as effectual. (The price of ice is about £5 a ton, so that this would make a saving of £50 on the total cost.) Considering the temperature of the New Zealand waters in the locality decided on for hatching the salmon, Mr Youal thinks that the ova ought to be shipped about the 15th December, but it ought not in any case to be packed more than two days before the sailing of the vessel, everything in the way of arrangements for receiving the ova on board having been previously adjusted, so as to defer the shipping to the last moment of sailing. He recommends an icehouse on the principle of those used by the P. and O. steamboats; double walls, the outer one being of three-inch deal planks, and the interspace of eleven inches filled with pulverized charcoal well rammed down, the interior chamber being of lead, thickened at the base. He further recommends that the cases for the reception of the ova should be on the model of that invented by himself, and now on view at the Kensington Museum, and that we should adopt his plan of packing in live moss (*i.e.* with the roots and portion of clay attached). He lays the utmost stress on the importance of having some trustworthy agent on the spot ready to receive the ova on its arrival in New Zealand, because the slightest neglect or inattention there would render perfectly useless all the previous care and trouble in packing and shipping it. To provide against this danger, he sent Mr. Ramsbottom, junr., to Australia in charge of one of his shipments, and the result fully justified the expenditure. If the ova should be sent out in an emigrant vessel, this might be done without any appreciable addition to the cost. It would only be necessary to select one or two suitable men among the intending emigrants, and to give them some training in the work before placing them in charge. They might then have free passages granted them, and a reasonable bonus on the successful accomplishment of their task in New Zealand.

2. Mr. Frank Buckland is of opinion that the ova ought not to be shipped before the first week in January. He suggests the use of a refrigerator on the passage out; but this is strongly condemned by Mr. Youal, who declares that the contents of the icehouse, once soldered down, should never be interfered with till the arrival of the vessel in New Zealand.

Mr. Buckland has had considerable experience in the hatching and rearing of salmon and trout; and his fish ponds and nurseries in the Kensington Museum Grounds—which I visited in his company—are decidedly the most successful thing of the kind in England. On the whole, Mr. Buckland is in favour of making the shipment from London instead of from the Clyde, and offers to render any personal assistance in his power. He strongly recommends, however, that the present experiment should be made in two shipments—one from the Clyde, and the other from London. He estimates the cost at a considerably less sum than that named by Mr. Youal, and considers that the amount already authorized would be ample to cover the expense of both shipments.

3. Dr. Günther, while not professing much practical knowledge of the subject, is strongly of opinion that we should stand a better chance of success in shipping from the Clyde than from London, chiefly because we should thus avoid all risk of detention in the Channel. He believes that the whole success of the experiment depends on the quickness of the passage out, and that every other consideration ought to give way to this one. He is of opinion that the ova might with perfect safety be taken even earlier than the date mentioned by Mr. Youal; and he suggests that in any case, before deciding against making a shipment from the Clyde, an agent of the Government should visit that port to make inquiries on the subject, and report the result to the Agent-General. On the subject of quality, Dr. Günther states that the salmon from the Tay are undoubtedly the largest and best that ever come into the market.

4. Dr. J. E. Gray informs me that the proposal to use ice in packing salmon ova for the Colonies came originally from himself; but he disapproves of the manner in which previous experiments have been conducted. He is entirely opposed to large shipments of ova, and considers that a few thousand salmon eggs forwarded at one time, and under proper care, would be more likely to prove a success.

It must be borne in mind, however, that the cost of building an icehouse and leaden chamber for a thousand ova would be as great as for a quarter of a million or more, while the other preliminary expenses of netting the salmon, carrying and packing the ova, &c., would scarcely be regulated by the quantity of ova required. Under favourable circumstances, as Mr. Buckland informs me, fifty females, weighing on an average ten pounds each, would produce half a million of eggs; but, on the other hand, even at the height of the spawning season, you may catch twenty or more females without finding one with ova sufficiently matured to be ready for the artificial impregnation. The expense of hiring nets, employing skilled fishermen, &c., would be the same whether the supply of ova required were large or small; and as Dr. Günther forcibly puts it, *ceteris paribus*, we stand a better chance in the end the larger the number introduced; for a liberal allowance must be made for what are called "blind eggs," or imperfect ova, to say nothing of ulterior causes of failure, such as the dangers to which the newly hatched salmon will be exposed from the existence of fresh-water eels and other predaceous species.