

Flat-fish, from which eggs are obtained, are plentiful during February near the Woods Hole Station, and as many as seventy are sometimes taken in a net at one time. The ripe fish captured are stripped artificially as soon as they are caught; and the unripe ones are confined in wooden tanks, supplied with constantly changing water, until ripe. The eggs are quite small, there being thirty in a lineal inch. Unlike the eggs of the cod, haddock, and some other marine fishes, they do not float, but sink to the bottom of the vessel in which they are held. When first deposited the eggs are very adhesive, and stick together in one mass, or in clusters of different sizes. This adhesiveness is overcome, in a measure, by thoroughly washing them. The use of dry powdered starch is very effective for this purpose, and mixes readily with salt water, and admirably overcomes the glutinosity of the eggs. Its action is purely mechanical. The period of incubation at a mean temperature of 37° Fahr. is seventeen to eighteen days.

Flat-fish eggs may be hatched in several different kinds of apparatus, but the Chester jar is most used, in combination with the McDonald tidal box, employed in incubating cod-eggs. The fry are quite hardy, and stand transportation well. In planting them they are put into the transportation-cans commonly used for such purposes, and are taken in a boat to the localities in which the brood fish are found.

The McDonald automatic tidal boxes are used for buoyant ova, such as the cod, mackerel, and the most pelagic fishes. This apparatus (Plate IV.) is the outcome of long experience and study, and has as its special features the closest possible simulation of natural conditions. The motion or circulation is got by means of a brass siphon-cap, which fits over the upper end of the waste-pipe. The cap is a tube, closed at the top, 9 in. long and 1½ in. in diameter. It is kept at any desired height on the waste-pipe by wire springs in the cap. By virtue of the siphon attachment the water in each box rises to the height of the top of the waste-pipe, and begins to run over; this partly exhausts the air in the cap, more water rushes in, and the pipe becomes filled with water; then the siphon begins to act, and takes off the water to a level of the bottom of the siphon-cap. Usually the siphon-cap is pushed about half-way down the waste-tube, although the height of the water in the box after the discharge of the siphon is regulated by the manner in which the eggs are working. About seven minutes are required for the water to be drawn down and the box to again fill, and, approximately, two-fifths of the water is taken off at each discharge. By this arrangement the water in the boxes is constantly rising and falling automatically. The movements of the waves are thus simulated, the eggs are kept in constant circulation, and fresh water is continually entering the boxes. When the supply of water is well regulated the motion of the eggs is perfect. I have watched them for hours, and could detect no sign of "banking."

Size of Trough and Boxes.

The dimensions of the troughs in which the boxes are placed are as follows: Length over all, 13 ft.; width, 2 ft. 7 in.; depth, 12 in.; and they are made of 1½ in. timber. The box compartments are separated by 1½ in. partitions, and are 22 in. long, 12 in. wide, and 11 in. deep. The hatching-box is made of ½ in. timber, and is 22 in. long, 12 in. wide, and 9 in. deep in the centre, but only 8 in. at the ends. The bottom slopes upward towards the ends of the box, and is covered with linen scrim. A wooden strip, ½ in. thick, and conforming to the shape of the bottom of the box, extends the length of the box.

The water is introduced to the egg-box in two places; the most important supply comes in through a ¼ in. hole through the centre of the partition and end of the box immediately above the lengthwise strip. The water goes through the small hole with considerable force, creating a strong current, and keeping the eggs in a rotary motion. This current is one of the principal features of the apparatus.

Cod-fry are planted almost as soon as hatched out. About two hundred thousand can safely be carried in a 10-gallon can. Deposits are usually made on the natural spawning-grounds.

GLoucester MARINE STATION, MASS. (Superintendent, C. G. Corliss). (Plate V.)

This station is situated on Ten-pound Island, off the Massachusetts coast. The hatchery is fitted up similarly to the one at Woods Hole—that is, with McDonald tidal boxes for all buoyant eggs and Chester and McDonald jars for heavy eggs.

The water-supply tank holds 15,000 gallons. As at Woods Hole, the water is pumped up with an engine. The hatchery has room for 25,000,000 eggs, which are collected in a similar manner to those at Woods Hole. Cod and flat-fish are principally dealt with. Mackerel are also hatched, but great difficulty is experienced in getting a supply of eggs.

Gloucester is the principal fishing port on the Atlantic Coast, and there are also large fish-curing and packing establishments there. Cod and mackerel are the principal fish dealt with.

IMPORTATION OF MARINE FISH.

Beyond doubt the successful transplanting of some of the more valuable marine fishes of the Northern Atlantic, such as the herring, cod, and turbot, to the Southern Pacific Ocean would be a valuable work, worth a considerable expenditure on the part of the inhabitants of these islands at the antipodes. To the general public the transport of the ova or fry of these fish may seem an easy matter, but the conditions surrounding it are widely different from those involved in the transport of *Salmonidae*, which are now well known; but little is as yet known as to the best means of carrying delicate marine ova or fish for great distances, involving a journey of some six weeks' duration, and with great changes of temperature. The short journeys they have been carried in European waters are really no test, and any attempts to import these fish into New Zealand waters at the