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French Research Report
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A. SUBAREA 1

by

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Research Studies

The oceanographic vessel "Thalassa" based at l'Institut des Pêches maritimes worked in Subarea 1, between Frederikshaab and 72°30'N lat during the period 6 July to 20 August (Fig. 1, 2 and 3).

I. Environmental Conditions

1) Ice situation: ice covered all the southwestern banks and work could only be attempted commencing at Frederikshaab Bank, on the edge of the slope. In the northern part, from the sill of Davis Strait to the centre of Baffin Bay, the ice pack occupied all the eastern section up to meridian 60°00'W.

2) Hydrographic observations (Fig. 1, 2, 3, and 4): because of this situation, observations were made under poor conditions at the limit of Frederikshaab, Dana and Fiskenaes Banks. The eight sections on the latitudes of Godthaab, Sukkertoppen, Holsteinborg, Egedesminde, south and central Disko, from the 72nd parallel and through the deep of Disko were occupied without any major difficulty.

A total of 541 temperature, salinity and dissolved oxygen observations were made from 51 standard stations, to a depth of 1,500 m. These observations were complemented by 75 bathythermograms which were effected mainly after each trawl, and by a continuous recording of surface temperature and salinity.

The surface temperature remained very low up to Dana Bank where a minimum of 0.4°C was observed, and a maximum temperature of 4.2°C was found south of Disko Bank. In the north centre of and on the sill of Davis Strait, the temperature remained lower than 0°C, to the west of the meridian 57°, due to the influence of the northern ice.

The minimum temperature of Arctic water reached 0.9°C at about 30-40 m in the south, +0.15°C to +0.6°C at about 100 m from Fyllas Bank to the outside north of Hellefiske Bank, -0.98°C to -1.7°C at about 50-80 m between Disko and the 72nd parallel.

The underlying, intermediate Atlantic water, enclosed by isotherms of 4°, and by 3 and 2° in Baffin Bay, was separated from the Arctic water by a rather distinct gradient situated between 120-200 m and 240-370 m. The higher isotherm of 4° was found at about 300-400 m on the Davis Strait banks. The maximum temperature of 5.04° was reached on slope of Sukkertoppen at about 450 m.

North of the sill, the deepest observation at 1050 m gave a temperature of 0.26° at that depth.

The conditions are different in the deeps depending on whether the barriers which closes them off partially at the entrance are found at the level of the cold layer or at the warm layer in open sea. Thus the temperature of 1.40° is observed at 440 m in the Holsteinborg deep, while at the same level, at sea, it is 4°. On the other hand, the deep which extends along the Disko Bank is washed with water of a temperature higher than 4° and a salinity of 34.70‰.

The bottom temperatures are given in Fig. 1, 2 and 3. As the banks are found at different depths, the conditions change appreciably from one section to another. On Fyllas Bank, we observe 2.15°; on the top of Lille Hellefiske, 1.6° and on Store Hellefiske, 2.15° to 3.5°. At about 80-160 m one enters the Arctic layer where temperatures are barely above 0°. The gradients of the contact zones between the different masses are more or less restricted according to the inclination of the slope.

The regularity of the Danish observations on 4 sections of West Greenland allows one to make a comparison with preceding years. At the 500-m station, on the western edges of Fyllas Bank and with regard to data averages up to 1968, the anomalies are negative up to 300 m, but a little lower than in 1968: from 0 to 50 m = -1.08°; from 50 to 100 m = -1.17°; from 100 to 200 m = -1.44°; from 200 to 300 m = -0.71°; on the other hand, from 300 to 400 m = +0.04°; from 400 to 500 m = +0.17°.

Furthermore, the surface temperature is generally lower than in 1968, but the Arctic layer is a little less thick. The Atlantic layer from Irminger seems more important, with values appreciably higher.

II. Observations on Fishing

During this survey, 96 trawl hauls were made, on top of the banks as well as on the slope. The Lofoten trawl, modified on the lower wings, and the semi-pelagic trawl 35/42 were used, the first in the southern section and the second in the northern section, according to the difficulties encountered in this section.

Eighty-nine trawl hauls were chosen for scientific study. These were grouped by geographic section and by stage. For data purposes, the duration (often shortened) was brought to one hour of fishing.

The main commercial species are represented by cod (Gadus Morhua), redfish (Sebastes marinus marinus and Sebastes marinus mentella), american plaice (Hippoglossoides platessoides), wolffish (Anarhichas lupus, A. minor, Lycichthys denticulatus) and the Greenland halibut (Reinhardtius hippoglossoides). We can also add to this list the pink shrimp (Pandalus borealis) sometimes taken in large enough quantity.

a) Yields

The yield per hour calculated by stage for these different species appears in Fig. 5, 6, 7 and 8 for cod, redfish, american plaice and Greenland halibut.

The largest quantities of cod were taken south of the Godthaab latitude (ICNAF Div. 1D), at depths of 50-150 m and 150-300 m, with yields of 544 and 1,063 kg/hr. It will be noted that a one-hour trawl haul made southwest of Dana Bank, between 170 and 230 m, yielded 4,300 kg cod.

The best redfish catches were made north of Godthaab, and particularly in the Disko section where the hourly yield surpassed 1,300 kg, between 350 and 400 m. Nevertheless, on "Banana" Bank, at a depth of 380 to 420 m, a haul of 76 min produced approximately 1,700 kg of beautiful fish.

North and south of Godthaab, the american plaice was taken in small quantities in all surveyed stages, at a depth of 0 to 550 m, but still yielding 208 kg/hr on Fyllas Bank at a depth of 140 to 170 m.

The wolffish and Greenland halibut are represented among all other species taken. Wolffish were mainly taken on Dana, Fiskenaes and Fyllas Banks at a depth of 50 to 400 m with hourly yields reaching 219 kg/hr; the Greenland halibut was encountered more particularly beyond 400 m on the edges of "Banana" Bank and in the deeps of Sukkertoppen and Holsteinborg.

b) Observations on Stocks and Biology of Main Species

Cod (Fig. 9). Since 1967, fishermen of all nationalities exploiting the West Greenland fishing grounds found that their annual cod tonnage decreased year after year.

If one refers to the works of Hensen, Rasmussen and Templeman, one realizes that,

in addition to the local populations of the fjords, there exist two cod stocks west of Greenland, one being southern which would extend from Cape Farewell to Frederikshaab, and the other northern, from Frederikshaab to north of Disko. Tags indicated that individuals of the first stock would sometimes migrate to the spawning grounds of Iceland; whereas, the second stock would be relatively stable. There would not be any exchange between these two populations which would reproduce from March to May-June and more particularly in April; the spawning would be carried out particularly south of 65°N and at a depth of more than 200 m. The rate of production of the southern stock would be less than that of the northern stock.

The ice situation prevented us from studying the first stock and our study was thus limited to the northern population. This study was concentrated on the banks south of Godthaab where the hourly yields of certain trawl hauls were satisfactory: 4,280 kg, 1,156 kg, 1,190 kg and 4,960 kg on Dana Bank; 1,155 kg and 938 kg on Fiskenaes Bank. In the majority of cases, the size varies from 40 to 90 cm, with means predominating at 61, 64 and 79 cm. From the previous results of foreign vessels, these dimensions would correspond by analogy to age groups V and VIII, i.e., yearclasses 1965 and 1962. On Fiskenaes Bank, at a depth of 150-380 m, one also observes a relatively important proportion of individuals measuring 43 to 46 cm and being probably three-year-olds (yearclass 1967).

In these sections the presence of sand lance was detected. These were in their period of reproduction and were the essential nutrition for cod.

North of Godthaab, the hourly yields were very small at all levels; the best yield provided 67 kg/hr at a depth of 150-200 m. Beyond latitude 69°13'N (off Disko) and up to 72°30', the limit of our survey, no cod were taken.

The size of fish varies from 22 to 97 cm in both Div. 1B and 1C. However, the presence of little individuals (19 to 34 cm), not more than two years old, was noted; there were less at a depth of 150-280 m, and were more numerous at a depth of more than 280 m.

In all sections studied, reproduction had ceased, but it was noticed that in July reproduction had ceased only recently for some fish.

Three cod larvae only were identified in the numerous plankton samplings made during the survey, which only confirms the low rate of reproduction for cod shown for some years. Therefore, recruitment will apparently not improve in the coming years.

Redfish (Fig. 10). The two types, Sebastes marinus marinus and S. marinus mentella were encountered predominantly in the form "marinus" south of Godthaab and "mentella" to the north.

In the southern part, low yields reach a maximum of 120 kg/hr between 350 and 400 m, but it must be emphasized that we did not trawl above this last level. The size of fish is interesting, however, since it varies from 20 to 55 cm, with means of 27-28, 30, 36, 42 and 46 cm. In Div. 1D one establishes that the form "marinus" is found uniformly spread from 150 m, while the form "mentella" is observed beyond 280 m.

North of Godthaab, the yields are clearly above the previous ones mentioned and reach 1340 kg/hr between 350 and 400 m, but in most cases the "mentella" type fish is not commercial size (averages of 11-16 cm). Nevertheless, west of "Banana" Bank, we observed an average of 40 cm during a 76-min haul which produced 1,664 kg.

It will be noted that in this northern section, the type "mentella" was always caught at depths beyond 280 m, while the type "marinus" only appeared at depths of 150-280 m in Div. 1C where the size of fish was mainly between 16 and 34 cm.

As far as reproduction is concerned, this had already ceased.

American plaice (Fig. 11). As previously mentioned, the american plaice (Hippoglossoides platessoides) does not give an interesting yield on the western border of Greenland. The yield is 50 kg/hr at the top and south of Godthaab (Div. 1D and 1C) and decreases progressively towards the north, becoming nil in Div. 1A, north of 68°30'.

This fish is encountered at all levels, but it is noted that the best catches are made on Fyllas Bank between 140 and 170 m (208 kg/hr) and in the Holsteinborg deep between 270 and 320 m (210 kg/hr). South of Godthaab, the size is between 12 and 45 cm, giving three means: 15-16 cm for the young individuals, 25-26 cm for males and part of the females, 37-38 cm for females only. The most frequent size is found between 20 and 30 cm. The largest individuals (21 to 41 cm) of commercial size are mostly encountered at depths beyond 280 m.

North of Godthaab, in Div. 1C, averages are 26-27 cm for males and a part of the females and 33-36 cm for females only. The young individuals (mean 8 cm) do not appear until further north, Div. 1B; in this section other means are 18-19 cm (male and female), 26 cm (male), 36-37 cm (female). The most frequent size, 20 to 45 cm, is observed in depths of 100 to 150 m.

In most cases the american plaice were spawning or had just spawned, which leads one to believe that, having been given the period of time from the beginning to the end of observations (starting in July for the south, starting in August for the north), reproduction is carried out progressively from the south to the north.

Greenland halibut (Reinhardtius hippoglossoides). This fish is encountered in all sections surveyed. Its yield increases with latitude since one passes from 15 kg/hr in Div. 1D to 26 kg/hr in Div. 1C, 35 kg/hr in Div. 1B and finally 75 kg/hr in Div. 1A.

South of Godthaab, the best catches were made between 250 and 350 m, with an average yield of 47 kg/hr and a maximum yield of 71 kg/hr in the deeps of Godthaab.

North of Godthaab, the small catches at the depth of 150-200 m increase regularly with depth, reaching 350 kg/hr at about 850-900 m. This yield increase on the slope of Baffin Sea is inversely proportional to the number of individuals caught, due to the fact that their size increases with depth and their number decreases from the edge of the shelf to the greater depths surveyed.

In fact, in Div. 1A, the size is distributed from 8 to 56 cm between 350 and 450 m with means of 10 cm, 18-20 cm and 26-32 cm. Between 550 and 600 m for the same demonstration, a mean of 39 to 41 cm is added to the first three. At about 800-900 m the fish measure from 25 to 70 cm with a single mean of 41-47 cm. It will be noted that in the Holsteinborg deep the distribution is made between 11 and 48 cm with means of 14-15 cm, 24-28 cm and 36-41 cm.

Wolffish. These are present in all stages south of Godthaab; the best catches were made on Fiskenaes Bank. The size of Anarhichas lupus mostly varies from 46-47 cm to 68-69 cm with a mean of 60-61 cm.

Shrimp. The pink shrimp (Pandalus borealis) was sometimes taken in great quantities along the whole edge of Greenland. It will be noted that shrimp was especially abundant in the deeps, where the bottom is muddy. The highest yield was obtained in the deeps of Godthaab, Sukkertoppen with 55 kg/hr, and in the Holsteinborg deep with 60 kg/hr. However, the Thalassa was not equipped for this kind of fishing and it is known that the Danish trawlers take more than 100 kg/hr.

It will be noted that the shrimp was also present, but in lesser quantity, on the exterior slope of the banks, at a depth of more than 280 m.

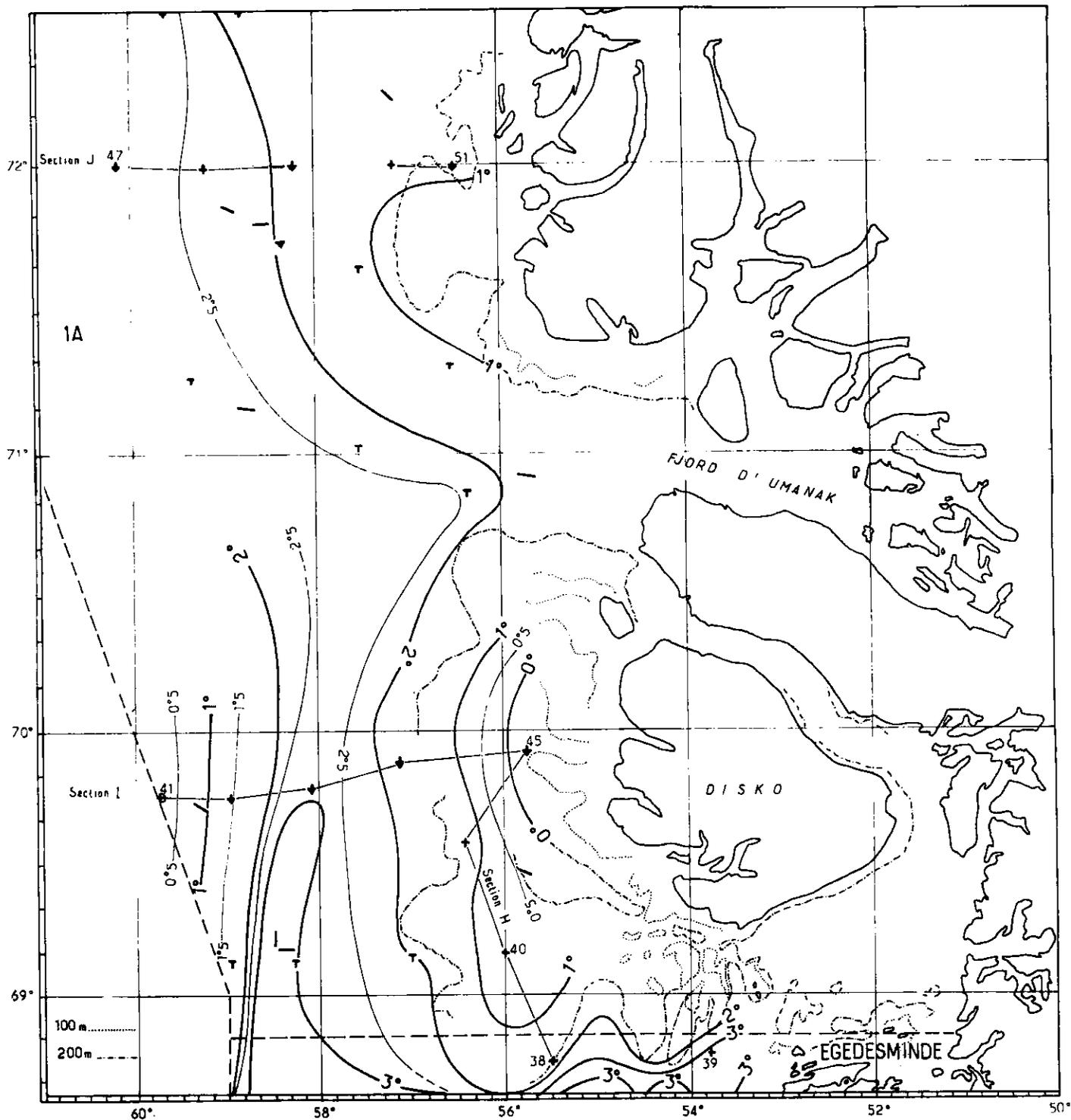


Fig. 1. Plots of trawl hauls and various stations, showing isotherm profiles near bottom between latitude 72°30' and Egedesminde. (See Fig. 2 for legend.)

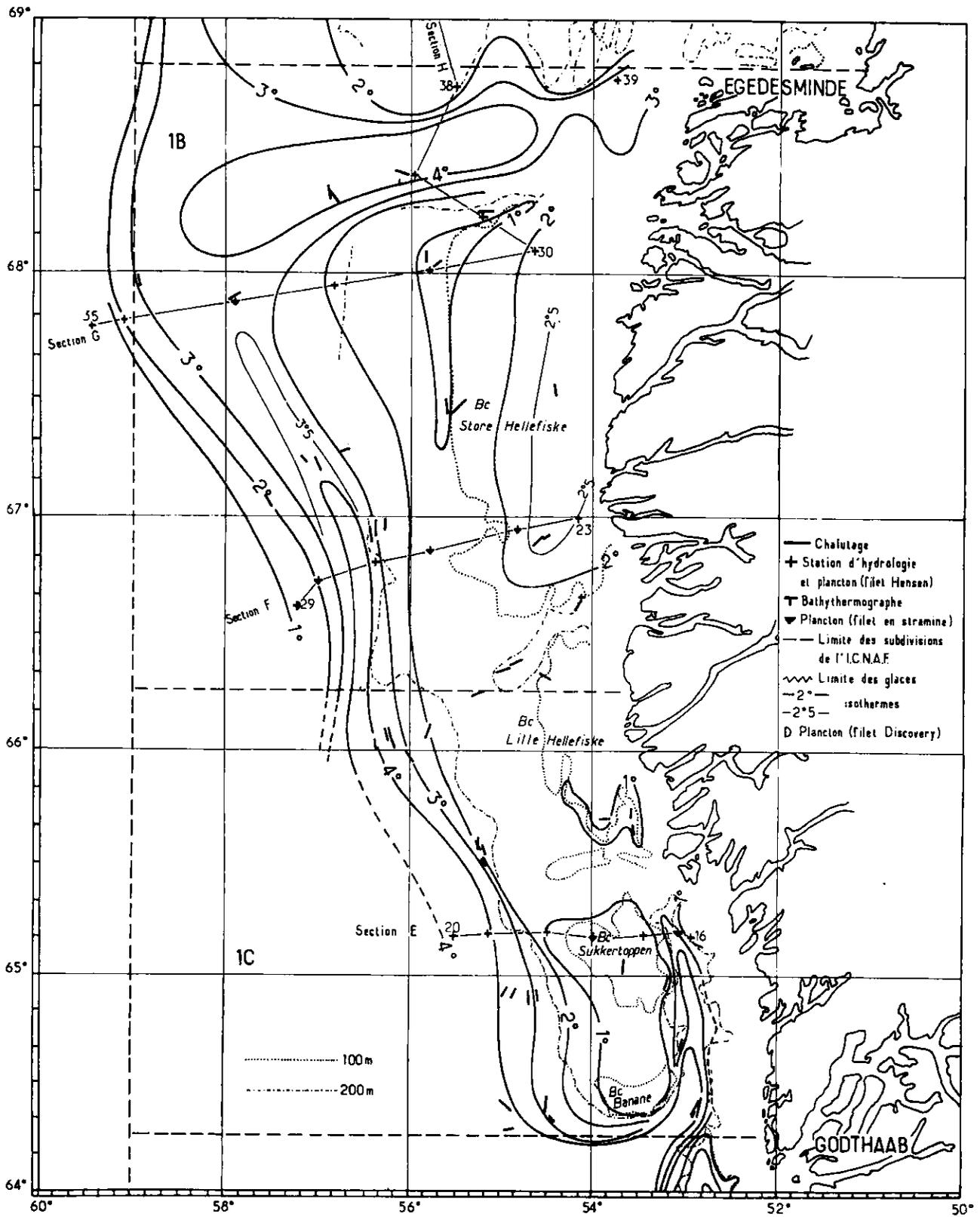


Fig. 2. Plots of trawl hauls and various stations, showing isotherm profiles near bottom between Egedesminde and Godthaab.

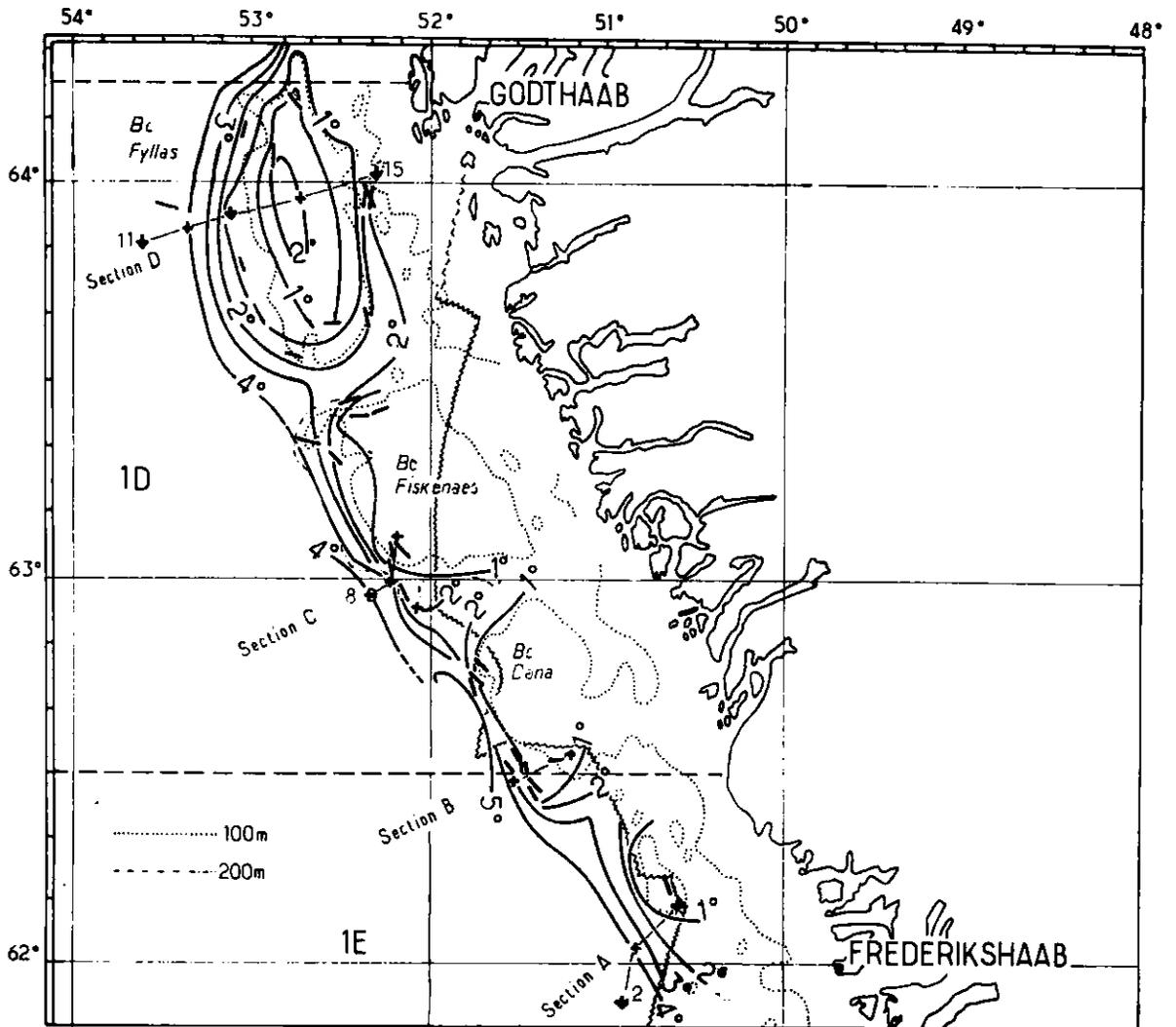


Fig. 3. Plots of trawl hauls and various stations, showing isotherm profiles near bottom between Godthaab and Frederikshaab. (See Fig. 2 for legend)

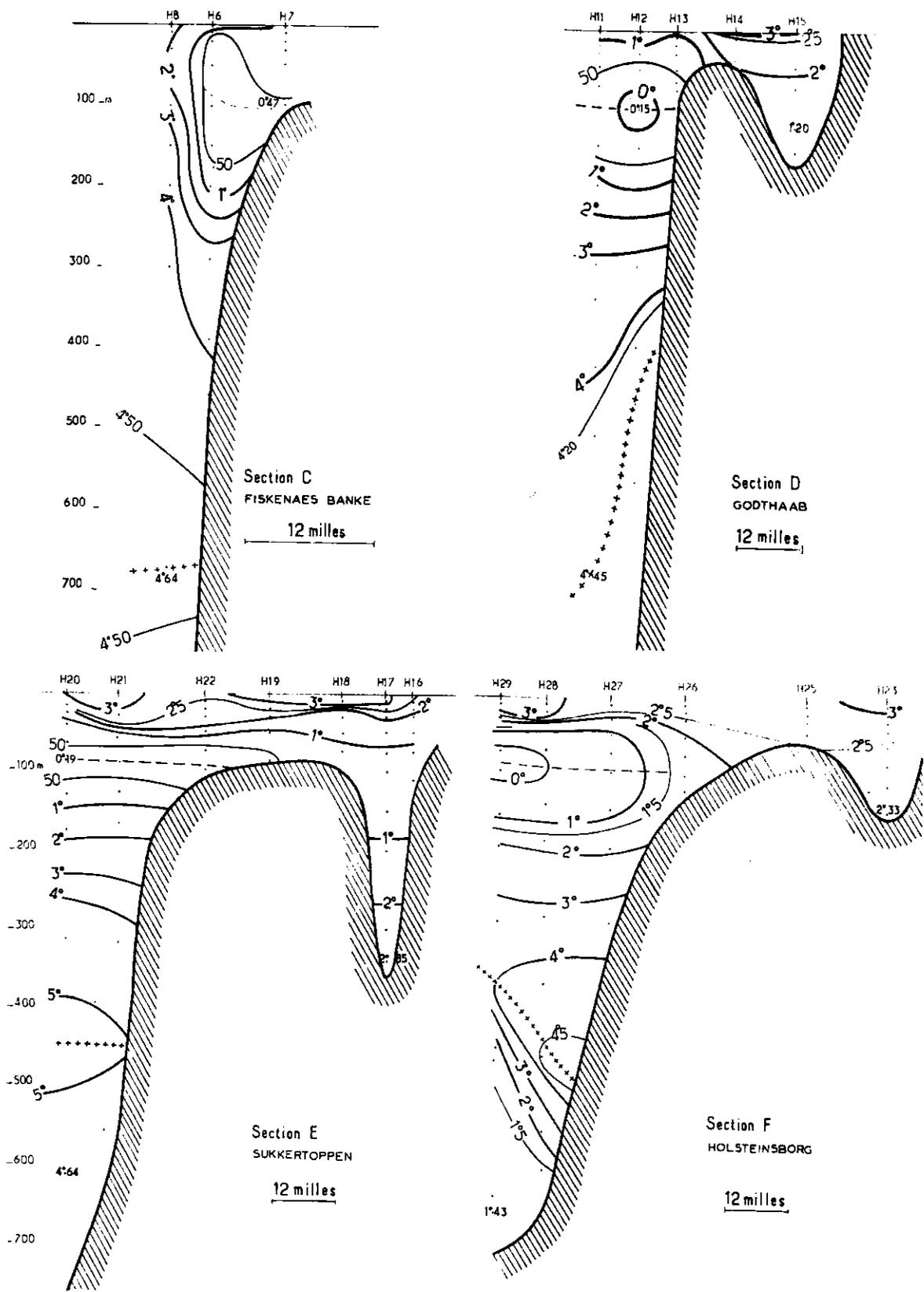


Fig. 4. Vertical temperature distribution: Fiskenaes Bank, Godthaab, Sukkertoppen and Holsteinsborg.

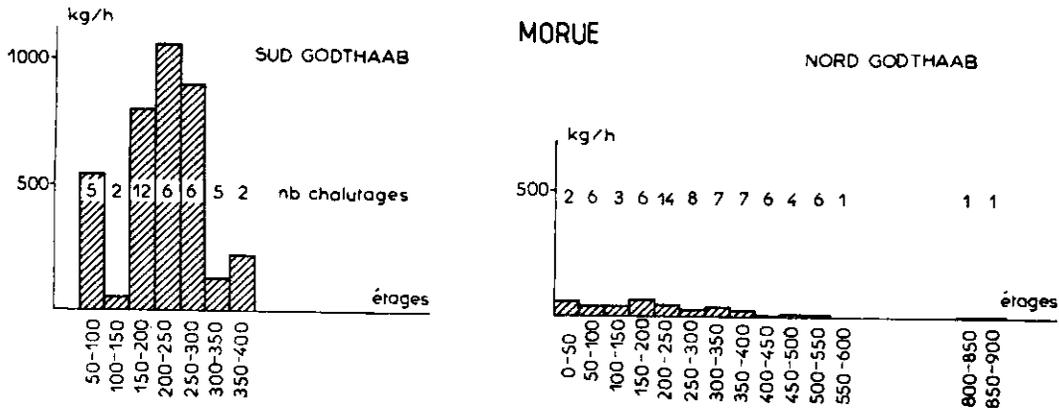


Fig. 5. Cod: Average yield at 50-m intervals, south and north of Godthaab, with number of trawl hauls.

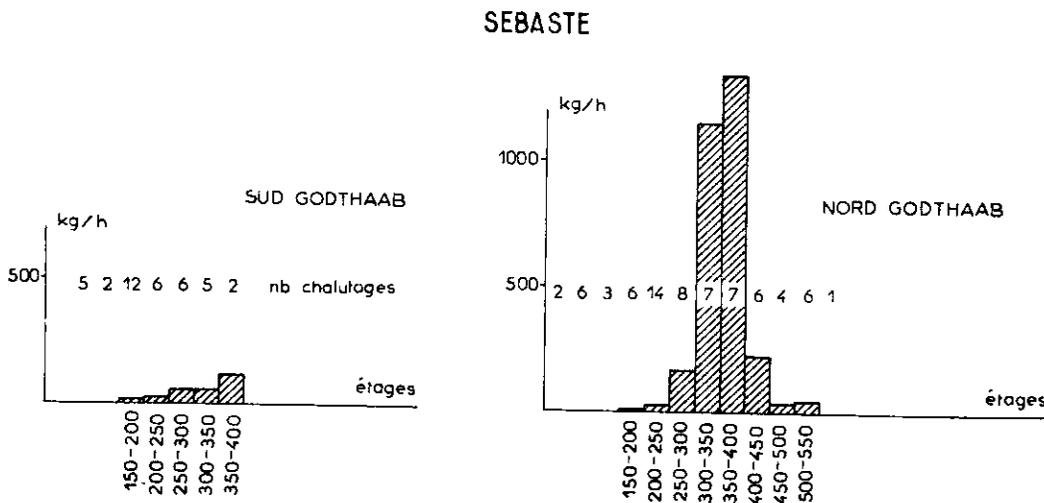


Fig. 6. Redfish: Average yield at 50-m intervals, south and north of Godthaab, with number of trawl hauls.

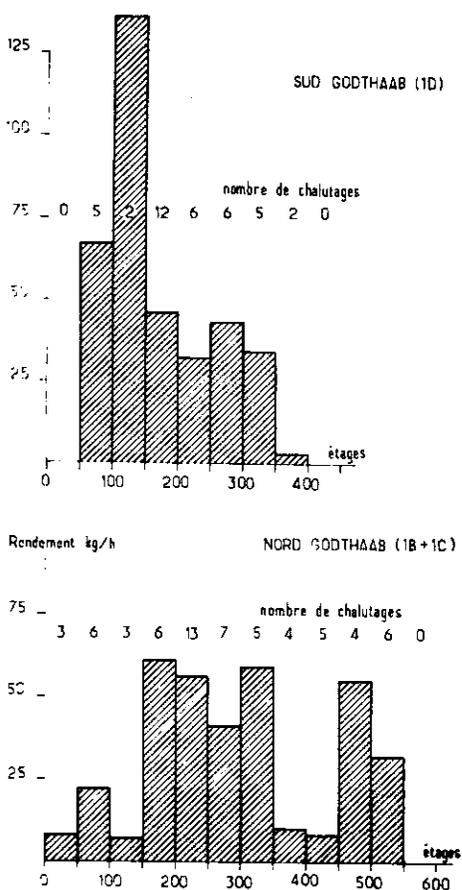


Fig. 7. American plaice: Yield according to depth, south and north of Godthaab.

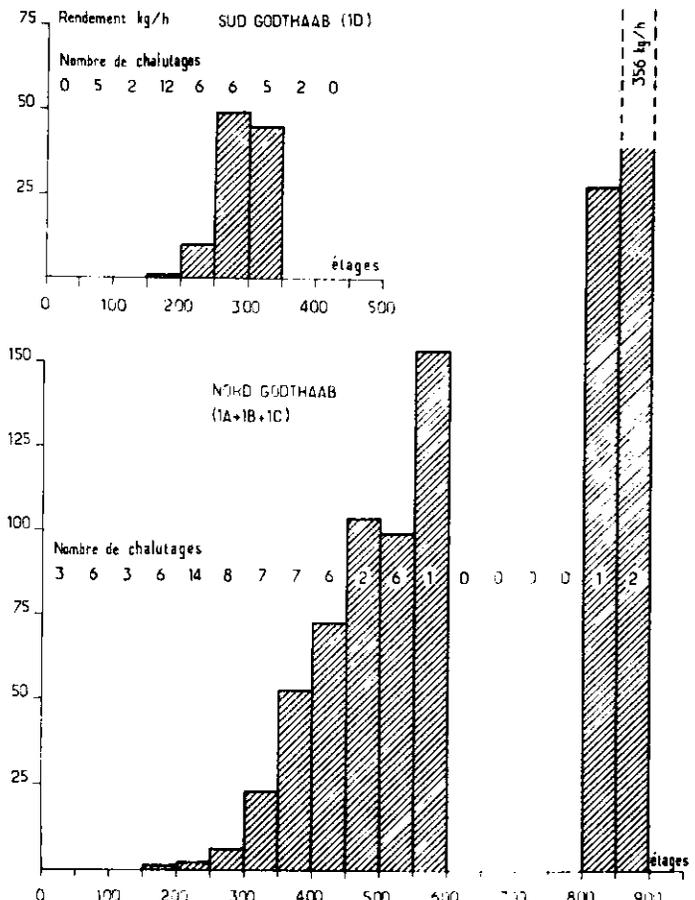


Fig. 8. Greenland halibut: Yield according to depth, south and north of Godthaab.

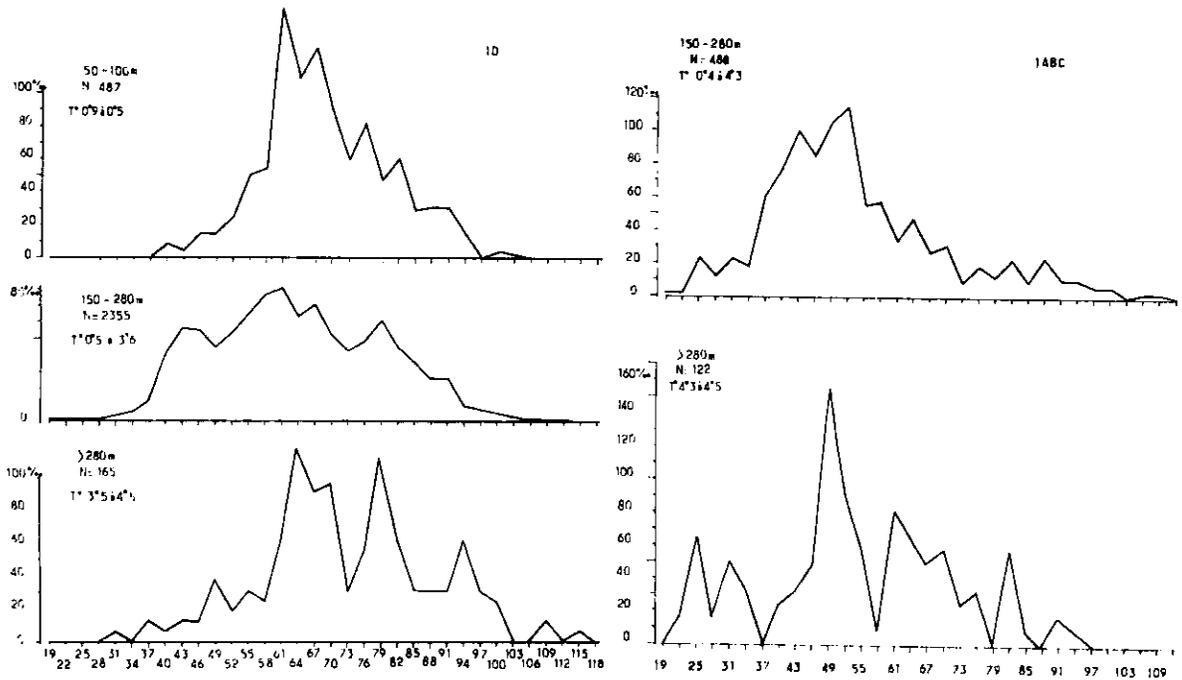


Fig. 9. Cod: Length frequency in ICNAF Div. 1D (south of Godthaab) and Div. 1A, 1B, and 1C (north of Godthaab) for each stage considered.

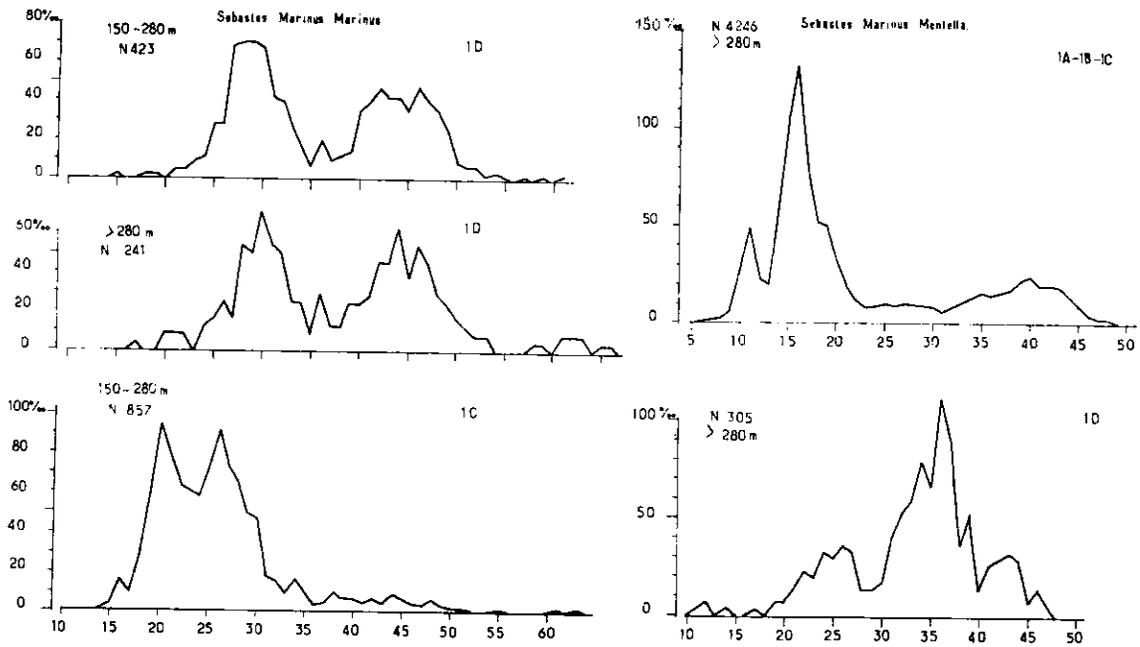


Fig. 10. Redfish (Sebastes marinus marinus and Sebastes marinus mentella): Length frequency by section and stage considered.

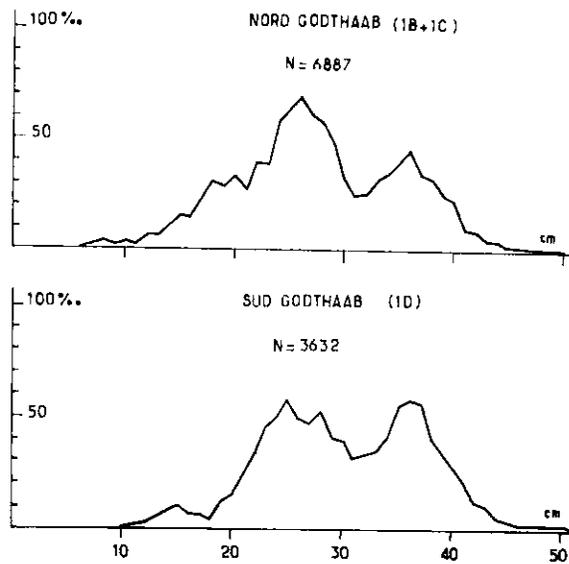


Fig. 11. American plaice: Length frequency, north and south of Godthaab.

B. SUBAREAS 3 AND 4 (FISHING FROM ST. PIERRE ET MIQUELON)

by

Jean Morice
CRIP, St. Pierre et Miquelon

In 1970, a total of 6,784 various fish were landed in the "Convention Area" by trawlers of the Territory.

Subarea 3

A. State of the Fisheries

As indicated in Table 1 the greatest part of St. Pierre cod was taken in Div. 3Ps, on St. Pierre and Burgeo Banks, places which are visited all year round. Traditional fishing for which one uses motor dories and works only with hand lines, is strictly limited to the coastal waters and shallow waters located near the **processing** centres; the fishing grounds are all included in 3Ps. The dories go to sea from May to November, the most fruitful period extending from June to September.

Div. 3L, rich in american plaice, is **little** exploited for cod.

Haddock is almost exclusively taken on the edges of St. Pierre Bank, in Div. 3Ps, during January, February, March, April and May, the most fruitful period being March-April.

Most of the american plaice landed at St. Pierre come from the "platiers" in Div. 3Ps; St. Pierre Bank is exploited practically all year round.

Redfish is taken on the slope of St. Pierre and Burgeo Banks, all year round, but in 1970 the yields were better in July-September and October-November.

Traditional fishing of the Territory in Div. 3Ps

This is relatively important, particularly where cod is concerned, as it yielded 1,306 tons against only 872 tons landed by trawlers (see Table 2).

Subarea 4

A. State of the Fisheries

Table 1 shows that trawlers take cod in Div. 4R; March was the most important month for St. Pierre vessels in 1970 when large standard trawlers and metropolitan stern-trawlers worked for several months.

It must be noted that the production of the St. Pierre trawlers is essentially directed by the American market which it supplies and not by the actual possibilities of the fishery. The sale of frozen products, obtained after processing at St. Pierre, is subject to severe control conditions. Thus, the tracking down of parasite nematodes is such that it prohibits exploitation of cod in most banks of Div. 4T and 4S.

B. Special Research Studies

In April-May 1970, observations were made on board R/V "Thalassa" in ICNAF Subareas 3 and 4.

I. Environmental Studies

The area of study was limited to the west, from Cabot to Banquereau Strait, and to the east, from Burin Peninsula to south of St. Pierre Bank, that is, ICNAF Div. 3Pn, 3Ps, 4Vn and 4Vs.

On the one hand, 28 hydrographic stations distributed in five sections (two of these sections, the transverse of Cabot Strait and that which joins Cape Breton to the south of Banquereau, are recommended by ICNAF) were occupied, using Nansen reversing bottles to study temperature and salinity. Data collected thusly will be presented

to ICNAF in a more important report. On the other hand, 105 temperature measurements were made by bathythermograph at the start of each trawl haul. The surface and bottom temperatures observed were regrouped for a total of 133 stations (Fig. 2 and 3).

A vertical plankton haul was made with a Hensen net, between 100 m and surface, at each of the above-mentioned stations. The results obtained, regarding volume of plankton collected, will be presented to ICNAF in the afore-mentioned report on environment.

II. Observations on the Fishery

Fishing was carried out with the Lofoten trawl described in ICNAF Redbook 1968, Part II, p. 35, and with the shrimp trawl (headline 33.30 m, rubber footrope 39.50 m, mounted on 37.50 m; wings, back and belly: 60-mm mesh; codend: 40-mm mesh).

Unfortunately, plotting of trawl stations was not done according to the stratified method recommended by ICNAF in 1970. The principle is recalled here only to keep in mind that from 1971 the above-mentioned technique will definitely be used by CRIP, St. Pierre.

Sampling was based on half-hour trawl hauls. The plotting chart was based on the Canadian chart No. 4490. The axis of the Laurentian Channel was fixed arbitrarily by joining point 47°50'N lat-60°00'W long, to point 43°30'N lat-55°00'W long, an axis which separates ICNAF Subareas 3 and 4.

The 10 divisions studied were distributed normally at this axis, for all 30 miles and extended to a distance of 60 miles, or according to section interest.

A certain number of hauls were distributed in each area thus defined, which allowed the study of the bottom of the Laurentian Channel, the approaches to the shelf, the shelf itself, the edges, and finally the "platier". Figure 1 shows the plotting and hydrographic radius and trawl haul stations with an overlay of bathythermograph and plankton.

Commercial species taken were cod (Gadus m. morhua), red hake (Urophycis chuss), haddock (Melanogrammus aeglefinus), redfish (Sebastes m. mentella), american plaice (Hippoglossoides pl. platessoides), herring (Clupea h. harengus) ... etc. and Pandalus borealis.

We shall see, specie by specie, the first knowledge which we can derive from collected data.

Cod (Gadus m. morhua).

A total of 8,613 measurements were recorded and 1,549 otoliths read. The most interesting catches concerne the following areas (see Table 3):

- a. Gulf of St. Lawrence: Div. 4T (2 stations), 4R (1 station).
- b. Nova Scotia banks: Div. 4Vn (2 stations).
- c. St. Pierre Bank: Div. 3Ps (2 stations).

1. Gulf of St. Lawrence, Div. 4T, Cape St. Lawrence: one station only was valid, commercial-wise, with a yield of 6.8 tons for one hour of fishing. Thirty-six percent of the fish were of inferior length at 40 cm (ages 2, 3 and 4 years) - see Fig. 4: cod length frequency and age composition.

2. Nova Scotia banks near Cape Breton Island: Div. 4Vn: the two stations producing hourly yields of 4.46 and 1.52 tons and very few fish less than 40 cm in length (6.1 and 2.3%) were the only commercial ones. Fig. 5: cod length frequency and age composition.

3. St. Pierre Bank: Very small cod with a mean of 19 cm were caught on the western edge of St. Pierre Bank. Ninety to 98.5 percent of the catches were less than 40 cm in length.

Red hake (Urophycis chuss)

During these same surveys, yields obtained for Urophycis chuss were not very important

During April and May (Fig. 6), eight stations only yielded more than 100 kg/hr of fishing. Div. 4Vn was relatively more productive since five trawl hauls allowed a catch of 114, 253, 532, 1,018 and 1,136 kg/hr. The other hauls made in Div. 3Pn and #ps yielded in the first case 150 kg/hr, in the second case 127 and 202 kg/hr. The depth varied from 180 to 450 m during these different trawl hauls.

The length of individuals varied from 15 to 91 cm and the length frequency curve allowed the distinction of three means: 42-43 cm, 56-57 cm and 64-65 cm.

In December the catches reached a maximum of 78 kg/hr on the south and west coasts of Newfoundland while the length of the fish was between 21 and 88 cm with two main means at 36-37 cm and 54-55 cm (Fig. 7). During this survey, depth was about 240 m.

Haddock (*Melanogrammus aeglefinus*)

During the R/V "Thalassa" survey along Laurentian Channel and the bordering banks, in April and May, and the R/V "Cryos" survey in December on the south and west coasts of Newfoundland, haddock catches were very small. In the spring, at six stations only, yields surpassed 100 kg/hr of trawl haul and the most important catches produced 320 to 454 kg/hr. In one case, these catches are of interest to Div. 4R (187 kg/hr) and in other cases, of interest to Burgeo and St. Pierre Banks, Div. 3Ps; all catches were made on the edges at depths varying from 140 to 195 m. For all other trawl hauls, yields were nil or very small: 2 to 86 kg/hr of fishing.

Length of individuals varies from 14 to 85 cm and the representative curve allows the distinction of three means: 20-21 cm, 30-31 cm, and 44-45 cm (Fig. 8).

In December, no catch of commercial interest was made in south and west Newfoundland: Div. 3Ps and 4R.

Redfish (*Sebastes m. mentella*)

In April and May 1970, 64 trawl hauls yielded redfish. The best catches were made in Div. 4Vn and particularly in Scatari and Saint Ann areas, at depths varying from 175 to 350 m. Yields, in this area, often surpass one ton per hour and ~~even~~ reach six tons per hour for one station. Among the 64 hauls mentioned above, 33 show yields between 0.6 and 6 tons per hour.

A total of 19,791 individuals were measured: distributed as follows: 9,801 in Div. 3Ps, 6,095 in Div. 4Vn and 3,895 in Div. 3Pn. These measurements allow tracing of population curves in Fig. 9, 10 and 11.

The extreme lengths are from 6 to 55 cm. If one analyzes the curves by division, one realizes that in Div. 3Ps two very distinct means appear, one at 16 cm and the other at 33 cm, and that the individuals between 6 and 28 cm represent 85.7% of the population, whereas, in Div. 3Pn the same individuals represent only a little more than half the population, i.e., 56%. Two means appear, one at 15 cm and the other at 33 cm.

A great difference exists between these two divisions and Div. 4Vn where one mean only appears at 32 cm and where practically the whole population is found between 28 and 43 cm (88%).

In addition to these measurements, several biological operations were carried out: otolith readings, sex and weight by length. These various data are exploited and presented to ICNAF in a more detailed report submitted to the 21st meeting of ICNAF.

American plaice (*Hippoglossoides pl. platessoides*)

During the April-May 1970 survey, american plaice catches were essentially made in Div. 3Ps and 4Vn.

In Div. 3Ps, the best yields were obtained north of St. Pierre Bank (230 kg/hr at a depth of about 60 m). However, the smaller yield of other hauls can be explained by the fact that they were mainly carried out on the west edges of this bank in the search for other species. For this division, the measurements made on a sample of 624 individuals show that the length is distributed around a main mean of 19-20 cm, when secondary means of 44-46 cm and 53-54 cm appear.

In Div. 4Vn, the best yields were obtained off Cape Smoky (an average of 530 kg for depths from 130 to 340 m), then on the edges of Mimia Bank (250 kg at depths of 90 m), and on Aspy Bank (210 kg at depths of 100 m). For this division, measurements made on a sampling of 3,812 individuals indicate that the american plaice is larger in this area since the mean length distribution is found at 27-30 cm.

Grey Sole (*Glyptocephalus cynoglossus*)

The April-May 1970 survey shows some indications of grey sole catches in ICNAF Div. 4Vn and 3Pn.

In Div. 4Vn, the best catches were made off Cape Smoky (450 kg/hr at depths of 340 to 380 m), off St. Paul Island (400 kg/hr at depths of 480 m) and off Sydney (125 kg/hr at depths between 300 and 340 m).

In Div. 3Pn, the best yields were obtained in May 1970 13 miles south of Couteau Head 230 kg/hr at depths of 250 m. During an R/V "Cryos" survey in December 1970, trawl hauls made at the same position only yielded 70 kg/hr. During this survey, the R/V "Cryos" worked in Div. 3Pn and 3Ps. The best yields were obtained for Div. 3Ps in Burgeo deep at depths of 230 m: 270 kg/hr. Measurements made on a sampling of 1,604 grey sole in this trench show a length distribution from 20 to 60 cm with two means: one at 26 cm and the other at 39 cm.

Herring (*Clupea harengus*)

During the R/V "Thalassa" survey, in spring 1970, the interesting catches (made with the Lofoten trawl) were recorded.

1. Inside the Gulf of St. Lawrence, between Madeleine and Cape Breton Islands, and for one trip only, 17 April.

- yield obtained for one half-hour of fishing was 348 kg;
- length varied from 24 to 35 cm (mean length 29 cm);
- stage V of sexual maturity represented 72% of population.

2. Nova Scotia banks and Saint Ann Bank, 7 to 18 May.

- small yield of 63 kg for one half-hour of fishing;
- length varied from 28 to 41 cm (mean length 35-36 cm).

Observations were repeated in the fall by R/V "Cryos". In November, ahead of Cape Smoky, lengths varied from 27 to 40 cm (mean length 36 cm). In December, near Ramea Islands and on the northern edges of Burgeo, it was noted that lengths varied from 32 to 39 cm (mean lengths 35-36 cm). Finally, small herring (lengths of 11 to 14 cm), with a mean of 12 cm, were observed during two months (October and November) within radius of Miquelon (see Fig. 12).

Shrimp (*Pandalus borealis*)

Research carried out since 1966 in an effort to track down shrimp grounds in the open sea were undertaken in 1970 during the spring survey of R/V "Thalassa".

Shrimp of the *Pandalus borealis* species are found on the bottom and edges of the Laurentian Channel where they are dispersed; on the other hand, they are concentrated in the deeps here and there.

In December the R/V "Cryos" made a short cruise to test a shrimp trawl of the "balloon" type. Hauls were made in the Burgeo deeps and south coast of Newfoundland on the one hand, and on the other hand in the "Esquimau" Channel and west coast of Newfoundland. At this time of the year, average yields vary with hour of fishing, being very small at dawn and at sunset.

The Burgeo deep produces a smaller average yield per hour of fishing, 44 kg/hr, than the "Esquimau" Channel, 81 kg/hr, but the shrimp collected are greater in size. Males are an average length of 22.5 mm Lc and females are 26 mm Lc in Burgeo Trench, against 21 mm and 24.5 mm in the "Esquimau" Channel.

The trawl used had a 60-mm mesh (stretch mesh) in the wings, belly and back, and 40-mm mesh at the neck and codend.

The percentage of fish of commercial size taken varies according to the hauls, between 10% and 50%. The two species particularly concerned are the redfish (Sebastes sp.) and the grey sole (Glyptocephalus cynoglossus). For example, in a redfish catch of 1,460 kg, fish of commercial size represented only 216 kg.

Benthos

The benthos collected were studied along with the fish stock. A community of Yoldia thraciaeformis, Lamellibranch molluscs associated with Pennatules, appeared in the Laurentian Channel. This community is established on a compact black mud bottom. As an associated specie, one must also note the presence of Pasiphaea tarda which yields up to 5 kg per hour of haul.

TABLE 1. Saint-Pierre et Miquelon. 1970 Yields - Industrial and traditional fishing - nominal fishing expressed on tons)

Sous-zone	sect	Morue	églefin	balai	Rascasse du Nord	lieu noir	plie	flétan	loup	raie	carrelet	lotte	Non ident.
3	Ps	1 970	1 158	397	1 072	1	111	23	11	229	214	19	120
3	L	68		389	7		2		26	111	16		43
	3Pn	1		1	153		2			2			
	3 O	3	1				1			1			
Tot. sous-zone 3		2 042	1 159	787	1 232	1	116	23	37	343	231	19	163
4													
	4 Vh	6	1	11	51		6			10	6		1
	4 Vs	10	15	8	80		8	1		6			3
	4 S				86								1
	4 R	120	6	6	178		1		1				9
Tot. sous-zone 4		136	22	25	395		15	1	1	16	6		14
Tot. zone ICNAF		2 178	1 181	812	627	1	131	24	38	359	237	19	177

TABLE 2. Traditional fishing at St. Pierre et Miquelon (in metric tons).

Month	Cod	American plaice	Ray	Total
May	89		0,060	89,060
June	405	1	0,120	406,120
July	327	5	0,360	332,360
August	223	1	0,110	224,110
September	166	1	0,250	167,250
October	83		0,100	83,100
November	14			14,000
Total	1 307	8	1	1 316

TABLE 3. Cod - hourly yield and age at mean length by station.

Secteurs CNAF Divisions	Station	Rdt/h en tonnes Yield/hour in tons	Taille modale (cm) Mean Length (cm)	Age at mean length âge à la taille moda- le (en années) (in years)
<u>Cap de St Laurent:</u>				
Cap St. Laurent 4T (91-182m)	1 (St 35)	0,197	22	2
Cap St. Laurent 4T (91-182m)	1 (St 38)	6,812	34 et 49	4 et 6
Cap Anguille 4R (91-182m)	1 (St 61)	2,358	37	5
<u>Nova Scotia Banks Bancs de la Nlle Ecosse</u>				
Cap Egmont 4 Vn (91-182m)	1 (St 67)	4,466	46	6
Banc St. Ann 4 Vn (91-182)	1 (St 155)	1,527	52	6
<u>Banc St Pierre</u>				
3 Ps (91-182m)	1 (St 164)	0,480	19 et 34	2 et 4
(91-182m)	1 (St 168)	0,235	19	2

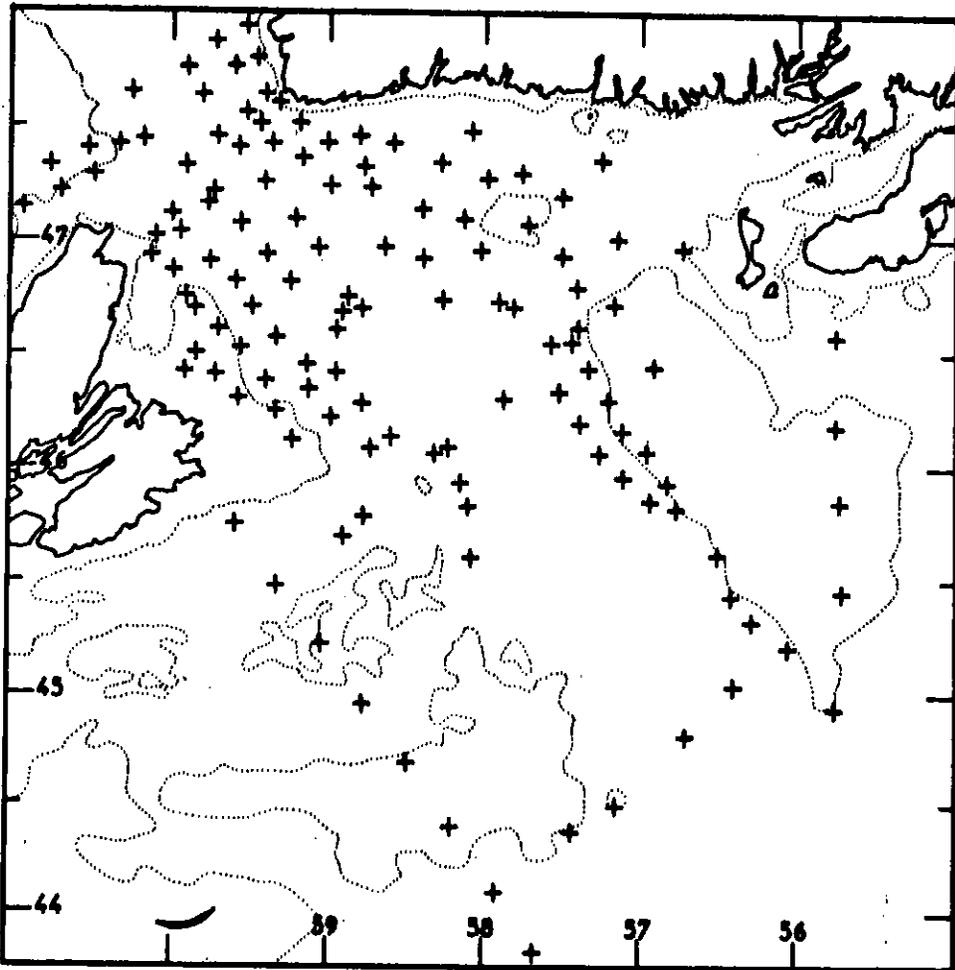


Fig. 1. April-May 1970 - "Thalassa" survey in Northwest Atlantic. Plotting chart of hydrographic stations (bottles and bathythermographs).

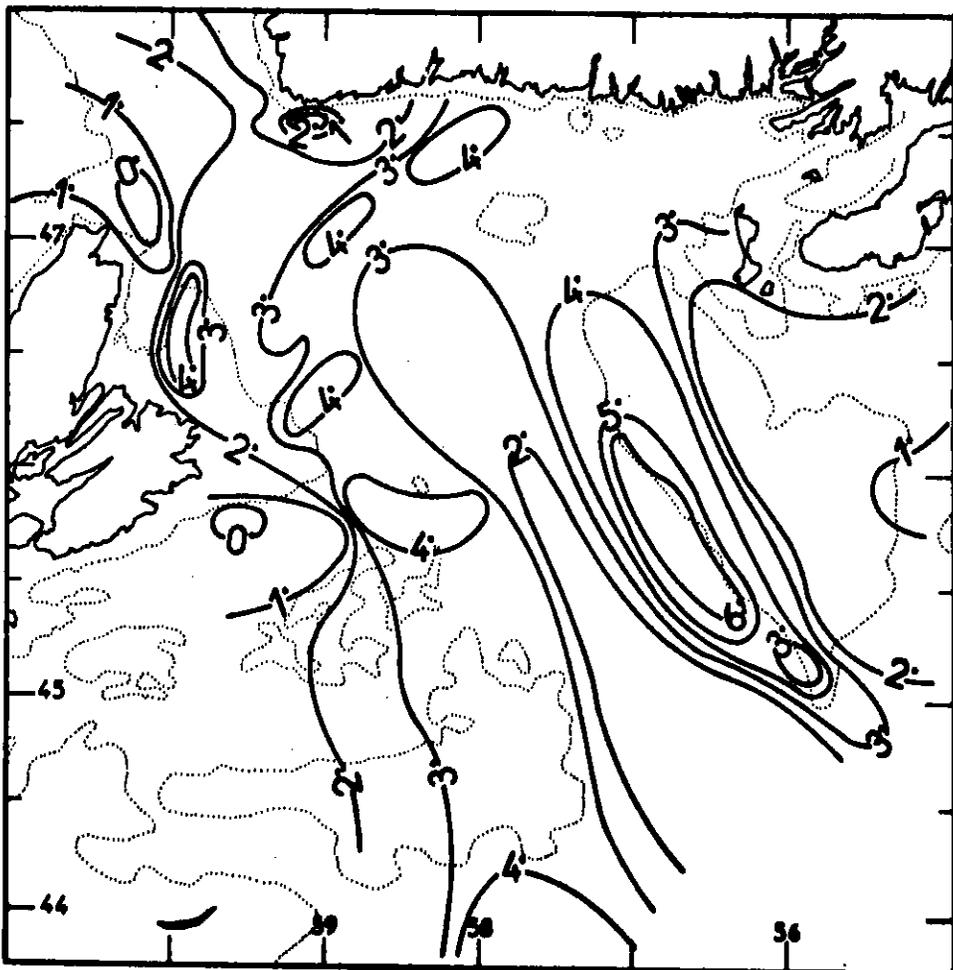


Fig. 2. April-May 1970 - "Thalassa" survey in Northwest Atlantic. Distribution of surface temperature.

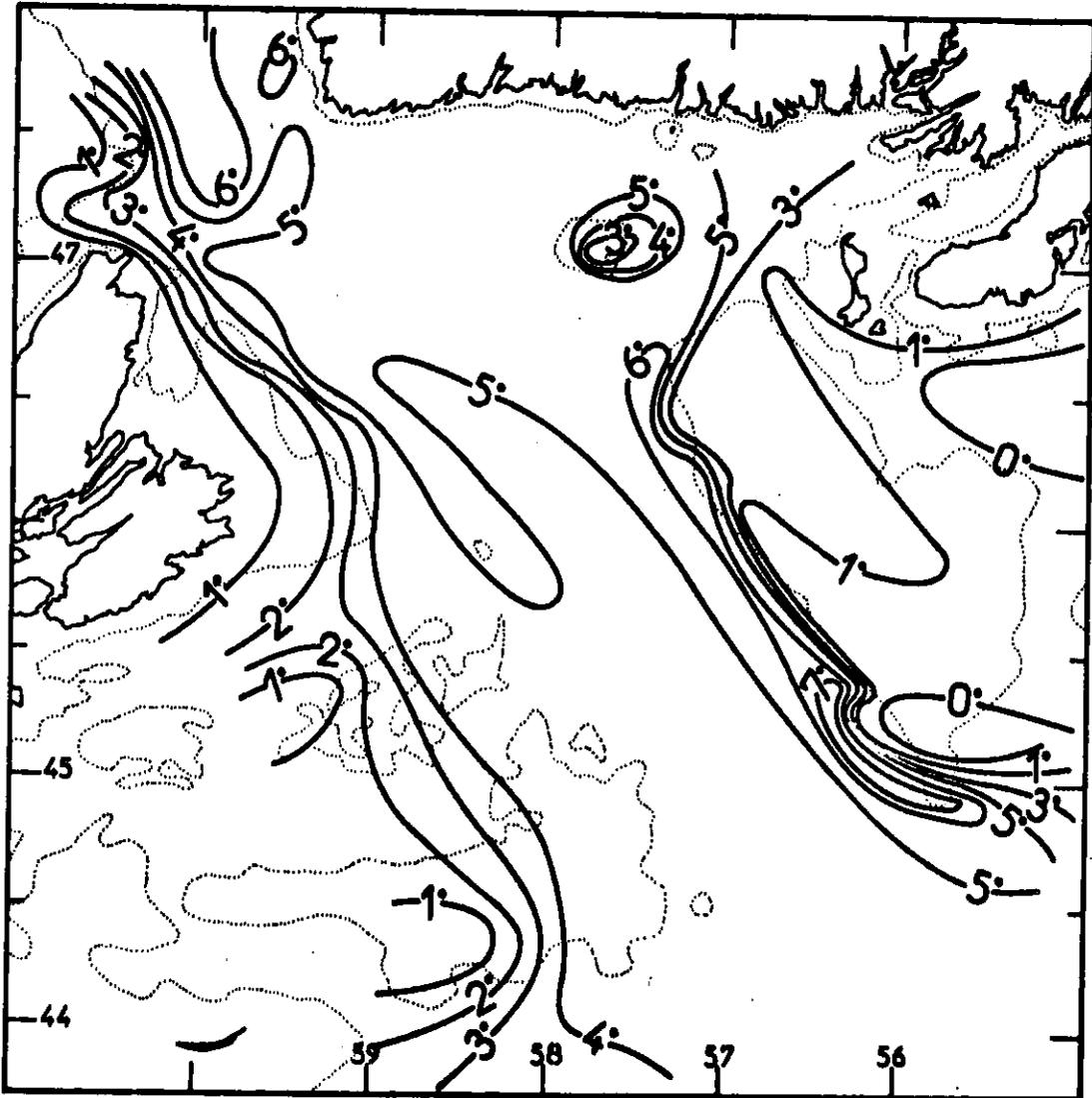


Fig. 3. April-May 1970 - "Thalassa" survey in Northwest Atlantic. Distribution of bottom temperature.

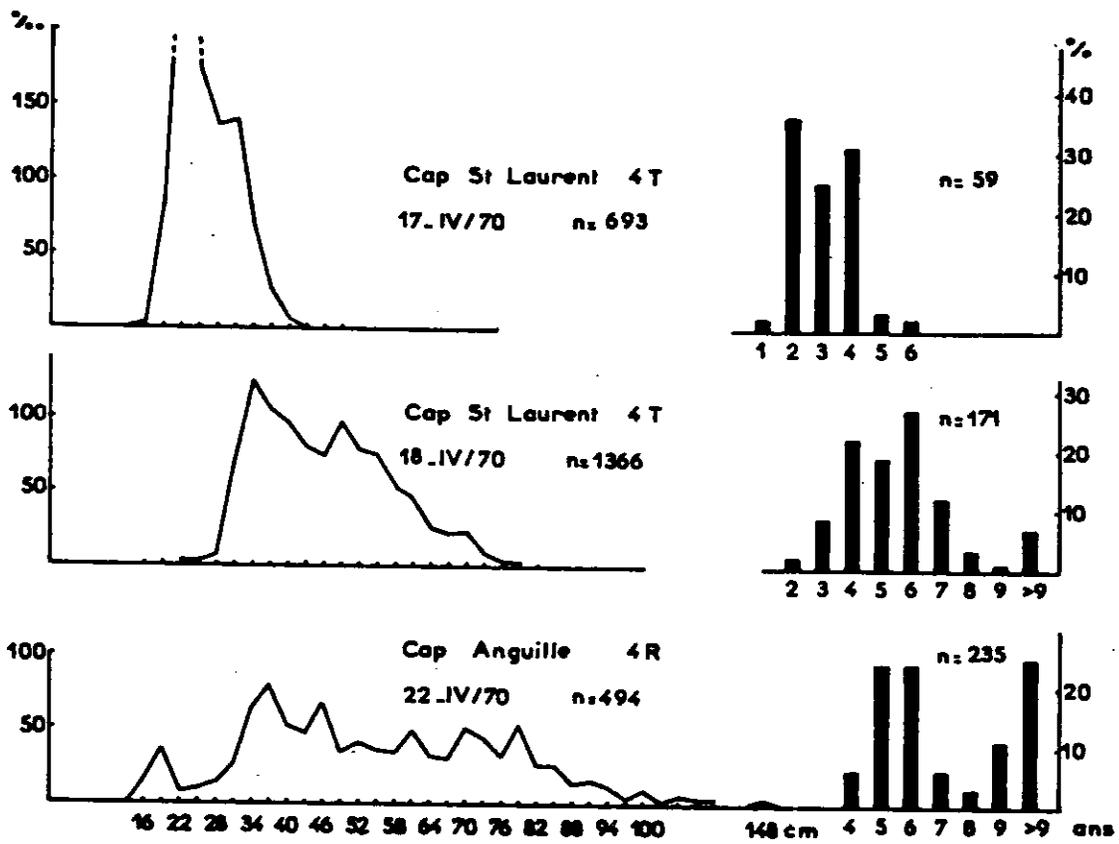


Fig. 4. Cod - length frequency and age composition.

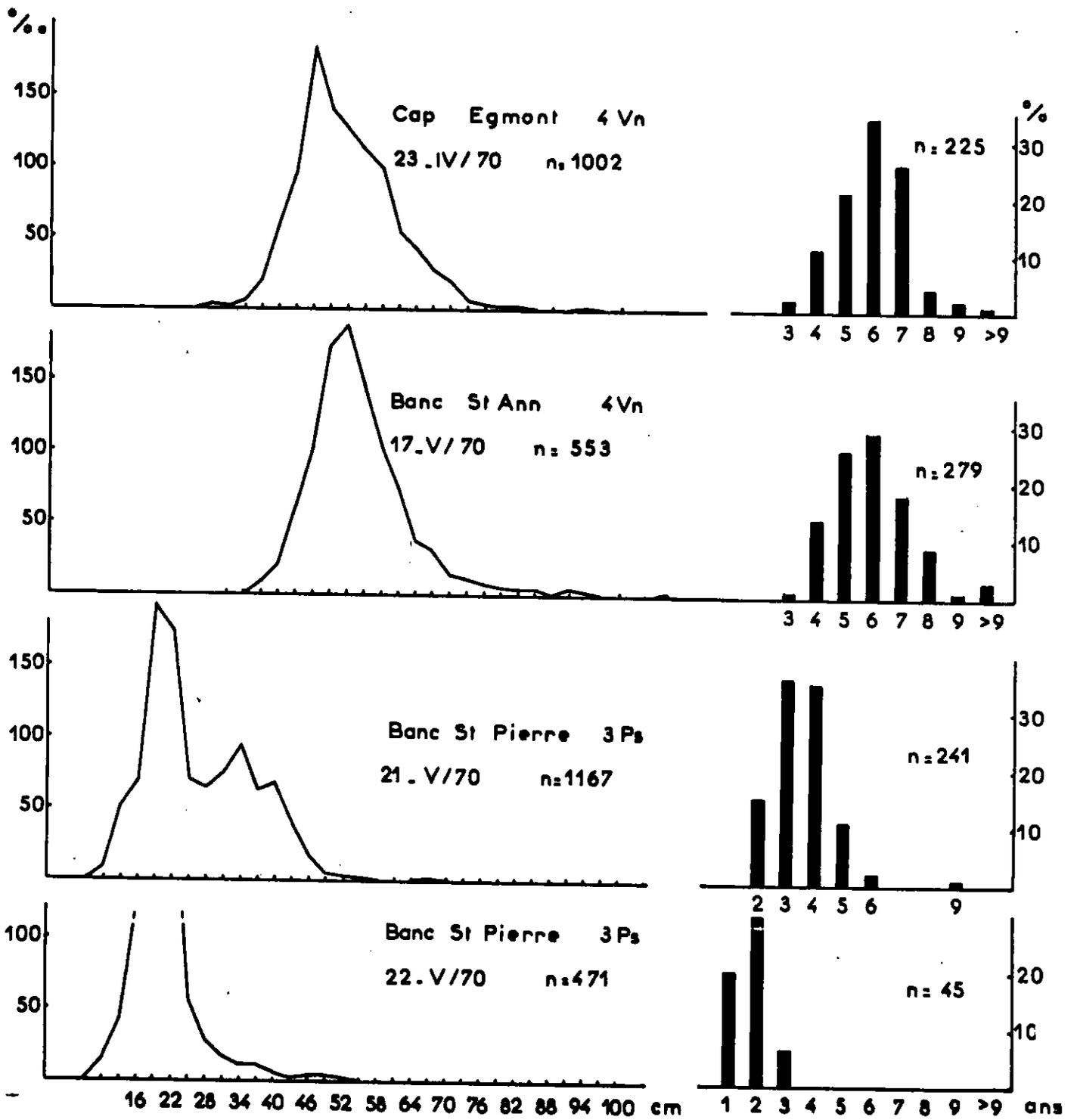


Fig. 5. Cod - length frequency and age composition.

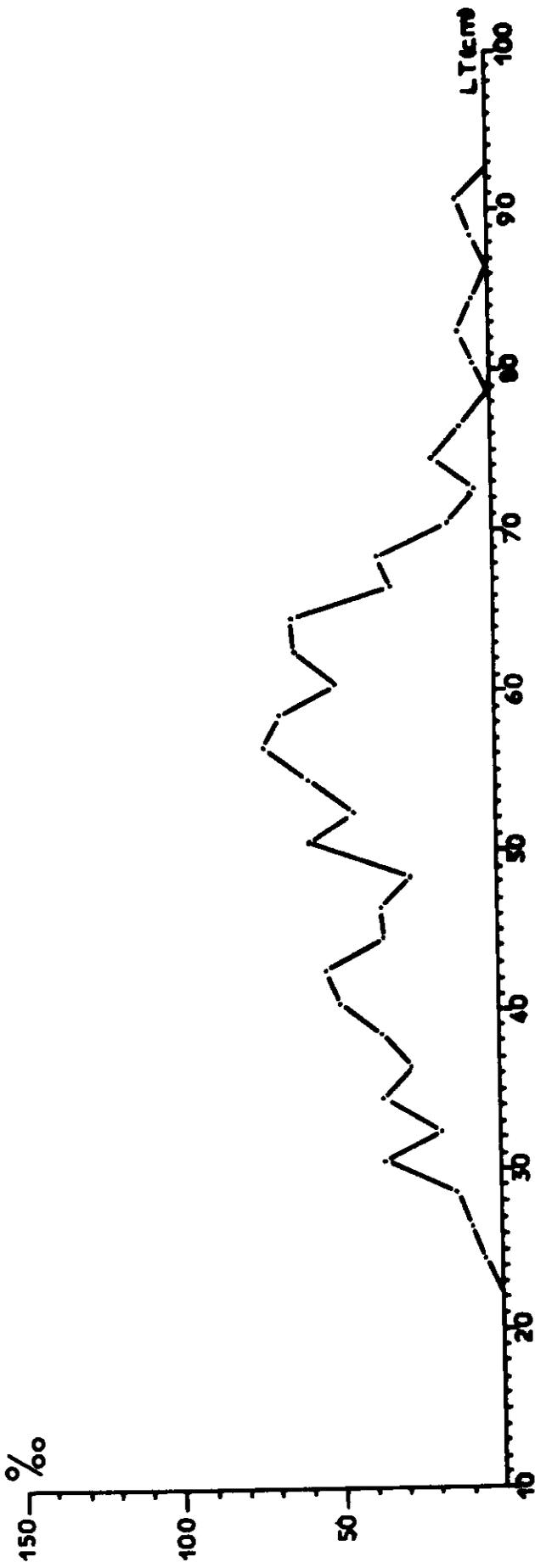


Fig. 6. Urophycis - (April-May) - Length frequency per thousand.

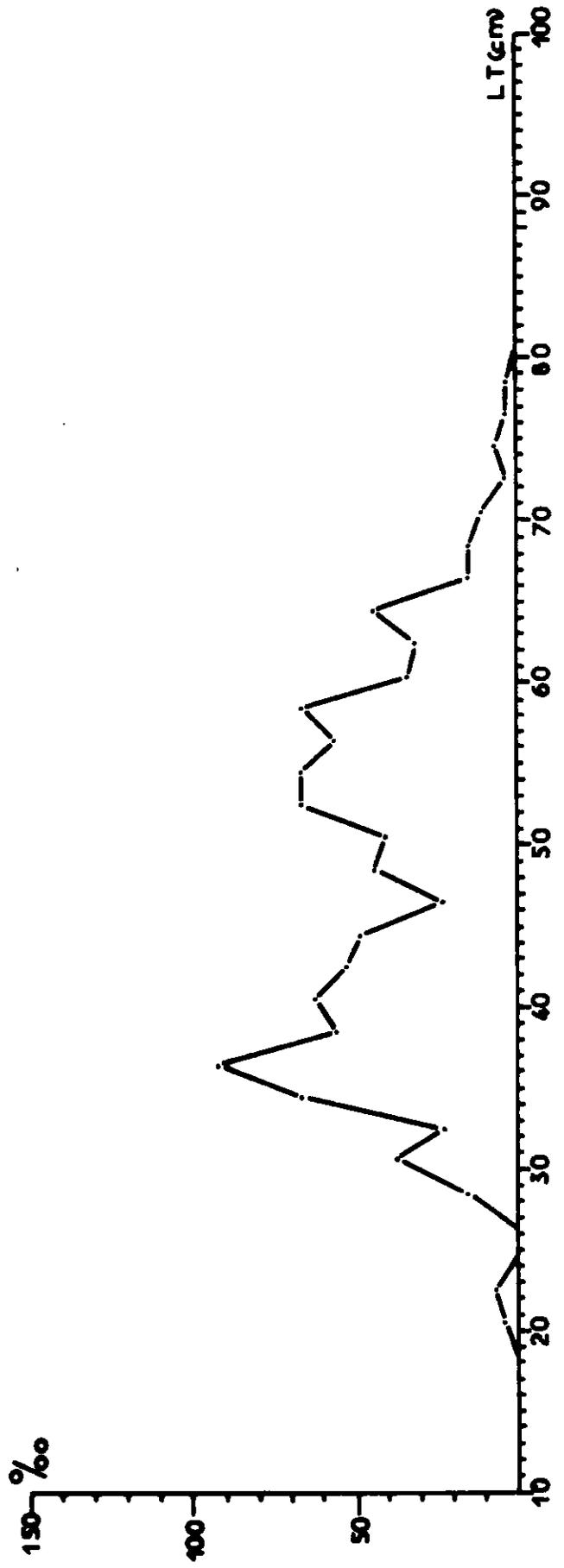


Fig. 7. Urophycis - (South Newfoundland - December 1970) - Length frequency per thousand.

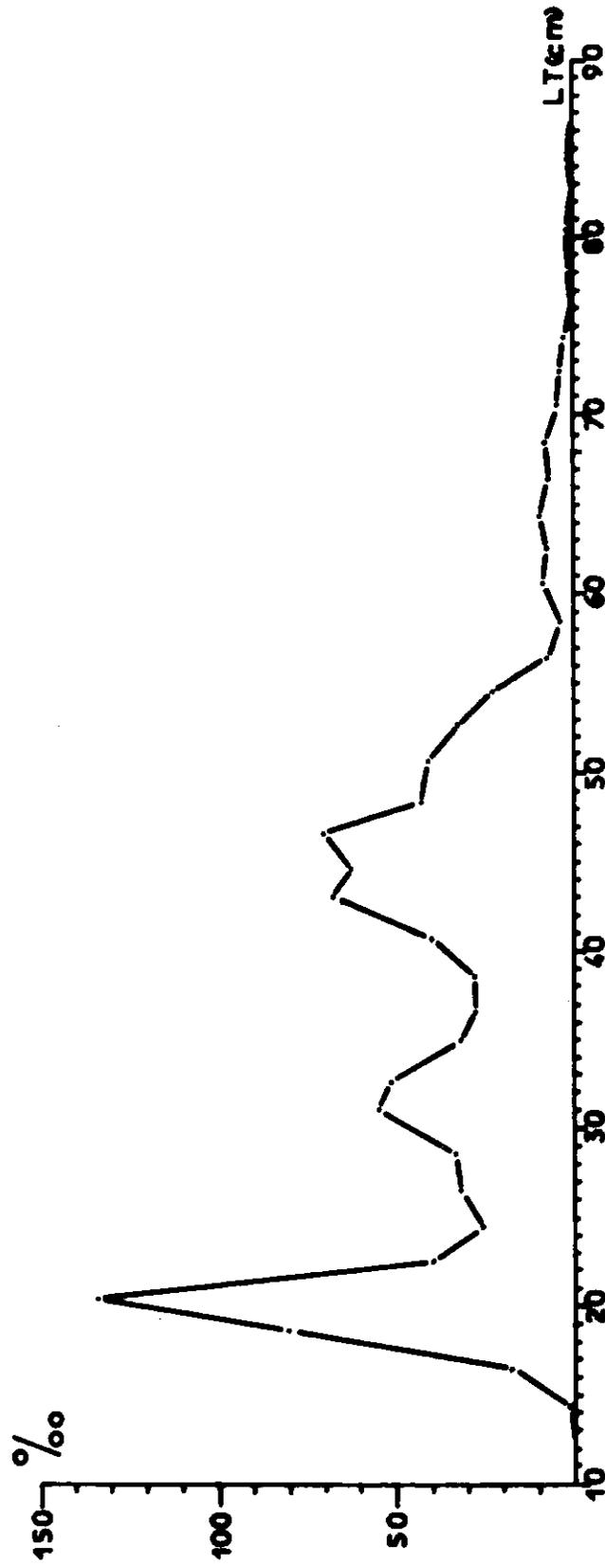


Fig. 8. Haddock - Length frequency per thousand.

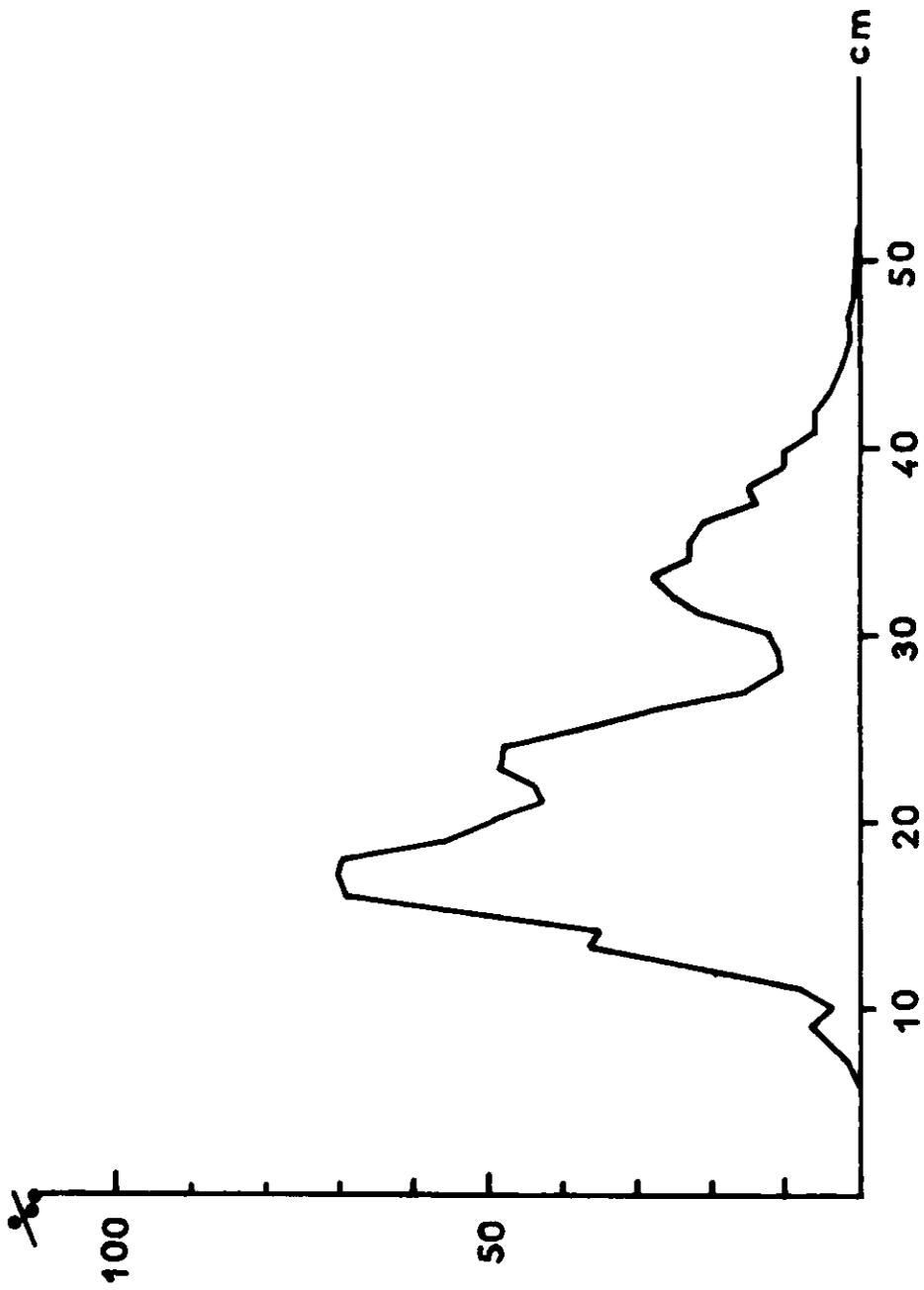


Fig. 9. Redfish - Length frequency per thousand in Div. 3Ps.

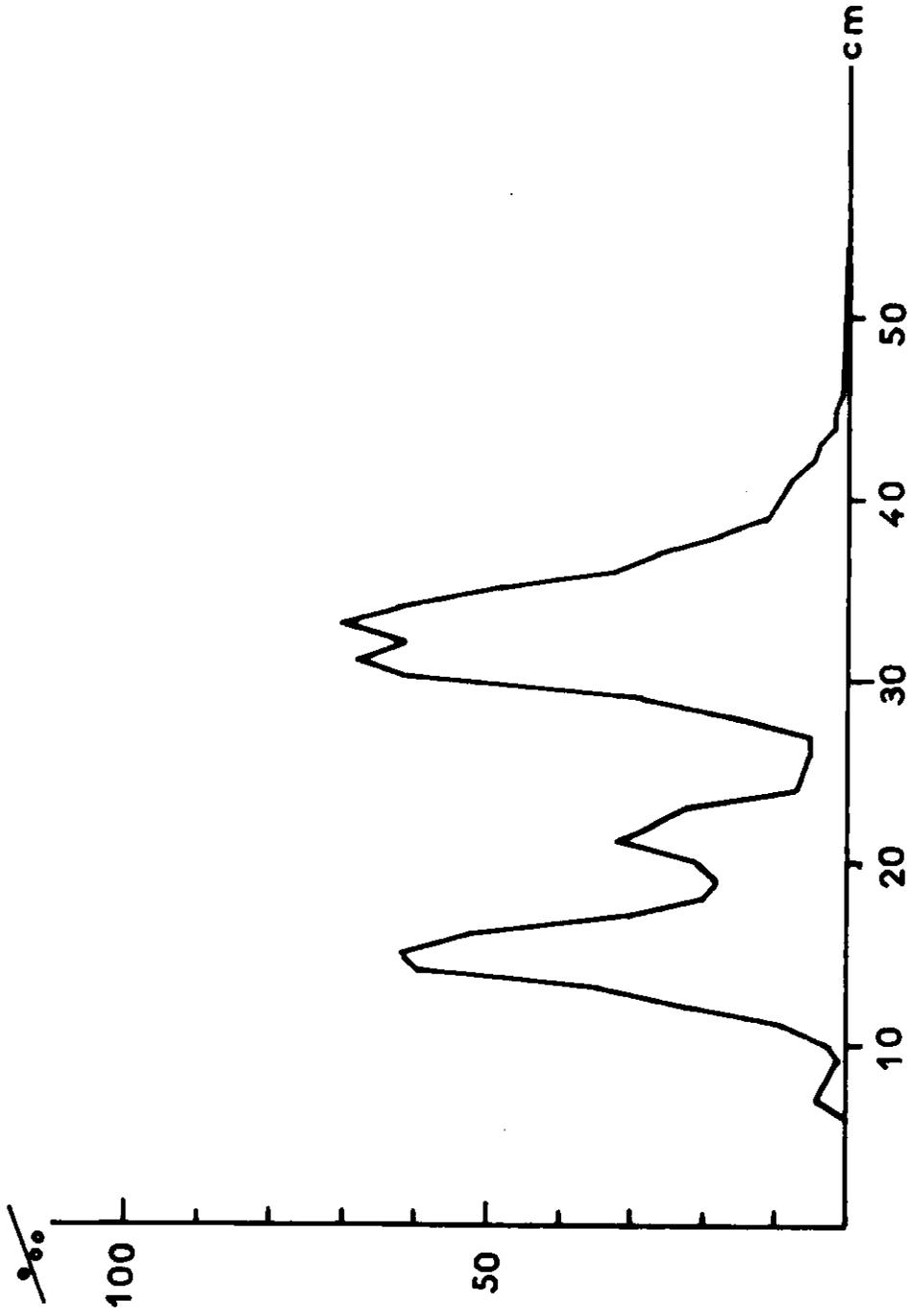


Fig. 10. Redfish - Length frequency per thousand in Div. 3Pn.

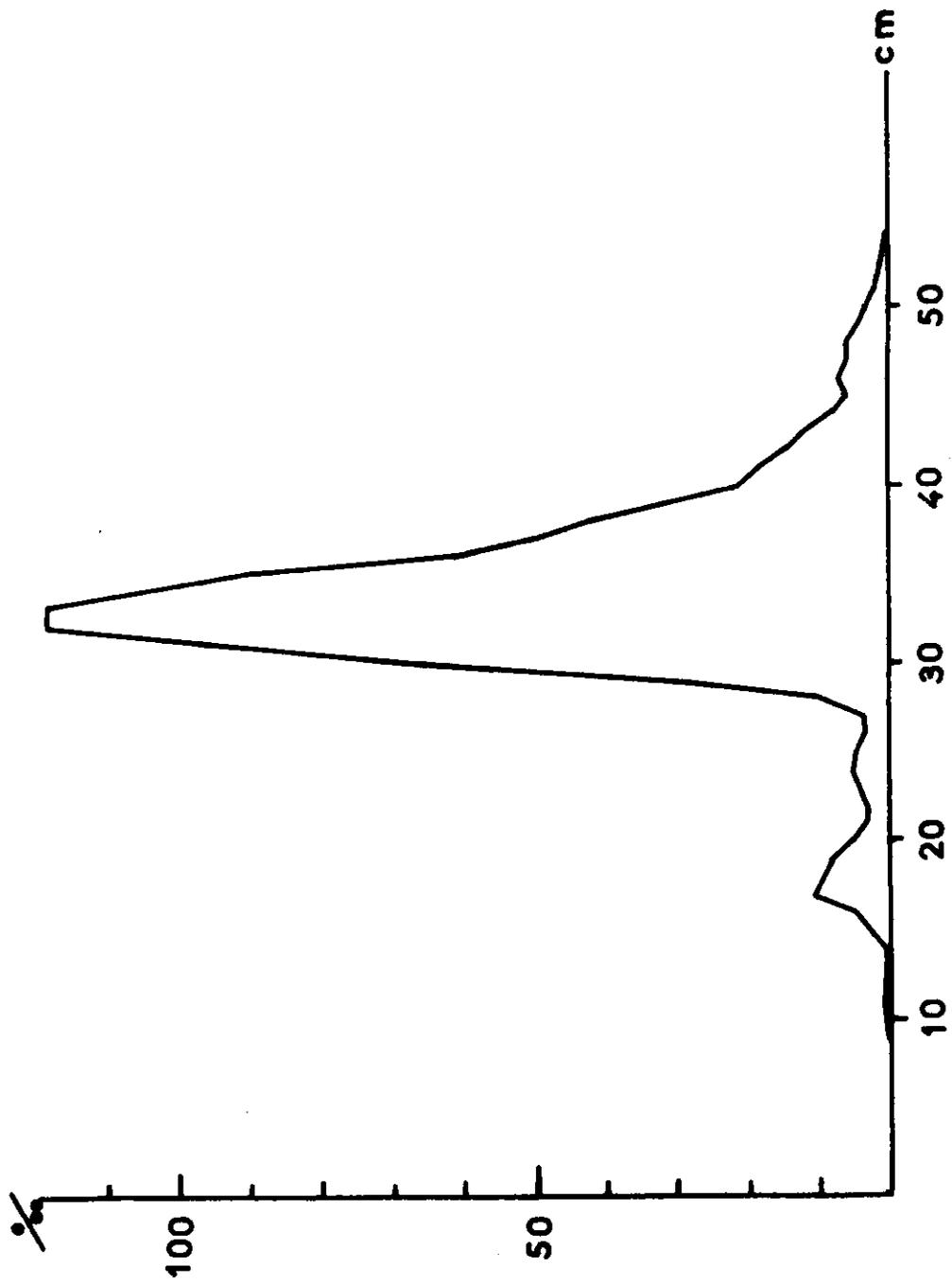


Fig. 11. Redfish - Length frequency per thousand in Div. 4Vn.

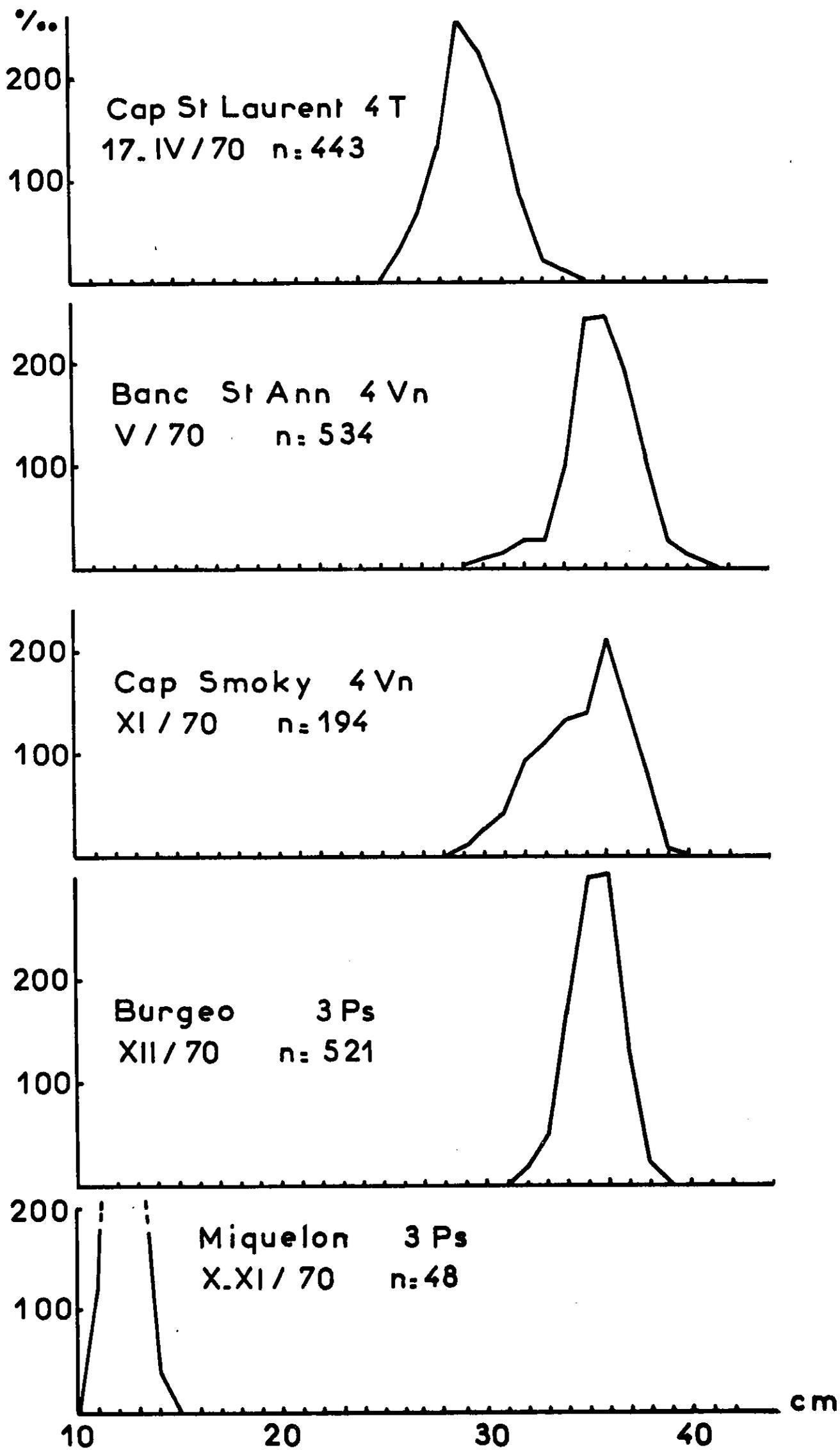


Fig. 12. Herring length frequency.