the flannels with a knife. In appearance and consistency this substance much resembled yellow ochre just as it is pressed out of a tube of oil colours, and probably consisted of rust-grease from the pump and a large amount of organic matter.

Calculated on a temperature-unit basis, a temperature of 35·5° F. would retard the development for the necessary fifty days. This temperature was maintained with little variation throughout. The maximum and minimum thermometers registered 40° and 32° F. Two streams were laid on, each supplying three compartments. This means that compartments 1 and 4 were of equal temperatures, but that (whilst proceeding through the tropics) Nos. 2 and 5 and 3 and 6 became slightly warmer through contact with the atmosphere, which at times reached 63° F. This difference never exceeded 1½° F., but even with this a considerable difference of development could be seen in the ova from the different boxes. The ova were still fairly clean on crossing the Equator on the 24th January, and the outline of the embryo could be easily distinguished. In the ova from the warmest box the tail of the embryo reached better than half-way to the head. Very few dead eggs were discerned up to this time. The water at Cape Town was somewhat dirty, and the ova received an extra coating of sediment. This was removed by means of a long-haired camel-hair brush, and the compartments were scrubbed out separately soon after leaving Cape Town. By this time the ova were assuming a slightly reddish tint, and more appeared to be dead, especially on those plates upon which the ova were spread thickly. Nevertheless the majority were developing very nicely for some time after this, the tail of the embryo having reached past the head, and the chord and eyes were visible in all the live eggs. No diatoms, algæ, or fungus at any time appeared, and I was not able to detect the presence of any of the crystals mentioned in Dr. Williamson's reports. All the compartments were thoroughly cleaned out on the 6th February, the plates were still in very fair condition, and a number from each box was examined and notes of their condition were made.

Up to this time there appeared to be every prospect of a large number being successfully carried through. This cleaning, which had occupied eight hours, was nicely completed when from some cause or another the supply-tank ran dry. When the water returned it came with such tremendous pressure as to force itself through the joints of the coolers and filters, and brought with it such an amount of rust and sediment that had collected in the bottom of the supply-tanks that in a moment the water became as thick as soup. My time for the next few hours was fully occupied in getting the fish and lobster tanks in order again, and by the time I was able to give my attention to the ova they had received a very heavy coating, and the water in the boxes was so thick that one could not see an inch below the surface. For the next few days the water continued fairly thick, and when a number of eggs were examined on the 12th most of them were seen to contain dead embryos. The experiment was abandoned on the 14th February in latitude 47° 26′ S., longitude 104° 57′ E. The ova at this time were impregnated through and through with rust, &c.; no trace of a live embryo could be seen in any of the eggs, but where the capsule was sufficiently clear the opaque dead embryo was seen.

The ova were fertilized at Plymouth on the 10th January. By far the majority contained live embryos on the 6th February, twenty-seven days after fertilization, and some still contained live embryos on the 12th February, thirty-three days after being fertilized. None of the ova hatched out: the steady low temperature at which they were maintained precluded the possibility of any hatching up to the thirty-third day. From 30 to 50 gallons of water passed through the boxes per hour.

I attribute the failure to convey the ova to New Zealand to be due to a very great extent to the tremendous amount of matter in suspension in the water taken from the ship's main sanitary service. The boxes and frames containing the ova, and the rotary motion produced by means of the water-wheel, worked perfectly, and could hardly be improved upon, excepting if it were possible by supplying each compartment with a separate water-supply. If the experiment should at any time be repeated it would be advisable to have an independent water-supply, not necessarily from the sea, but to avoid the large amount of cooling and filtering that would be required for a large shipment. By providing two large wooden tanks, one above and one below the fish-chamber, it would be possible to use the same cooled and filtered water over and over again to a great extent. A small electrically driven pump and aerating plant would be required for this purpose, and this would allow the control of the water-service to remain entirely in the hands of the responsible attendants.

In my preliminary report I expressed a strong conviction that the "scheme" was impracticable. I did not mean by this that I considered it would be impossible to retard the development of the ova on board ship for a sufficient period to allow of a number hatching out after reaching these waters, especially by a direct steamer making the passage in about forty-two days. An independent water-supply as described above would go a long way towards remedying the defects that have been pointed out by this small shipment. My reasons for expressing an adverse opinion against the scheme of attempting to acclimatize the herring into New Zealand waters by means of bringing out shipments of ova are on account of the delicacy of the undertaking and the heavy recurring expenditure involved, and, summarized, are as follows:—

(1.) The retardation of the herring-ova from about nine to fifty days, of itself a very delicate experiment even when conducted on a small scale in a well-equipped marine laboratory.

(2.) Dr. Williamson only succeeded in one out of three experiments in retarding development for fifty days, and even in this one only one larvæ hatched out of every six thousand ova.

(3.) During these experiments the water used stood at about 42° F., and therefore contained more oxygen than when suddenly cooled from higher temperatures during the voyage.