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A. Biology

By Paul M. Hansen

I. COD, West Greenland

1. Young Stages.

a. Occurrence of cod eggs.

In table 1 are presented the numbers of cod eggs caught in hauls of 30 minutes with 1 m stramin-net and 1 m nylon-net in the Godthåb Fjord area. The catches with nylon-net are given in brackets. Figure 1 shows the stations where the hauls were made. It is apparent that large quantities of eggs are taken in the spawning area proper (Stations 3, 4 and 5) in March and April. The numbers are somewhat greater than in any previous year. The numbers of eggs taken at the other stations were much smaller.

b. Occurrence of cod fry.

The numbers of cod larvae (fry) caught with 1 m stramin-net in the Godthåb Fjord area are also shown in Table 1.

The numbers of cod larvae caught by "Dana" in 30 minute hauls with a 2 m stramin-net in July are presented in Figure 2. The numbers caught were very low in the fjord-area as well as over the banks. The greatest numbers were, as in 1956 and 1957, caught on the stations west of the banks.

The small quantities caught indicate that the 1958 year-class will be a poor one.

c. Occurrence of small cod of age-groups I, II and III.

Small cod were taken in rather low numbers in fine-meshed seines and in shrimp-trawl (see Table 2). The length frequencies are presented in Figure 3. The largest amounts were found in catches c and e, 1,989 and 995 respectively.

It is difficult to state, based on these catches, which year-classes are expected to gain importance in the commercial fisheries in future years. However, there are reasons to assume that the 1957 year-class is rich, as large shoals of this year-class were observed in many places along the coast, where the bottom conditions did not permit the use of seines.

2. Commercial Sizes of Cod, Age and Length Composition.[1)]

a. Offshore banks.

Age determinations were carried out on 1,135 cod from the banks. Of these 879 were taken with handline from "Dana", end of July-beginning of August, 79 with longlines from "Adolf Jensen" on 6 May, 97 with handlines from "Sujumut" 4 September, and 80 with longlines from "Immanuel" 2 September. Figure 4 shows the age-composition in 6 of these 8 catches (the catches 7 and 8 are omitted in Figure 4, but included in Figure 5).

1) The data referring to this section will be presented in tabular form in the 1958 Sampling Yearbook.

TABLE 1. Number of cod eggs and larvae taken per 30 minute hauls in the Godthåb Fjord area with 1 m stramin-net (nylon-net figures in brackets).

Stations		March 15-31	April 1-15	April 15-30	May 1-15	May 15-31	June 15-30	July 1-15
3	Eggs	(3190)	(350000)	(105000)				
	Larvae							
4	Eggs	(4350)	(78400)	(148000)				
	Larvae							
5	Eggs	(11890)	3730 (3380)	125000 (115000)		5981 (8000)		0 (6)
	Larvae							5 (2)
6	Eggs	(27)						
	Larvae							
7	Eggs				150	1370		
	Larvae				1			
8	Eggs	9		84 (81)		147 (106)		0 (0)
	Larvae							1 (1)
9	Eggs	1 (0)		36 (52)	60 (81)			0 (2)
	Larvae							1 (8)
10	Eggs	0			10 (8)		8	(0)
	Larvae						14 (1)	(1)

TABLE 2.

Sample	Locality	Date	Gear	Number of fish
a	Frederikshåb district	11.6.	seine	281 (ages determ.)
b	Frederikshåb district	13.6.	"	84
c	Godthåb district	5.7.	"	1989 (ages determ.)
d	Godthåb district	23.7.	"	608
e	Holsteinsborg district	15.6.	"	995
f	Godthåb district	30.1.	shrimp trawl	239 (ages determ.)
g	Godthåb district	26.2.	" "	176 (ages determ.)
h	Godthåb district	14.4.	" "	104 (ages determ.)

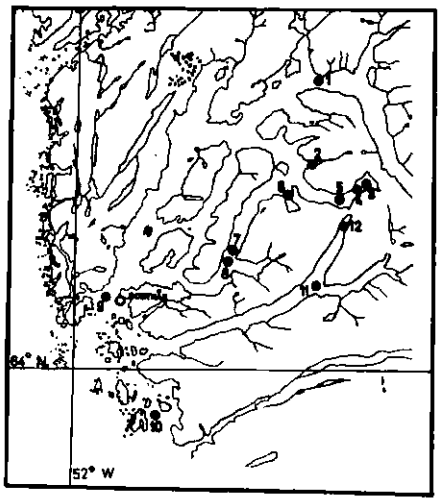

Figure 1. The positions of the stations at which cod eggs were taken in 30-minute hauls with the 1 m. stramin net and the 1 m. nylon net by "Adolf Jensen" and "Tornaq" with 100-50 m. wire out.

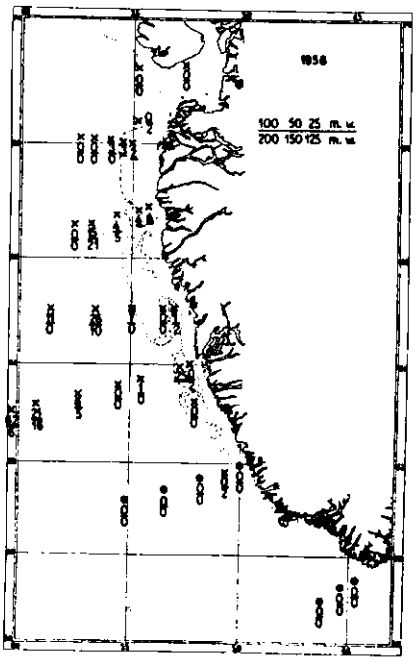

Figure 2. Catches of cod larvae in 30-minute hauls with the 2 m. stramin net taken by "Dana".

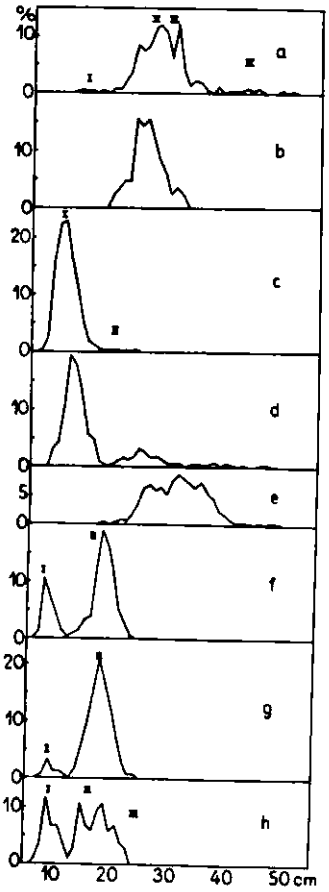

Figure 3. Length frequencies of small cod, age-groups I, II, and III.

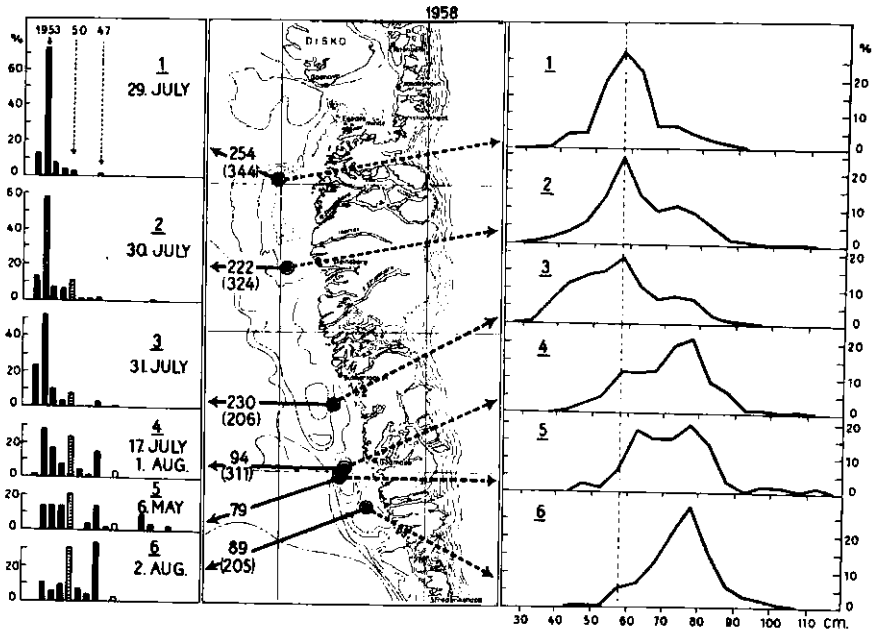

Figure 4. Percentage age distribution (left) and length measurements by 5 cm groups (right) of cod caught on the Greenland banks in 1958. The numbers of fish examined and of cod tagged (bracketed figures) are given for each station.

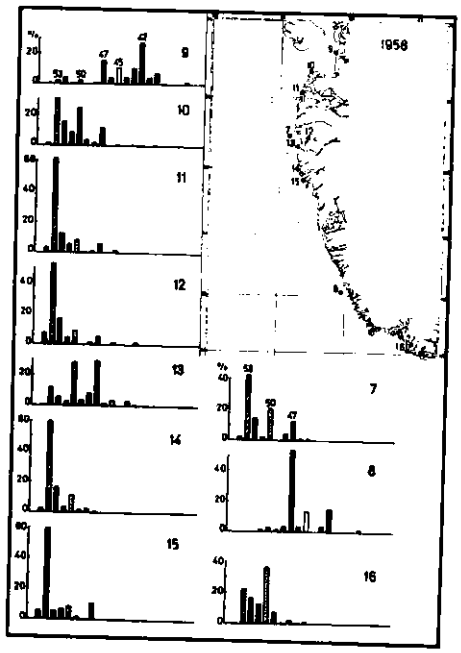

Figure 5. Percentage age distribution of cod caught in the coastal area of West Greenland in 1958 (No. 7 and 8 from the banks).

It is apparent that the 1953 year-class predominates very strongly (40-70%) in catches 1, 2, 3 and 7 (Subdivisions 1A, 1B and 1C). Three catches were made in 1D; in no. 4 the 1953 year-class predominates with a little more than 25%, in no. 5 the 1950 year-class, and in no. 6 the 1947 year-class (ca. 30%). Subdivision 1E is only represented by one sample (no. 8, longline, 2 Sept.); the 1947 year-class predominates with 58%.

Judging from these catches a strong improvement seems to have occurred for the 1953 year-class, especially in Subdivisions 1B and 1C, whereas the 1950 and 1947 year-classes were greatly reduced. The two latter year-classes only predominated in the catches from 1D and 1E.

The length distribution of the catches, shown in Figure 4 (right), are clearly conforming with the age composition. In the three northernmost catches mainly smaller cod are present; considerably larger cod are found in the more southerly catches, nos. 4, 5 and 6. The catch no. 6, with the 1947 year-class predominating includes mainly large cod.

b. Inshore waters and fjords.

From the coastal region and from the fjords 3,764 cod were aged, 2,440 distributed over 17 catches from Godthåb Fjord and the remainder 1,324 on eight catches from other areas. The age-compositions and the localities are shown in Figures 5 and 6.

These samples are distributed over the various subdivisions as follows:

Subdivision	1A	1B	1C	1D	1E	1F
No. of samples	1	4	2	17	0	1

Ten samples are shown on the map Figure 5 (nos. 7 and 8 of these, as taken on the banks, have been considered in the preceding section). The samples from 1D, all from Godthåb Fjord and the coastal area nearest to the Fjord, are presented in Figure 6.

Sample no. 9 is from Subdivision 1A. In this subdivision the stock of cod, as well as the fishery, has declined considerably, and was of hardly any importance in 1958. The 1942 year-class predominates in the sample in accordance with the established fact that the old year-classes are the strongest in this northern region. The 1953 year-class is very strongly represented in the samples from the coastal areas, as was also the case for the samples from the bank. However, the 1947 year-class predominates in the Holsteinsborg Deep (no. 13) whereas the 1950 year-class is the strongest in no. 16 from Subdivision 1F.

The samples are not so evenly distributed over the subdivisions as to afford a true picture of the age distribution for the whole of the West Greenland region. Thus there are no samples from the coastal area of 1E, and 1F is represented by only one sample.

It is feared that part of the material sent to this laboratory was lost in a recent shipwreck.

From the material available it appears, however, that a reduction of the 1947 and 1950 year-classes has occurred in the northern area, while the 1953 year-class has improved considerably. This year-class will no doubt play an important role in the catches in 1959. In 1958 the 1953 year-class presented sizes between 55 and 60 cm and an average individual weight of ca. 2kg. In 1959 it is expected to have a mean length of 65 cm and a mean weight of ca. 3 kg.

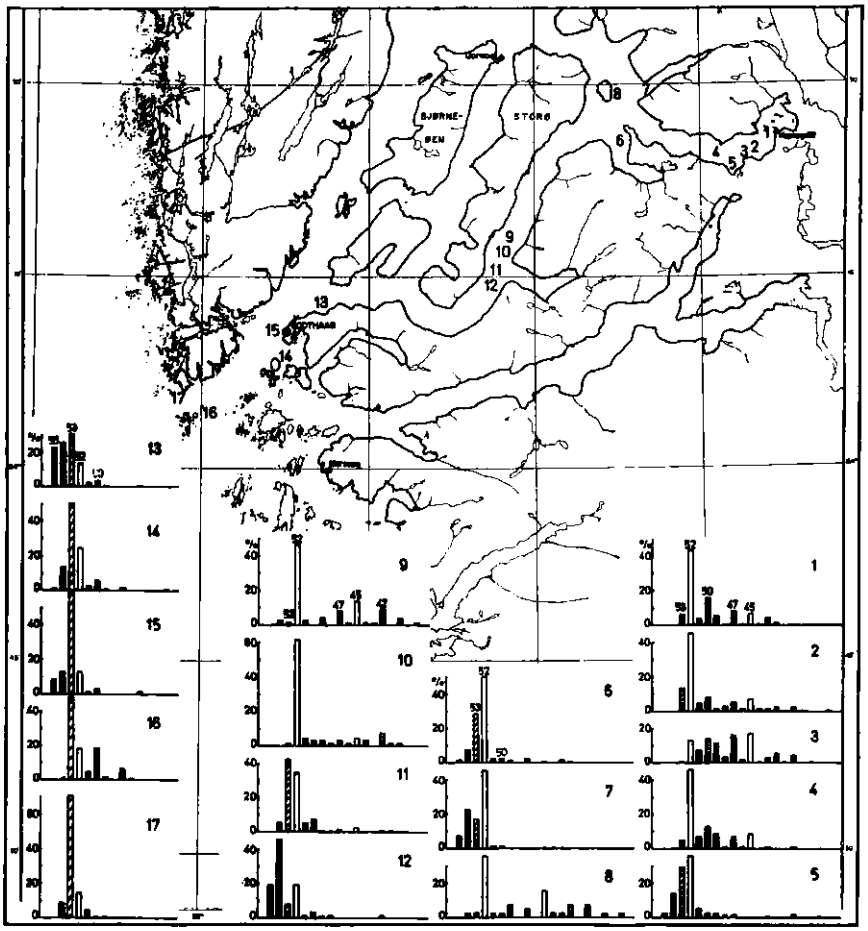

Figure 6. Percentage age distribution of cod caught in the Godthab Fjord area in 1958.

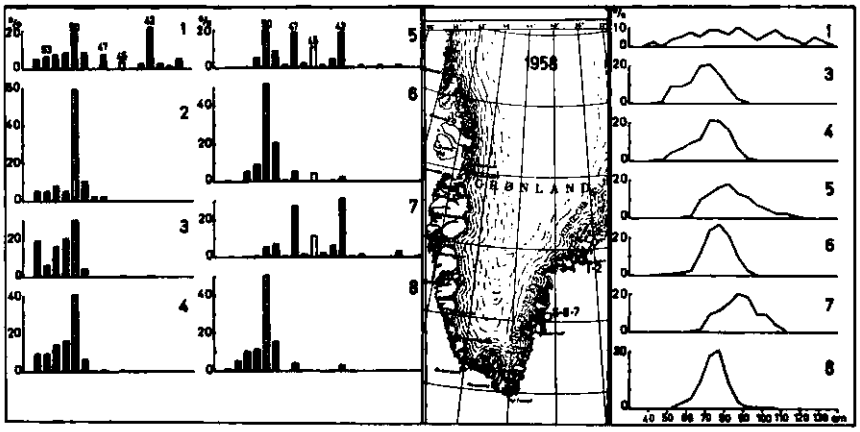

Figure 7. Percentage age distribution (left) and length measurements by 5 cm groups (right) of cod caught in Angmagssalik district, East Greenland 1958.

II. COD, East Greenland.

The research work in Angmagssalik district in Southeast Greenland which was started in 1957 was continued in 1958 (5th August to 22 September).

From 8-14 August large concentrations of cod were observed at Skjoldungen (63°N) on the bank as well as near the coast in a depth of 170 m. The cod were present below the layer of polar water which reached from 30-170 m. Good catches of cod were taken on 8 August on the bank of Skjoldungen with longlines and handlines (Figure 7, nos. 5 and 6). The fishing with these two types of gear was carried out in the same place and at the same depth, but the catches were completely different as to age- and size-distribution. The longline catches included the 1942, 1947 and 1950 year-classes in almost the same proportion (15-20%), while the 1950 year-class made up over 50% of the handline catch leaving only less than 5% for each of the year-classes older than 1948; the 1949 year-class came to 20%.

On 12 and 13 August two catches were made, one (no. 7) with longline from the Skjoldungebank, and another (no. 8) with handline from the mouth of the Skjoldungesound. Also these catches show that the longlines take cod of the large old 1942 and 1947 year-classes, the handlines mainly cod of the younger 1950 year-class (50%). The fact that the longlines used on the bank only included ca. 5% of the 1950 year-class, which was so richly represented in inshore handline catches, may well be explained by this year-class having migrated to the coastal area.

The samples from the Angmagssalik Bank show the same differences in age composition between longline and handline catches. In sample no. 3 from the coastal area of Angmagssalik are many cod of the young year-classes, while the 1950 year-class constitutes 30%. In the Angmagssalik Fjord this year-class is more numerous (40%); it formed the basis for the fishery for cod which commenced here in 1958. Also at Angmagssalik there is a migration of cod into the fjord. Thus, in the beginning of September hardly any cod were observed on the bank and the longlines yielded almost exclusively halibut; at the same time cod occurred in large quantities in the fjord itself. Of a catch of 37 cod from handline fishing on the Angmagssalik Bank (22 August) 22 belonged to the 1950 year-class. These cod were exceptionally large with a mean length of 85.7 cm or 8-10 cm higher than the averages of the same year-class in other East Greenland samples. This fast growth indicates that these 22 cod belong to the Icelandic stock. None of them were ripe. Obviously they are Icelandic cod which during their feeding-migrations have reached the East Greenland waters.

III. COD, Age at First Maturity (Table 3).

The age of cod at first maturity was investigated by means of the otoliths and for the following regions: West Greenland Banks, coastal area north of 63°N (1A, 1B, 1C), and south of 63°N (1F), the Godthåb Fjord, and the Angmagssalik district (East Greenland). Only cod of the old rich 1942, 1945 and 1957 year-classes were considered. Greater differences as to age at first maturity were not observed for these year-classes. Obviously the females become mature at a later age than the males.

IV. COD, Tagging Experiments (Tables 4 and 5)

A total of 2,881 cod were tagged at West Greenland in 1958: 1,300 on the banks and 1,581 in fjords and coastal waters (of these 657 in the Godthåb Fjord). At East Greenland, Angmagssalik district 1,015 were tagged.

TABLE 3. Age at first maturity of the 1942, 1945, and 1947 year-classes of Greenland cod in 1958.

Banks off the west-coast

1942 year-class					1945 year-class					1947 year-class				
age	no. ♂♂	%	no. ♀♀	%	age	no. ♂♂	%	no. ♀♀	%	age	no. ♂♂	%	no. ♀♀	%
imm	-	-	-	-	imm	-	-	-	-	imm	-	-	-	-
6	1	14.3	1	8.3	6	1	9.1	1	10.0	6	3	4.1	-	-
7	4	57.1	7	58.3	7	5	45.5	-	-	7	39	53.4	17	36.2
8	1	14.3	4	33.3	8	4	36.4	7	70.0	8	27	37.0	22	46.8
9	1	14.3	-	-	9	-	-	2	20.0	9	4	5.5	6	12.8
10	-	-	-	-	10	-	-	-	-	10	-	-	2	4.3
11	-	-	-	-	11	1	9.1	-	-	11	-	-	-	-
Total	7		12			11		10			73		47	
mean age		7.1		7.2			7.6		8.0			7.4		7.9

Coastal area north of 63°N.

imm	-	-	-	-	imm	-	-	-	-	imm	-	-	2	3.6
5	-	-	-	-	5	-	-	-	-	5	1	1.6	-	-
6	3	20.0	1	4.3	6	1	10.0	1	7.1	6	-	-	-	-
7	9	59.9	14	60.9	7	2	20.0	5	35.7	7	26	41.9	9	16.1
8	2	13.3	5	21.7	8	3	30.0	7	50.0	8	25	40.3	25	44.6
9	1	6.7	3	13.0	9	4	40.0	1	7.1	9	10	16.1	18	32.1
10	-	-	-	-	10	-	-	-	-	10	-	-	2	3.6
Total	15		23			10		14			62		56	
Mean age		7.1		7.4			8.0		7.6			7.7		8.2

Godthåb Fjord

imm	-	-	-	-	imm	-	-	-	-	imm	1	2.4	-	-
6	1	5.6	3	18.8	6	6	13.6	8	16.0	6	5	12.2	8	14.0
7	13	72.1	6	37.5	7	26	59.1	24	48.0	7	14	34.1	19	33.3
8	2	11.1	5	31.3	8	8	18.2	12	24.0	8	18	43.9	25	43.9
9	2	11.1	1	6.3	9	3	6.8	5	10.0	9	2	4.9	4	7.0
10	-	-	1	6.3	10	1	2.3	1	2.0	10	1	2.4	1	1.8
Total	18		16			44		50			41		57	
Mean age		7.3		7.4			7.3		7.3			7.5		7.5

East coast

imm	-	-	-	-	imm	1	5.3	1	3.2	imm	1	2.1	3	6.1
6	4	13.3	2	2.7	6	3	15.8	1	3.2	6	2	4.3	-	-
7	13	43.3	33	43.9	7	7	36.8	8	25.8	7	16	34.0	14	28.6
8	10	33.3	31	41.2	8	4	21.1	8	25.8	8	19	40.4	18	36.7
9	3	10.0	5	6.7	9	2	10.5	4	12.9	9	8	17.0	10	20.4
10	-	-	2	2.7	10	1	5.3	7	22.6	10	1	2.1	4	8.2
11	-	-	2	2.7	11	1	5.3	2	6.5	11	-	-	-	-
Total	30		75			19		31			47		49	
Mean age		7.4		7.9			7.7		8.5			7.8		8.1

TABLE 4. Marked cod recaptured at Greenland (Gr.) and at Iceland (Ic.) in 1958, tabulated according to age and year of liberation.

Year-class	Age-group	1951		1952		1953		1954		1955		1956		1957		1958		Total		
		Gr.	Ic.	Gr.	Ic.	Gr.	Ic.	Gr.	Ic.	Gr.	Ic.	Gr.	Ic.	Gr.	Ic.	Gr.	Ic.	Gr.	%	Ic.
1938	XX	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	0.2	-
1940	XVIII	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	0.2	-
1942	XVI	-	-	-	-	-	-	2	-	-	-	2	-	6	-	1	-	11	2.2	-
1943	XV	-	-	-	-	1	-	1	-	-	-	-	-	1	-	-	-	3	0.6	-
1945	XIII	-	-	-	-	-	-	4	1	1	-	-	-	9	1	-	-	14	2.8	2
1946	XII	-	-	-	-	-	-	-	-	2	-	1	-	2	-	-	-	5	1.0	-
1947	XI	-	-	2	-	1	-	11	-	10	-	28	-	42	-	10	-	104	20.9	-
1948	X	-	-	-	-	-	-	-	-	1	-	2	-	3	-	1	-	7	1.4	-
1949	IX	-	-	-	-	-	-	2	1+)	4	-	2	1	6	2	-	-	14	2.8	4+)
1950	VIII	-	-	-	-	-	-	3	-	16	-	16	-	65	3	13	-	113	22.7	3
1951	VII	-	-	-	-	-	-	-	-	1	-	1	-	26	1	3	-	31	6.2	1
1952	VI	-	-	-	-	-	-	-	-	-	1	4	-	77	-	4	-	85	17.0	1
1953	V	-	-	-	-	-	-	-	-	-	-	-	-	53	-	15	-	68	13.7	-
1954	IV	-	-	-	-	-	-	-	-	-	-	2	-	28	-	3	-	33	6.6	-
1955	III	-	-	-	-	-	-	-	-	-	-	-	-	7	-	1	-	8	1.6	-
??		2	-	-	-	4	-	20	3	19	1	58	2	125	-	45	-	273		6
Total number		2	-	2	-	6	-	45	5+)	54	2	116	3	450	7	96	-	771		17+)

+) One cod recaptured at East Greenland.

From West Greenland tagging experiments 788 recaptures were reported: 771 from West Greenland, 16 from Iceland, and 1 from East Greenland. The recapture from East Greenland was made by a German trawler near Angmagssalik on 7 March 1958. The cod had been tagged 7 December, 1954 in the inshore water of Subdivision 1F. The 16 recaptures from Iceland had been tagged as follows in the subdivisions: 1B - 1, 1C - 3, 1D - 8, 1E - 1, and 1F - 3.

Otoliths of 509 recaptured cod were forwarded. Ca. 75% belonged to the 1950, 1947, 1952, and 1953 year-classes. The 1952 year-class amounts to no less than 17% of the aged, recaptured cod, due to the large amount of tagging (over 2,000) in Godthåb Fjord in 1957 and 1958 when the 1952 year-class constituted a very large part of the stock. In other West Greenland localities it was of no importance. A total of no less than 56 cod of this year-class were recaptured in 1958 in the Godthåb Fjord itself.

In Table 5 are presented numbers of recaptures reported by the various countries. As usual Portugal has reported the highest numbers, about one half, while the Greenlanders have reported about 1/3 of the recaptures from Subarea 1.

From the tagging experiments at East Greenland in 1957 three recaptures were reported in 1958; one from East Greenland by a German trawler. The cod was tagged 16 September 1957 at Angmagssalik (65°35'N -37°35'W) and recaptured 22 September 1958, 66°50'N-35°45'W. Two other recaptures from Iceland are from the same experiment, they were recaptured off West Iceland 26 April, and off NW Iceland 15 June, 1958.

TABLE 5. Cod tagged at West Greenland in different years recaptured in 1958.

	West Greenland	Iceland	East Greenland
Greenland	253	-	-
Faroe Islands	12	-	-
Norway	15	-	-
Iceland	25	9	-
United Kingdom	22	2	-
France	9	-	-
Germany	36	5	1
U.S.S.R.	2	-	-
Spain	13	-	-
Portugal	384	-	-
Total	771	16	1

V. HALIBUT

Halibut were caught on the banks off Angmagssalik, East Greenland on longlines in the period 22 August to 8 September. Five hauls were made with a total of 4,800 cod-hooks and 2,600 halibut-hooks. The total catch from these hauls amounted to 144 halibut, 43 cod, 16 Anarhichas minor and 49 A. denticulatus, together with a few other fish without any commercial importance. Seventeen halibut were tagged with Petersen disks; from the rest, otoliths were taken for age-determinations. Halibut were always found in smaller quantities in the fjords.

Of 152 halibut, 75 were males and 77 females. The length distribution of the two sexes is shown by 10 cm groups in the following Figure 8.

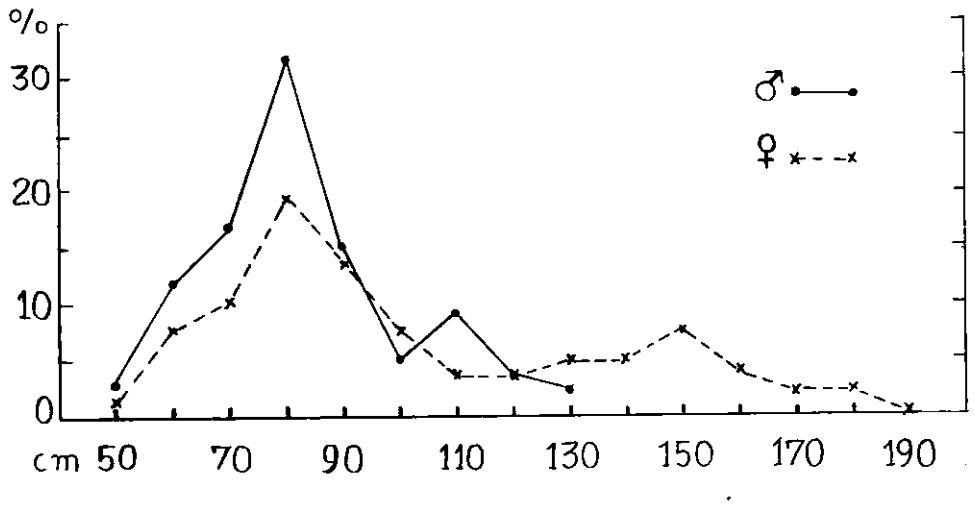

Figure 8. Length distribution by 10 cm groups of males and females of halibut caught off Angmagssalik in 1958.

VI. REDFISH

Fishery with shrimp-trawl for small redfish was carried out in continuation of experiments of previous years in Godthåb Fjord (1D) and in Tunugdliarfik Fjord (Julianehåb district, 1F). Tables showing the length distribution of the samples will be presented in the 1958 Sampling Yearbook. The total catch was 4,107 redfish in the Godthåb Fjord (April: 2 hauls, May: 1, July: 2, and October 1) and 794 in Tunugdliarfik Fjord (October: 2 hauls, November: 2).

Otoliths were collected for age-dtermination, and various meristic observations were made for the purpose of racial studies.

In the Godthåb Fjord 41 redfish were tagged.

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B. Hydrographic Conditions in the Eastern Part of Labrador Sea and Davis Strait in 1958 (Figures 1-8).

By Frede Hermann

The sections I to VI shown in Figure 1 were worked with R/V "Dana" from July to August.

Figure 1 further shows the temperature distribution at 50 metres. The sharp front between the Arctic and the Atlantic component of the West Greenland Current is clearly seen in the southern part of the area.

Off Godthåb a part of the West Greenland Current bends westward and later southwestward and meets the cold Labrador Current. Over the West Greenland banks the temperatures were a little below normal on Dana Bank and Fiskenaes Bank but about normal from Fylla Bank and northward. In the area west of the banks the temperatures were lower at 50 metres than normal except in the southernmost part of the area.

The conditions are further illustrated by the sections Figures 2 - 7. Off Cape Farewell and Frederikshåb the Arctic component of the West Greenland Current seems to be weak, and the temperature at its core was not as low as usual. The warm Irminger Current was well developed. West of Fylla Bank and Lille Hellefiske Bank the temperature in the upper 100 metres was lower than in 1957, which probably is due to stronger winter cooling. The Irminger Current which is found here as an undercurrent was well developed.

In the western part of the three northernmost sections the cold Baffin Land Current with temperatures below -1° was met. The boundary of this current seems to lie further eastward than usual.

A fixed station at the entrance to the Godthåb Fjord (64°07'N, 51°53'W) was worked frequently throughout the year with the M/C "Adolf Jensen" and the M/C "Tornaq". The variation of the temperature from January 1958 to March 1959 is shown in Figure 8. The winter cooling in 1958 was strong so water with negative temperature reached from surface to bottom both in January and March. In late April an inflow of warm bottom water took place and a still stronger inflow of warm bottom water occurred in October - November. The winter cooling in 1959 was less severe than in 1958.

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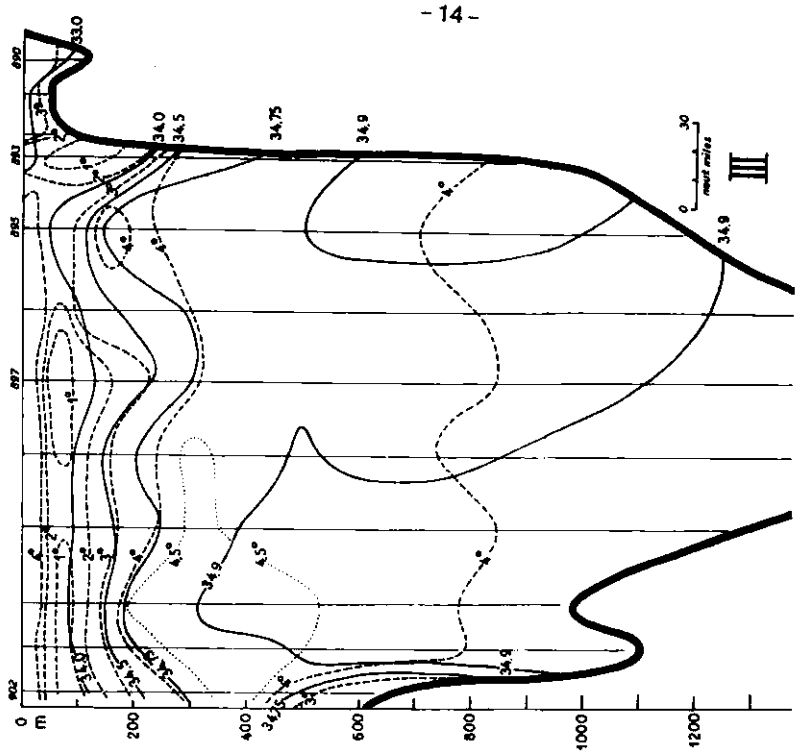

Figure 4. Section III across Fylla Bank, 17-20 July, 1958.

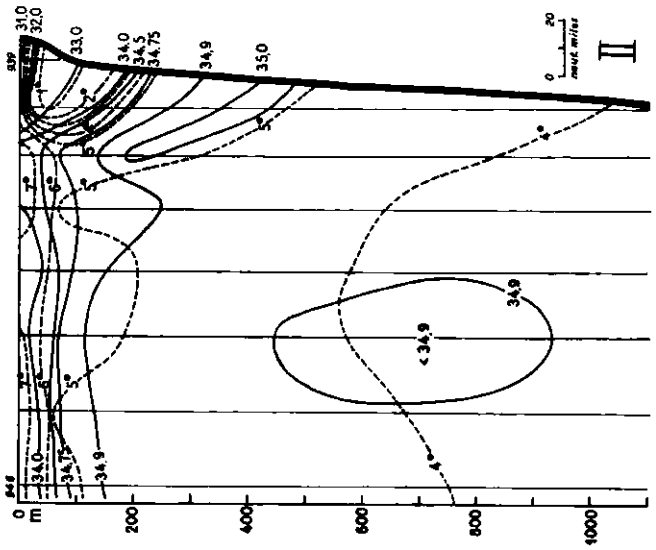

Figure 3. Section II off Frederikshåb, 9-10 Aug., 1958.

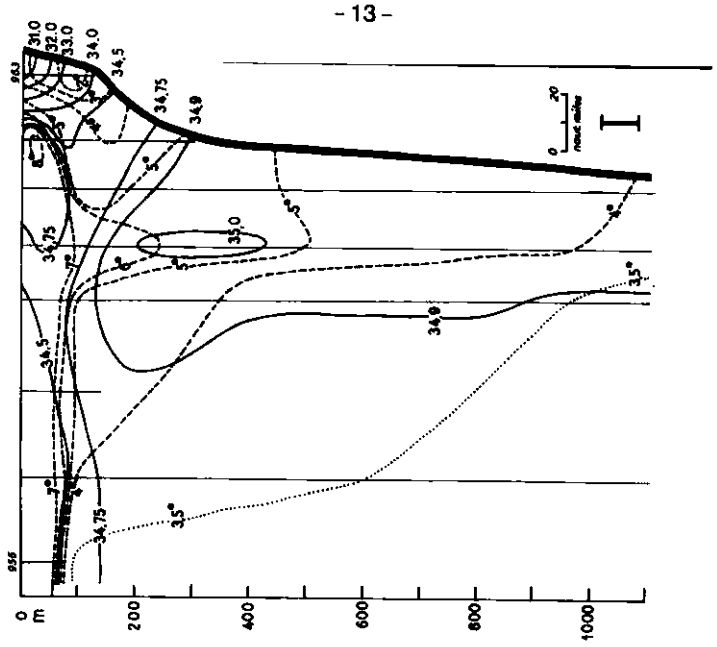

Figure 2. Section I off Cape Farewell, 13-15 Aug., 1958.

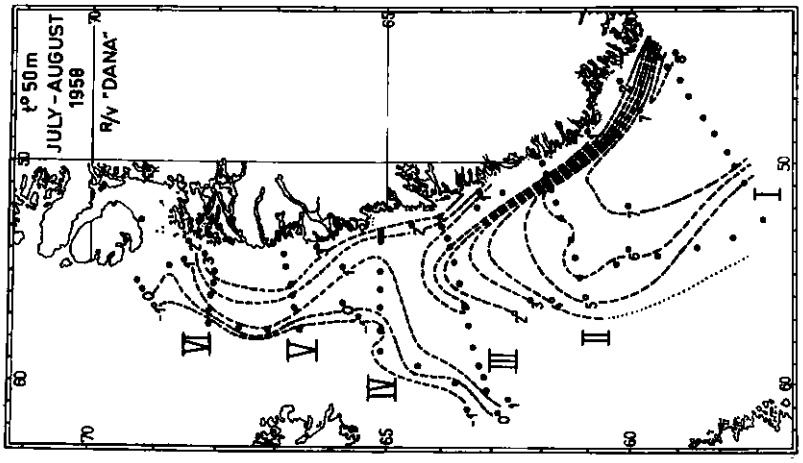

Figure 1. Location of sections and distribution of temperature at 50 metres.

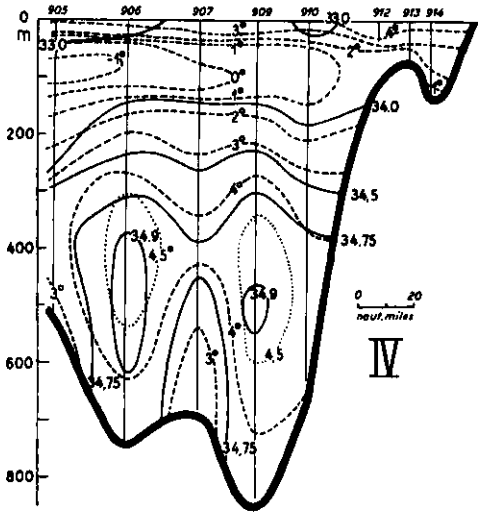

Figure 5. Section IV across Lille Hellefiske Bank, 20-22 July, 1958.

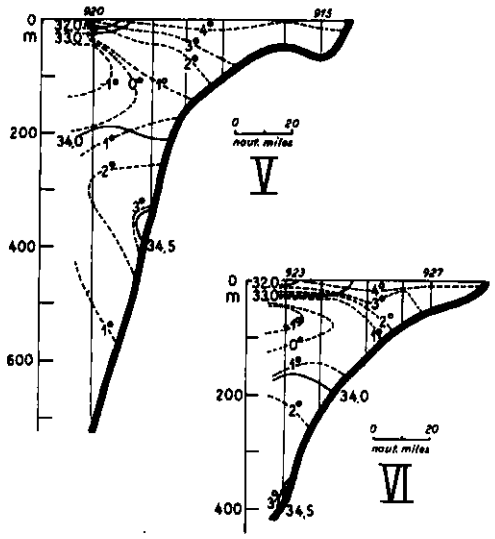

Figure 6. (above right) Section V across Store Hellefiske Bank, 22-23 July, 1958.
Figure 7. (below left) Section VI off Egedesminde, 24 July, 1958.

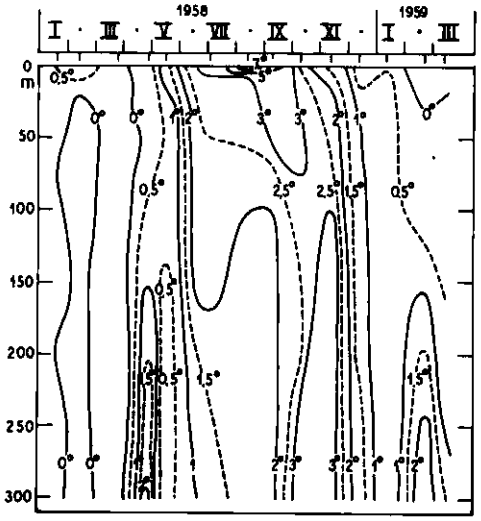

Figure 8. Variation of temperature at the entrance to the Godthåb Fjord.