

73.—THE BREEDING HABITS OF THE EEL.

By J. N. SAWYER.

There are, no doubt, many different opinions regarding the breeding habits of the eel. Having lived along the Delaware during the most of my life, and having been engaged in fishing for this slippery customer a great deal, I have made considerable investigations concerning its habits, propagation, &c.

A great many tell me that "they believe the lamper eel to be the mother of all eels, as they find eggs only in them." But this cannot be true, for the different sexes are easily distinguishable in the lamper eel. Their habits are not like those of the common eel. The female nests in shoal water, spawning during the latter part of May; and in June, when we find other eels done spawning, the little ones, two or three inches long, are ascending the river by millions.

I have caught eels in large numbers from early spring until late in the fall, and have always observed two kinds, which I believed to be male and female, thus proving (to *my* mind) the story, "that the female reproduces her species without the aid of the male," to be false. The male eel can be distinguished from the female by his large head on a comparatively small trunk, quite poor, and upon examination internally we can find two longitudinal rows of a bright, glossy appearance, and of a very compact tissue and rounded form. These are the spermatogenic organs. While in the water he is constantly moving from place to place. What I take to be the female is the one with the smaller head, generally quite fleshy, and, upon examination in the late fall, a whitish substance can be found internally on each side, just in front of the vent, and in which, upon breaking open, can be discovered small eggs, easily seen with the naked eye. I accordingly believe that both the male and the female possess their own natural sexual organs of fecundation and reproduction.

Eels descend the streams in the fall to places where there is deep water, and where mud will serve them as a refuge during the winter. Here I believe they spawn very early in spring, or in late winter, for as early as May large numbers of the little eels can be seen ascending the streams. Some claim "eels all go to salt water to spawn." While some of them do, I do not think they all do, for in the winter of 1836 or 1837 we had what is known as the January flood in the Delaware, and wagon-loads of eels of all sizes were found on low places after the water had subsided. One of my neighbors built a very tight dam, so constructed as not to permit any fish or eels to ascend. By this he overflowed quite a tract of land, and placing some eels in the pond left them to breed. After a period of fifteen or twenty years he placed an eel-weir in the

dam and drew off the water to drain the pond for a meadow, catching barrels of eels of all sizes. These instances cited prove to me that eels do not all return to salt water to spawn, but spawn wherever they find suitable places in ponds or streams.

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74.—STATISTICS OF THE SEA FISHERIES OF FRANCE FOR THE YEAR 1884.*

[Abstract.]

VESSELS AND MEN.—During the year 1884 there were engaged in the fisheries 23,929 vessels or boats, with a tonnage of 162,467 tons and manned by 87,179 men. To these should be added 346 Italian fishing vessels, manned by 1,098 men, who engaged in fishing on the coasts of the fifth district. In addition to these, 53,713 persons (men, women, and children) engaged in fishing on the shores. These figures, as compared with those of 1883, show an increase of 4,855 men, 1,667 vessels, and 11,142 tons.

The value of the products of the fisheries amounted to 87,961,124 francs [\$16,976,496.93],† that is to say, a decrease of 19,265,797 francs [\$3,718,298.82] from 1883. The decrease was especially noticed in the cod, herring, and sardine fisheries, and was caused by the course of the sales, which were difficult and not very profitable, owing to the epidemic which visited the south of France in 1884.

The products of the cod fisheries (Newfoundland and Iceland), and of the herring, mackerel, and anchovy fisheries, as well as of all those kinds designated by "other fish," amounted in 1884 to 149,661,099 kilograms [329,942,859 pounds], and in 1883 to 133,131,046 kilograms [293,500,705 pounds], showing an increase in 1884 of 16,530,053 kilograms [36,442,154 pounds].

There was also an increase in 1884 of 75,844 hectoliters [214,639 bushels] of other shell-fish, 214,344 crustaceans (lobsters, &c.), 256,069 kilograms [564,529 pounds] of shrimps, and 41,116 cubic meters [1,451,806 cubic feet] of marine fertilizers; while there was a decrease of 736,550,973 sardines, 38,388,451 oysters, 97,371 hectoliters [275,560 bushels] of mussels, and 643,551 kilograms [1,418,773 pounds] of fish designated "other fish."

COD FISHERIES.—Retarded by the ice, all our vessels had not yet arrived on the fishing grounds by the middle of June. The general mildness of the winter of 1883-'84 caused in the arctic regions an un-

* "*Statistique des pêches maritimes.*" Paris, 1885. Translated from the French by HERMAN JACOBSON.

† Throughout this article reductions have been made according to the following equivalents: 1 franc=19.3 cents; 1 kilogram=2.2046 pounds; 1 hectoliter=2.83 United States bushels; and 1 cubic meter=35.31 cubic feet.