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A. Cod Investigations.  
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In 1962 the German trawlers have fished off West, South, and East Greenland again over the whole year. The landings increased by 42% to 205000 tons (landed weight), of which cod account for 55.5% and redfish for 36.4%. This further rapid increase was chiefly caused by a more intensive fishery in the divisions 1B, 1C, and 1E. The trend of the German fishery for cod and redfish in the different regions off Greenland during the last 3 years is shown in Table 1.

Table 1.German landings from Greenland 1960-1962 in tons,  
percentage of total landings in brackets

		Cod		Redfish		Total	
West Greenland (1A-1E)	1960	18664	(50.9)	14894	(40.6)	36662	(39.7)
	1961	61514	(62.3)	27964	(28.3)	98805	(62.2)
	1962	94176	(61.9)	44214	(29.0)	152152	(74.3)
South Greenland (1F)	1960	522	( 8.3)	5395	(85.5)	6310	( 6.8)
	1961	8642	(39.1)	11995	(54.3)	22095	(13.9)
	1962	7953	(49.1)	7094	(43.7)	16214	( 7.9)
East Greenland	1960	15378	(31.1)	30250	(61.2)	49421	(53.5)
	1961	11232	(29.6)	24292	(64.0)	37968	(23.9)
	1962	11489	(31.6)	23103	(63.4)	36334	(17.8)
Total Greenland	1960	34560	(37.4)	50538	(54.7)	92389	
	1961	81388	(51.2)	64249	(40.4)	158871	
	1962	113618	(55.5)	74410	(36.4)	204701	

Investigations at sea could only be carried out during a cruise with the "Anton Dohrn" off South Greenland in the beginning of March (mainly fishery protection cruise) and during an experimental trip of a trawler (for pelagic fishery) in September. All other data are from landings of trawlers including samples of ungutted cod preserved especially for research. A total of 48 samples are available including 19025 measurements, 7344 otoliths, and 1428 observations on maturity.

West Greenland (1A-1E)

Fishery was carried out off West Greenland throughout the year. Only during the period of April to June most trawlers were fishing in 1E (mostly for redfish), all the other time of the year most trawlers worked the northern divisions 1D to 1A, mainly 1C. By this change in spring to a more profitable redfish fishery in 1E no real fishery for spawning cod could be developed in 1D and 1C as in 1960.

Age determinations showed again, that the rich 1957 year-class is of West-greenlandic origin and concentrated only north of Fyllas Bank, whilst the rich 1956 year-class is distributed in the southern part and of Eastgreenlandic-Icelandic origin. The boundary line of these two important year-classes lies between Fyllas and Banana Bank. The 1957 year-class made up 64-77% of the total landings from Banana and Little Halibut Bank in February, October, and December (see Fig. 1) and only 25-28% on Fyllas Bank in September and 9-13% on Noname and Frederikshaab Bank in March, June, and August. The 1956 year-class, however, was predominant with up to 74% in the south and 42-49% on Fyllas Bank. In contrast to the preceding years the 1953 year-class was only just of commercial importance during spring and early summer when the trawlers were fishing in deeper waters for big migrating mature cod. The once important year-classes of 1950 and 1947 have become totally weak.

Observations on maturity of cod from Banana Bank in February revealed that 20% of the 5 years old and 73-81% of the 6 years old and 100% of all older cod were mature. Spawning west of Banana Bank occurred 2-3 weeks later than observed in 1961, when spawning was at its peak by the end of March and the beginning of April. On 21st of March most mature cod had reached the stage V and only very few cod (3%) were spawning (stage VI). On the 21st of April, however, 27% were just about to spawn, 15% were spawning, and 58% were close to finishing or had finished spawning.

#### South Greenland (1F)

In 1962 the landings from division 1F, especially those of redfish, decreased and the mean length of the cod was considerably smaller than in 1961. As predicted the rich year-class of 1956 was predominating in most landings with up to 67-84%. The older year-classes of 1947 and 1950, up till 1961 of great commercial value, became weak. Only in catches in deep water for migrating spawners (Febr.) and remigrating postspawners (May) the 1953 year-class reached 22-28% of the total catch (Fig. 2). During winter and spring again a reverse depth-distribution of cod and redfish was made out (see German Research Report, 1961). Spawning of cod was observed only in the northwestern part of division 1F off Storø. Farther to the south off Cape Thorvaldsen and on Nanortalik Bank only immature cod were found. On 10th of April off Storø 81% of the mature cod were just about to spawn and 19% were spawning or were close to finishing. It was not only noteworthy in this sample, that the 1957 year-class - otherwise of small importance off South and South-West Greenland - was predominating, but that 80% of the 5 years old cod were mature whilst of the 1956 year-class only 42% had reached maturity.

The growth of cod off South Greenland is smaller than off West Greenland. The 6 years old cod had reached an average length in fall of 68 cm off Farvel and of 76 cm on Fyllas Bank, that means that off West Greenland the 5 years old cod have nearly the same length as the 6 years old off South Greenland.

#### East Greenland

##### a) Southeast Greenland (Walloe Bank to Moesting Ground)

The profitable winter and spring fishery for redfish and cod has more and more developed into a fishery of specialists, well experienced in the difficult fishing grounds and the varying and severe ice-conditions. Off Southeast Greenland cod is only of minor importance. Bigger catches of cod can only be made during late winter and spring, when mature cod pass this region on their spawning migration to East Greenland and Iceland or come here for spawning. From February to June the cod made up 18% of the total catch.

The age composition was varying, mirroring the migration of the spawners, but similar to that of South Greenland. At the beginning of the spawning migration in February and the end in May the older year-classes (1953, 1952, 1950, and 1947) were dominant, whilst in April the 1956 year-class was strongest with 45%. In June, when all spawners had left Southeast Greenland the 6 years old cod made up 66% (Fig. 3). Spawning must have occurred late in 1962, for on the 19th of April only 20% were spawning or had nearly finished and 80% were just about to spawn.

b) East Greenland (Heimland Ridge to Dohrn Bank)

In contrast to Southeast Greenland off East Greenland cod accounted for 58% of the total catch. The most profitable cod fishery lasted from February to May with a peak in March and April on Dohrn Bank. The age composition was similar to that of South and Southeast Greenland with the only exception that the stock of cod on Dohrn Bank is composed more of older year-classes. Big cod with an average length of 80 to 82 cm (68% of the older year-classes 1953, 1952, and 1950) were caught in March. In April the share of the 1956 year-class rose to 14-17%, in the beginning of May to 23% and in August and October to 26 and 28% (Fig. 3). The average length of the 1956 year-class increased from 71 cm in May to 79 cm in November.

Cod Taggings

Until January 1963 105 recoveries were reported from the 2081 taggings off Greenland since 1959, the total recoveries being 5%. From the 1962 taggings off Cape Thorvaldsen (1 March) and on Fyllas Bank (18-19 September) the number of returns was considerably higher, 8.3% and 5.5% respectively.

7 further returns in 1962 came from Icelandic fishing grounds, all big mature cod, caught during the spawning season off S.W., W. and N.W. Iceland and tagged off S. W. and E. Greenland (see Table 2).

Table 2  
1962 returns of Greenland-tagged cod from Iceland

<u>Tagged</u>			<u>Found</u>					
Date	Locality	Length cm	Date	Locality	Length cm	Growth cm	Year- Class	First Spawning
18.12.59	61.19N, 49.49 W	66	15.5.62	NW Iceland	91	25	-	-
19.12.59	62.37N, 51.28 W	55	15.5.62	NW Iceland	82	27	1955	1962
29.4.60	61.10N, 49.41 W	68	3.4.62	W Iceland	81	13	1953	1962
" " "	" "	66	2.5.62	W Iceland	72	6	1954	1962
" " "	" "	71	25.4.62	SW Iceland	86	15	1953	1962
" " "	61.58N, 50.22 W	65	28.4.62	SW Iceland	-	-	-	-
27.7.61	64.43N, 35.08 W	86	2.5.62	SW Iceland	93	7	1950	1961?

Of great interest is the return of the tagging off Angmagssalik (E. Greenland). Whilst all other returns from Iceland (from 1960 to 1962 a total of 18 cod) seem to be first time spawners (from interpretation of otoliths) this 12 years old cod has probably spawned the second time in 1962. If the interpretation of the spawning zones is right the question rises, where (E. Greenland or Iceland) this cod has spawned for the first time? Further tagging experiments especially off East Greenland and on Icelandic spawning places are of urgency to clear the migrations of Greenlandic cod after having spawned for the first time off Iceland. Are they staying in Icelandic waters or are they returning to East Greenland?

Hydrography

During the cruise for fishery protection in the beginning of March only 19 stations off West and South Greenland could be worked by "Anton Dohrn". The section across the southernmost part of the Banana Bank (Fig. 4) shows that the highest temperatures of 4.82°C lie between 600 and 800 m and confirms thus the experience made by German trawlers in 1961, that a profitable fishery for spawning cod requires trawling in very

deep water. (In the middle of March 1963 captains made the same experience off Storo and got good catches of pure big cod only in depths below 470 m, whilst catches of redfish were best in round about 300 m). Too off Cape Desolation (Fig.5) the highest temperature was found in 700 m. Some hydrographic stations off Frederikshaab, S. W. of Cape Thorvaldsen and S.S.W. of Cape Egede show the following observations. On the western slope off Frederikshaab the highest temperature was found in 600 m with 4.59° (salinity 34.96 o/oo). On the northern top of Noname Bank the bottom temperature in 75 m was only +0.8°C. Off Cape Thorvaldsen the edge of the shelf below 200 m had temperatures of more than 3.5°C. On the shelf in 125 and 130 m and 10 to 22 miles S.S.W. of Cape Egede only arctic water with temperatures of -0.36°C (33.76 o/oo salinity) and -0.18°C (33.87 o/oo salinity) was found.

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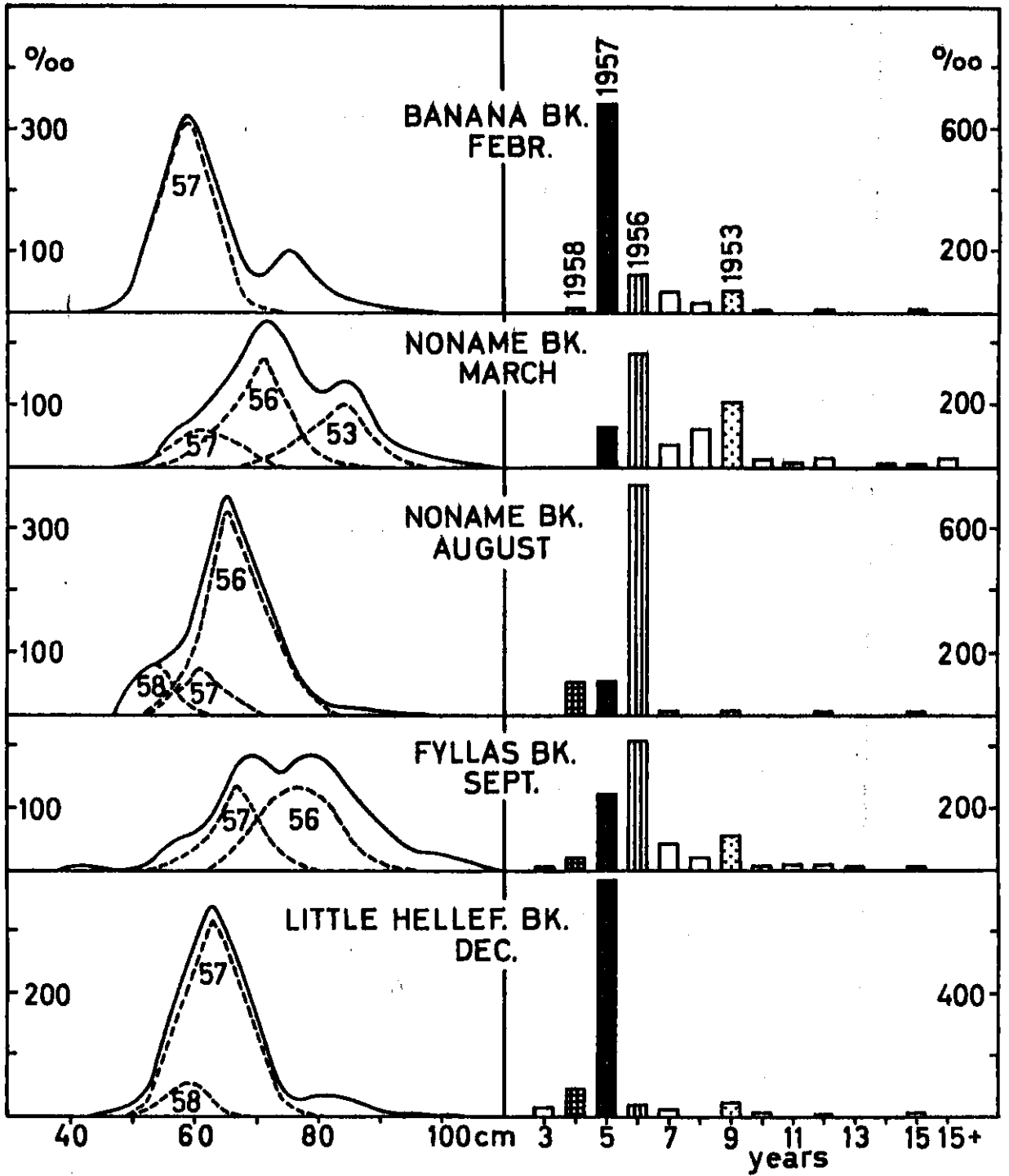


Fig. 1: Cod. Length-and age distribution off West Greenland.

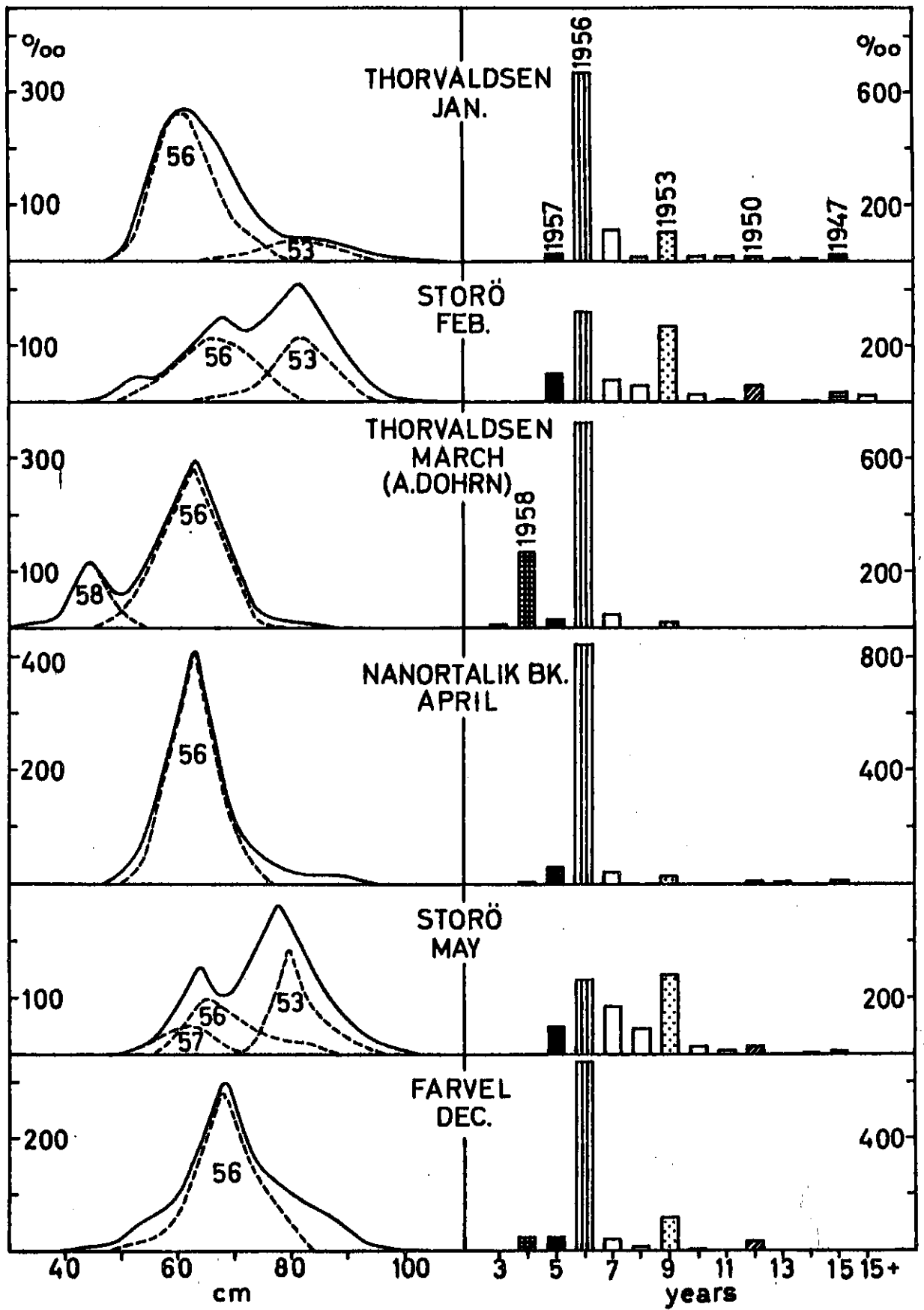


Fig. 2: Cod. Length-and age distribution off South Greenland.

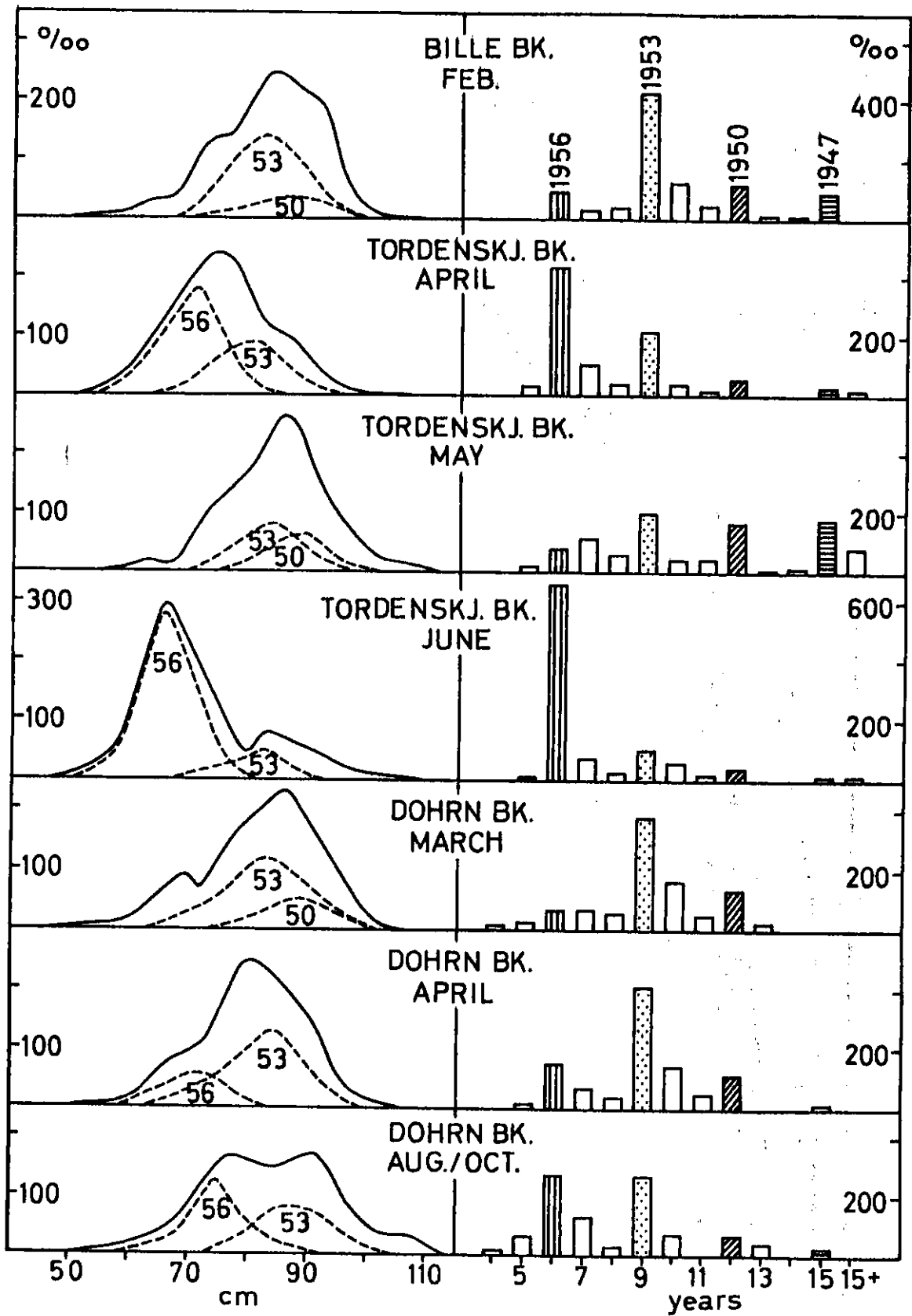


Fig. 3: Cod. Length-and age distribution off Southeast and East Greenland.

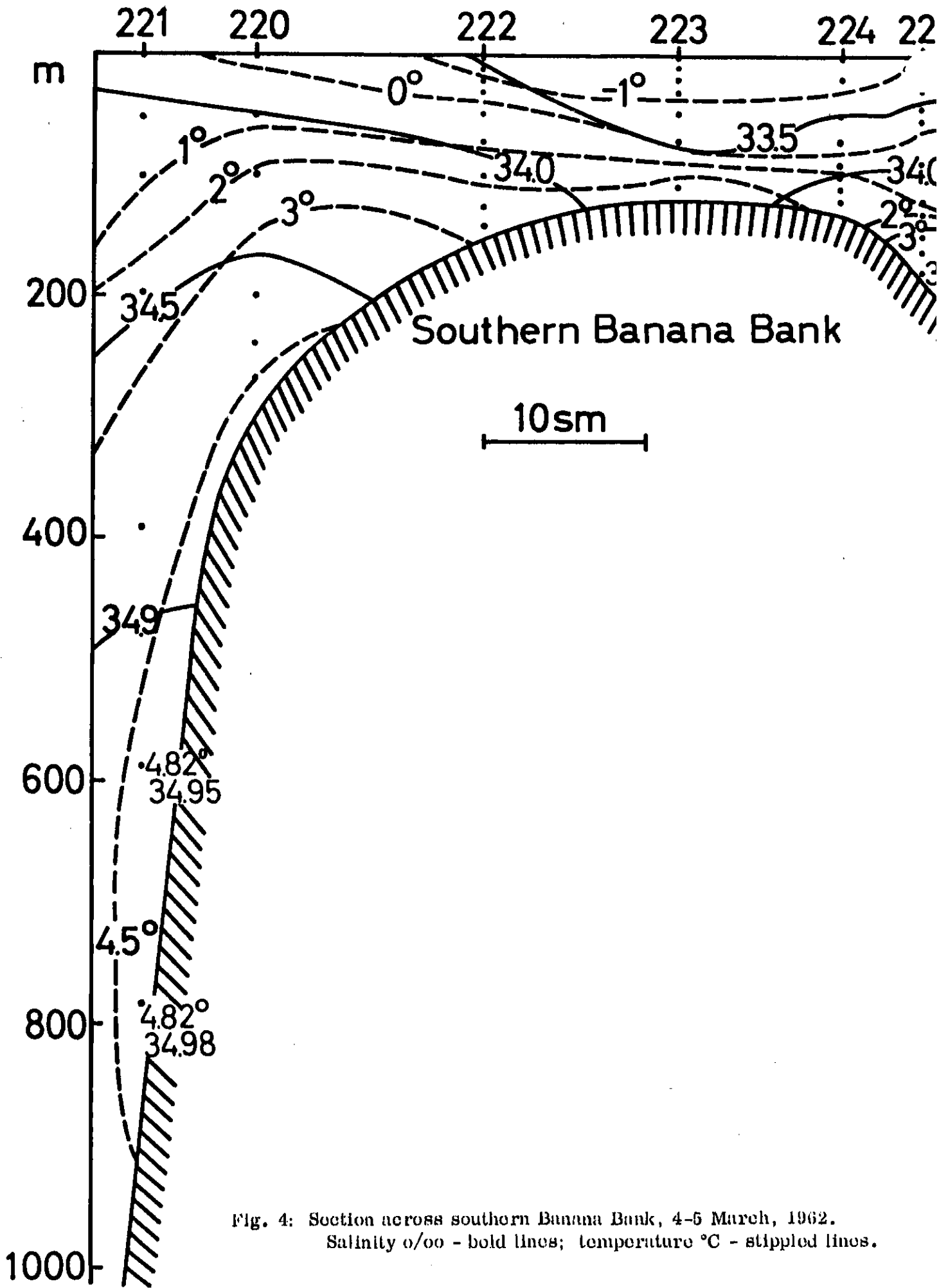


Fig. 4: Section across southern Banana Bank, 4-5 March, 1962.  
Salinity o/oo - bold lines; temperature °C - stippled lines.



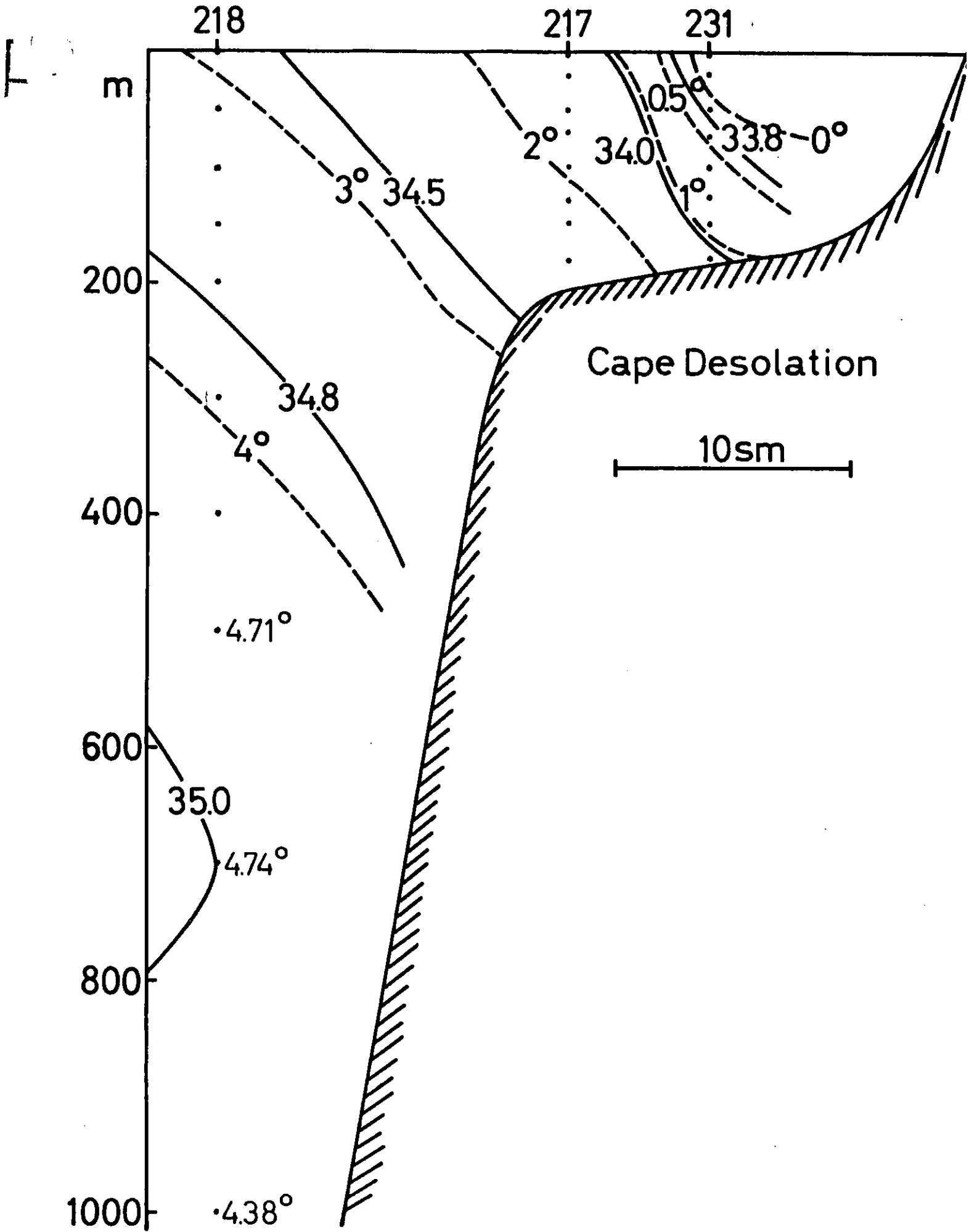


Fig. 5: Section off Cape Desolation, 2 + 8 March 1962.  
Salinity o/oo - bold lines; temperature °C - stippled lines