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AN INVESTIGATION INTO THE ALTERATIONS IN THE GROWTH-RATE OF THE HADDOCK

BY

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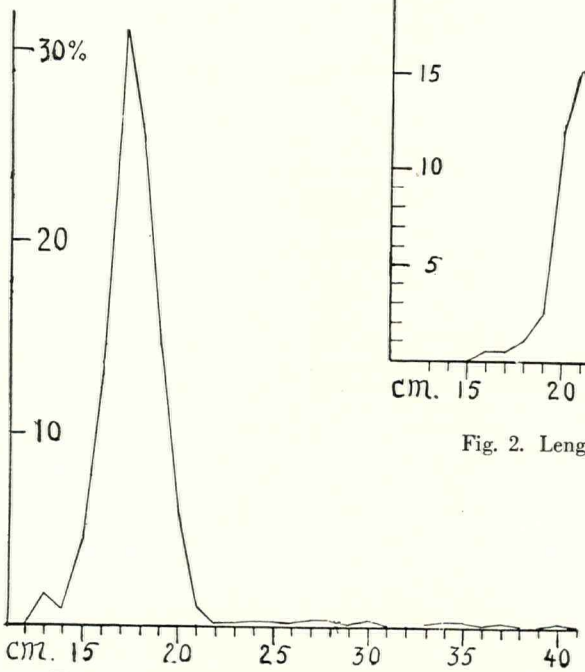

Fig. 1. Length curve of haddock from three hauls, 6th and 8th February 1929.

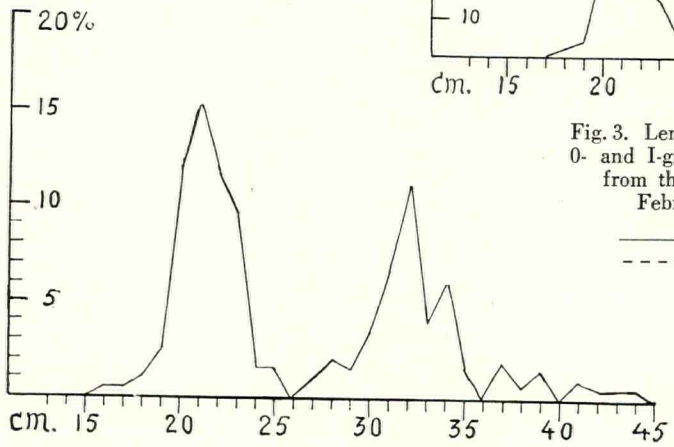

Fig. 2. Length curve of haddock from three hauls, 9th February 1938.

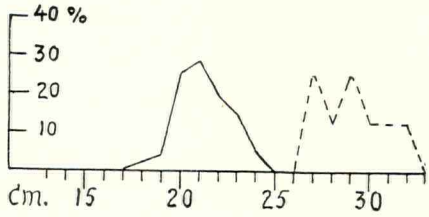

Fig. 3. Length curves of the 0- and I-groups of haddock from three hauls, 9th February 1938.

——— 0-group;
- - - - I-group.

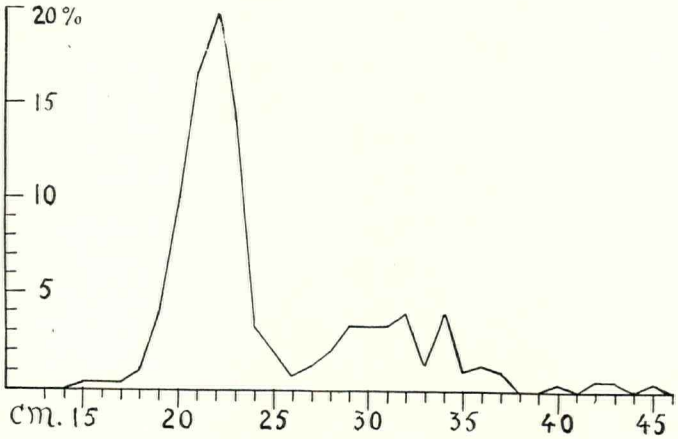

Fig. 4. Length curve of haddock from three hauls, 7th March 1938.

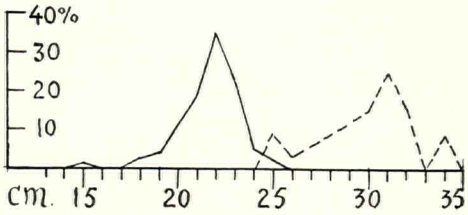

Fig. 5. Length curves of the 0- and I-groups of haddock from two hauls, 7th March 1938.
———0-group; - - - - I-group.

HADDOCK spawning in the Skagerak is as a rule so infrequent as to be of little significance. The stock of haddock in that sea is therefore maintained, for the greater part, by the drifting of eggs and larvae from the North Sea into the Skagerak. The strength of the year-classes in the Skagerak depends upon their strength in the North Sea. Thus a large number of the eggs and larvae of the strong year-class 1928 drifted into the Skagerak and in February and March 1929 the 0-group was extremely abundant there.

On Fig. 1 is given a length-curve of the total catch obtained in three hauls with a fine-meshed herring trawl on the 6th and the 8th of February 1929. A determination of age showed that the 0-group had for the greater part a length of 16—19 cm.

Repeated age determinations made in March 1929 gave the same results. During a trawling operation carried out on 9th February 1938 with a fine-meshed herring trawl approximately in the same area (NW. of the Skaw) I was very surprised to find, when measuring the catch of haddock, that its length-curve was that given on Fig. 2. The 0-group, according to this curve, ought to have a length of 20—23 cm., that is to say about 3 cm. longer than in 1929. An age determination of the material collected did indeed show that the 0-group had in the main a length of 20—23 cm. (Fig. 3).

The catches yielded by three hauls, on 7th March, approximately in the same area, showed the length composition given by Fig. 4. An age determination showed also here that the 0-group chiefly had a length of 20—23 cm. (Fig. 5).

Determinations of age compositions carried out on haddock from the same hauls of 7th March 1938 showed that also the I-group was considerably larger than normal (Fig. 5).

What can be the cause of this strong increase in the growth-rate of the haddock? A tempting explanation would be to seek its cause in some increase in the temperature of the bottom water. In the area of the Skagerak where this research upon the haddock has been carried out changes in the temperature occur fairly often. For that reason it is difficult to prove that the temperature has been above normal for any considerable part of the haddock's period of growth. I have, unfortunately, not had the opportunity of studying the question more closely.

It has, however, been easy to establish that there is a great difference between the abundance of the stock of the year 1929 and that of the year 1938.

Thus on 6th February 1929, NW. of the Skaw (Lat. 57°59′, Long. 9°50′), in a haul which lasted two hours with a fine-meshed herring trawl at a depth of 105—109 m. 23,750 specimens were obtained, 23,500 of which belonged the 0-group (nearly one year old). In five hauls in February and March 1929 the catch averaged 3,180 fish per hour, about 3,100 of which belonged to the 0-group. The total number per hour varied between 11,875 and 642 and the number of 0-group fish between 11,750 and 628.

In two short papers I have dealt with this matter[1]).

There is a striking contrast between these figures and those obtained from the catches made in February and March 1938. In six hauls with a fine-meshed herring trawl in the same area NW. of the Skaw in these months an average of 130 haddock per hour were obtained, 82 of which belonged to the 0-group. The total number varied between 42 and 250 and the number belonging to the 0-group between 12 and 165. The figures given above show that the density of the haddock stock in the examined area in 1929 was when regarding the whole haddock stock about 24 times. and when regarding the 0-group about 37 times larger than in 1938. This means that every haddock had in 1938 a 24 times larger area at its disposal than in 1929. As the haddock feeds on bottom animals (Cumacea, gammarids, annelids etc.) the above-mentioned conditions should have a great effect upon the haddock's thriving and upon its growth-rate. Scottish scientists have also proved that the haddock has different growth-rates in different areas[2]). Poulsen has reported that the haddock exhibit a higher growth-rate in the Belt Sea than in the North Sea[3]). The conditions described regarding the Skagerak in 1929 and 1938 show clearly that the growth-rate can vary considerably in the same area. It seems highly probable that this depends upon the various densities of the stock, and therefore upon the different supplies of food per specimen. One may venture to say that in 1929 a state of overpopulation and in 1938 a state of "underpopulation" existed in the area mentioned and that this is the reason why haddock of 0-group and I-group were larger in 1938 than in 1929.

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[1]) K. A. Andersson in "Ny Svensk Fiskeritidsskrift" 1929, No. 8 and 1931, No. 19.

[2]) See Ritchie, A., The food and feeding habits of the Haddock (*Gadus aeglefinus*) in Scottish waters. Fisheries, Scotland, Sci. Invest., 1937, No. II.

[3]) Poulsen, Erik M., The Haddock of the Belt Sea and Western Baltic during the Years 1926—1928. Rep. Dan. Biol. Stat., XXXIV, 1928.