

THIRD ANNUAL MEETINGThe Danish Investigation Work in Subarea 1 in 1952.

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(13 March 1953)

Two Danish research ships worked in Subarea 1 in 1952. The research ship "Dana" worked in Davis Strait from 6 July to 10 August while the research cutter "Adolf Jensen" operated in the coastal waters and in the fjords from April to October.

The work included:

1. Hydrographical observations.
2. Observations upon distribution of eggs and larvae of cod, redfish and other species of marine fishes.
3. Sampling of otoliths of cod and length measurements of cod.
4. Tagging experiments on cod.
5. Investigations of stomach contents of cod and other fishes.
6. Herring investigations including fishing experiments, samples of scales, stomach contents, etc.
7. Char and salmon investigations.
8. Studies upon deep sea prawn (*Pandalus*).
9. Plankton collections with the Hensen net.

Only the investigations concerning hydrography and cod will be discussed in this report.

1. Hydrography. Mr. Frede Hermann has worked out the hydrographic material and the results will be published in *Annales Biologiques du Cons. Int. p.l'Expl. de la Mer.* Eight hydrographic sections were made, in all 47 stations mainly across the offshore banks.

The 1952 season may be considered a cold one, especially in the southern part of Davis Strait up to Lille Hellefiske bank. A strong influx of arctic water took place in the middle of July. On the banks north of Fylla bank the arctic water was much less dominant and temperatures on the northern sections were about normal for the season.

2. Occurrence of cod eggs and larvae. In fig. 1 are given the catches of cod eggs taken by the "Adolf Jensen" in April and May with 1 m. stramin net. Fig. 2 shows the catches of cod larvae taken by the "Dana" in July with 2 m. stramin net.

While relatively large numbers of cod eggs were taken in the inner part of Godthåb fjord only a few were taken in the outer part of the fjord and on Fylla bank, where the number of cod eggs taken only amounts to 58 on the middle of the bank and 85 on its western edge. In 1950, 491 and 566 cod eggs were taken in the same month and on corresponding stations on Fylla bank.

The numbers of cod larvae taken from "Dana" in July 1952 were very small compared with the numbers taken in the same month in 1950 (Ann. Biol. du Cons. Int. p. 1'Expl. de la Mer 1950, pag.38). It appears that the conditions for survival of cod larvae in Davis Strait were unfavourable in 1952 and it is therefore possible that the yearclass 1952 will be a poor year-class which will not contribute very much to the output of the fishery in the future.

It appears from catches of small cod with the hand seine in the coastal region that the yearclass 1950 is fairly rich, which agrees well with the comparatively large numbers of cod larvae taken by the "Dana" in Davis Strait in 1950.

3. Composition of year classes in catches of cod.

a. The material. On the "Dana" a material of 1,500 otoliths of cod was taken at 15 different stations over the fishing banks. On the "Adolf Jensen" about 2,453 otoliths were collected in Godthåb fjord and Ameralik fjord in the Godthåb district, from Amerdlok fjord in the Holsteinsborg district and from localities in the Julianehåb district. Besides the collections made from the research ships, about 3,000 otolith samples were collected from the Greenlanders' catches at many different fishery stations along the coast. The total number of otolith samples collected in 1952 amounts to about 6,900. Up to the time of writing 3,885 have been read.

b. The composition of year classes percentages in the different samples are given on the map (Fig. 3). On the map the different samples are numerated with Roman numerals which will be referred to in the following. To make it easy to compare the different samples the year class 1945 is given in white columns while the year class 1942 is given in shaded columns.

The collections of otoliths come from cod taken by different methods. All the collections taken by "Dana" come from cod taken with handline (IV and X-XV). The samples collected at the Greenland fishery stations come from cod taken mainly with long lines (I-III, VI-VII and XVI-XIX) or from fish yard (V). On some stations the material is derived from cod taken with different gears such as hand lines, long lines and shrimp-trawl (VIII and IX).

It is seen that only three year classes dominate in the samples from the offshore banks, (X-XV) namely the yearclasses 1942, 1945 and 1947. The two last mentioned year classes are especially rich while the year class 1942, which was a very important year class on the banks in three previous years (Rasmussen, Ann. Biol. 1951 pag.51-53) is only of slight importance in 1952. Only in one sample on the western edge of Store Hellefiske bank (XI) does this year class amount to between 25 and 30% of the sample. In the samples from both Store and

Lille Hellefiske banks (X and XI) the year class 1947 is the dominating year class. In the samples from Fylla bank (XIII) and Fiskenaes bank (XIV) this year class and the year class 1945 are of about equal importance, while on Dana bank (XV) the year class 1947 alone amounts to less than 10 per cent.

In the samples north of 69°NL (I-IV) the composition of year classes is quite different from the banks. In this region the three year classes 1934, 1936 and 1942 are dominant.

In the samples from Umanak fjord (I) and Jakobshavn (III) the year classes 1934 and 1936 together amount to between 30 and 40 of the total per cent while they are present in very small amounts in two other samples (II and IV). The richest year class in this northern region is the year class 1942. The two year classes 1934 and 1936 have been the richest year classes in West Greenland waters in a long period, from 1940 to 1949. In 1950 they were replaced by the year class 1942.

In the coastal waters and in the fjords the two samples from the Holsteinsborg district (V and VI) are very much alike and are also very similar to the samples from Store Hellefiske bank (X). The year class 1947 is by far the richest. The sample from Sukkertoppen shows a more even age-distribution than the sample from Holsteinsborg.

Godthåb fjord (VIII) and Ameralik fjord (IX) have cod stocks which are very much alike as regard year class composition. Especially the former has a very even distribution of the different year classes which is added evidence (together with the otolith type and slow growth rate) that the fjord has a local population. This fact is also proved by tagging experiments. In Ameralik fjord (IX) as already mentioned, the composition of year classes in the catches is very similar to Godthåb fjord. The otolith types in the two fjords are also very much alike (fjord cod type) with many secondary rings, which make age determinations very difficult. The growth rates, however, are very different in the two fjords, being very slow in the Godthåb fjord while the Ameralik fjord cod has about the same rate as the cod on the banks (see table 1). In Ameralik fjord the cod occur only in May to June pursuing the spawning capelin. During the last part of June they disappear with the capelin from the fjord and migrate to coastal waters and the offshore banks. From a tagging experiment carried out in May 1952 seven recaptures have hitherto been procured. Four of these recaptures came from coastal waters, one from Fylla bank and one from Store Hellefiske bank.

The two samples from Julianehåb district (XVIII and XIX) differ from the other samples south of the 69°NL by the absence of the year class 1947. The year class 1945 is the richest in the samples from this district. It is also remarkable that in one of the samples (XIX) the year class 1942 amounts to a little more than 20 per cent. From a provisional study of types of otoliths it seems that there is a difference between the types of otoliths of cod from the Julianehåb district and otoliths from cod taken on the northern banks which perhaps indicates two different populations of cod in the area. It has been

Table 1.

Locality	No. on map Fig. 3	Date	Mean length (no. of spec.)		1947		1945		1942	
			♂	♀	♂	♀	♂	♀	♂	♀
Off Disko fjord	IV	1 Aug.	-	-	-	-	69.5(12)	69.4(20)	77.9(50)	81.5(80)
St. Hellefiske bank	X	25 and 26 July	52.3(87)	51.8(85)	71.8(17)	68.0(20)	71.8(17)	68.0(20)	76.4(14)	80.1(12)
" " "	XI	24 July	-	-	68.9(20)	70.7(24)	68.9(20)	70.7(24)	-	-
" " "	VI	10-11 June	51.1(62)	52.0(60)	-	-	64.4(16)	64.4(16)	-	-
Lille Hellef. bank	XII	14 Jul. - 3 Aug.	51.6(117)	51.8(86)	67.4(36)	68.2(37)	67.4(36)	68.2(37)	77.8(13)	79.3(22)
Fylla bank	XIII	21 July and 4 Aug.	54.1(48)	55.8(55)	69.5(66)	69.7(61)	69.5(66)	69.7(61)	78.8(6)	79.3(8)
Fiskenes bank	XVI	10 Aug.	55.2(16)	54.6(23)	69.2(17)	72.1(27)	69.2(17)	72.1(27)	75.8(12)	-
Dana bank	XV	11 Aug.	-	-	70.8(13)	71.3(10)	70.8(13)	71.3(10)	-	-
Amerdlok fjord	V	6 July	51.7(52)	52.1(49)	62.8(10)	63.3(11)	62.8(10)	63.3(11)	65.2(9)	71.1(8)
Godthåb fjord	VIII	30 Apr. - 7 May	43.8(13)	46.3(9)	61.5(8)	68.1(15)	61.5(8)	68.1(15)	76.1(18)	77.6(14)
Ameralik	IX	13 May	56.4(23)	55.8(17)	67.5(29)	69.7(36)	67.5(29)	69.7(36)	75.2(11)	75.6(10)
Julianehåb			-	-	64.7(23)	65.8(26)	64.7(23)	65.8(26)	-	-

Mean lengths calculated from material for the years 1931-39.

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Northern * Districts
Southern **

Mean lengths of the year classes 1947, 1945 and 1942
calculated from material for 1952.

* Material collected north of 62°NL.

** Material collected south of 62°NL.

mentioned previously that a special fjord type of otolith has been found in Godthåbsfjord and Leralik fjord. This matter cannot yet be said to be wholly elucidated. A more detailed study of these very important problems will be urgent in the coming years.

4. Length-measurements of cod. In Fig. 4 are given length-distributions in 5 cm. groups of cod from samples taken on the offshore banks and from two samples from coastal waters. The Roman numerals correspond with those given on the map (Fig. 3). The material consists mainly of measurements of tagged cod and of cod from which otoliths are taken. Some of the graphs are based upon a rather small number of measurements. Nevertheless the peaks of the graphs correspond fairly well with the occurrence of the different dominating year classes in the samples.

5. The growth rate. In table 1 are given the mean lengths of both sexes of cod belonging to the three year classes 1947, 1945 and 1942 from catches taken at twelve different localities off West Greenland in 1952 including samples from offshore banks, coastal waters and the fjords. In the same table are also given the mean lengths of cod five, seven and ten years old calculated from a large material taken in the years 1931 to 1939. It is evident that the mean lengths in 1952 are much lower than those found in the period 1931-39 indicating a slower growth rate. The mean lengths for cod belonging to the year class 1947 are about the same in 1952 as were found for four-year old cod in 1931-39. It is obvious that this very slow growth rate affects the output of the fishery to a very high degree. The slow growth rate may probably be ascribed to an overpopulation of cod in the area, or scarcity of food or some other environmental factor (climatic change?). The very low growth rate for cod from the Godthåb fjord is remarkable.

6. Tagging experiments with cod. A total of 1545 cod were tagged on the offshore banks on board the "Dana" in 1952. The localities where tagging experiments were carried out coincide with the stations where otolith samples were taken. On the map (Fig. 3) these stations are IV (121), VI (128), X (258), XI (139), XII (525), XIII (223), XIV (101), XV (50).

In coastal waters and in fjords 2234 cod were tagged on board the "Adolf Jensen". The stations were: V (397), VIII (103), IX (337) and XIX (1397). 153 recaptures were taken in 1952. 142 were taken in Greenland waters while 11 were taken at Iceland. The distribution by years of tagging is as follows:

Year of tagging	Recaptured in 1952 at	
	<u>Greenland</u>	<u>Iceland</u>
1946	1	-
1947	-	-
1948	15	2
1949	13	2
1950	11	1
1951	28	6
1952	74	-
Total	142	11

Eleven recaptures from Iceland is a little higher than the numbers of recaptures in that area in the years after the war but nothing compared with the numbers of recaptures taken in the years before the war in the Icelandic area. In 1939 for instance 66 recaptures were made at Iceland while 64 were taken at Greenland. In 1931 the numbers were 47 at Iceland and 32 at Greenland, in 1933 57 at Iceland and 22 at Greenland and in 1934 55 at Iceland and 48 at Greenland.

From eight of the eleven cod taken at Iceland in 1952 otoliths were received. These eight cod belonged to the following year classes:

Table 3.

Year class	1938	1942	1943	1945
Nr. of cod	1	4	1	2

The most interesting recapture was taken on Store Hellefiske bank on 30 August by an Icelandic trawler. Only the tag (small Lea tag) was found unattached and lying on the deck. The cod was marked on 6 August 1949 in Umanak 70°39'N 52°00'W and was only 20 cm. long when tagged. Doubtless it belonged to the year class 1947. In 1943 about 1000 small cod were tagged with Lea tags in Disko Bay and Umanak fjord, where very large schools of small cod, mainly belonging to the year class 1947, were concentrated. In 1951 two recaptures of small cod tagged in North Greenland were taken in the coastal waters of South Greenland in Amerdlok fjord 66°52'N 52°52'W and at Narssak near Godthåb 63°50'N 51°38'W. The cod were marked at Ritenbenk 69°43'N 51°20'W on 27 July and at Christianshåb 68°50'N 51°10'W on 26 August. They were taken in distances from the marking place of 210 miles and 360 miles respectively. The lengths were 42 and 33 cm. at the time of tagging and they belonged to the year classes 1943 and 1945. It appears from the experiments that there is a migration to South Greenland of small cod from North Greenland waters. It is possible that there was a very intensive migration of small cod of the year class 1947 in 1952 from North to South Greenland coastal waters and to the offshore banks, which explains the enormous occurrence of the year class 1947 especially on the northern banks. The lack of this year class in the sample XI seems to indicate that these small cod are distributed only over the more shallow parts of the banks near to land and not over the deeper water over the western slopes of the banks.

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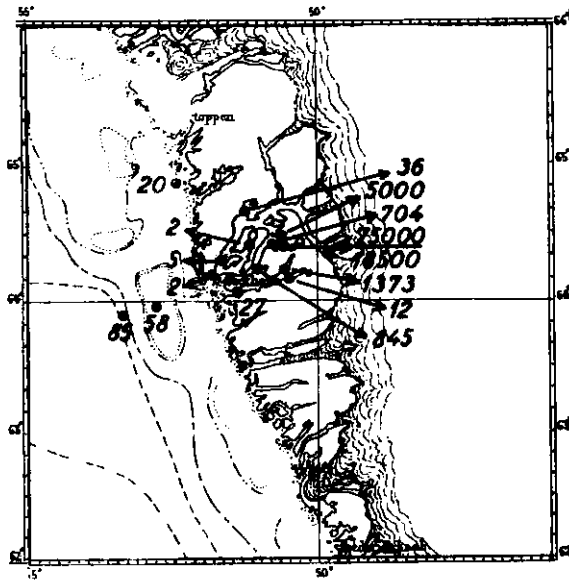


Figure 1.

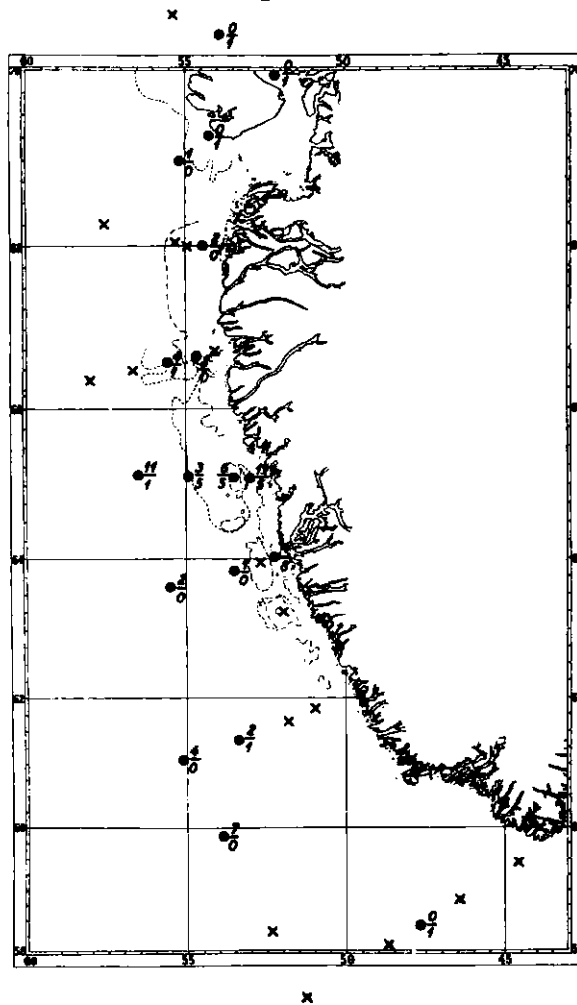


Figure 2.

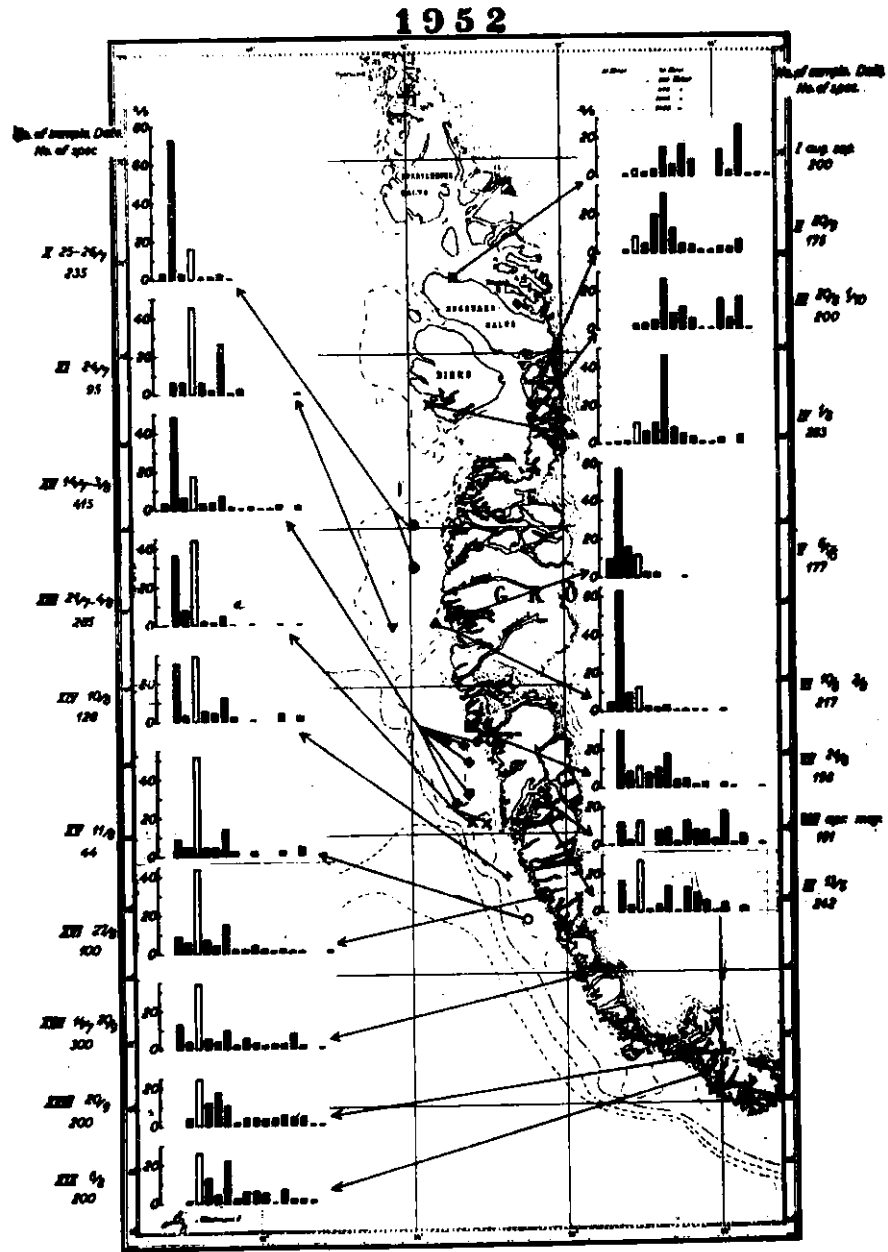


Figure 3.

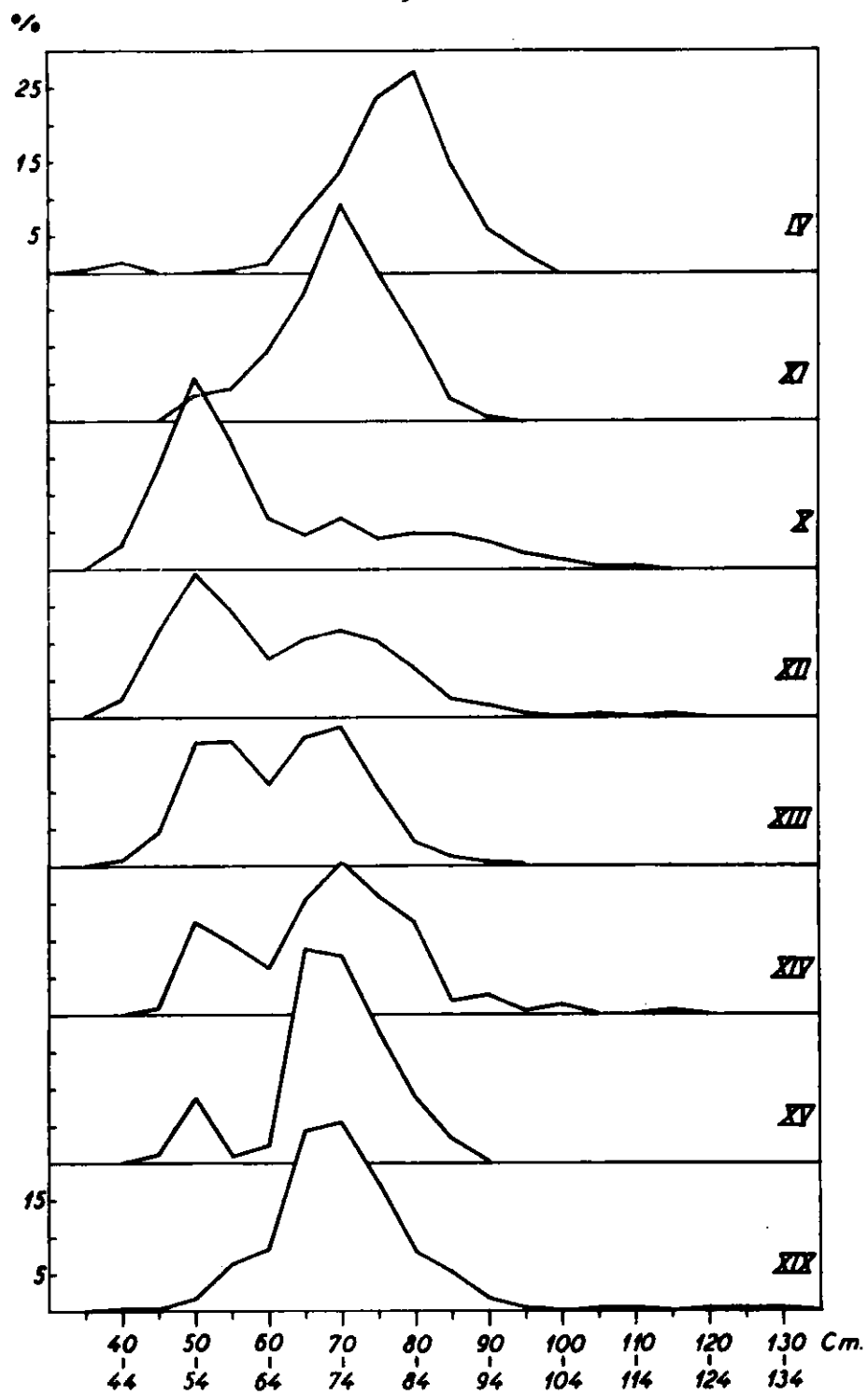


Figure 4.

