

SESSIONAL PAPER No. 38b

Bay of Fundy.—A sample of young immature herrings from 16 to 22 centimetres of length with genital organs so small that no conclusion can be drawn as to their spawning time. Dorsal rays 18 to 20, average 18.7; anal rays 15 to 20, average 17.7; keel scales 13 to 16, average 14.1; total number of vertebrae 55.57, average 56.5; first haemal vertebra number 31.7.

Gloucester, Massachusetts.—A sample of small herring (13 to 22 cm.) taken in December, 1914, with immature genital organs. Dorsal rays 18 to 21, average 19.9; anal rays 16 to 20, average 18.1; keel scales 12 to 17, average 13.4; total number of vertebrae 55.58, average 56.68; first haemal vertebra number 24.8.

While the foregoing figures are worthy of very careful study, yet the difficulty cannot be ignored that the investigation was essentially of a preliminary character, and it is possible that the material obtained was not sufficient to decide with certainty its full representative character. The quantity may not be sufficiently large to be regarded as representative or typical of the schools of herring from which the samples were taken.

No opinion can of course be made from *a priori* considerations; experience and continued investigation are the only means of arriving at a final and reliable conclusion in this matter. It will be noticed that the samples examined have been limited to about fifty in each sample. The reason for this was that the varying factors in most cases show a comparatively very narrow amplitude of variation (four or five classes). The results obtained seem to demonstrate that the method adopted gives corresponding results, but I wish nevertheless here to emphasize: first, that the results will have to be regarded as tentative and preliminary; and, secondly, that they ought to be confirmed during the work of the expedition before us. For this purpose it is valuable to consider the figures more thoroughly and try to ascertain what further investigations would seem of greatest interest and importance.

The first result yielded by the figures given above, and by table 1, is this: that there is a marked difference between the spring-spawning types of the gulf of St. Lawrence, Northumberland strait, Magdalen islands, and the west coast of Newfoundland, and the herrings from the Atlantic open coast (Cape Breton and Nova Scotia). This is already well known from the experience of men engaged in the Atlantic fishing industry; spring spawners being caught everywhere in the gulf, fall spawners off the Atlantic coast. According to information, which I have obtained, through interviews with the fishermen, the limit dividing the spring spawners and the fall spawners has to be drawn in an easterly direction through a point along the coast of Cape Breton at its northern shore (at the entrance to the gulf of St. Lawrence). North of this line all herrings are said to be spring spawners. South of the line the oceanic types are all of them fall spawners, but besides these types there are known to exist local spring spawning coast herrings as, for example in the bay of Fundy and around the coasts of the southern part of Nova Scotia. This is confirmed by the early investigations of Gilpin,¹ who observes that he has seen spawning herrings both in May and in September and October. From the Digby basin (bay of Fundy) he observes: "The first herring that make their appearance in the basin come there the last of March and the first of April; about the first of May they begin to spawn, and by the 20th May they have mostly left the harbour. On the Atlantic coast of Nova Scotia he has observed a shore run, about 11 inches in length, appearing early in March, and spawning in September and October." This would correspond to the conditions in the North Sea where there are herrings, coast herrings spawning in the spring, and oceanic herrings spawning at the outer banks, (e.g. Dogger bank) in the fall, but my material gives no opportunity for a proper description of these interesting varieties, which should be subjected to more thorough examination. The average figures given in the table, page 10, show, on the whole, small differences only between the different samples. There are no very striking differences to be observed in the

¹ Edward Gilpin, "On the common herring (*Clupea elongata*).", Proceedings and Transactions of the Nova Scotia Institute of Natural Science, vol. 1, 1863.