

ANNUAL MEETING - JUNE 1965Norwegian Research Report, 1964

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SUBAREA 1

A. Status of the FisheriesI. Cod

In the period 11 April-6 May 1964, fishing experiments were carried out by the Norwegian R/V "Johan Hjort" off West Greenland on the northern part of the Noname Bank-Banan Bank area (Fig. 1). Both trawl and bottom long line were used. Cod were present on all the banks in the investigated area but pelagic shoals of cod were not recorded.

The mean length of the cod varied considerably in the catches and from one bank to another. On bottom long line both the smallest and largest cod were taken on Noname Bank. In 3 catches the mean lengths were 62.6, 70.6 and 79.4 cm respectively. The fish of 79.4 cm mean length were taken by halibut long line, hooks no. 2 and 4, the others by cod bottom long line, hook no. 6; the variation in mean length may be due partly to the different selection of the hook sizes. In 2 bottom long line catches on the Dana Bank the mean length was 73.6 cm, in one catch on the Fiskenaes Bank 68.8 cm. In 4 catches on the Fylla Bank the mean lengths were 65.5, 66.2, 67.2 and 70.2 cm respectively. In trawl catches on the Banan Bank the mean length was 56.4 cm, on the Fylla Bank 65.7 cm. In the trawl catches (Fig. 2), the overall mean length is 63.6 cm; compared with 1963 (62.6 cm), a slight increase has taken place. In the bottom long line catches (Fig. 3), the overall mean length is 69.5 cm, a marked increase as compared with 1963 (66.4 cm).

In the total bottom long line catch (Fig. 4), the 1957 year-class still dominates, but decreased in importance from about 45% in 1963 to 32.2% in 1964. The 1956 and the 1953 year-classes are also of some importance, together constituting 12.9% of the total catch. The proportion of cod, seven or more years old, increased considerably in the total bottom long line catch, from about 29% in 1963 to 54.7% in 1964.

In the total trawl catch (Fig. 5), the 1957 year-class diminished from 50.2% in 1963 to 16.6% in 1964; but fish, seven years or older increased from about 16% in 1963 to 30.6% in 1964.

If the age data are representative of the West Greenland cod population, a further decrease of the 1957 year-class is to be expected. The 1958 year-class will probably also decrease in importance as this year-class increased only slightly in the total bottom long line catch from 1963 to 1964 and decreased in the total trawl catch. The year-classes 1959 and especially 1960 seem to be promising. The latter increased from about 2% in 1963 to 11.1% in 1964 in the bottom long line catch and from about 2 to 22.9% in the total trawl catch.

In 1965 the mean length of the cod in the trawl catches will probably be much the same as in 1964. A slight increase in the mean length of the cod in the bottom long line catches may be expected in 1965. However, this increase in mean length will of course depend upon the availability of the 1960 and 1957 year-classes.

B. Special Research Studies

I. Environmental Studies

1. Hydrography. In 1964 the same hydrographical program was planned as that carried out during the Norwegian part of NORWESTLANT I in 1963; due to difficult ice conditions many hydrographical stations had to be omitted. Off Cape Farewell heavy drift ice concentrations were observed on 7 and 8 April about 50 nautical miles from the coast. In the middle of April a drift ice concentration was followed from 63°12'N, 54°00'W to 63°43'N, 54°48'W. At the same time brash covered wide areas of Banan Bank and some parts of Fylla Bank. At 65°00'N the pack ice was met with west of 53°30'W. In the beginning of May the ice border off Fylla Bank had moved about 40 nautical m. westwards. Later on drift ice was observed in position 61°10'N, 50°10'W and this ice border was followed 25 nautical miles southwestwards.

During the cruise 42 hydrographical stations were worked. In connection with the fishing experiments sea temperature was measured with bathythermograph on 21 localities. The hydrographical sections were situated as follows:

1. 60°48'N, 48°43'W to 59°58'N, 51°37'W
2. 62°00'N, 50°00'W to 61°15'N, 53°15'W
3. 62°46'N, 50°50'W to 62°22'N, 54°32'W
4. 64°00'N, 52°30'W to 63°38'N, 55°35'W
5. 64°32'N, 52°33'W to 64°28'N, 54°04'W

Section 4, across Fylla Bank, was worked both 15 April and 2-3 May.

In April 1964 the temperature in the surface layers seemed to be unusually low as compared with previous years (Fig. 6-11). In the southwestern part of the area investigated the temperature in the surface layers was between 0°C and 1.5°C, on the banks and in the northern area between -1.7°C and 0°C. Water as cold as -1.2°C penetrated down to the top of the Fylla Bank in April but when the Fylla Bank section was repeated in May, warmer water with temperatures between 0.1°C and 1.0°C covered the bank. As usual the western slopes of the banks, below about 200 m, were covered by water warmer than 2°C; in the deeper water layers the temperatures seemed also to be normal with regard to the time of the year.

The low temperatures in the surface layers were probably not caused by a heavier influx of polar water. It seemed more reasonable to connect the strong cooling of the surface layers with the hard ice conditions and the extraordinary low air temperatures which were predominant during the winter 1963-64.

II. Biological Studies

1. Cod eggs. Cod eggs were sampled at all the hydrographical and on some of the fishing stations. A total of 55 stations were worked. A standard Hensen net was used in vertical hauls 100-0 m, in shallower areas, from bottom to surface.

Very few cod eggs were found (Fig. 12). The total number was about the same as in 1963 but compared with 1961, when the same number of stations was worked with a 1 m egg net, the total number of sampled cod eggs was extraordinary low. The highest number of eggs was found south of 63°N. Most of the cod investigated were spent and the small numbers of eggs in the samples may therefore indicate that the spawning had failed. The reason may be that the low surface temperature in the area destroyed the eggs.

III. Mesh Selection Experiments

1. Cod Selection. From 21 to 30 April trawling was carried out between the northwestern part of Fylla Bank and Banan Bank. A Hamburg 140' trawl was

used. In 2 hauls cod ends of double manila were used, in 4 hauls, courleen, and in 7 hauls, ullstron. The meshes were measured with a standard ICES gauge and the covered cod end method was used. The following table lists the results of the experiments; the selection curves are shown in Fig. 13-15.

Material	Mean mesh size	Hauls	50% length	Selection factor	25%-75% sel. range	Total of hauls	
						No. of fish in 25% - 75% selection range	
						Cod end	Cover
Double Manila	133.5	2	45.0	3.4	10.5	734	806
Ullstron	141.5	7	46.0	3.3	12.0	1420	1394
Courleen	134.9	4	42.5	3.2	11.5	461	386

The selection experiments will be continued in 1965.

EAST GREENLAND

A. Status of the Fisheries

I. Cod

The Norwegian bottom long line fishery off East Greenland started very early in 1964; the first vessels began fishing in the area between Cape Tordenskjold and Skjoldungen in the middle of February. At the beginning only a few vessels participated in this fishery, but in July-August, 10 Norwegian vessels fished off East Greenland, in the area between Cape Farewell and Cape Dan. At this time three of the vessels used both bottom long line and hand line, while the others used hand line only. During the winter and in spring the fishery was comparatively good. From late June the catches were decreasing; from the middle of August the catches were no longer profitable and most of the Norwegian vessels left this fishing area.

R/V "Johan Hjort" visited the area off East Greenland between 18 August and 10 September. Pelagic concentrations of cod were not recorded on the banks or in the fjords where the cod is usually found at this time of the year. The fishing experiments were unsuccessful. Small numbers of cod were present in Angmagssalik Fjord where the Greenlanders reported some catches. The cod arrived in Angmagssalik Fjord later than usual and the catches were considerably smaller than normal.

The sampled material is probably not representative for the East Greenland cod population, but the length and age distributions obtained may give some hints (Fig. 16-17). To some extent the age distributions in 1964 and 1963 agree. Also in 1964 the year-classes 1947, 1950 and 1953, together, seem to play an important part, as they constitute 29.5% of the catch. All together about 55% of the cod are more than 8 years old. The 1956 and 1957 year-classes seem to be important, but, from this material, it is difficult to predict their part in the cod fisheries off East Greenland in 1965.

As compared with last year the mean length of the cod increased considerably, from 77.0 cm to 86.0 cm. This great increase in the overall mean length is hardly representative for the whole East Greenland cod population, but probably some increase in the mean length has taken place.

B. Special Research Studies

I. Environmental Studies

1. Hydrography. During the cruise the weather conditions were very good and the ice conditions were also favourable. Only in the Skjoldungen area was some rough but scattered drift ice found. The number of icebergs seemed to be greater than on previous cruises. Due to the favourable conditions the hydrographical program could be worked as planned. The grid of hydrographical stations was the same as in 1963. In all, 57 stations were worked in connection with the sections. In addition, the temperature was registered on all the fishing stations. The hydrographical sections were:

1. From Prins Christian Sund and eastwards:
60°03'N, 42°55'W - 60°03'N, 38°50'W
2. From Cape Tordenskjold to Ocean Weather Station "Alpha":
61°24'N, 42°10'W - 62°00'N, 33°00'W
3. From Cape Møsting and southeastwards:
63°35'N, 39°58'W - 62°44'N, 36°45'W
4. From Cape Dan and southeastwards:
65°26'N, 36°50'W - 64°19'N, 34°00'W
5. From Cape E. Holm in East Greenland to Bjargtangar in Iceland:
67°45'N, 31°49'W - 65°33'N, 24°41'W

Fig. 18 shows the net of stations and Fig. 19-23 show the temperature in the sections.

Compared with the investigations during the previous years, it seemed that in 1964 the temperatures were normal for the time of the year. The amount of cold polar water along the coast was near the average for the previous years. Farther off from the coast, the surface temperatures were higher than in previous years. These high temperatures were probably caused by great radiation of heat from the air as the summer of 1964 had been comparatively warm in these areas. At most of the fishing stations the bottom temperatures were between 2°C and 4°C. On Cape Dan Bank the bottom temperature was 1°C, and at 2 fishing stations on the slope of the Heimlandsryggen, 500 m deep, about 6°C.

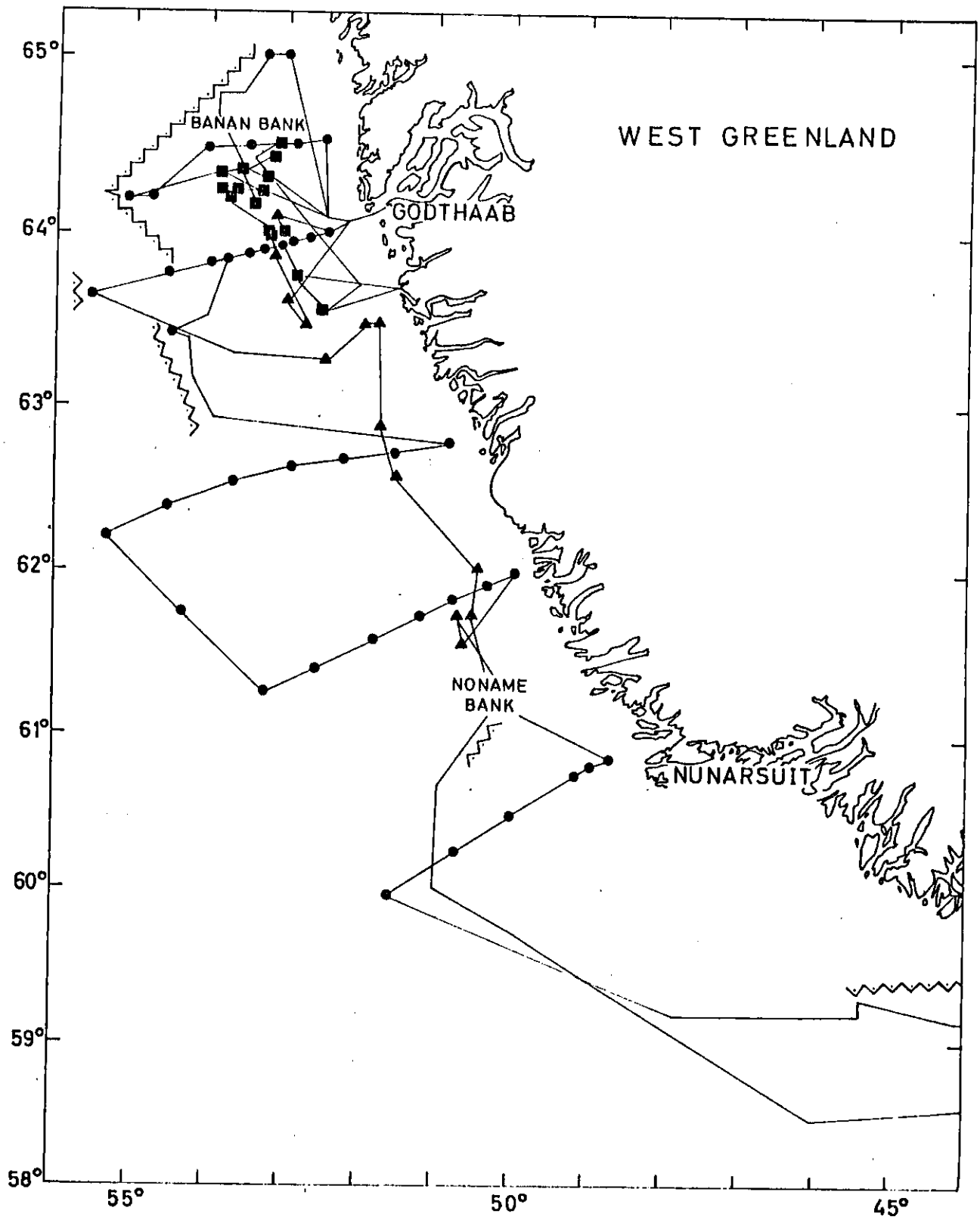


Fig. 1: "Johan Hjort", West Greenland, April-May 1964. Route and net of stations. ● : hydrographical station. ▲ : bottom long line station. ■ : trawl station. ≡ : drift ice.

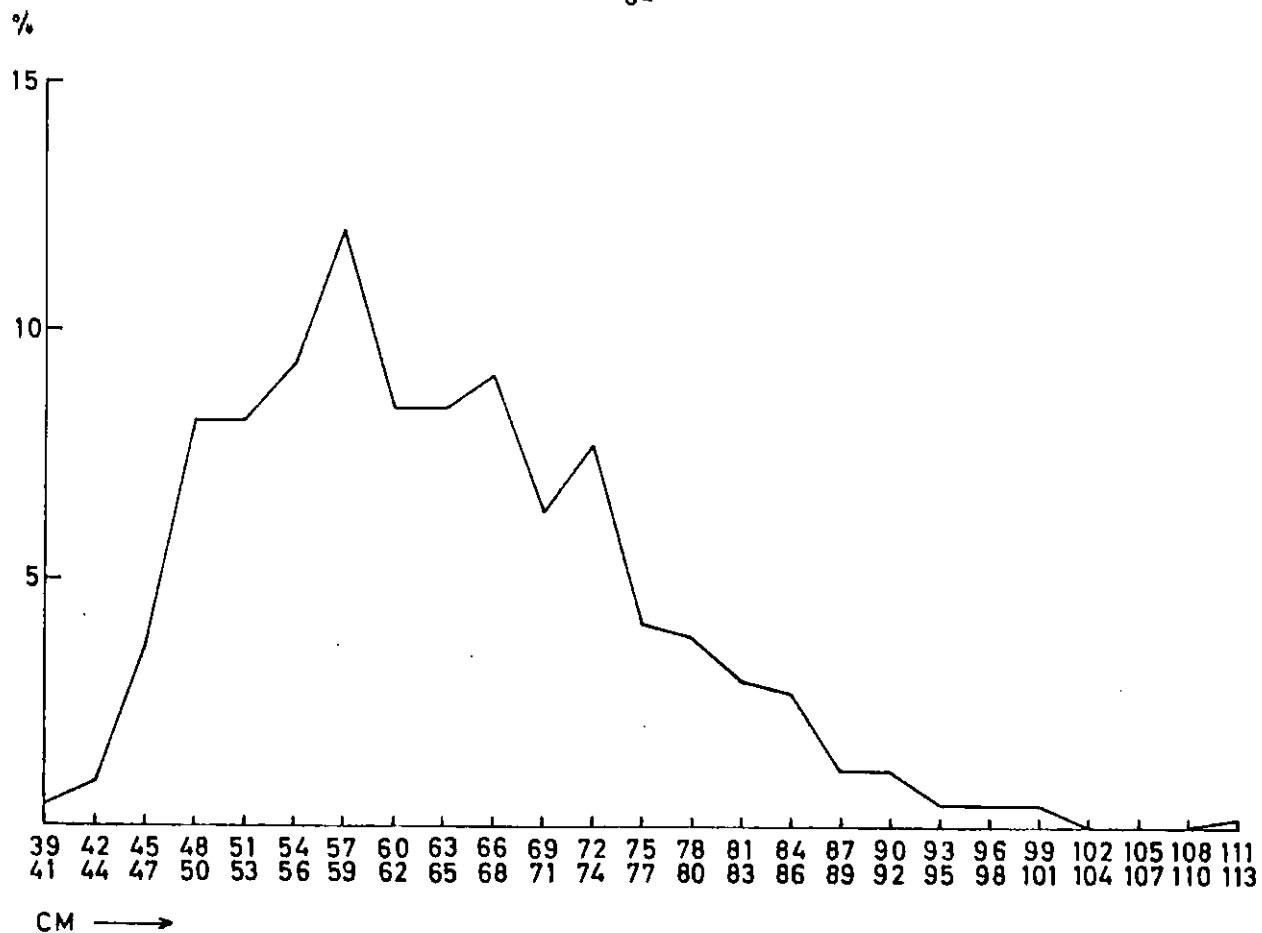


Fig. 2: "Johan Hjort", West Greenland, April-May 1964. Cod. Length distribution. Total trawl catch.

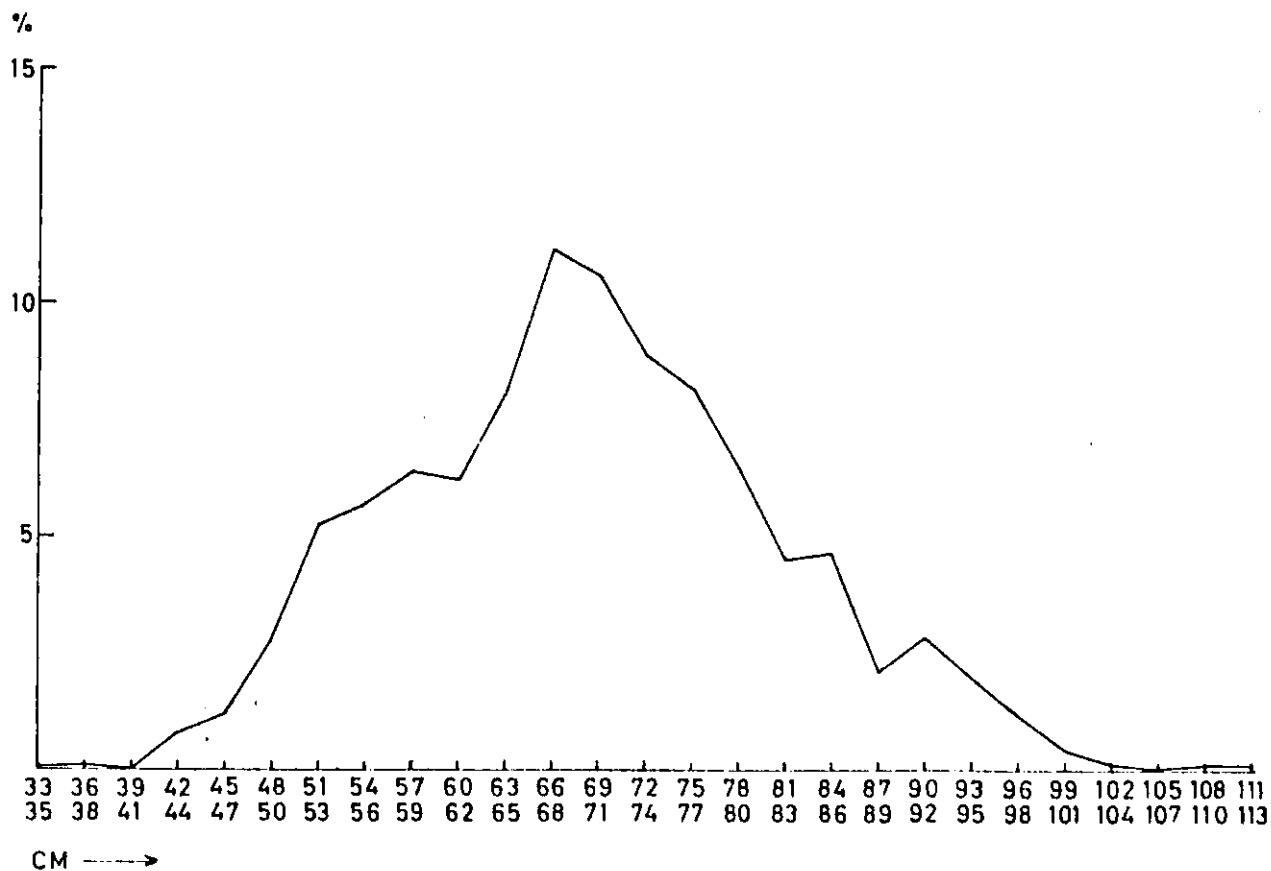


Fig. 3: "Johan Hjort", West Greenland, April-May 1964. Cod. Length distribution. Total bottom long line catch.

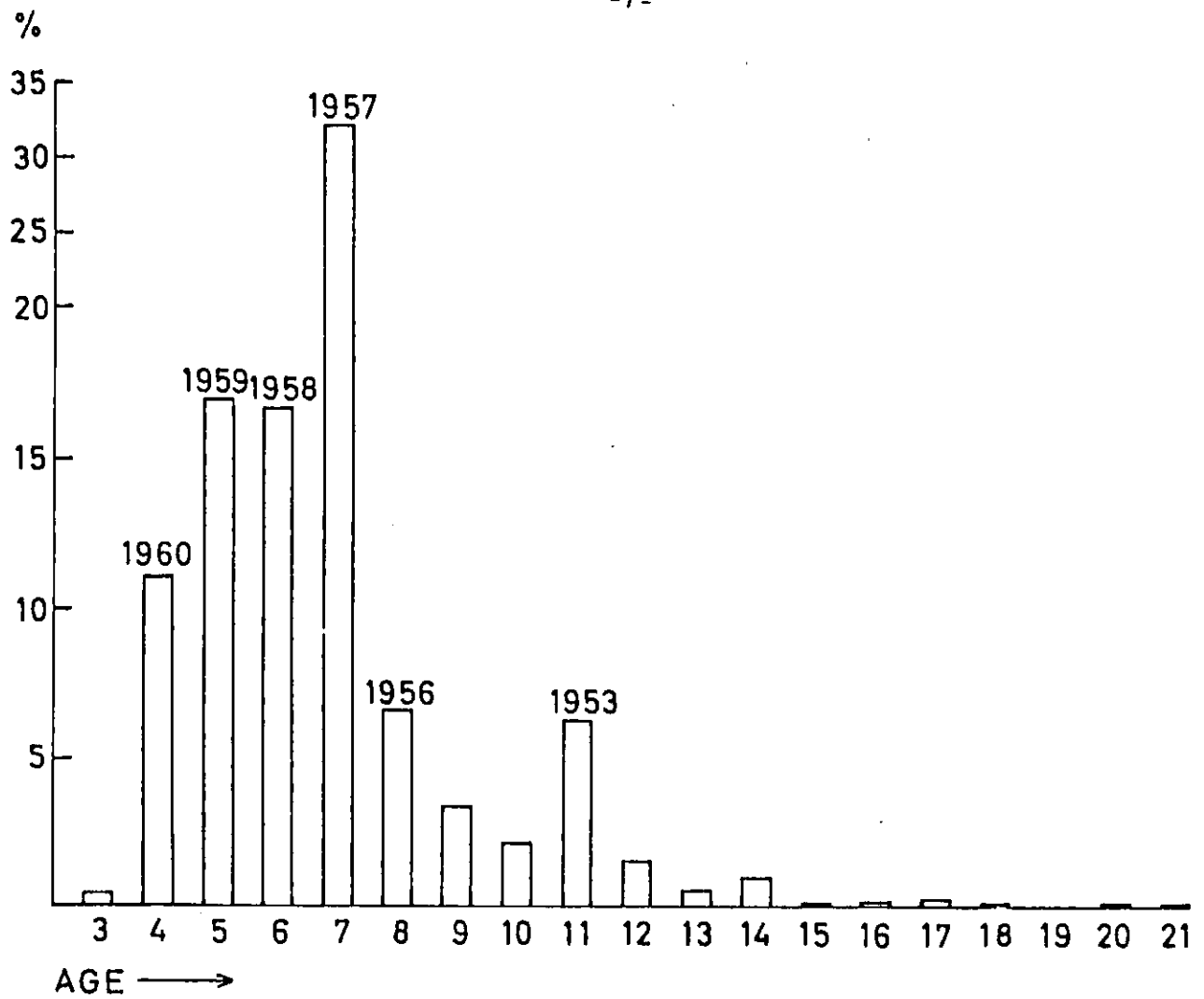


Fig. 4: "Johan Hjort", West Greenland, April-May 1964. Cod. Age distribution. Total bottom long line catch.

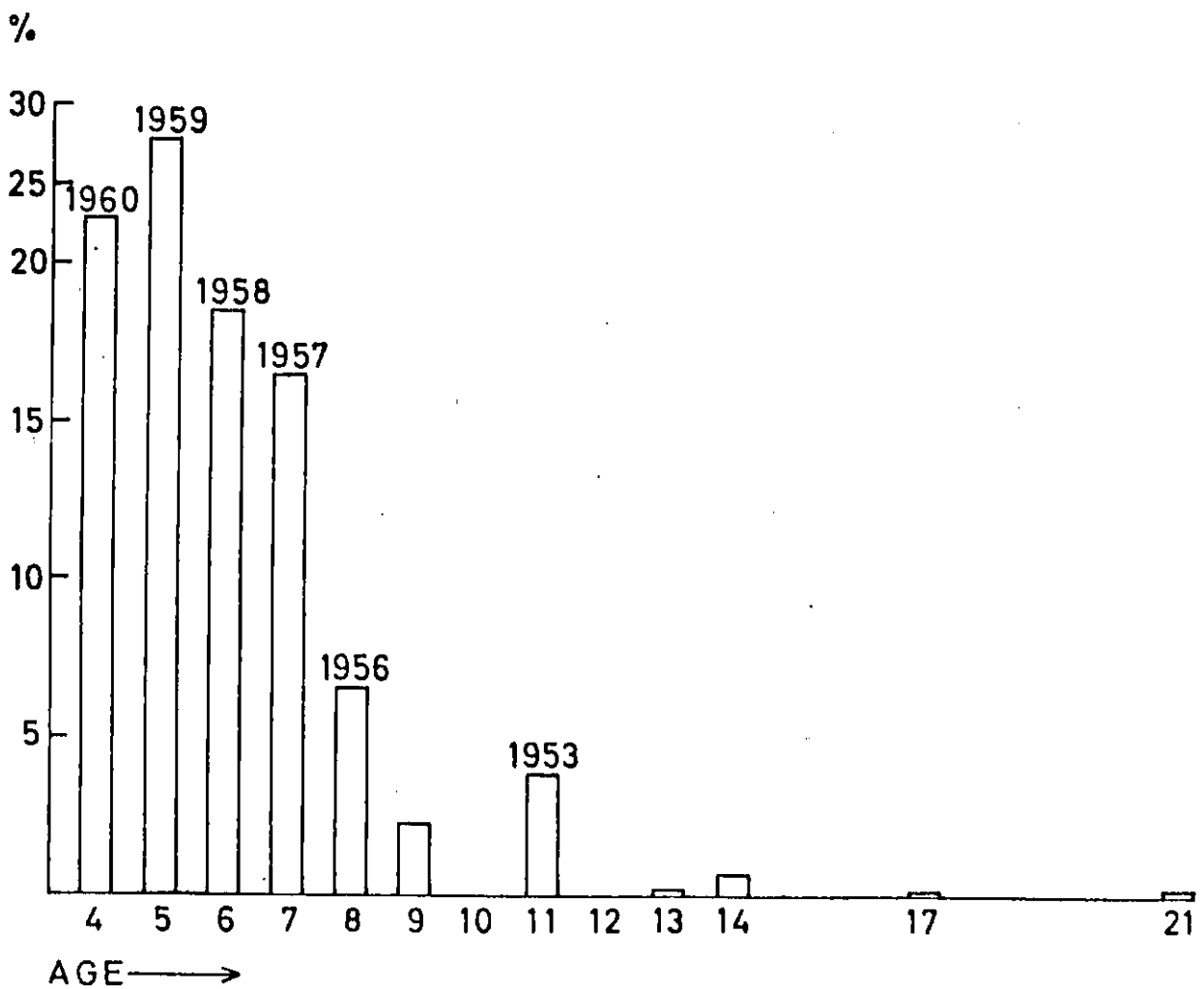


Fig. 5: "Johan Hjort", West Greenland, April-May 1964. Cod. Age distribution. Total trawl catch.

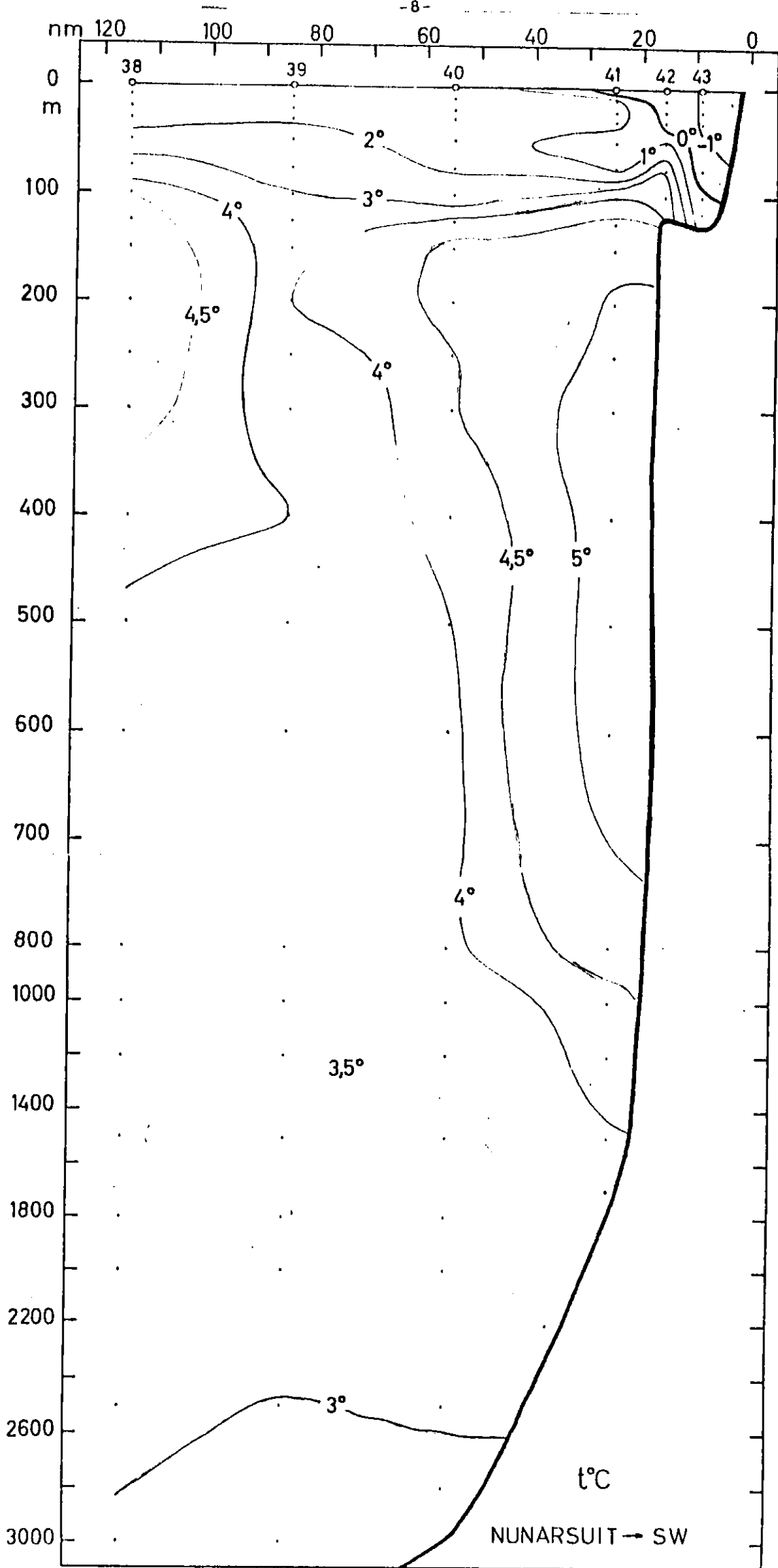


Fig. 6: "Johan Hjort", West Greenland, 9th-10th April 1964. Section I. Vertical distribution of temperature ($^{\circ}\text{C}$).

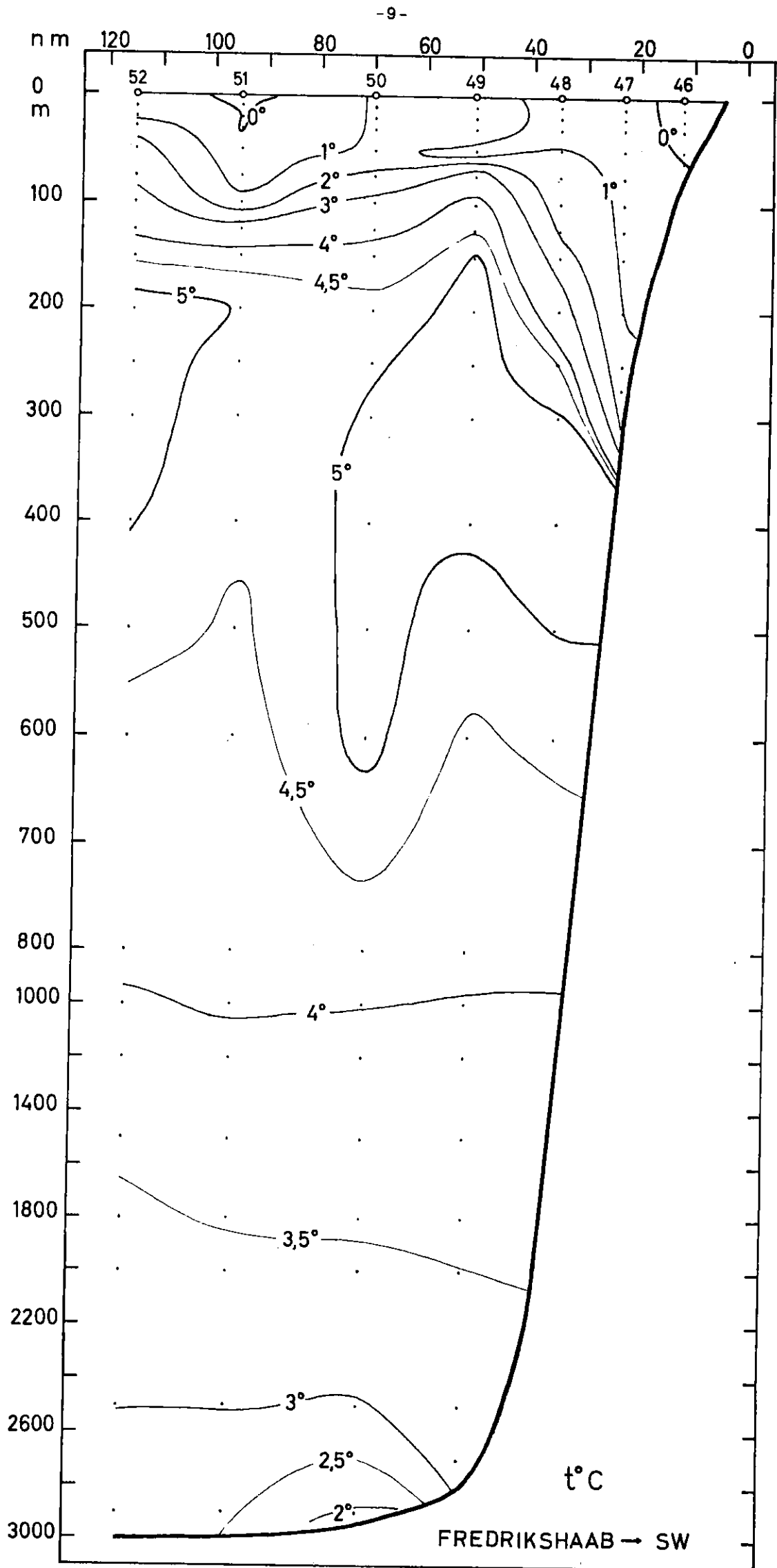


Fig. 7: "Johan Hjort", West Greenland, 12th-13th April 1964. Section 2. Vertical distribution of temperature ($^{\circ}\text{C}$).

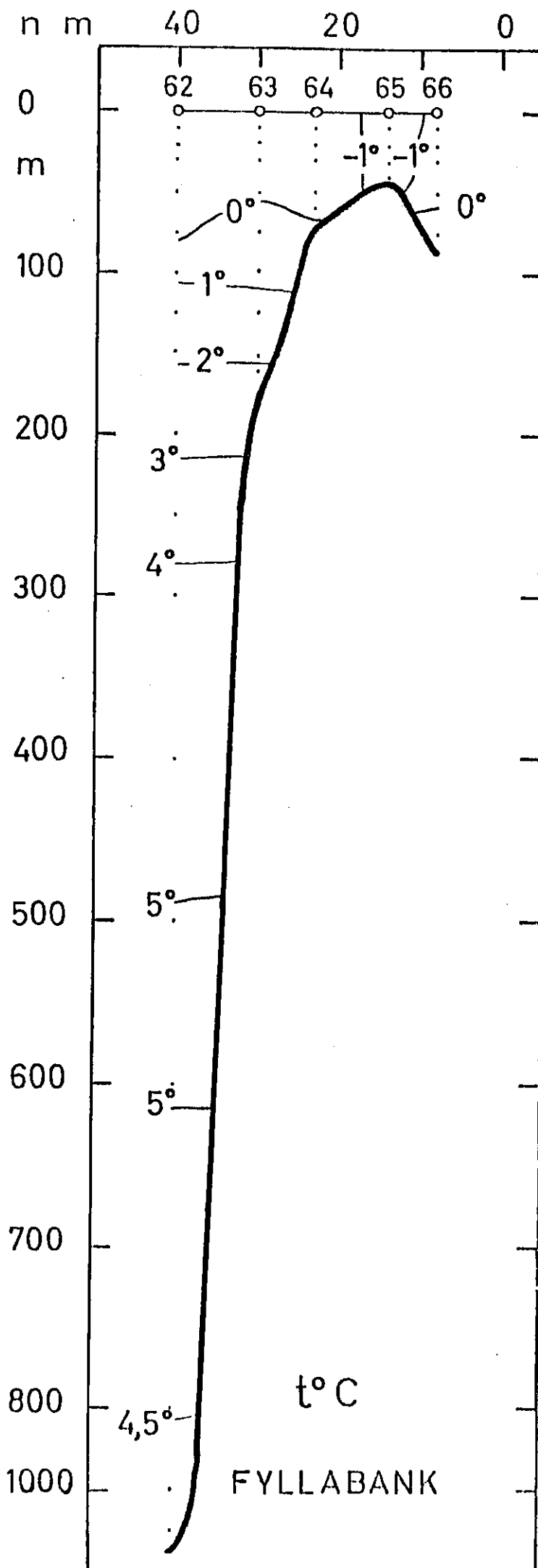


Fig. 9: "Johan Hjort", West Greenland, 15th April 1964. Section 4. Vertical distribution of temperature (°C).

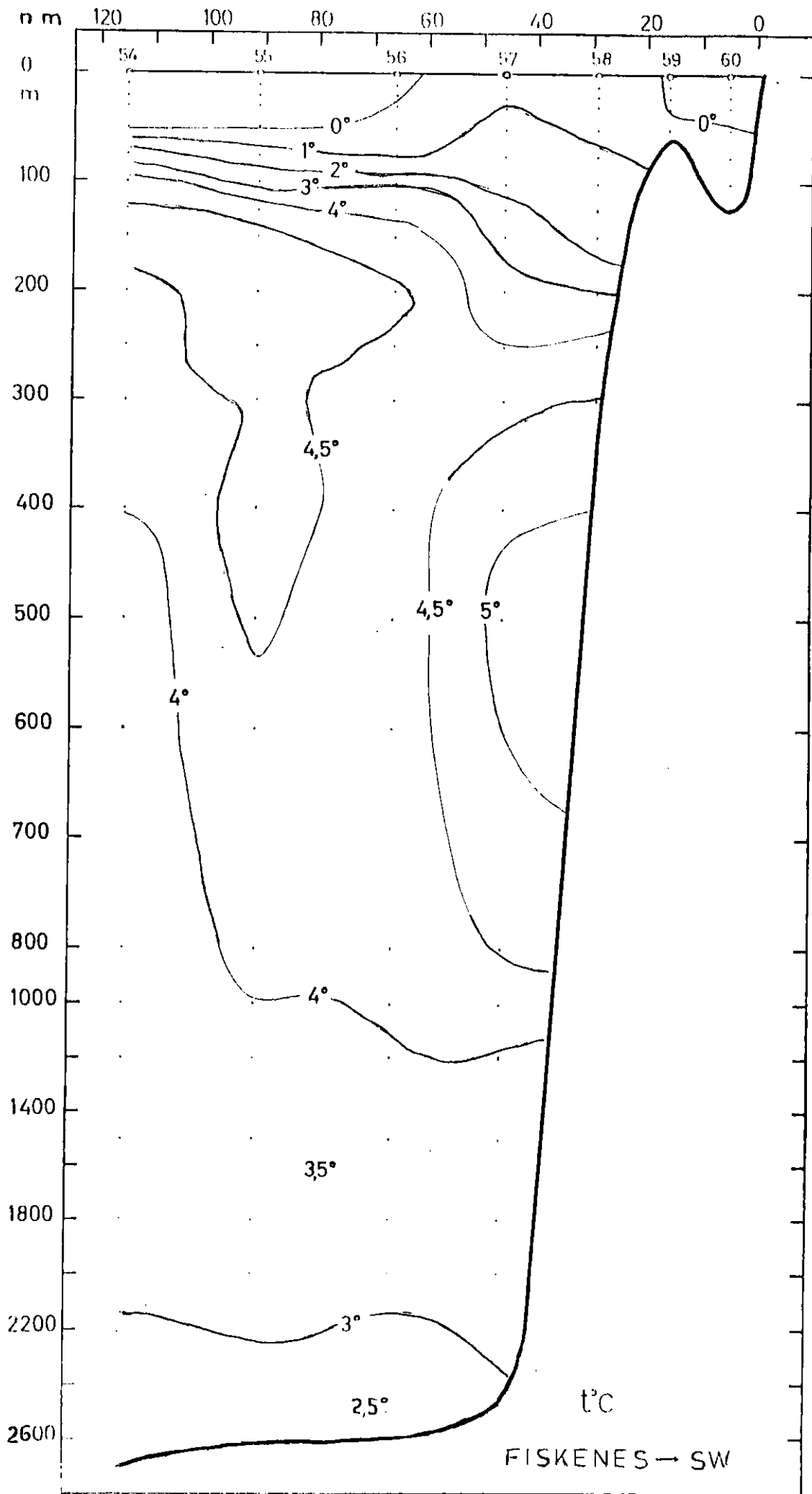


Fig. 8: "Johan Hjort", West Greenland, 14th-15th April 1964. Section 3. Vertical distribution of temperature (°C).

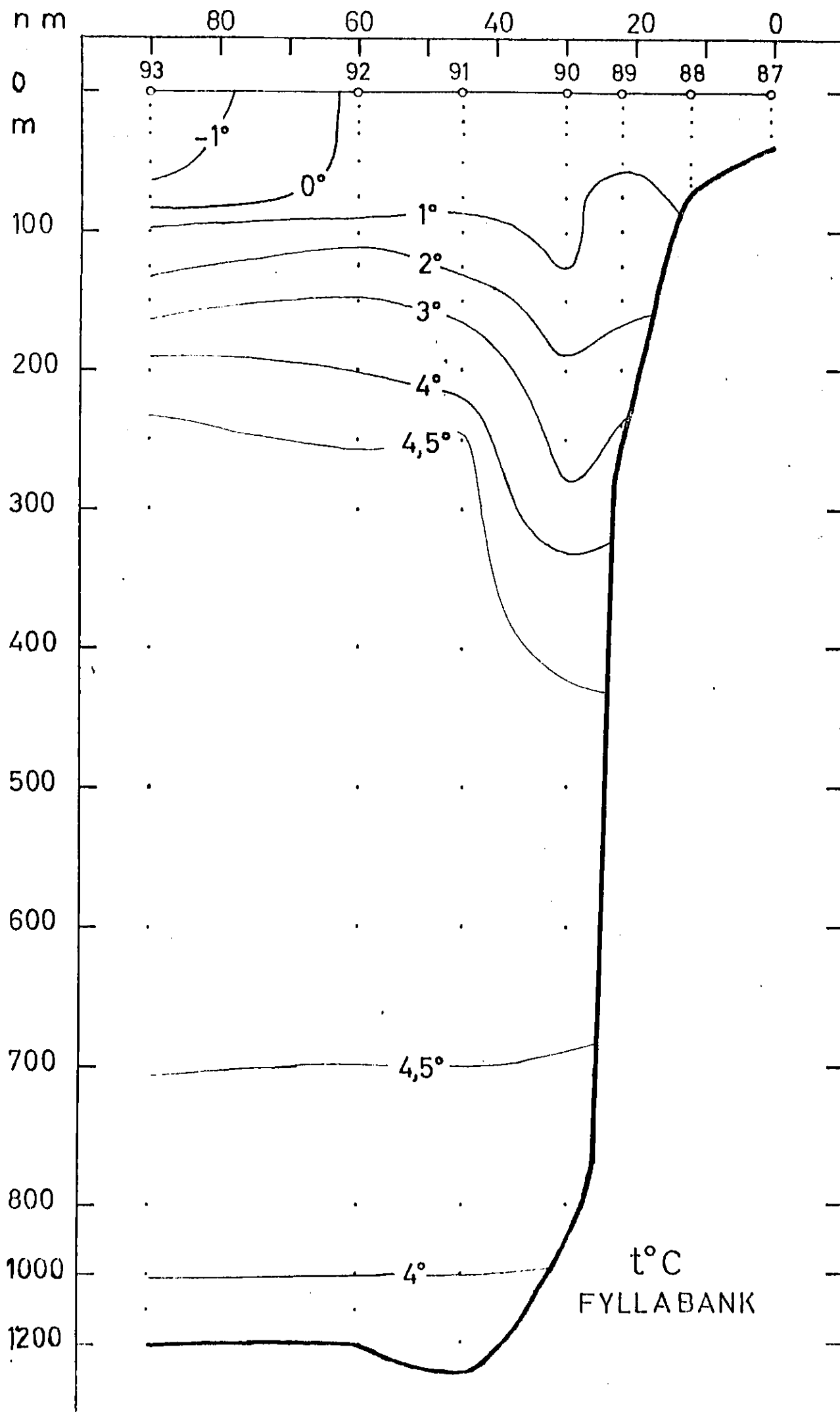


Fig. 10: "Johan Hjort", West Greenland, 2nd-3rd May 1964. Section 4. Vertical distribution of temperature (°C).

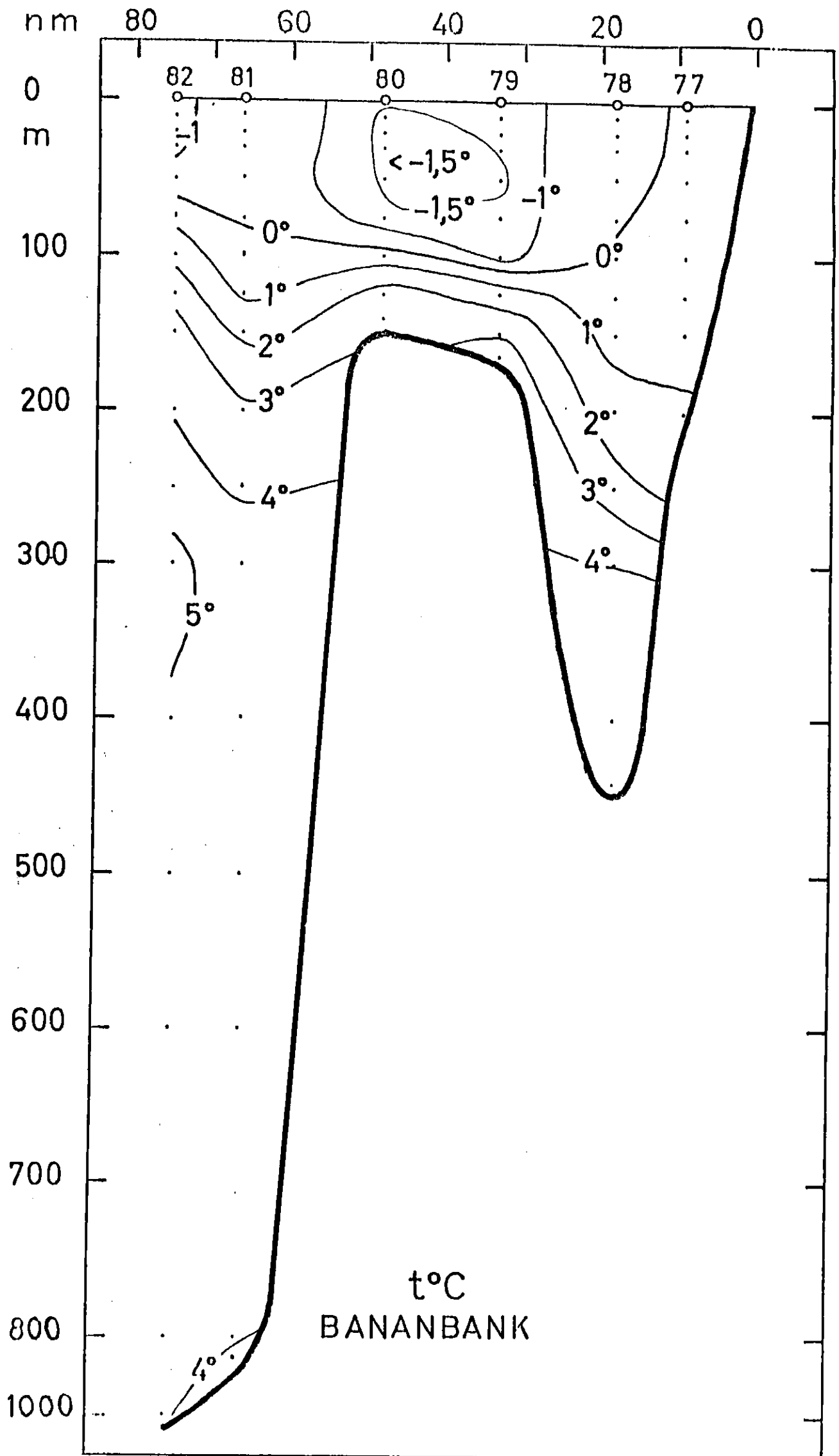


Fig. 11: "Johan Hjort", West Greenland, 23rd-24th April 1964. Section 5. Vertical distribution of temperature ($^\circ\text{C}$).

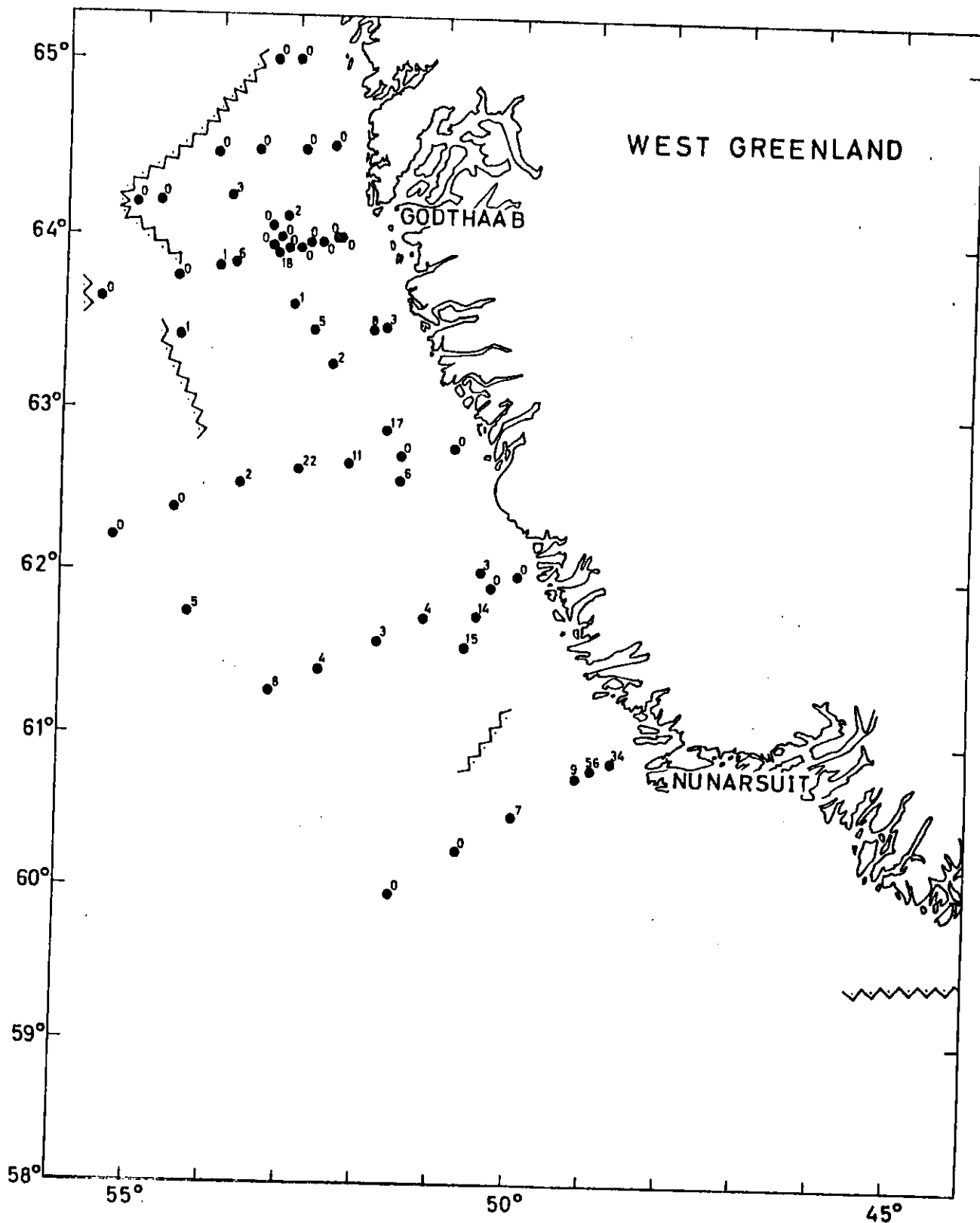


Fig. 12: "Johan Hjort", West Greenland, April-May 1964. Distribution of cod eggs. Numbers in vertical hauls with Hensen net.

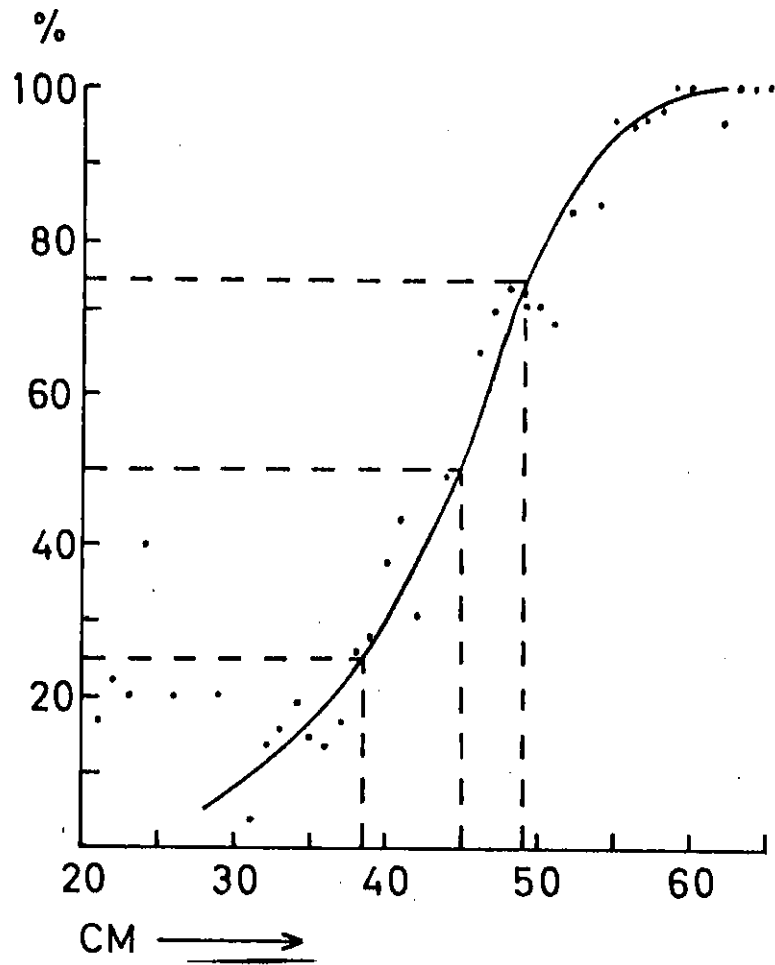


Fig. 13: "Johan Hjort", West Greenland, April-May 1964. Cod. Selection curve. Double manila.

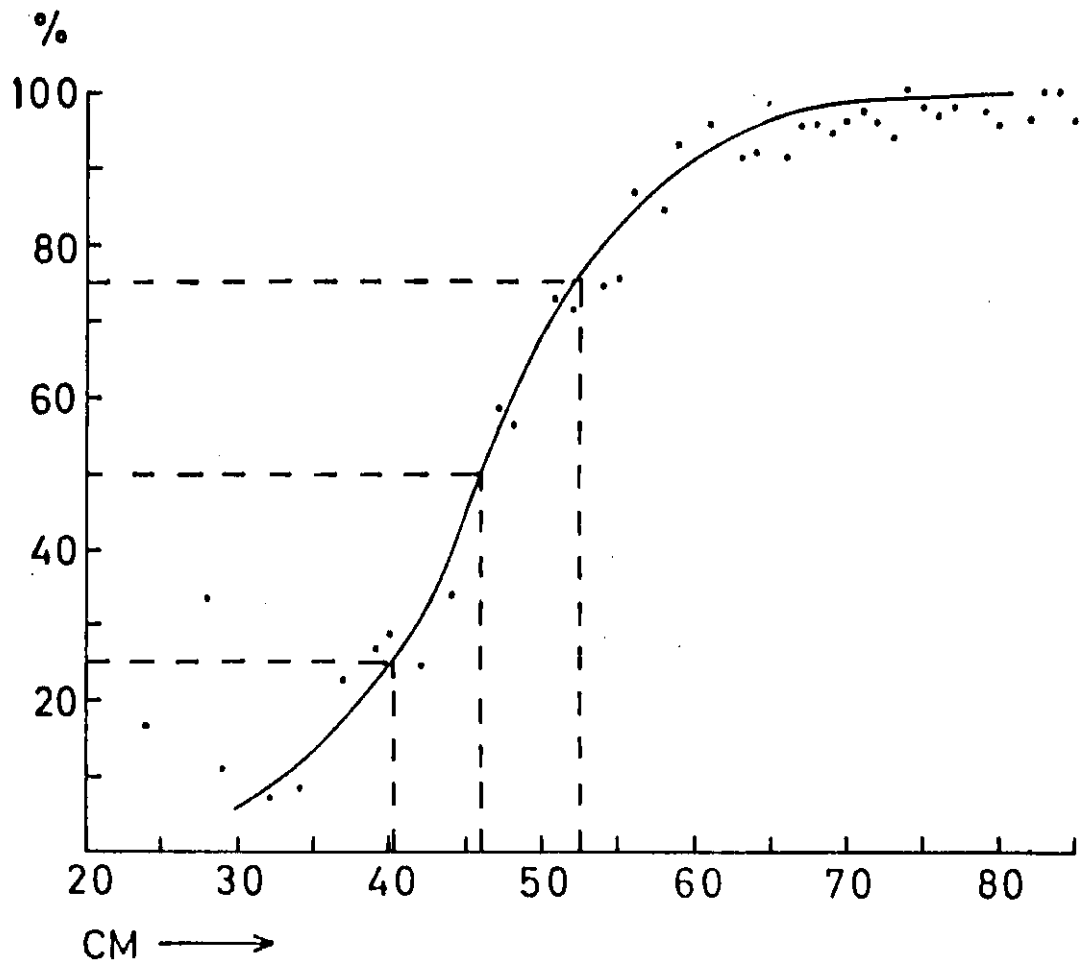


Fig. 14: "Johan Hjort", West Greenland, April-May 1964. Cod. Selection curve. Ullstron.

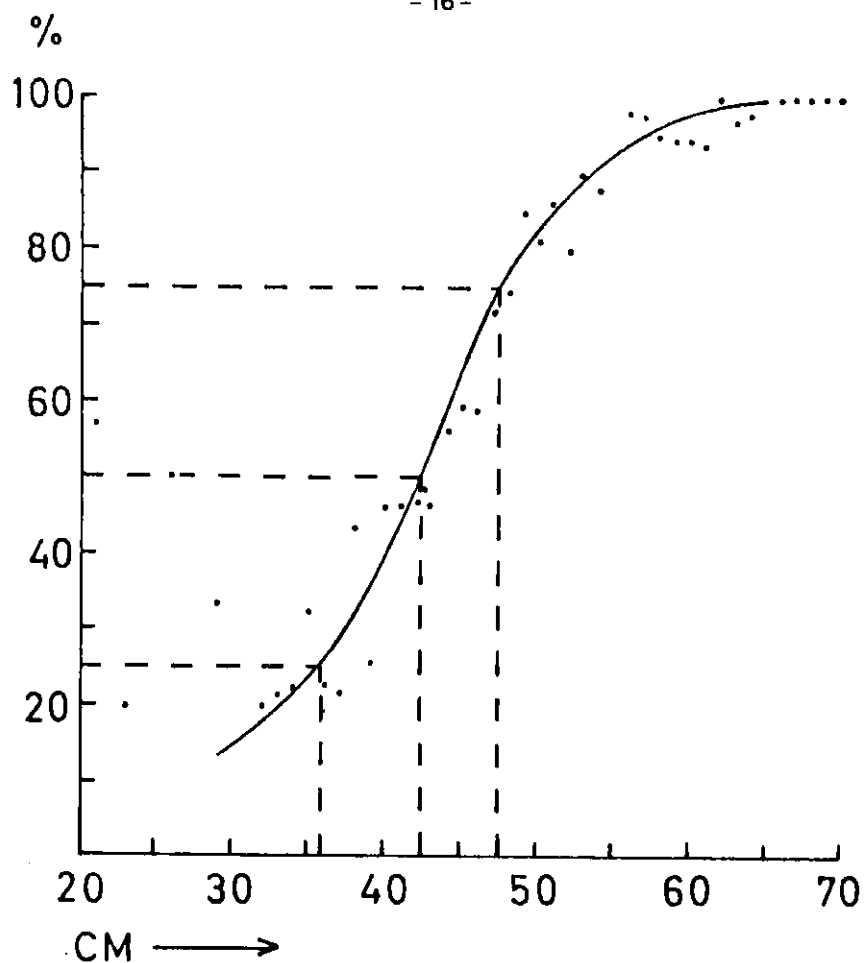


Fig. 15: "Johan Hjort", West Greenland, April-May 1964. Cod. Selection curve. Courleen.

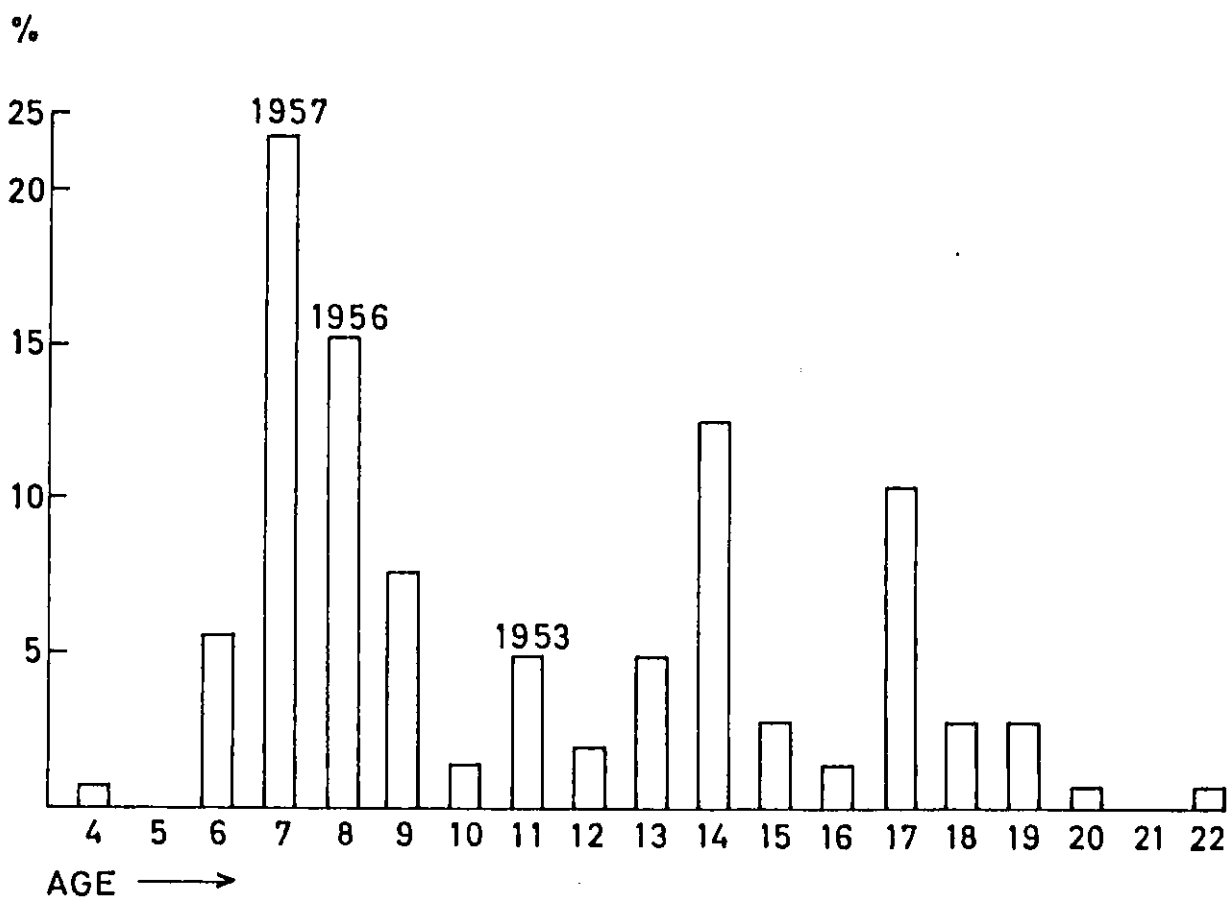


Fig. 16: "Johan Hjort", East Greenland, August-September 1964. Cod. Age distribution. Total bottom long line catch.



Fig. 17: "Johan Hjort", East Greenland, August-September 1964. Cod. Length distribution. Total bottom long line catch.

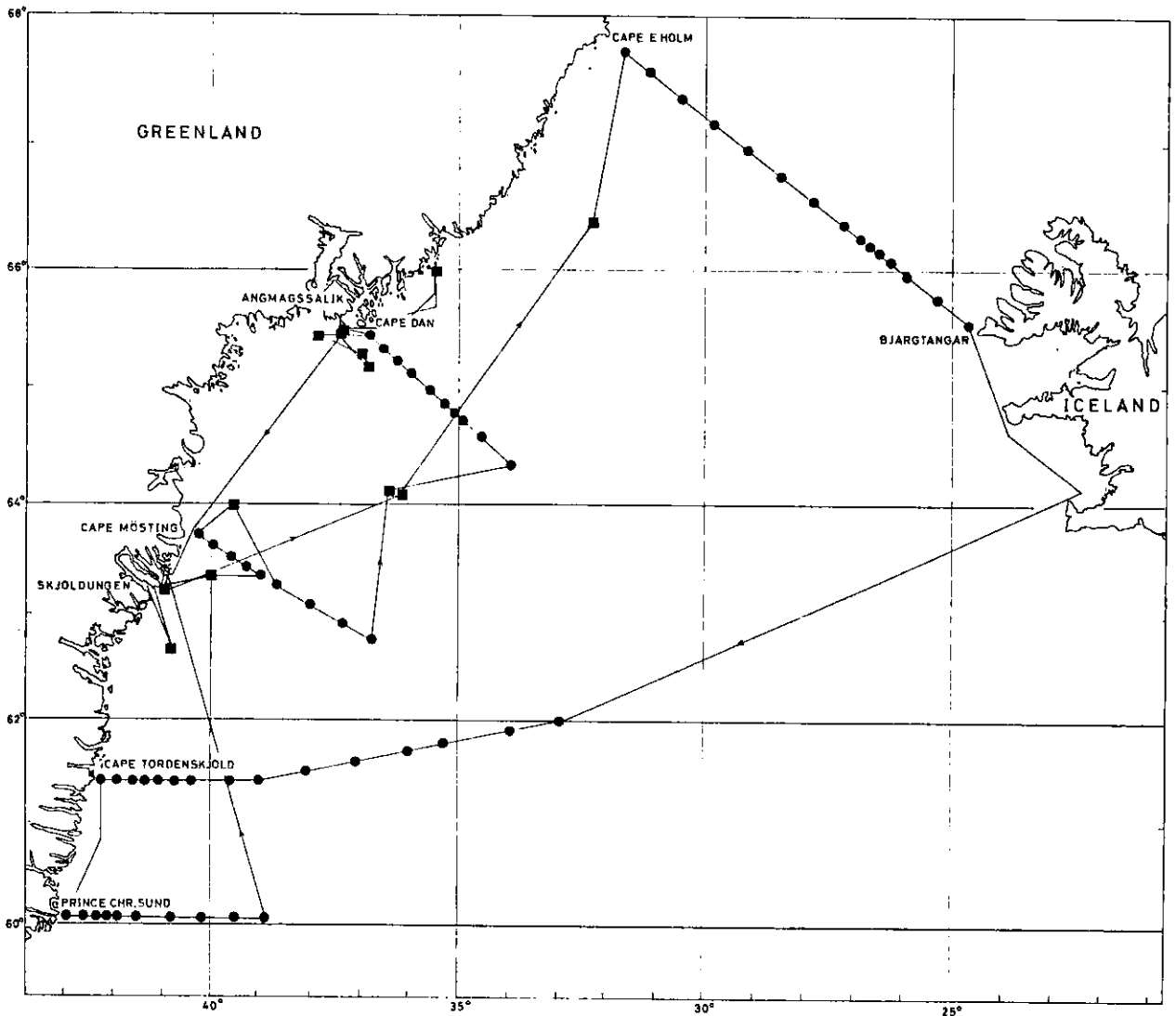


Fig. 18: "Johan Hjort", East Greenland, August-September 1964. Route and net of stations. ● : hydrographical station. ■ : bottom long line station.

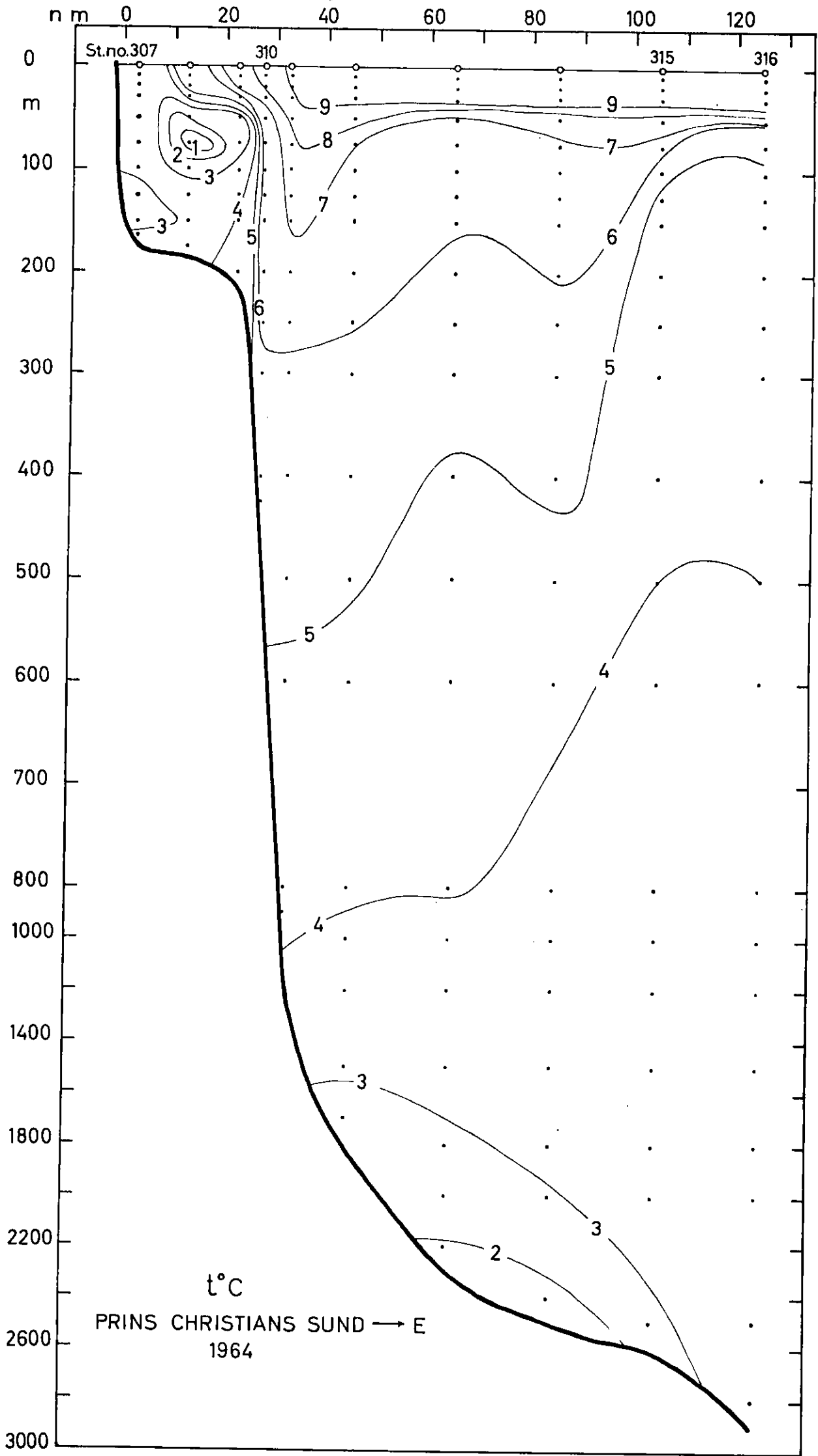


Fig. 19: "Johan Hjort", East Greenland, August-September 1964. Section 1. Vertical distribution of temperature (°C).

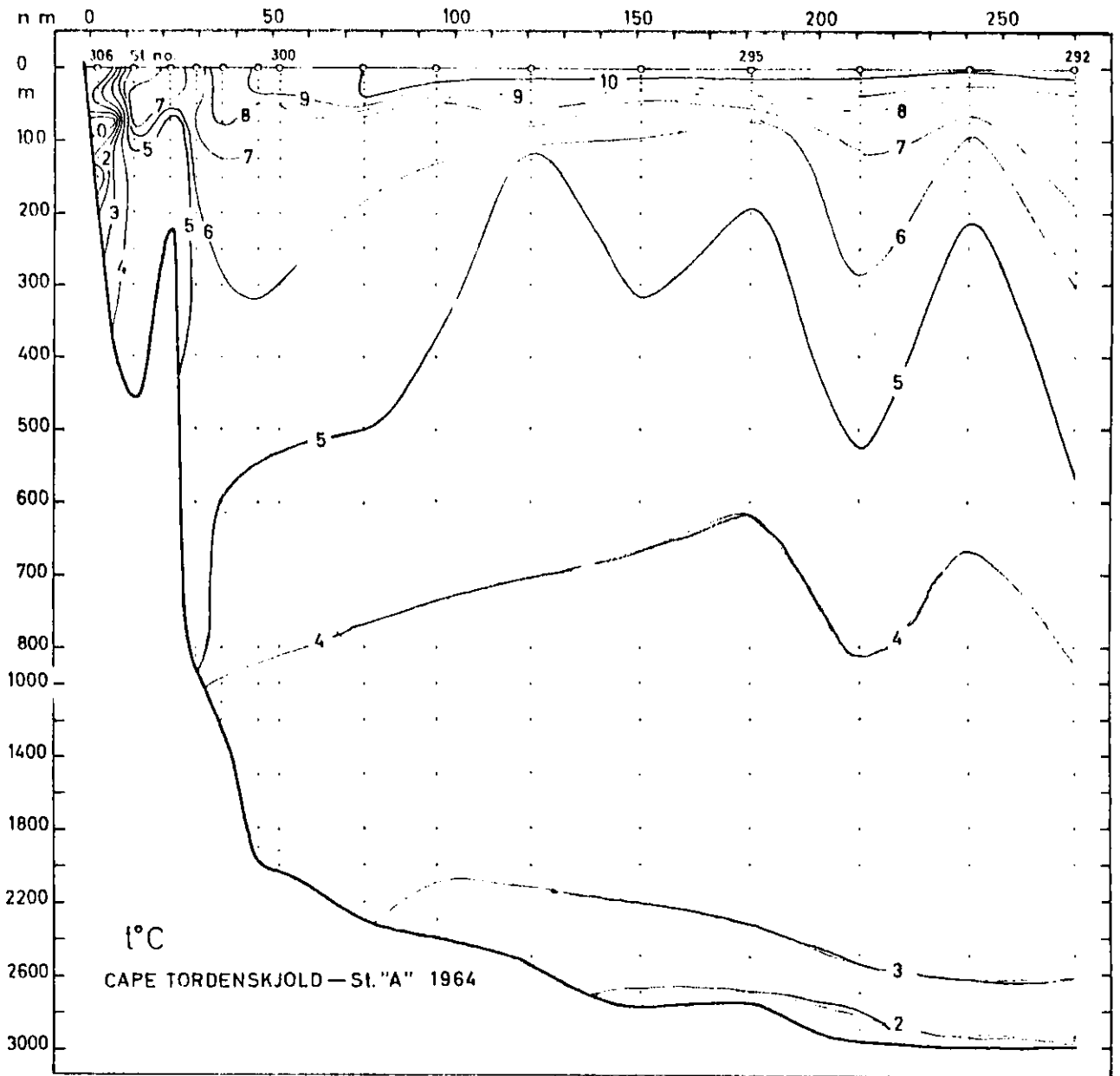


Fig. 20: "Johan Hjort", East Greenland, August-September 1964. Section 2. Vertical distribution of temperature ($^{\circ}\text{C}$).

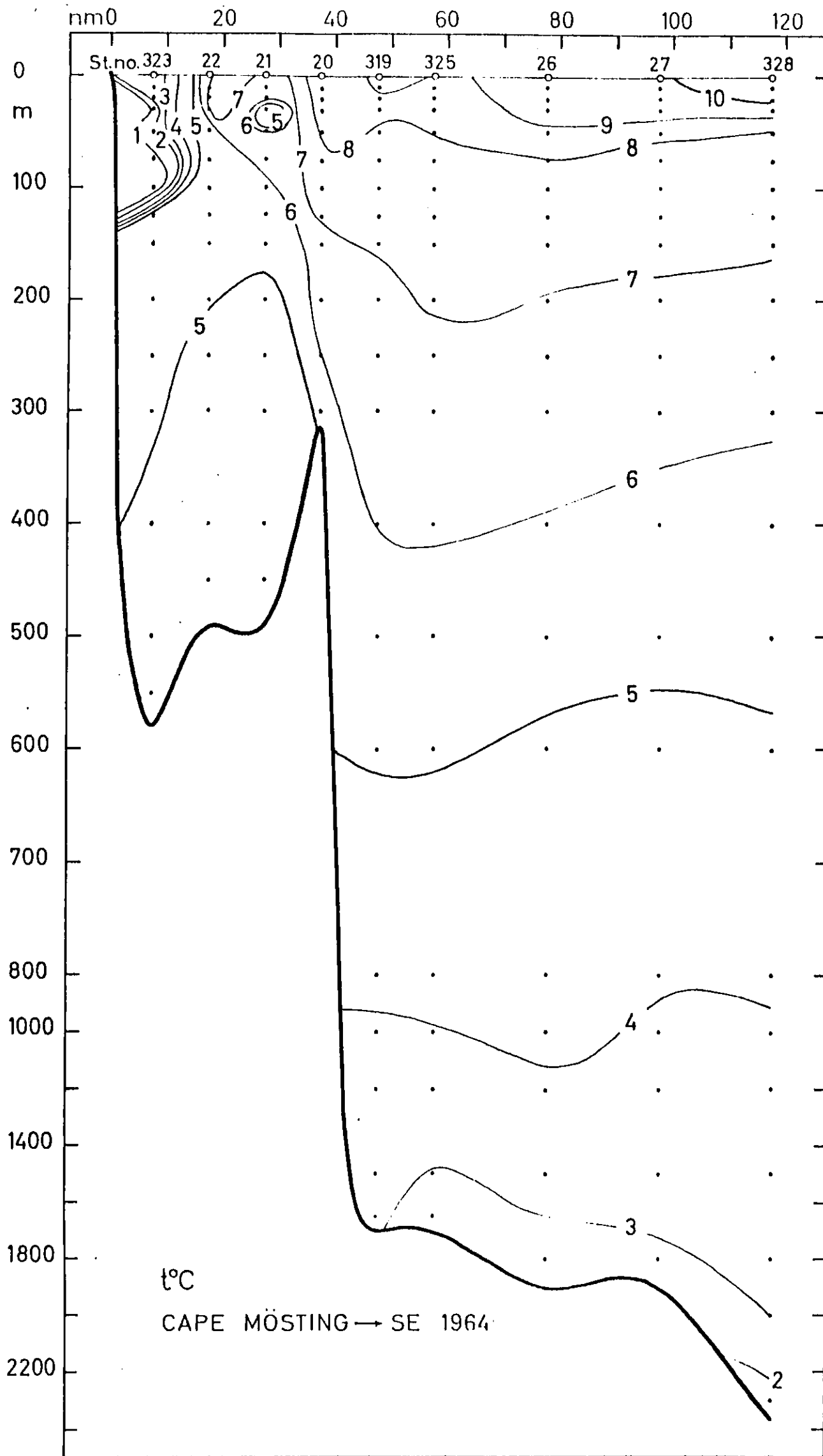


Fig. 21: "Johan Hjort", East Greenland, August-September 1964. Section 3. Vertical distribution of temperature (°C).

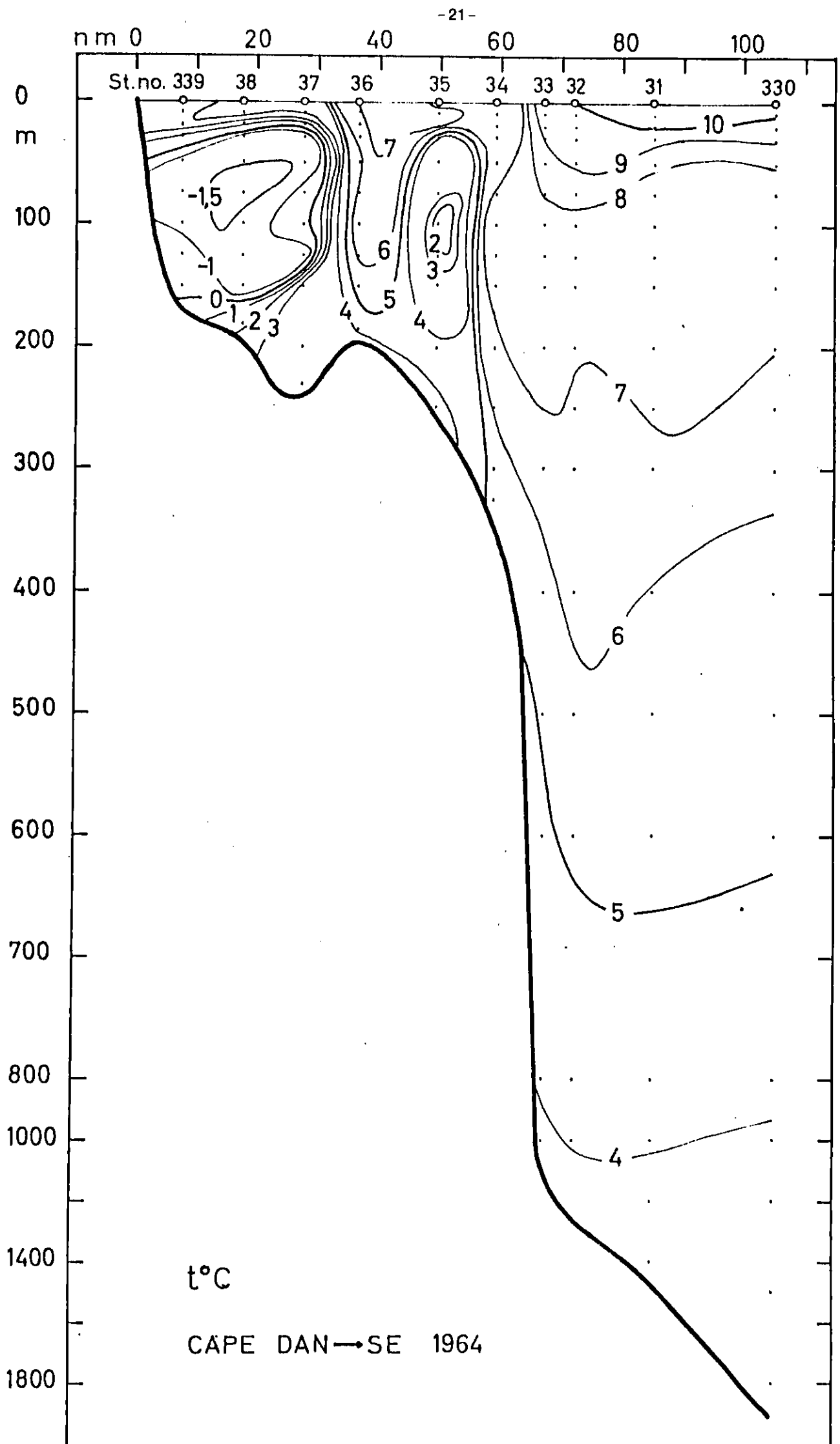


Fig. 22: "Johan Hjort", East Greenland, August-September 1964. Section 4. Vertical distribution of temperature (°C).

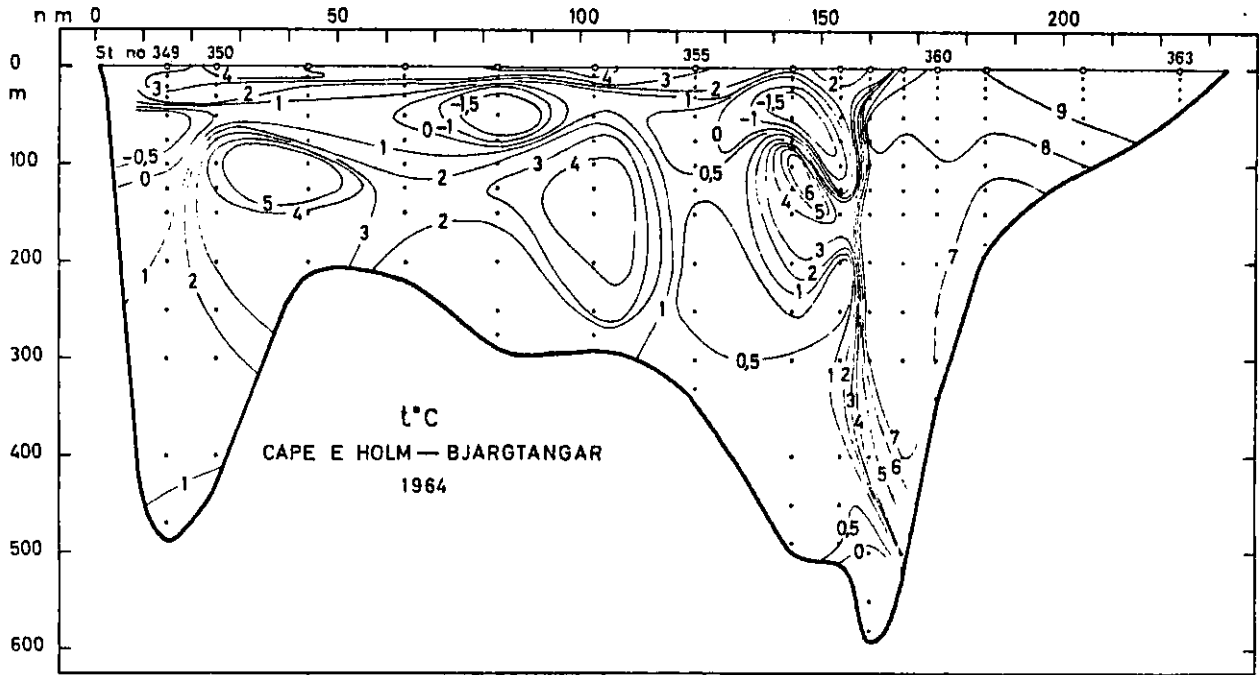


Fig. 23: "Johan Hjort", East Greenland, August-September 1964. Section 5. Vertical distribution of temperature (°C).