

## FISH CULTURE IN CANADA.

(See page 136.)

The propagation of fish by artificial means is a science to which particular attention has been given in many of the leading European Governments, and which latterly has been brought prominently before the people of Canada and the United States, and is to be considered as a valuable adjunct to the natural methods of fish-breeding.

It is but a few years since this new industry was inaugurated in Canada; but the rapid strides which it has made in the successful experiments carried on at Newcastle, in Ontario, by Mr. Wilmot, together with the practical results which have been brought about in relation to this interesting procedure, has given it great popularity with the Canadian public, and it has been also, thus far, somewhat liberally acknowledged by the fostering patronage of the Government.

A very general desire now pervades the minds of the people of Canada to encourage, by every possible means, the advancement of this practical science; and also to obtain such general information in relation to the *modus operandi* of fish-culture as can be intelligently given. With this view as public journalists, our artist was despatched to the Government Fish-breeding Works at Newcastle, Ontario, in order to be an eye-witness of the operations engaged in there, and take sketches of the buildings and grounds in connection with the establishment; and also delineate, as minutely as possible, by principal drawings, the internal arrangements of the breeding-rooms, and the apparatus used in the practice of artificial fish-breeding.

The result of this visit has been that we are now enabled to present to our readers a series of pictures which will give a comprehensive idea of this national enterprise, and from which we trust the public will derive general information and useful knowledge.

Our pictorial illustration includes in it several drawings, each representing different sketches of the outside premises and grounds, as well as views and plans of the interior arrangements of the buildings, as are more particularly adapted for the work. These drawings will be found numbered for more ready reference.

No. 1 is a panoramic view of the buildings and grounds, and of the surrounding country. The building to the left of the picture, on the edge of the stream, is the Government Fish-Breeding Establishment, with its long, low reception house alongside; just here a permanent weir or barrier is thrown across the stream which prevents the upward passage of the salmon. Being thus stopped on their progress up the main channel, they are attracted by the rapid outflow of water coming through the reception house, and rushing up the current they pass through an ingeniously-contrived triangular-shaped weir (No. 3), and become entrapped within the house where they are kept confined till they become ripe for spawning. From this building the stream runs (along the side of the picture) downwards a distance of some two miles, where it empties into Lake Ontario.

Beneath the two large clumps of evergreen trees in front on the hillside and the main stream, the several nurseries and retaining ponds are shown, dotted here and there with miniature islands. In some of these ponds the parent salmon are retained for a while to recuperate after the exhaustion produced by spawning; others are used as nurseries in which the young fry are kept for a time just after they are hatched out, and have absorbed the umbilical sac.

The small building to the extreme right of the view was the old or original reception house, but it is now used as the gateway and general outlet from the ponds. On the extreme left, just above the main building, is an old mill with its raceway and mill pond beyond. From the higher elevation of this large reservoir a sufficient head is obtained to force through an underground pipe a large flow of water into the first and second apartments or breeding rooms, thus giving a constant and sufficient supply at all times for the hatching troughs.

The premises and ponds cover some ten acres of land; two public road leads from the grounds, one at each extremity of the picture, and converge together at the Village of Newcastle, about three-quarters of a mile distant, where an important station of the Grand Trunk Railway is located. The Town of Bowmanville is situated about four miles to the west, and the Town of Port Hope seventeen miles to the east. On the summit of the hill is the farm and private residence of Mr. Wilmot, the originator and founder of this institution.

No. 2 is a ground plan of the premises with the location of the buildings and ponds as described in the panoramic view No. 1.

No. 3 shows the inside arrangements of the reception house for entrapping and penning up the parent salmon. The fish enter this building through the triangular-formed weir, and become imprisoned in the first or large compartment. They are afterwards transferred (as represented by the assistant dipping them out with a small net) into the smaller pens above. The males and females are then separated and placed in different pens; in this way they remain quiet, and are more easily retaken at the time when they become ripe for laying their eggs. When mature, a dozen or more of these fish at one time are again caught with the hand net, and carried (only a few feet) to the tanks, arranged for their safe-keeping at the right hand side of the breeding-room, lower flat, No. 4, where the workmen are engaged at their work.

No. 4. Here the process of taking the ova from the fish and impregnating it is carried on; this is done by lifting from the tank a ripe female fish and holding her over a vessel securely, and gently pressing her body with the hand when the eggs will flow freely from her. (See figure No. 5.) After this operation is performed, she is liberated by dropping her into a raceway running from the room, down which she quickly swims into the pond marked A on the ground plan No. 2. A male fish is then taken from another tank, and operated upon in the manner as the female; the milt extruded from him is mixed with the eggs by a gentle stirring with the hand; this causes immediate impregnation. The ova are then dipped out of the pan with a small ladle, and put into a measure made to contain one thousand eggs; from this they are spread evenly on the hatching trays. (See apparatus plate No. 6.) These trays are made two feet long and ten inches wide, with a division in the centre, and hold four thousand eggs each; when filled they are carefully laid in the breeding troughs shown in figures 4 and 7. After the ova are thus deposited they are closely watched, and regularly cleansed from all sediments or other impurities which may settle upon them during the process of incubation.

The eggs are of a clear salmon color, but should any prove to be unfertilized, or become injured in any way, they change their appearance to an opaque white, when they are picked out with forceps and cast away, thus preventing the remaining ova from becoming contaminated. At the time of our artist's visit a *million and a half* of these vivified eggs were deposited on the hatching trays in these rooms.

No. 4 and 7 explain the manner in which the breeding troughs are distributed in the rooms. In the lower flat they are placed lengthwise, in the upper room crosswise of the building. Six of these are laid side by side with intervening aisles two feet wide for the convenience of the workmen in picking and washing the eggs. The troughs are each supplied with a constant flow of living water from the tanks which are fed from the raceway above, and are regulated in quantity by wooden taps as shown in the cut. In the lower flat a series of aquaria are shown; they are placed alongside the wall and contain young salmon and other fish which are kept for observation and also for exhibition to the numerous visitors who frequent the institution.

No. 8 represents the upper story of the building, which, after taking from it office rooms, leaves a large commodious apartment used as a museum in which are collected a number of specimens of fish of various kinds and other animals. This natural history depository is only of a few months' existence, yet it comprises numerous specimens of the salmon family and other fish, prominent amongst which are the large ones shown in the plate; the one on the right is a sturgeon weighing 280 lbs.; the one on the left is the *Tunny* or giant mackerel—its weight when alive was upwards of 600 lbs.—a Greenland shark ten feet long, an immense moose deer, male and female cariboo, a bear, and other animals; also an alligator ten feet long. All of these specimens present a life-like appearance, and are artistically mounted.

No. 9 shows the front and side elevation of the fish-breeding house proper; its dimensions are 64 feet in length by 22 feet in width, with a cellar or lower flat built of stone, and two frame storeys above ground. The building presents a handsome and commanding appearance externally; and the arrangements inside are convenient and well adapted for the purposes for which they are intended. The whole establishment gives convincing proof throughout of the exercise of practical ingenuity and personal industry.

No. 10 gives a view of the retaining ponds (marked A. Fig. 2) into which the spent salmon pass from the main building after manipulation. It is about forty feet in diameter, and circular in form, with an average depth of water from two to three feet. At the time of our artist's visit, there were in this pond between