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CRUISE REPORT

F.R.S. "SCOTIA"

May-June 1954

NARRATIVE

"SCOTIA" left Aberdeen at 1130 on Wednesday, 12th May, and occupied the first station twenty-four hours later. Lines of hydrography and plankton stations were worked from the Butt of Lewis to Rockall, and from Rockall to Reykjanes (Iceland). The Denmark Strait hydro-plankton survey was begun at midnight on 16th May, and the greater part of the grid had been completed seven days later when it became necessary to obtain fuel and stores. The ship entered Reykjavik at 1300 on 23rd May.

On Tuesday 25th, "SCOTIA" left Reykjavik, and the grid was completed on 28th May. In view of reports that the halibut off Iceland were spent, it was decided not to fish in this area, but instead to continue along latitude $65\frac{1}{2}^{\circ}\text{N}$ to the west side of the Denmark Strait, with the object of extending the hydro-plankton survey to fishing grounds off east Greenland. Stations were worked every twenty-seven miles along the $65\frac{1}{2}^{\circ}\text{N}$ line until we entered the east Greenland current, when we turned south and worked across the halibut grounds. On 31st May we came up against the edge of the coastal ice, which prevented further progress to the west. Hydro-plankton work was completed on 1st June, and we were preparing to shoot lines when the weather began to deteriorate. At this time a shallow bank, unrecorded on our charts, was picked up on the echosounder, but continued bad weather made it impossible for us to investigate it, and we were forced to head towards Iceland. On 4th June a line of plankton stations was worked across Faxe Bay, and we entered Reykjavik at noon on the following day.

Having taken fuel, water and stores, we left Reykjavik and began work on the Iceland-Faroe line at 1600 on Thursday, 10th June. This line was completed twenty-four hours later, and the first station of the Butt-Faroe line was occupied on Saturday, 12th, at 0015. On the following day this line also was completed in good weather, and work commenced on the north-west larval survey. After finishing the greater part of this survey, a call was made at Lerwick, where it was arranged that "SCOTIA" should include in the final part of her programme an echo search for herring west of Shetland, in co-operation with "CLUPEA" and "SILVER SCOUT", which were working to the east. The work was completed on Saturday, 19th, and "SCOTIA" docked at Aberdeen at 0400 on the following day.

HYDROGRAPHY

Temperature conditions on the Continental Shelf west of Scotland and Shetland were fairly uniform, with temperatures at the surface ranging between 10° and 11°C , and those at the bottom between 8.5° and 9.2°C .

On the southern half of the Butt-Faroe line the upper waters were above 10°C , but as Faroe Bank was approached temperatures dropped to almost 9°C . Subzero values at the bottom were encountered only at the first three stations south of Faroe Bank, and thereafter bottom temperatures remained above 7.7°C .

On the Faroe-Iceland line the temperature of the upper water at the most northerly station was just over 4°C , but at all other stations it ranged between 8° and 9°C .

PLANKTON

In deep water, Calanus was abundant, but Clione, Aglantha, and various chaetognaths and ctenophores were of frequent occurrence. At certain stations collections were dominated by types of organisms which had been otherwise uncommon - zoea larvae at one station, for example, and Tomopteris at several others.

On the north-west larval survey, phytoplankton was abundant at many stations, and again Calanus was taken in great quantities. Clupeoid larvae occurred at most stations.

DENMARK STRAITS SURVEY

This consisted of a hydro-plankton survey of the Straits, covering in particular the known halibut grounds. The station positions are shown on the chart. At each station outside Faxe Bay, temperatures and salinity samples were taken at bottom and surface. On the $65\frac{1}{2}^{\circ}\text{N}$ line we entered the east Greenland current between $32^{\circ}51'\text{W}$ and $33^{\circ}57'\text{W}$, and the surface temperature dropped from 6.67° to -0.80°C . The edge of the cold water was very sharply defined, and minus temperatures extended down to 75m. Even at bottom in this area, temperatures were considerably lower than those in the halibut grounds off west Iceland. This cold water may well restrict the distribution of pelagic stages of the halibut, and its possible effects on the movements of adult fish must also be considered. Bottom temperatures on spawning grounds off Iceland were between 5° and 7°C , while those off east Greenland were considerably lower, and this may help to account for the differences in spawning times between the two areas.

At all stations in the Denmark Strait, and at those in Faxe Bay, three number 16 mesh 1m. tow-nets were towed for over an hour at various depths between 500m. and surface, or in shallow areas, between bottom and surface. A rapid preliminary examination of the samples has yielded no halibut eggs or larvae, although earlier in the cruise one halibut egg was taken in a surface tow-net in deep water west of St. Kilda. Three larvae of the Greenland halibut, Reinhardtius hippoglossoides, were taken two in positions considerably further east than they have previously been reported.

At each station in the Denmark Strait samples for chlorophyll and phosphate analyses were taken at 10m., and the Hensen net was used for dry weight estimations of the plankton. These data are given on the chart. It is of interest that high dry weights and the highest chlorophyll values (underlined on chart) occurred in the north-east part of the area where a large concentration of fishing vessels was observed.

In addition, full hydrographic data were collected at all standard depths on two lines off Iceland, on the $65\frac{1}{2}^{\circ}\text{N}$ line, and at east Greenland. These will be fully assessed when the salinity data are available.

GENERAL

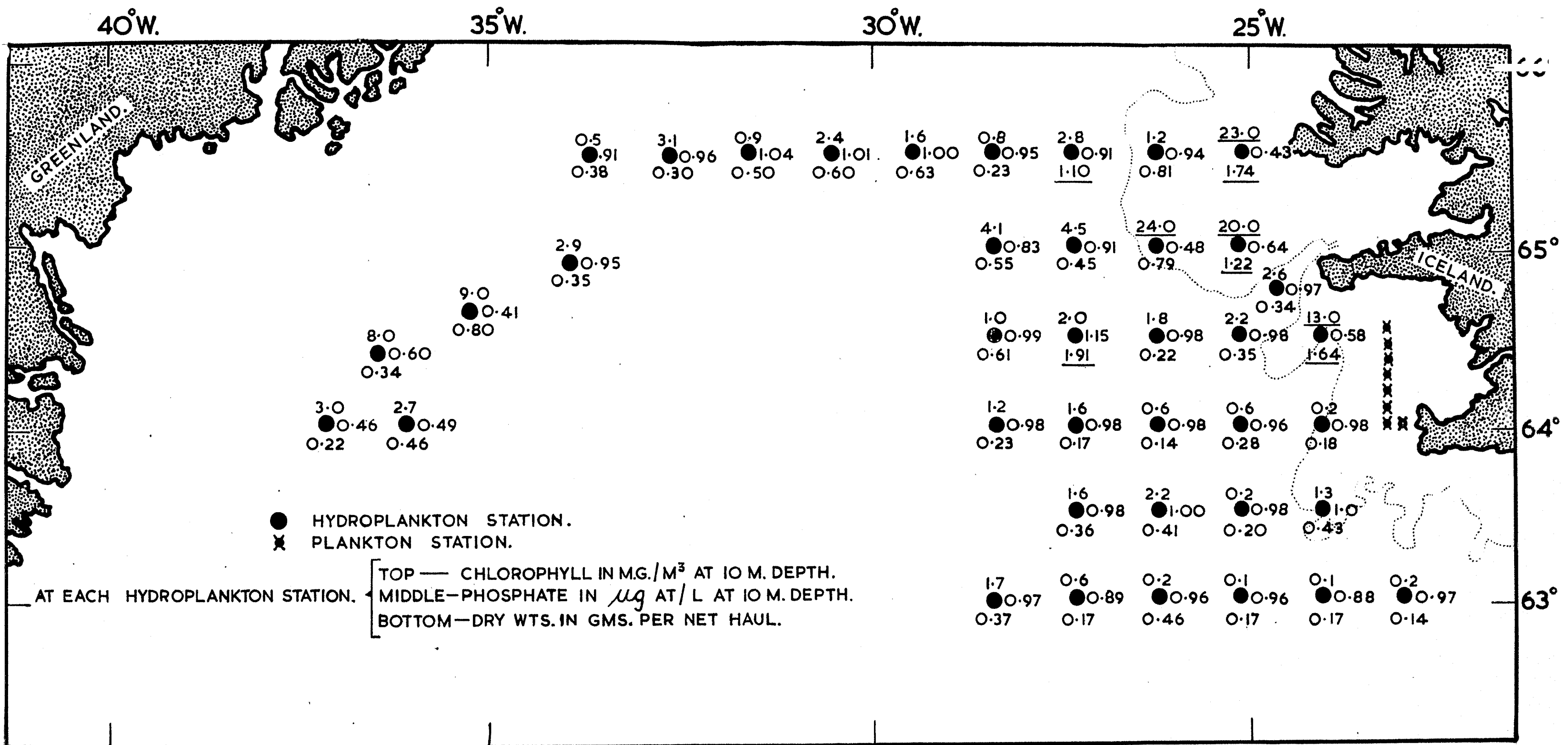
At the request of the Meteorological Office at Reykjavik a report on the position and extent of the ice at Greenland was made.

The echosounder was run as continuously as possible during the trip, but few traces were observed.

A. D. McINTYRE.
27th July, 1954.

CIRCULATION

Mr. R.G.R. Wall	Dr. J. Ancellin	Mr. T.C. Jones	Mr. R. Jones
Dr. J.N. Carruthers	Prof. A. Bückmann	Mr. G.S. Gault	Mr. J.H. Steele
Capt. C.H. Champness	Dr. B. Haviga	Dr. H. Wood	Mr. C. Davidson
Mr. F.S. Russell	Mr. U. Stefansson	Dr. J.B. Tait	Mr. R.G. Lawrie
Mr. E. Ford	Mr. G. Rollefson	Dr. J.H. Fraser	Mr. N.T. Nicoll
Mr. K.M. Rae	Dr. A.R. Molander	Dr. B.B. Rae	Mr. J. Gordon
Dr. G. Reay	Capt. G.B. McLaren	Mr. E.B. Parrish	Circulation (3)
Dr. E. Leloup	Mr. J. Jappy	Mr. A. Saville	Library
Dr. A.V. Tåning	Mr. J. Smith	Mr. A.D. McIntyre	File, Spare 4



DENMARK STRAITS SURVEY.

MAY - JUNE 1954.

FROM ADMIRALTY CHART NO. 246.)

F. R. S. "SCOTIA".

CRUISE REPORT

F.R.S. "SCOTIA"

May-June, 1954.NARRATIVE

"Scotia" left Aberdeen at 1130 on Wednesday, 12th May, and occupied the first station twenty-four hours later. Lines of hydrography and plankton stations were worked from the Butt of Lewis to Rockall, and from Rockall to Reykjanes (Iceland). These lines were completed in excellent weather, and the Denmark Strait hydro-plankton survey was begun at midnight on Sunday, 16th May. After five stations had been completed the weather deteriorated, and the ship was forced to dodge for forty-eight hours, until work could be resumed on the morning of Thursday, 20th. Weather thereafter remained good, and the greater part of the grid had been completed by Sunday 23rd, when it became necessary to obtain fuel and stores. The ship entered Reykjavik on Sunday 23rd at 1300. During our stay in Reykjavik a visit was paid to the skipper of the Aberdeen great-liner "Mount Keen", which had been brought into Reykjavik for echosounder repairs. This was a fortunate meeting, since the skipper had just left fishing grounds off west Iceland and was able to tell us that the halibut there were spent. It was therefore decided not to fish lines in this area, but two blocks of frozen herring bait were taken aboard, in the hope that it might be possible to line at east Greenland, where a later spawning of halibut had been reported by fishermen in previous years.

The ship left Reykjavik at 1130 on Tuesday 25th, but we had completed only one station when gale force winds drove us to shelter in Patrick's Fjord. We were able to resume work on the morning of Friday 28th, and the grid was completed on the following day. We then encountered thick fog, but since the weather otherwise seemed fairly settled, it was decided to continue along latitude 65°30'N to the west side of the Denmark Strait, with the object of extending the hydro-plankton survey to the halibut fishing grounds off east Greenland. Stations were worked every 27 miles on the 65½°N line until we reached the shallow coastal water, and minus surface temperatures indicated that we were in the East Greenland Polar current. We then turned south and proceeded to work a series of stations across the halibut grounds. At 1300 on 31st May we came up against the coastal ice. The ice edge was very clearly defined by a line of small broken particles, but inside this were large masses of ice several feet high, and it was not possible to steam more than a ship's length into the field. Because of the thick fog, and the proximity of the ice, the ship's officers were working under considerable strain, but the hydro-plankton work was completed on 1st June, and the ship began to steam towards a suitable lining position. At this point the wind began to increase, and for the next 48 hours we dodged through a gale. The ship took some heavy seas and all three dahms, which had been lashed to the rigging, were broken.

When the weather began to moderate we picked up on the echosounder a long stretch of flat ground at about 100 fathoms which was not marked on the chart, and had deep water on the coastal as well as the seaward side. It was decided to fish on this bank, and we were able to repair one of the dahms, but before lines could be shot the wind changed direction and began to increase again, blowing us towards the ice. In view of these conditions and since water was by this time getting short, it was decided to abandon work at east Greenland, and to steam towards Iceland. On Friday, 4th June, a line of plankton stations was worked across the entrance to Faxa Bay, and we entered Reykjavik at noon on the following day. After taking fuel, water and stores, we left Reykjavik at 1900 on Tuesday 8th and headed for the first station on the Iceland-Faroe line. We dodged in strong winds for twelve hours at the north end of the line, but at 1600 on Thursday 10th we were able to begin work, and the line was completed 24 hours later. The ship then steamed to the north end of the Butt-Faroe line, and the first station was occupied at 0015 on Saturday 12th. The line was completed in good weather on the following day, and work was begun on the north-west larval survey. The greater part of the work was completed by Wednesday 16th when we broke off and headed for Lerwick, where the ship docked at 0830. In Lerwick contact was made with "Clupea" and "Silver Scout" and it was arranged that "Scotia" should include in the final part of her programme an echo search for herring west of Shetland,

and should notify "Clupea" of any traces. The ship left Lerwick at 1900 on Thursday 17th and completed the larval survey on the morning of Saturday 19th. "Scotia" docked at Aberdeen at 0400 on Sunday, 20th June.

HYDROGRAPHY

Temperature conditions on the continental shelf west of Scotland and Shetland were fairly uniform, with temperatures at the surface ranging between 10° and 11°C and those at the bottom between 8.5° and 9.2°C.

On the southern half of the Butt-Faroe line the upper waters were above 10°C but as Faroe Bank was approached temperatures dropped to almost 9°C. Sub-zero values at the bottom were encountered only at the first three stations south of Faroe Bank, and thereafter bottom temperatures remained above 7.7°C.

On the Iceland-Faroe line the temperature of the upper water of the most northerly station was just over 4°C, but at all other stations it ranged between 8° and 9°C.

PLANKTON

In deep water Calanus was abundant, but Clione, Aglantha and various chaetognaths and ctenophores were of frequent occurrence. At certain stations the collections were dominated by types of organisms which had been otherwise uncommon - zoea larvae at one station for example, and Tomopteris at several others.

On the northwest larval survey, phytoplankton was abundant at many stations, and again Calanus was taken in great quantities. Clupeoid larvae occurred at most stations.

DENMARK STRAITS SURVEY

This consisted of a survey of the plankton and hydrographic conditions in the Denmark Straits, covering in particular the known halibut fishing grounds. The positions of the stations with depths are shown in Chart 1. Areas from where ripe halibut have been landed by commercial vessels are shaded in red. At each of the stations outside Faxa Bay temperatures and salinity samples were taken at bottom and surface. These temperatures are given on Charts II and III. The former shows that on the 65¹/₂°N line the surface temperature dropped from 6.67°C to -0.80°C. between 32°51'W and 33°57'W - a distance of only 27 miles. This was caused by our entering the east Greenland current at some point between the two stations, and a marked and sudden fall in air temperatures recorded between these stations suggests that the edge of the cold current may be much more sharply defined than the above data suggest. Thermograph recordings on this line would have been of interest. On the edge of the current cold water extended down to only 20 m., but further west minus temperatures were recorded as deep as 75 m.; and even at the bottom, temperatures were very considerably lower than those on the west Iceland halibut grounds. This sudden change of temperature may well be a barrier against the survival of fish eggs and larvae carried into the region from comparatively warm eastern side of the Strait. It is known that cod larvae are carried from Iceland to east Greenland in August, but at this time the East Greenland current is only a narrow strip along the coast. A cold water barrier extending so far out into the Strait at a time when halibut eggs and larvae were in the water might prevent grounds at east Greenland from being reached by pelagic stages from Iceland.

It is known that ripe halibut appear on the Iceland grounds from March to May, but not at east Greenland until later. In this connection it is of interest to examine the bottom temperatures in Chart III. While the temperatures on spawning grounds at Iceland are between 5°-7°C., those at east Greenland are considerably lower. This may help to account for the differences in spawning times between the two areas. It is also perhaps worth noting that on the Iceland-Greenland ridge, which from considerations of depth and distance alone would seem to be the best place for crossing the Strait, the bottom temperatures were among the lowest recorded - less than 3°C.

At all stations in the Denmark Strait and at the eight in Faxa Bay, number 16 mesh 1 m. townets were used. In areas deeper than 500 m., three nets were attached to the warp, and towed for 20 minutes at 500 m., 400 m., and 300m. They were then raised 100 m. and towed for 20 minutes, and finally raised another 100 m. and towed for a similar time. This gave a tow of 1½ hours and covered the top 500 m. On shallower areas the nets were towed at bottom, midwater and near surface, again for over an hour. A rapid preliminary examination of the samples has so far yielded no halibut eggs or larvae. Material extracted from the samples has been examined by Dr. Fraser or Mr Saville, and they have identified three larvae of the Greenland halibut, Reinhardtius hippoglossoides. Earlier on the cruise, however, one egg of the halibut Hippoglossus hippoglossus was found in a surface net at 58°07'N 10°10'W, i.e. N.W of St. Kilda in 1028 fathoms. Large concentrations of halibut are not known to occur near this area, and it seems strange that off Iceland, where such concentrations do occur, no eggs were found. Yet accepting the 16-day incubation period at 6°C reported by Rollefson for halibut eggs, it is possible that hatching was over in the Iceland area. The larvae would be less numerous than the eggs, as well as more widely dispersed. Nevertheless, it remains remarkable that none were taken in so concentrated a survey.

Two of the records of Greenland halibut are of interest, since they occurred on latitude 65½°N at 27°20'W and 28°25'W. This is considerably further east than these have been recorded before, and Tåning states that they have previously been taken only "on the west side of the Denmark Strait, not on the warmer east side."

At each station in the Denmark Strait samples for chlorophyll and phosphate analyses were taken at 10 m., and the Jensen net was used for dry weight estimations of the plankton. These have been worked up by Mr. Steele, and the data are given in Chart IV. High dry weights and the highest chlorophyll values occur in the shallow water off Staalbergs Kük. In this area numbers of fishing vessels were observed, and the presence among them of Faroese smacks using "rippers" probably indicates the density of the fish.

In addition, full hydrographic data were collected at all standard depths on two lines off Iceland, on the 65½°N line, and at east Greenland. These will be fully assessed when the salinity data are available.

GENERAL

At the request of the Met. Office in Reykjavik a report on the position and extent of the ice at Greenland was made to that office.

The echosounder was run as continuously as possible during the cruise, but few traces were observed.

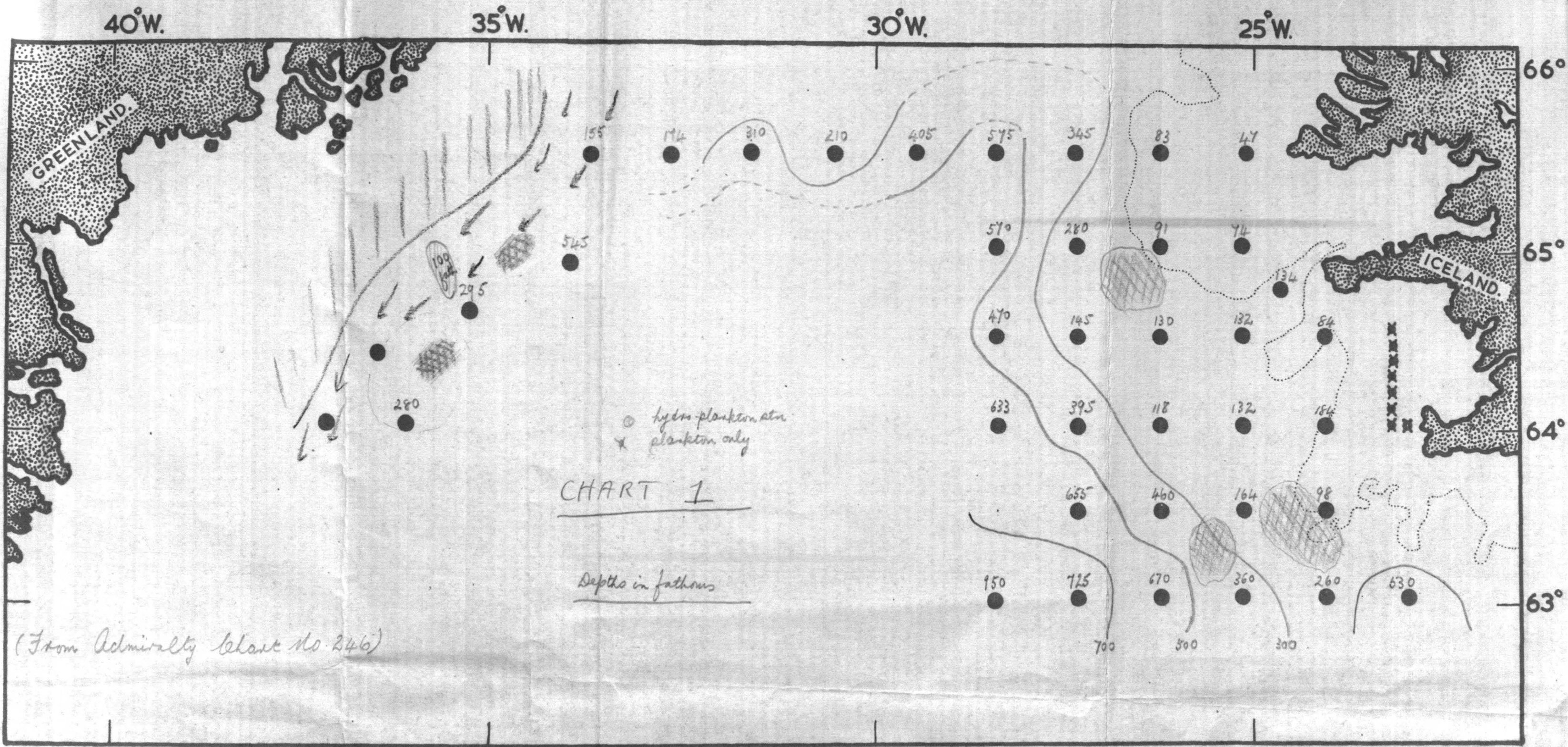
A. D. McINTYRE.

26th July, 1954.

CIRCULATION

Mr. M. Graham
Mr. W. K. Rose
Captain Bruce
Dr. Lucas

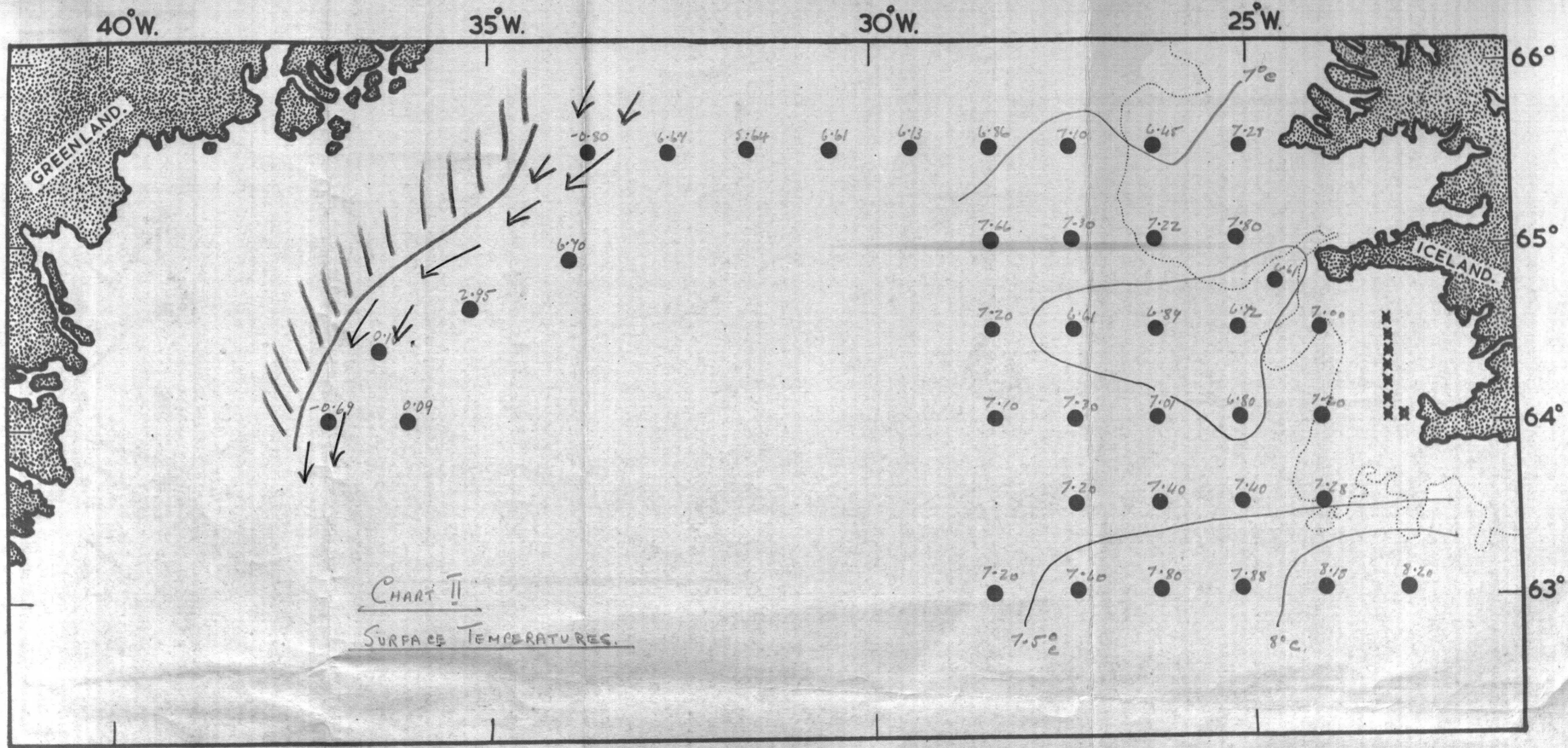
Mr. McIntyre
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DENMARK STRAITS SURVEY.

MAY - JUNE 1954.

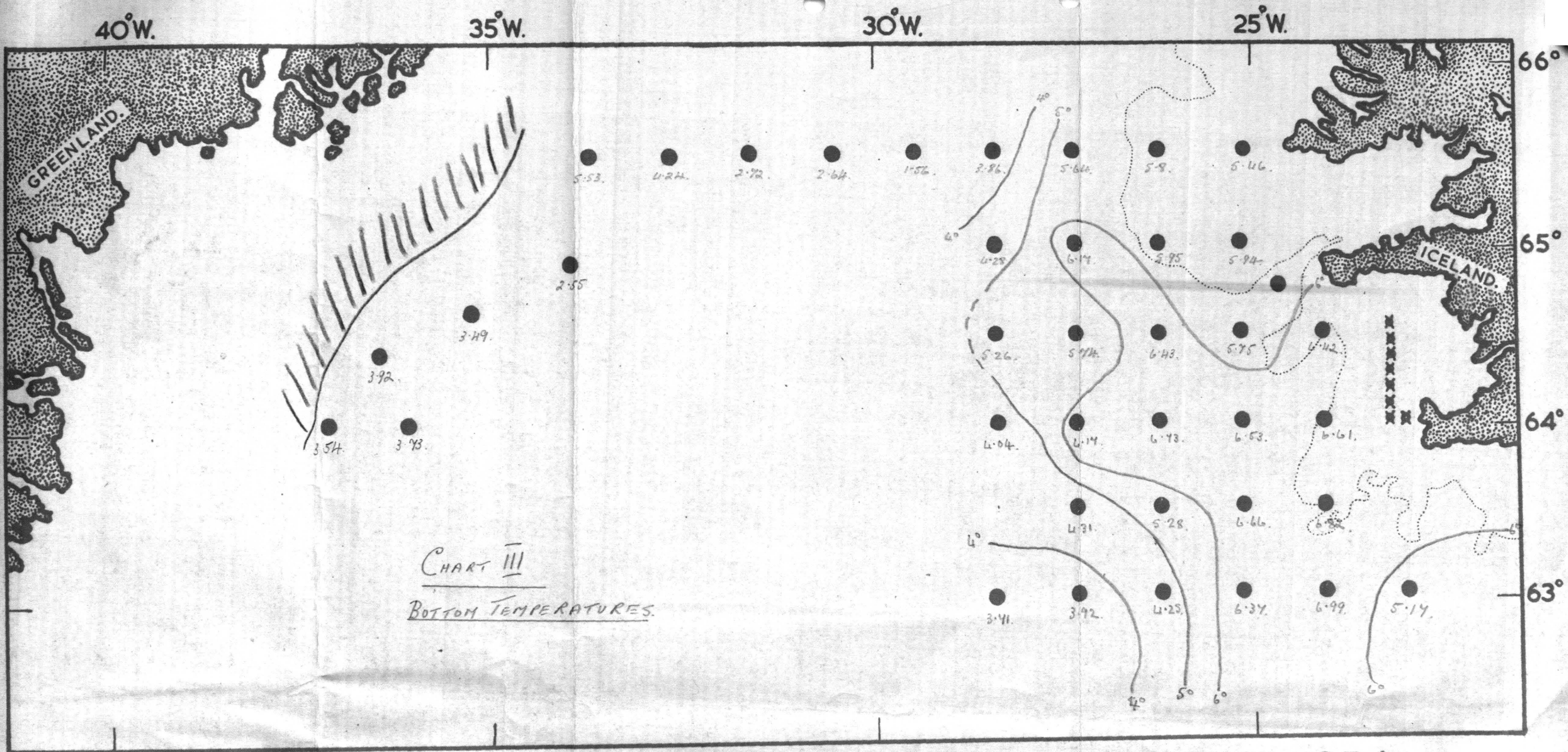
F. R. S. "SCOTIA".

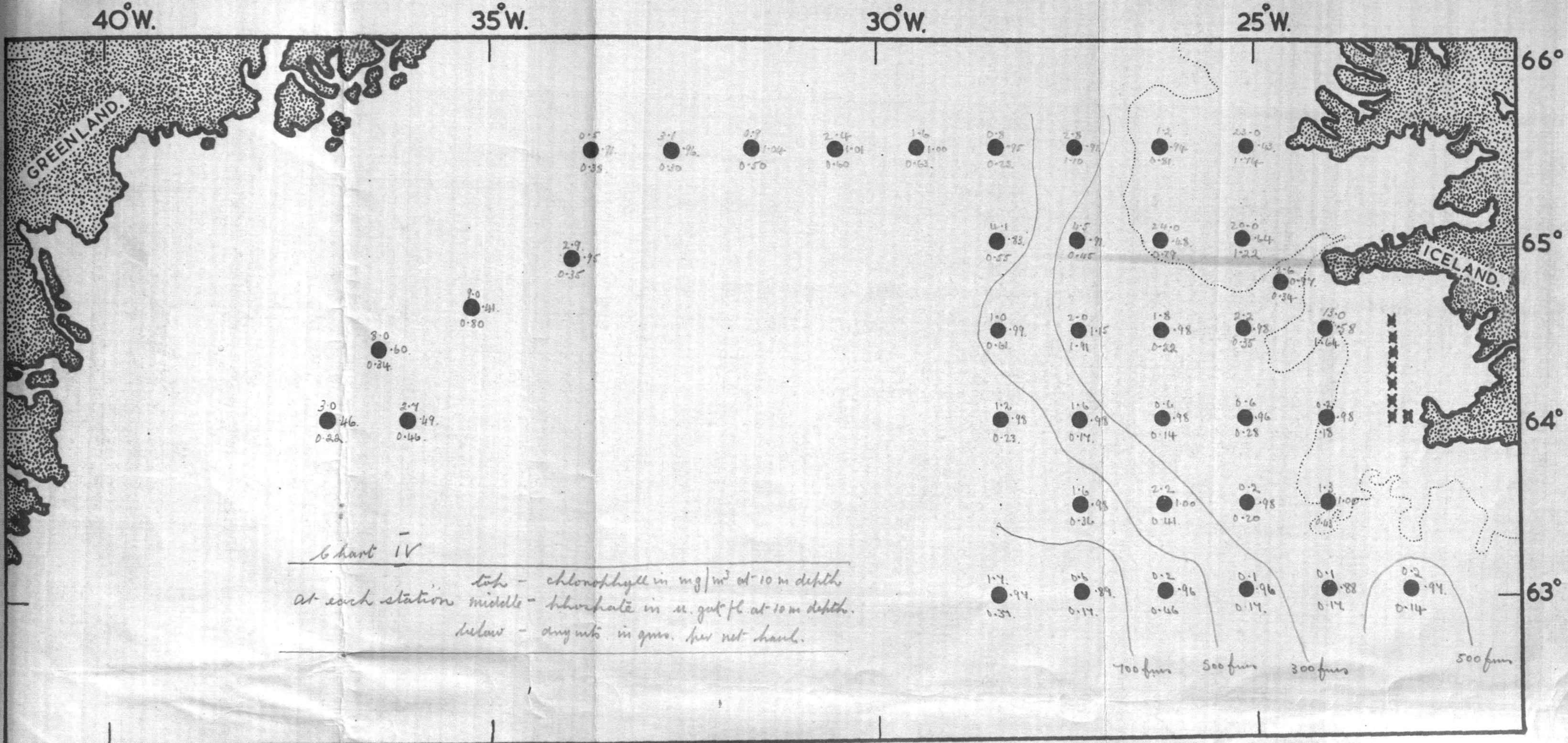


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