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A. W. Greenland. by Paul M. Hansen

I. COD

1. Cod Fry and Small Cod in Coastal Waters and on Offshore Banks, 1959.

a. Occurrence of eggs and larvae.

The catches of cod eggs in 1 m stramin net, 30 min. hauls, 100-50 m W. in the Godthaab fjord area were much smaller than in previous years. The highest number caught was 1973 eggs, taken on 4th April on a spawning ground near Kapsigdlit in the innermost part of the fjord.

On the 10 May 1036 and on the 13 May 1133 eggs were taken at two other stations in the fjord. On no other station did the number of eggs exceed 100.

Three hauls with a 1 m stramin net were made in the Davis Strait on the 5 June. A haul between the coast and Fylla Bank yielded 7 eggs, a haul on the bank none, and a haul on the western slope of the bank yielded 93 eggs. In addition on the first station one cod larvae was caught, on the last station 7, but none at the station on the bank. As the cod spawn on the western slope, it is only natural that the largest catches of egg and larvae were made there.

The numbers of cod eggs and larvae caught with stramin net by "Dana" in July are shown in Figure 1. For the first time during the nine years' investigations from "Dana" in the Davis Strait in July eggs were observed in the hauls. In Figure 1 the numbers of eggs are given in brackets. A total of 30 cod eggs were taken in six hauls from four different stations. These catches of eggs indicate a retarded hatching of eggs in 1959.

The distribution and frequency of cod larvae did not differ much from the year 1958. The largest numbers were observed west of Fylla Bank (63°18'N-57°47'W). On the westernmost station of the section across Fylla Bank (62°52'N-61°18'W), close to the edge of the ice covering the western part of the Strait, no larvae were caught.

The scarce occurrence of eggs and larvae of cod indicate that the year-class 1959 will become a poor year-class of small importance for the commercial fishery.

b. Occurrence of age-groups I, II and III.

Small cod occurred in large quantities along the coast. Good catches were made with fine-meshed seine near the beach and with shrimp trawl in 200-250 m. A summary of the catches is presented in Table 1, and the length-distribution of the different catches in Figure 2. A total of 11,373 small cod from 17 catches were measured, and 1,582 otoliths were aged from fifteen of these catches.

It is apparent from the length-distribution that one age-group, the II-group (1957 year-class) predominates strongly in most of the catches. This was to be expected as the 1957 year-class occurred

numerously along the coast of Godthaab (1D) and Holsteinsborg districts (1B) in 1958. In the samples a-h and in j, it is - practically speaking - the only year-class present. Samples g-n are from shrimp trawl at two localities close to one another in Godthaab district (1D). In six of these samples the II-group predominates, in the two remaining, i and k, the III-group. From the length distribution, it could appear as if the III-group dominated in l and m. However, the age determinations show that the II-group is the one predominating. The reasons for the great difference in the length distribution of the II-group in samples g-k and l-n is due to the fact that the g-k samples are taken January-March, while the l-n samples are from November-December. Between the two sets is an interval of 7-8 months, and in that time the individuals of the II-group have grown 7-10 cm.

The samples o, p and q are from catches with shrimp-trawl, fine-meshed seine and pound net, respectively, from Subdivision 1F. p and q are from the same locality and time, but they are highly different as regards length distribution, as the seine easily retains the small fish, while such small fish easily escape through the meshes of the pound net. o and q include exclusively the III-group (1956 year-class), apart from very few specimens of the IV-group. In p the I- and III-group are almost equally represented. All the three samples from 1F differ from the samples from the other subdivisions insofar as the II-group (1957 year-class) is lacking.

The rich occurrence of the 1957 year-class in the catches of small cod (I-, II- and III-group) confirms the assumption, cited in the 1958 research report, that this year-class is to be considered a rich one, which in the future will be of importance to the W. Greenland fishery (vide Ann. Biol. ICES Vol.XV, p.86). Table 2 presents the average lengths of cod of the I-, II- and III-age-groups in the samples a-o.

2. Commercial Fish, Coastal Waters and Offshore Banks.

a. Age-composition.

Offshore Banks:

Otoliths of 974 cod were collected from the banks; 94 are from long-lines, "Adolf Jensen", 5 June, Fylla Bank, 880 are from hand-lines, "Dana", 23 July-2 August. Figure 3 presents age- and length distribution by 5 cm groups.

It is to be noted that otoliths for aging were taken of those cod in the catches, which due to damage were not suited for tagging. As small cod are those most apt to be hurt, these will be included in the samples for age determination with too high percentages compared to the larger fish. This especially holds good for the catches Nos.4 and 5 in Figure 3, where the length distribution curves, including measurements of tagged as well as aged cod, show a higher frequency of larger cod than expected from the age analyses. For the remaining samples this is of no importance.

The 1953 year-class predominates in five of the catches, the 1955 year-class in three; the 1947 year-class is dominating in the long-line catches from the edge of Fylla Bank on 5 June.

Mainly smaller and middle-sized cod are present in the catches from Store Hellefiske Bank (1B) which almost exclusively consist of cod of the 1953 year-class or of younger cod.

The catches from Lille Hellefiske Bank and Banan Bank include small as well as large cod, as they consist of, besides the 1953 and younger year-classes, also of some older cod, especially of the 1947 and 1950 year-classes. In the age analyses of these catches, however, the older year-classes 1950 and 1947 are, as already mentioned, too weakly represented. The catches from Fylla Bank and Fiskenaes

Bank (1D) include in the main larger cod, as hardly any cod younger than the 1953 year-class were caught.

The 1953 year-class was in 1959 without doubt the most important for the fishery in the whole of the Davis Strait. The older, rich 1947 and 1950 year-classes appear to have played a bigger role on the more southern banks than on Store Hellefiske Bank, but both these year-classes are now strongly reduced in number.

Inshore Waters and Fjords:

From the coastal area and the fjords 5403 cod from 31 catches were aged. Age analyses and localities are presented in Figure 4. The catches are distributed through the subdivisions as follows:

1A	1B	1C	1D	1E	1F
3	2	5	10	3	8

Of the 10 catches in 1D five are from the Godthaab Fjord.

Samples No.1 and 2 are from 1A. The 1947 year-class predominates in No.1 with 25%. The older 1945 and 1942 year-classes, both with ca. 11%. The older year-classes have always accounted for a considerable portion of the catches at this northern locality. The 1942 year-class predominated in all samples from 1951 to 1958. The 1953 year-class predominates in No.2 with more than 35%; 1947 accounts for 20%, while all other year-classes are below 10%.

The three samples (Nos.3, 4 and 5) from 1B are dominated completely by the 1953 year-class with 60-65%.

In 1C the 1953 year-class predominates in four of the five (Nos.6, 7, 8, 9 and 10) samples; in No.6 it makes up more than 65%. The 1947 and 1950 year-classes are better represented in this subdivision than in 1B. In No.8 the 1947 year-class predominates, while the 1950 year-class holds the second place.

In Subdivision 1D samples Nos.11-15 are from the mouth of Godthaab Fjord, and 16-20 from the fjord proper. The samples from the mouth of the fjord are taken on long-line, with the exception of No.11 taken by hand-line. The 1953 year-class predominates in No.11 with the 1956 year-class as second; the remaining year-classes are unimportant. The other four catches (Nos.12-15), long-line catches from deep water, are more uniform as to age composition. The 1947 year-class dominates in all of them. The five samples from Godthaab Fjord present a rather differing composition. The two long-line catches (No.16 and 18) are from deep water, ca. 300 m, and are rather homogeneous with the 1947 year-class predominating. No.17 taken on hand-line and No.19 from long-lines, only 50-100 m depth, include - contrary to No.16 and 18 - mainly small fish. In No.17 the following year-classes - mentioned in their order of frequency - are dominating: 1955, 1953 and 1954. The 1955 year-class is the richest in No.19, next comes 1952. The 1952 year-class dominated in several of the samples from Godthaab Fjord in 1958. Therefore it is surprising that it only is of greater importance in one of the samples from 1959.

Sample No.20 is from a shrimp-trawl, and therefore includes almost only small cod of the 1955 year-class.

In three samples No.21, 22 and 23 from Subdivision 1E the 1953 year-class is the richest. In No.21 from June it accounts for more than 50%. In No.23 from October the 1947 and 1950 year-classes are better represented than in the two other samples, with between 15 and 20%.

In eight samples (No.24-31) from Subdivision 1F the 1947 year-class is only very weak, while the 1950 year-class on the whole is more numerous than in the other subdivisions. It dominates in two

samples (No.28 and 31) and comes next in three (No.25, 26 and 30). The 1953 year-class is here - as in most of the other subdivisions - the strongest, predominating in five of the eight samples. In No.24 the 1956 is the richest with ca. 35%. This year-class was only of importance in one sample from the other subdivisions, viz. No.11 from the mouth of the Godthaab Fjord (1D).

II. REDFISH

The fishing experiments with shrimp-trawl at Pisigsarfik in Godthaab Fjord for small redfish have been continued. Six hauls were made distributed over the months March, June, October, November and December. A total of 7319 redfish were caught and measured (see "Sampling Yearbook"). Otoliths for age analysis were collected from portions of the samples.

III. GREENLAND HALIBUT.

Investigations on the Greenland halibut have been carried out in Umanak Fjord, Disko Bay and Godthaab Fjord. Catches by long-lines have been measured and weighed and otoliths have been collected. Tagging of 266 Greenland halibut was made in Godthaab Fjord.

B. W. Greenland. by J. S. Joensen

I. COD

Faroese investigations of commercial catches of cod from the W. Greenland banks were carried out for the first time in 1959. The observations were made partly on board the S/T "Skalaberg" (955 br. tons) from 30 April-15 May, and partly on material collected from the M/K "Hamranes" (152 br. tons) from line fishery in the period 3-12 August.

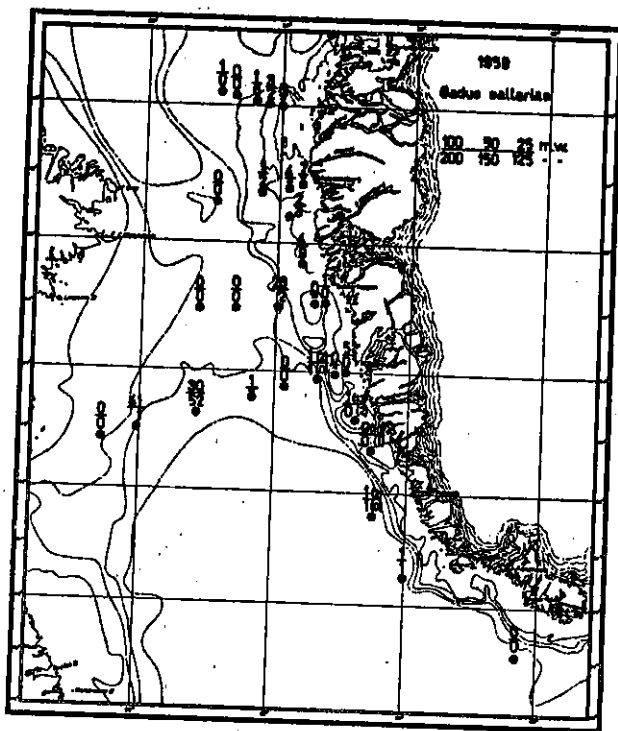
As both vessels salted their catch, only cod (on board "Skalaberg" also larger halibut were frozen) were used. The total catch by the two vessels from 30 April-15 May was 335 tons round fresh. Of this the marketable cod (over 50 cm) made up 277 tons; the remainder of the catch was as follows:

Small cod (below ca.50 cm)	= ca. 33 tons
Sebastes marinus	= " 19 "
Hippoglossoides platessoides	= " 3 "
Anarhichas sp.	= " 2 "
Other species	= " 1 "
	" 58 tons

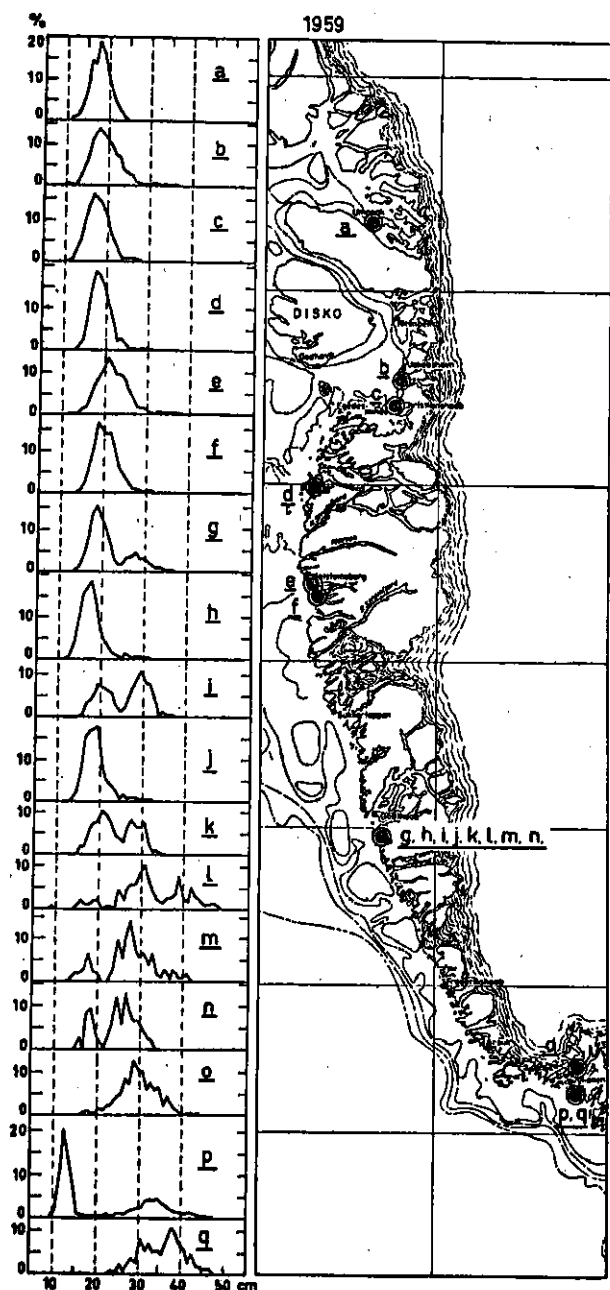
Thus about 17% of the catch were discarded. Catfish and flatfish are as a rule alive when discarded even after having been on the deck for a while. Also some small cod are able to swim down, when discarded, but the greater part flow in the surface together with redfish.

In the liner "Hamranes" the catch consisted almost exclusively of cod of a size suitable for salting, as the lines do not catch as many small cod as the trawl; of other species were only caught few redfish and halibut.

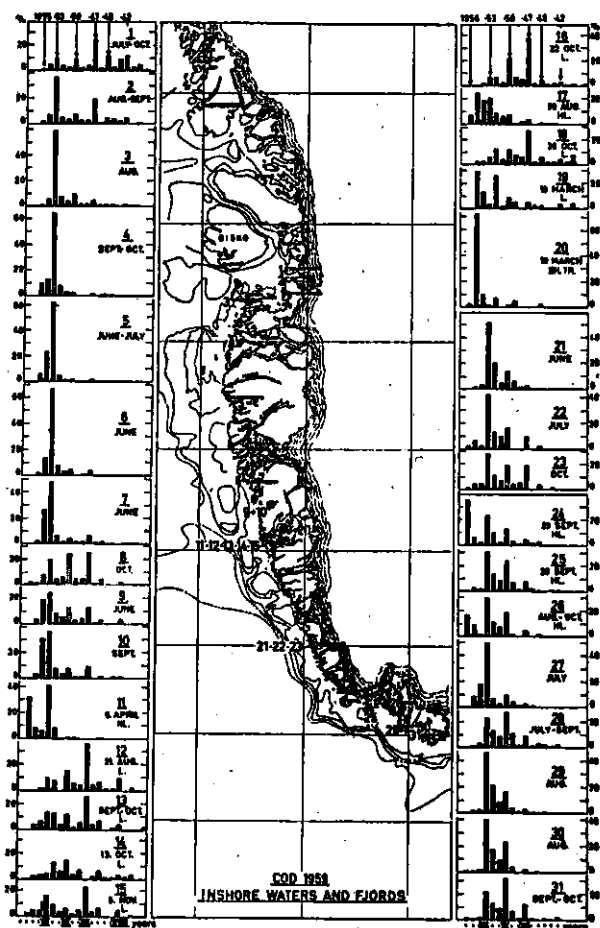
The material collected from the cod on board the two vessels was 2645 otoliths and 5935 length measurements: "Skalaberg", 1626 otoliths, 4483 measurements; "Hamranes" 1019-1552. The material from "Skalaberg" was mainly from cod for salting, of the discarded small cod only few samples were taken, they were composed almost exclusively of 3-4 year old cod (3 years-75%, 4 years-25%). The length distribution



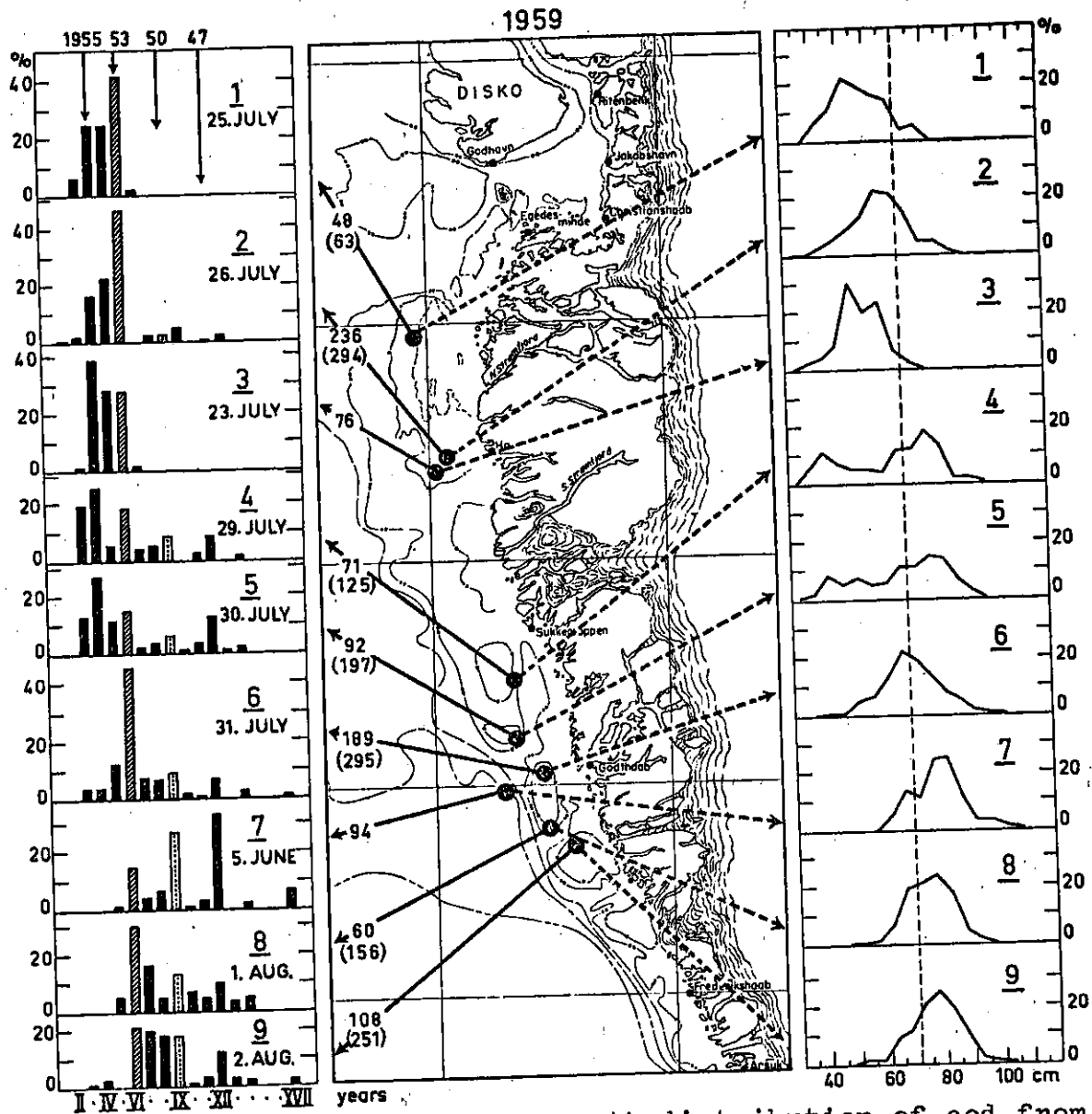
A. Figure 1 - Catches of cod larvae in 30 min. hauls with a 2 m stramin net.



A. Figure 2 - Length distribution of small cod in coastal areas.



A. Figure 4 - Percentage age distribution of cod from coastal areas.



A. Figure 3 - Percentage age and length distribution of cod from W. Greenland banks. The numbers of cod examined, and tagged (), are shown on the map.

of discarded small cod was as follows:

cm	No.
20-24	7
25-29	69
30-34	326
35-39	369
40-44	148
45-49	69
50-54	21
55-59	5
60-64	1

Figures 1 and 2 present age and length distribution of the cod from S/T "Skalaberg" and M/K "Hamranes". In all the trawler catches the 1953 year-class is predominating but also the 1950 is of importance. Also in the line catches 1953 is the predominating year-class in most localities, but the 1950- and the 1947 year-classes are present in important quantities.

The spawning of the cod was in the main completed, only 2% of the mature females and a little more mature males had not yet finished spawning.

II. OTHER FISH

Of other fish than cod are already mentioned redfish, wolffish and American plaice. From the "Skalaberg" the following more rare species were caught:

Myxine. 1 specimen

Raja radiata. A few specimens

Argyropelecus. 1 specimen

Macrurer. 3 specimens. 2 species.

Melanogrammus aeglefinus. A total of 15. Mostly large and fat, the largest 83 cm. Ripening, full-ripe and spent individuals.

Gadus ogac. 1 spec.

Molva byrkelange. ca. 50 spec.

Brosme brosme. only 3

Cyclopterus lumpus. a few

Hippoglossus hippoglossus. A few every day, mostly small.

Reinhardtius hippoglossoides. few

Glyptocephalus cynoglossus. "

C. E. Greenland. by Paul M. Hansen

The investigations off S.E. Greenland (60°-66°N) during the two preceding years were continued from 9 August-18 September 1959. The researches were concentrated in the two populated areas Skjoldungen (63°15'N) and Angmagssalik Fjord area (65°45'N). Contrary to 1957 and 1958, the work was much impeded by polar ice. It was impossible to go to the banks off Angmagssalik, and even in the fjords the large quantities of ice hindered the operations. The cod fishery, which started successfully in 1958 at Kungmint in the Angmagssalik, where Greenland rowing boats with hand-lines, and a salting mother-vessel, caught 865 tons, gave only 539 tons in 1959. The mother-vessel had to leave earlier than planned due to the adverse ice conditions. The cod caught in the fjord area in 1958 was of a very fine quality; in 1959 it was very lean.

Figure 1 presents age and length distribution of six samples of cod from Skjoldungen and Angmagssalik. No.5 is a long-line catch from the bank off Skjoldungen, Fylkis Bank, the rest are from hand-line catches. The figure shows that the catches from Skjoldungen mainly include large, old cod, whilst those from Angmagssalik almost exclusively

contain smaller, younger cod. In the catches from Skjoldungen old cod, 10 years or more, account for 79% of the catches, while at Angmagssalik cod of that age only make up 3.6%.

The 1950 year-class, which in the two preceding years - especially 1958 - was of great importance in the catches, is much reduced in strength in 1959. In the sample from Skjoldungen, 18 Sept., it, however, dominates with 35%. The strong reduction of the 1950 year-class may indicate that a greater emigration of this year-class to Icelandic waters has occurred; this is confirmed by returns from the tagging experiments of the two preceding years. The six year-classes younger than 1950, present in the Angmagssalik samples, occur in very much the same quantities; among these year-classes no year-class is especially dominating.

A rather rich occurrence of small cod of the age-groups I-III was observed in the harbour-basin of Skjoldungen in mid-August. As the bottom did not permit the use of fine-meshed seines, fishery with small jigs was tried. Only 13 cod, of which 8 belonged to the I and 5 to the II-group were caught. At Tasiusaq near Angmagssalik and in the inner part of Angmagssalik Fjord smaller amounts of young cod were observed, according to size they belonged to the II-group. It was here, as off Skjoldungen, impossible to fish with seines and jig yielded only few cod. However, the observations show that small growing cod occur in the coastal area and in the Fjords around Angmagssalik.

The tagging experiments were continued, 966 cod being tagged: 13 off the coast at 60 42'N, 79 at Skjoldungen and 884 in the Angmagssalik area.

Already the tagging experiments from 1927-33 showed that the E. Greenland cod is connected with the Icelandic stock. Of 772 cod tagged at Angmagssalik in that period, 20 were returned, 18 from Iceland and only two at E. Greenland, where the fishery in that period was only very small.

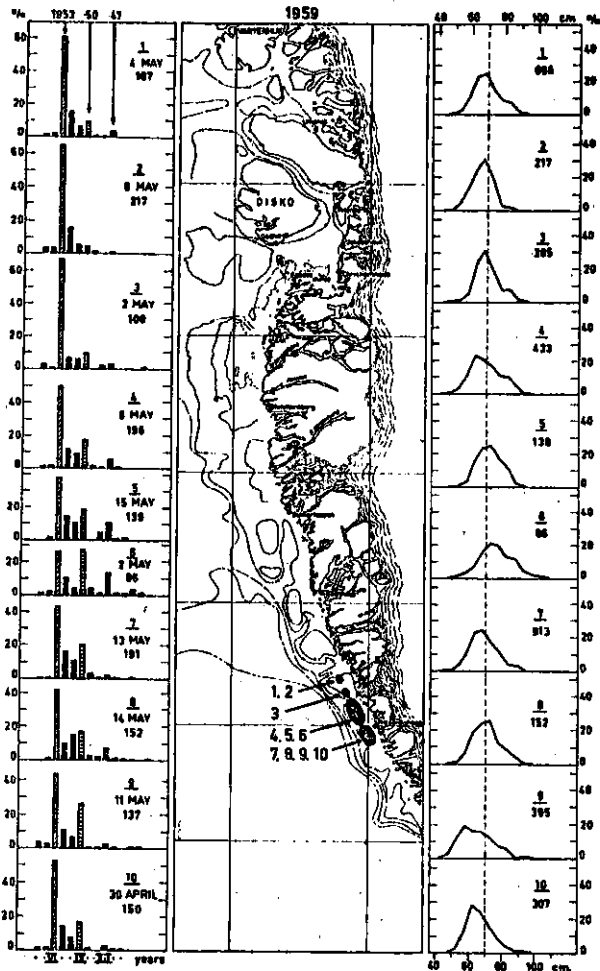
In 1959 30 returns of E. Greenland tagged cod were reported from Iceland; age analyses of 20 of these showed 13 belonged to the 1950 year-class. From E. Greenland a total of 9 returns of W. Greenland tagged cod are reported: from 1955 tagging, 2 cod, 1957, 5, and 1958, 2. One would be inclined to expect that most returns would be from the southern Subdivisions 1E and 1F. However, only one cod was returned from taggings in 1F, although many cod are tagged there every year. The returns are distributed as follows as to subdivision where tagged.

1B	1C	1D	1E	1F
1	1	6	0	1

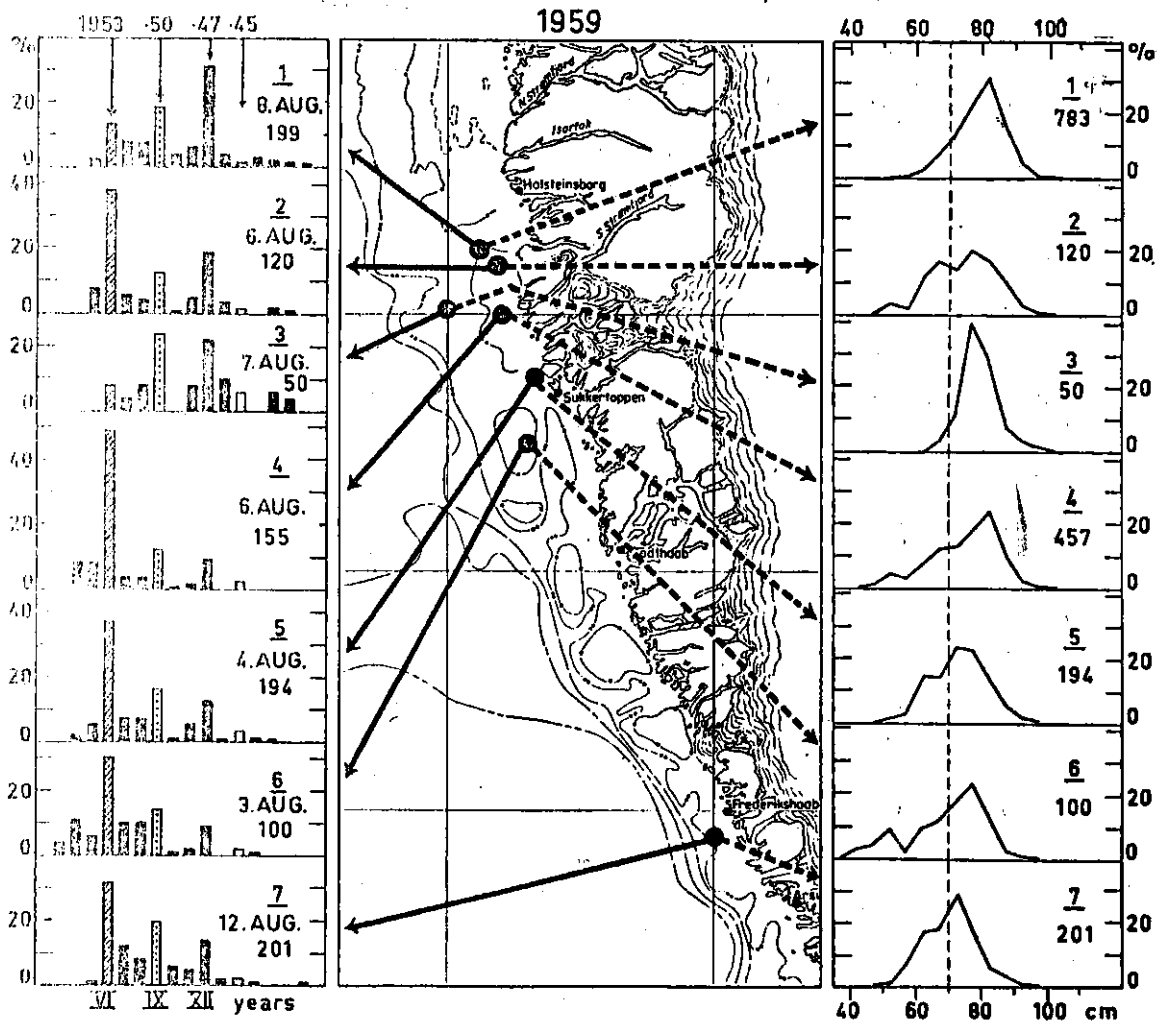
Of the six returns from 1D, three were tagged on Fylla Bank and three in the coastal area of Godthaab. The three from the other subdivisions were all tagged at the coast.

At W. Greenland are up to now recaptured two cod tagged at E. Greenland, one in a fjord in 1F and the other at the coast in 1C.

--ooOoo--



B. Figure 1 - Age and length of cod, "Skalaberg", April-May 1959



B. Figure 2 - Age and length of cod, "Hamranes", August 1959

Table 1 - Small cod, age-groups I, II and III

a.	70°40'N, 52°00'W.	22 July,	705 specimens,	hand-seine.
b.	69 05 51 00	29 "	889 "	"
c.	68 50 51 05	30 "	870 "	"
d.	67 57 53 35	2 "	1019 "	"
e.	66 55 53 35	1 "	1156 "	"
f.	66 44 53 28	26 June	961 "	"
g.	63 53 51 28	18 Jan.	1224 "	shrimp-trawl
h.	63 53 51 28	3 March	1429 "	"
i.	Utorqarmiut	3 "	386 "	"
j.	63 53 51 28	24 "	572 "	"
k.	Utorqarmiut	24 "	329 "	"
l.	"	23 Nov.	153 "	"
m.	63 53 51 28	24 "	114 "	"
n.	63 53 51 28	21 Dec.	108 "	"
o.	60 56 45 47	18 Feb.	337 "	"
p.	60 34 45 55	30 July	969 "	hand-seine
q.	60 34 45 55	30 "	152 "	pound-net

Table 2 - Mean-lengths of small cod of age-groups I, II and III

Age-Group	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
I	-	-	-	-	-	-	-	-	-	-	-	17.2	17.4	18.6	-
II	19.4	19.9	18.8	21.0	23.3	19.8	19.1	19.0	20.4	19.3	20.7	29.7	28.5	27.5	19.6
III	-	30.3	-	-	32.4	-	28.5	28.7	29.6	27.1	28.6	39.7	38.0	-	31.6

Table 3 - Age at first maturity of the 1947 year-class of Greenland cod in 1959

Coastal area north of 63°N.

Age	♂♂		♀♀	
	No.	%	No.	%
Imm.	1	4	4	15
6	19	84	3	12
7	117	522	98	378
8	69	308	113	436
9	16	71	34	131
10	2	9	7	27
Total	224		259	
Mean		7.4		7.7

Coastal area south of 63°N.

Age	♂♂		♀♀	
	No.	%	No.	%
Imm.	2	24	-	-
6	9	106	5	83
7	46	541	29	483
8	20	235	18	300
9	5	59	8	133
10	3	35	-	-
Total	85		60	
Mean		7.2		7.5

Banks off the west coast

Age	♂♂		♀♀	
	No.	%	No.	%
Imm.	-	-	1	25
6	3	68	1	25
7	24	545	15	375
8	12	273	15	375
9	4	91	5	125
10	1	22	2	50
11	-	-	1	25
Total	44		40	
Mean		7.5		7.7

East Coast

Age	♂♂		♀♀	
	No.	%	No.	%
Imm.	-	-	-	-
6	2	57	-	-
7	14	400	11	366
8	12	371	11	366
9	6	171	7	233
10	1	29	1	33
11	-	-	-	-
Total	35		30	
Mean		7.7		7.9

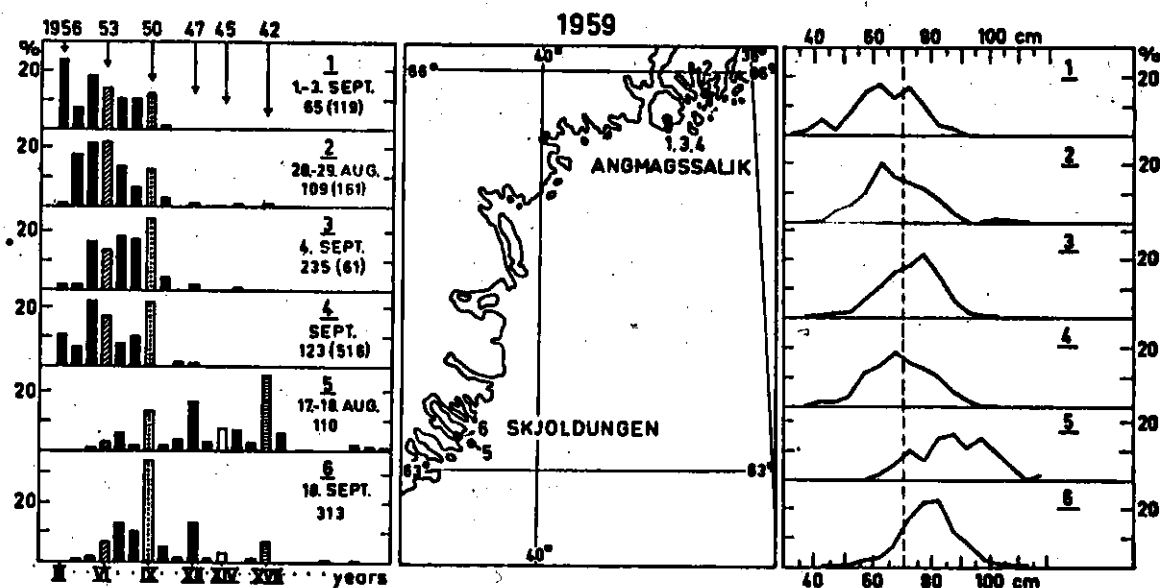
Table 4 - Tagged cod recaptured at East Greenland (East), Iceland (Ic.) and at West Greenland (West) in 1959, tabulated according to age and year of liberation. Tagging locality: East Greenland.

Year-Class	Age Group	1957		1958			1959		We
		East	Ic.	East	Ic.	West	East	Ic.	
1943	XVI	-	-	-	-	-	-	-	1
1949	X	-	2	1 ⁺	1	1	-	-	-
1950	IX	2 ⁺	5	2 ⁺	8	-	-	-	-
1951	VIII	-	1	1 ⁺	2	-	-	-	-
1952	VII	-	-	1 ⁺	-	-	-	-	-
1953	VI	-	-	-	1	-	-	-	-
????		-	2	-	8	-	1	-	-
Total		2 ⁺	10	5 ⁺	20	1	1	-	1

+ five on Dohrn Bank
 ' two off East. Greenland

Table 5 - Cod recaptured in 1959 tagged in East Greenland Waters.

	East	Ic.	West
Greenland	1	-	1
Norway	-	-	1
Iceland	1	12	-
United Kingdom	-	4	-
Germany	6	12	-
Total	8	28	2



C. Figure 1 - Age and length distribution of cod from E. Greenland.