

International Council for the
Exploration of the Sea

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Herring Committee
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Joint Report of the Scientists attending the "Academican Knipovich" -
"G. O. Sars" - "Ægir" Meeting held at Seydisfjordur, June 22-23, 1964

Introduction

The joint investigations started at the end of May or beginning of June and lasted to June 20th. As in the three previous years the Norwegian expedition with "G. O. Sars" covered the area north of the Faroe Islands, off the east and north-east coast of Iceland to Jan Mayen. The Icelandic expedition with "Ægir" covered the area west, north-west and north of Iceland. The Soviet expeditions worked in the area from 60°N to 76°N, between 20°16'E and 16°00'W in the north and between Iceland and Norway in the southern part of the Norwegian Sea. The following research and exploratory ships of the Polar Institute took part: "Academican Knipovich", "Academican Bay", "Professor Mesjatsev" and "Balaklava".

Throughout the cruises, hydrographic, phytoplankton, zooplankton and herring investigations were carried out. Reports and charts on hydrography, plankton and herring were prepared by three respective committees. On the final session the reports of the committees were presented and accepted.

It was decided that next year the meeting should be held at Seydisfjordur during 21st-22nd June 1965.

Mr. O. J. Østvedt convened the joint meeting.

Hydrography

The Soviet, Norwegian and Icelandic expeditions carried out observations respectively in the Norwegian and Greenland Seas from the Faroe Shetland Channel to 76°30'N (4.-20.June), east and north of Iceland (27.May-20.June), and in the coastal area west and north of Iceland (1.-17.June).

Preliminary conclusions of the collected material permit to make some short remarks on the ice and temperature distribution in the area in the first half of June 1964.

Ice Limit

An extremely eastern position of drifting ice in the Mohn's Ridge area and north-east as well as south-east of Jan Mayen was observed. Off north-west Iceland the ice limit was 35 miles off Straumnes and only 24 miles off Hornbjarg, which is nearer the land than in an average year. North of Iceland the ice limit was north of 68°N, with observations at 69°20'N, 16°00'W, at 68°30'N, 16°30'W and at 68°00'N, 21°00'W, which is further out than in an average year.

Temperature

This year the temperature off the west and north coast of Iceland in the uppermost 200 m was generally 1°C above normal and 2°C higher than in 1963. Thus the Atlantic influence north and north-east of Iceland in this year is extremely strong and similar to that in 1954 and 1960. In greater depths around Iceland the temperature was now similar to that of an average year. Off the west coast of Iceland in the beginning of June a for this region and time unusual warming-up in the surface layer down to 25 m had taken place, with surface temperatures up to 9°C, and between Langanes and Jan Mayen a relatively strong thermocline already occurred by the end of May, increasing with about 1°C to the second half of June.

The following can be noted concerning the temperature distribution in the Norwegian and Greenland Seas in June 1964:-

- 1) The transport of heat by the Norwegian Current was more intensive than normal, and somewhat less intensive than in the warm year 1960, i.e. respectively in 0-50 m, 0-200 m, 200-500 m; 0.88°C higher, 0.30°C lower, 0.04 higher in 1960 than in 1964.
- 2) In the southern and central part of the Norwegian Sea the upper 0-200 m of the Atlantic water was now characterized by higher temperatures than in 1962 and 1963. The western branch was now slightly warmer than in 1960 and the eastern branch colder.
- 3) Since 1962 the accumulation of heat by the western branch was more intensive than by the eastern branch.
- 4) In June 1964 the surface heating of the Norwegian Sea was less intensive than in the previous year.
- 5) This year the water of the East-Icelandic Current had a relatively high temperature. It was 1.18°C higher than in 1963 in the 0-50 m layer and 0.62°C higher in the 0-200 m layer. The 3°C-isotherm in 20 m was now about 230 miles further to the north than in the last year.
- 6) In the northern part of the Norwegian Sea the mean temperature was now lower than in 1960, 1961 and 1962, and only about 0.2°C higher than in the cold year 1963. The mean temperature of the north-western branch into the Jan Mayen area was now about 1-1.3°C lower than in 1963. The mean temperature of the middle branch at 71°N was lower than in the western branch.

In the whole, it may thus be concluded that in June 1964 the temperature in the uppermost 200 m in the area was mostly considerable above normal and thus the Atlantic influence strong and similar as in the warm year 1960. Only in the northern part of the Norwegian Sea a temperature below normal was observed.

Members of the hydrographic committee:- MM. Sv.Aa. Malmberg (Chairman), V. I. Pakhurukov, V. V. Penin, A. I. Klimenkov, V. M. Litvin and O. Dahl.

Plankton

Phytoplankton

Two of the research ships, "Egir" and "Academican Knipovich", used Secchi disc for transparency measurements, but on "G. O. Sars" the transparency was recorded by a continuous recorder. On "Academican Knipovich" the composition of the phytoplankton from Juday net was studied and on the other vessels quantitative phytoplankton samples were collected for a later study.

Both in 1964 and 1963 a mass development of phytoplankton was observed in the north-western part of the Norwegian Sea and in the mixed waters west of Jan Mayen. An intensive "blooming" of these waters were mainly induced by the development of the diatoms Rhizosolenia sp., Chaetoceros sp., Coscinodiscus, Thalassiothrix longissima and, to a certain extent, Phaeocystis pouchetii.

A mass development of P. pouchetii and the above-mentioned diatoms occurred also in the cold waters of the East-Icelandic Current on the section along 69°20'N from 16°00'W to 13°00'W. Phytoplankton was practically absent in the net samples on the Jan Mayen section in the mixed waters limited at 20 m by the 1° and 3° isotherms. Weak development of phytoplankton on this section was also confirmed by a relatively high transparency measured by Secchi disc. - By continuous transparency-readings the Norwegians have previously recorded high concentrations of phytoplankton in the Arctic water between Iceland, Jan Mayen and the ice border, with maximum in the core of the East-Icelandic Current, but this spring no such concentrations were found. It is assumed that the spring "blooming" has occurred earlier this year.

Zooplankton

All the participating ships used the Hensen net for 50-0 m vertical hauls. As to the volume distribution in Icelandic waters, it was found that on the sections west and north-west of Iceland, the volume was somewhat higher than the mean volume for these sections during the period 1956-63. Generally, this applies also to the sections off the north Icelandic coast. Off the north-east coast the plankton density was low east to 12°W L, but outside the 200 m depth line south of 65°30'W the plankton volume was high. Off the west coast the main concentrations are found in two separated tongues, one running along the 25°W, and the other along the 27°W. In accordance with the current system in the Irminger Sea, it is believed that the western plankton density tongue will not be carried to north-Icelandic waters but follow the western branch of the Irminger Current towards East-Greenland.

It can generally be stated that the main plankton concentrations off the north coast are found far off the coast, i.e. north of 67°30'N, and thus resembling the plankton distribution in 1963, but contrary to the 1962 distribution when the concentrations off the north coast were found south of 67°N. In the Icelandic cruise no Calanus hyperboreus was recorded east of 20°W, not even in the concentrations between 67°30' and 68°N. It was also noted that the frequency of fish larvae was very high off the north-west coast and the western part of the north coast.

The results of the Icelandic zooplankton investigations can be summarized as follows:-

1. Generally, the plankton density in Icelandic waters is rather high this spring and above the mean value for the 1959-63 period.
2. The main concentrations are found far off the north coast with minima zones near the coast. The older stages of C. finmarchicus dominated in the high density zones, the younger stages in the zones of low density. This is similar to the 1963 situation, but in contrast to the findings in 1962.
3. Fish larvae are frequent on the grounds off the western part of the north coast, and the absence of C. hyperboreus is also characteristic. This is surely in accordance with the relatively high temperatures found in Icelandic waters this spring.
4. It can thus be stated that relatively poor conditions for herring exist off the north Icelandic coast south of 67°30'N, but off the east coast the food conditions are favourable.

According to the Norwegian investigations, the overwintering stock of C. finmarchicus dominated in the East-Icelandic Current north of 66°30'N. Further south and in the mixed waters off the north Icelandic coast spawning had taken place. It was generally noted that the spawning of C. finmarchicus had occurred at an earlier date than last year, most likely due to higher temperatures in the upper water layers off the east and north coasts of Iceland. Generally stated, the Norwegian expedition found the zooplankton density to be lower in the area investigated than last year, the maximum densities found on the Melrakkaslétta-Jan Mayen section. Along the north-east coast of Iceland west to Melrakkaslétta, juvenile stages of Euphausiacea were predominating, but elsewhere Pseudocalanus minutus predominated together with C. finmarchicus and in some places with a considerable number of Oithona spp.

Soviet investigations in the Norwegian Sea showed that the biological spring started earlier than in 1963, and the distribution and age-composition of C. finmarchicus indicated this quite distinctly. In the area off East-Icelandic and in mixed waters the C. finmarchicus population consisted of the V-VI stages and a large number of C. finmarchicus eggs and nauplii indicating the onset of a mass reproduction in this area. Last year the Soviet expedition observed the same composition of C. finmarchicus in this area but somewhat later. This year, the reproduction of C. finmarchicus occurred considerably earlier in the area of mixed waters between the East-Icelandic and Irminger Currents. In 1963 the beginning of the mass reproduction of C. finmarchicus in this area was recorded in early June, but at the same time this year specimens of a new generation (stages I-III) prevailed in the population.

In the Atlantic water of the Norwegian Current, on the sections along 69°20'N and 67°30'N, the population of C. finmarchicus consisted mainly of older animals than at the same period in 1963, which also indicates an earlier onset of the reproduction and intensive development of Calanus in 1964.

Generally, it can be said that the quantitative composition of the zooplankton was the same as observed last year in the area of investigation.

The plankton biomass was unevenly distributed over the area investigated. The areas with high biomass coincided with the zones of mass development of phytoplankton. In the eastern areas higher biomass was developed due to great quantities of "red" Calanus of a new generation.

It can generally be stated, that on the three northernmost sections and in East-Icelandic and mixed waters the biomass of zooplankton was considerably higher than in last year. On the more southern sections and in the Faroe-Shetland Channel the biomass was considerably lower than in 1963. The average zooplankton biomass for the whole area covered by the Soviet expedition was somewhat lower than last year and approached the level of 1961.

Members of the Plankton Committee:- MM. A. F. Thimokhina (Chairman), Erik Rosenfold, Stein Tveite and Ingvar Hallgrímsson.

Herring

Central and Northern Norwegian Sea

No herring concentrations were found in the south-eastern part of the Greenland Sea on the sections from 76°30'N to 72°50'N.

Herring schools of varying density were located at different depths of 7-280 m in the Norwegian Sea on the sections from 71°10'N to 76°30'N, from 13°30'W to 09°00'E and on the southern section along 63°00'N from 06°30'W to 02°00'W.

The greatest number of schools were, however, located on the section along 67°30'N from 13°30'W to 02°00'E. These schools were registered at both frequent and distant intervals (distributed at three levels) with the density of I-IV grade found at 165-240 m in the western part of the section (from 13°30'W to 08°45'W) where the surface temperature was relatively low (3.2-4.3°C). In the eastern part of the section (from 00°00'E to 02°00'E) herring schools were distributed at the depths of 15-20 m where the surface temperature was somewhat higher (8.8°C).

On the section along 69°20'N herring schools of the I-IV grade density were traced at the depths from 20 to 280 m between 02°45'W and 09°00'E.

On the section along 71°10'N herring concentrations were located over a small area in the eastern part of the Norwegian Sea from 02°00'E to 03°45'E at the depths of 160-280 m and at the depths of 140-235 m from 05°45'E to 07°00'E. The densest schools (IV grade) were met in the waters with surface temperatures of 6.3°-7.4°C.

On the section along 63°00'N single sparse herring schools of the I-IV grade density were found at the depths of 30-200 m over a limited area in the western part of the Norwegian Sea with the surface temperature from 8.7° to 9.7°C.

The comparison of the distribution of herring in June 1964 with that observed in June 1963 shows that in 1964 the concentrations of herring were distributed in the Norwegian Sea (along the western branch of the Atlantic Current) in the same way as in 1963 (only insignificant fluctuations were found). Great similarity between the distribution of herring in 1964 and that in June 1963 was observed on all the sections and on each section taken separately.

It can be noted that herring distributed in the northern regions in June were of mixed composition with some admixture in the catches of large herring with a mode of 34-35 cm (fork length) and of middle-sized herring with a mode of 26-28 cm (fork length). In the 67°30'N section area middle-sized herring with a mode of 26 cm dominated in the catches.

Icelandic and Western Norwegian Sea

During the period 29th May to 10th June the herring survey in the area between the Faroes and Jan Mayen and the east and north-east coast of Iceland showed that the herring concentrations were observed in two areas as in 1963. Very scattered concentrations were found near the south-western border of the East-Icelandic Current along the section at 64°20'N between 8°W and 10°W. The main concentrations were found in the area north-east and north of Langanes from 67°30'N to 68°30'N between 12°W and 16°W. During the first week of June the herring shoals in this area moved north-westwards but after the 10th of June they either dispersed or had a north-easterly direction. Purse-seine catches were taken as far north as 68°40'N between 12° and 14°W. Samples from drift-net and purse-seine catches showed that these concentrations consisted mainly of old Norwegian spring spawners (mean length of 37,5 cm).

During the period 10th-20th of June both scattered and dense concentrations were found in the area east-north-east of Langanes from 66°20' to 67°20'N between 10° and 12°W. Large concentrations of Gadus potassou were also registered in this area. The densest herring concentrations during this period were, however, found 20-40 n.m off the east coast between 65°15' and 65°40'N. Samples from this area show that the herring concentrations consisted mainly of old Norwegian herring with considerable admixture of younger year-classes varying from 5% to 35%.

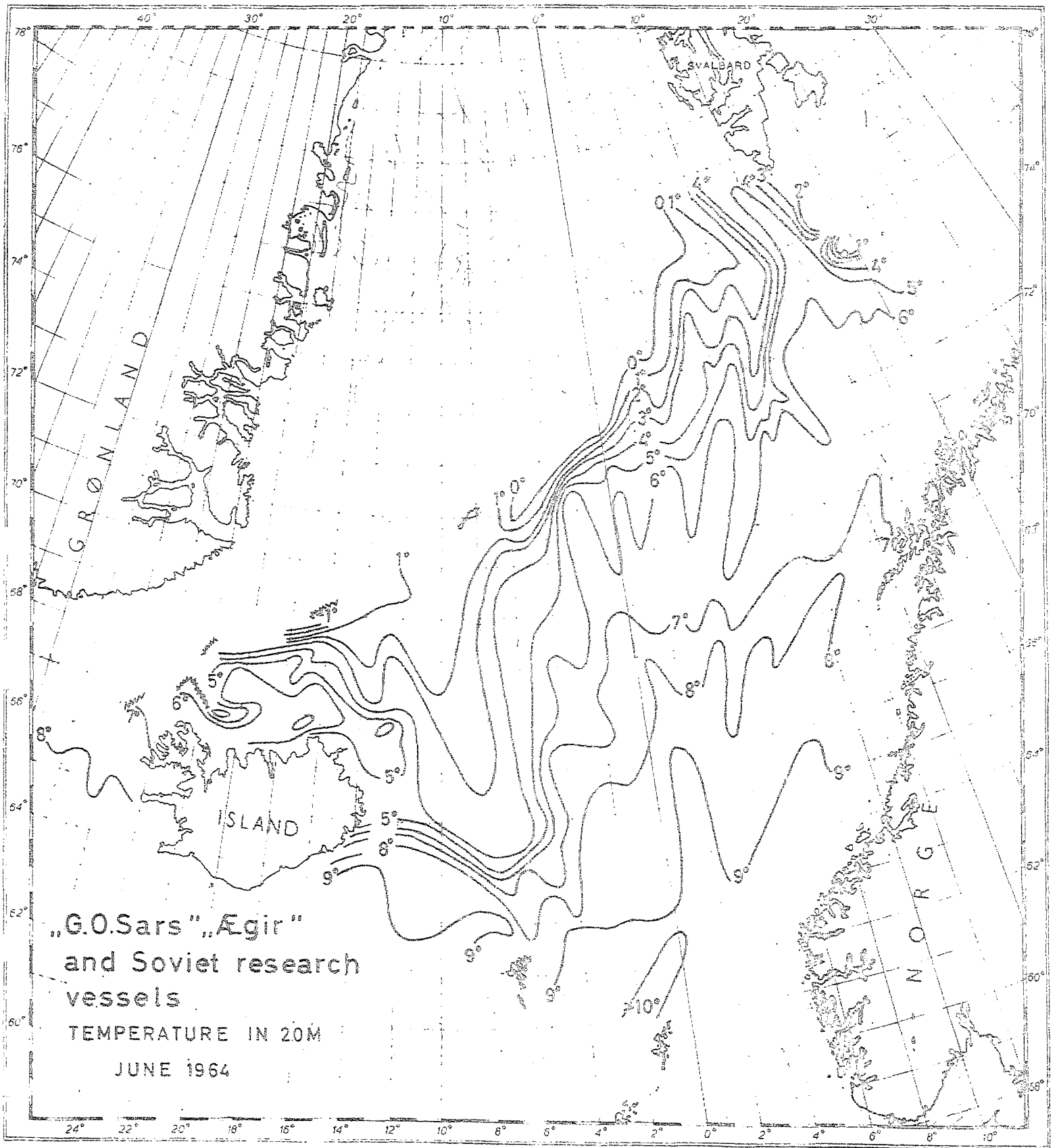
In spite of a thorough survey off the north-west coast and west-north coast of Iceland no invasion of Icelandic spring spawners from the western areas was observed.

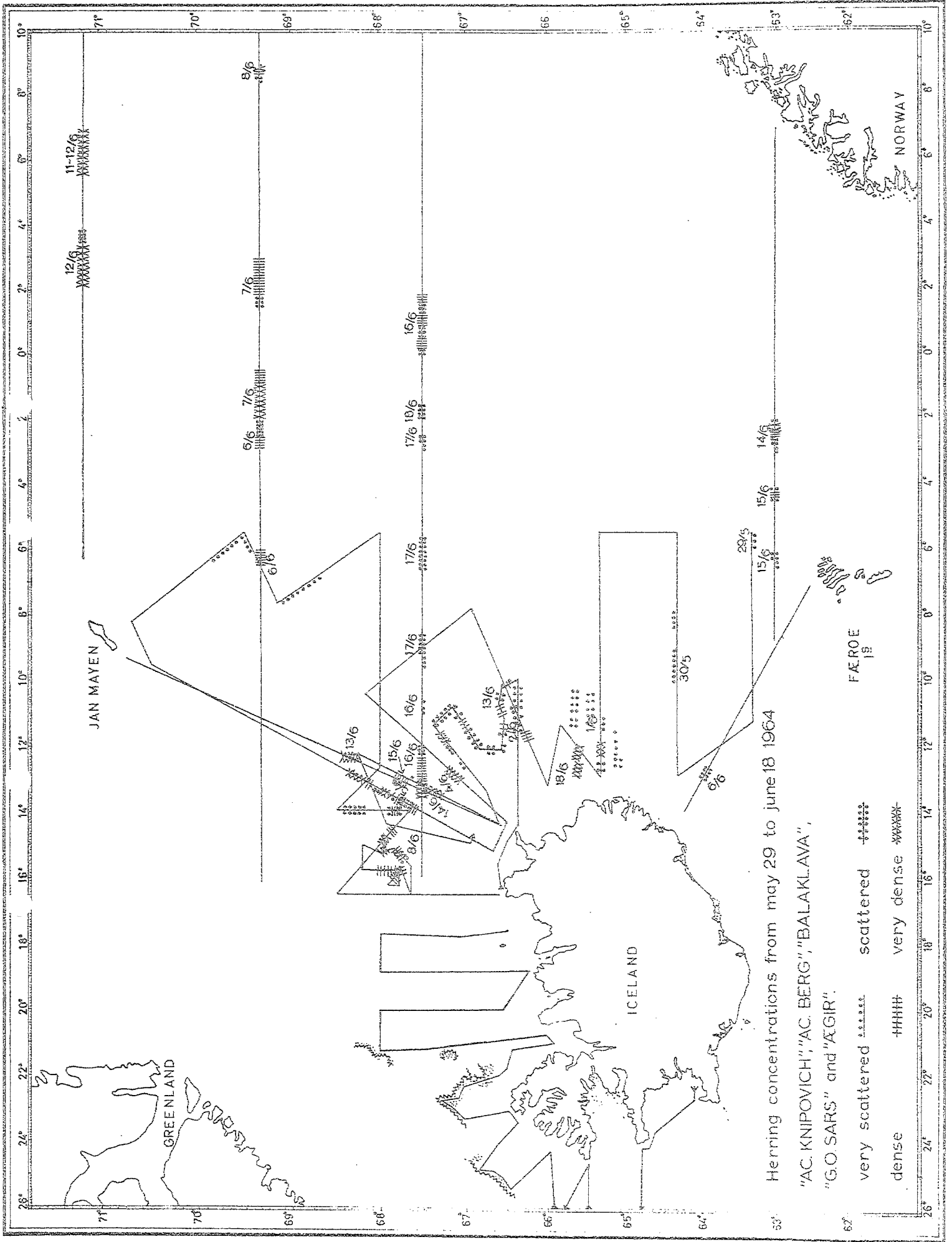
Conclusions

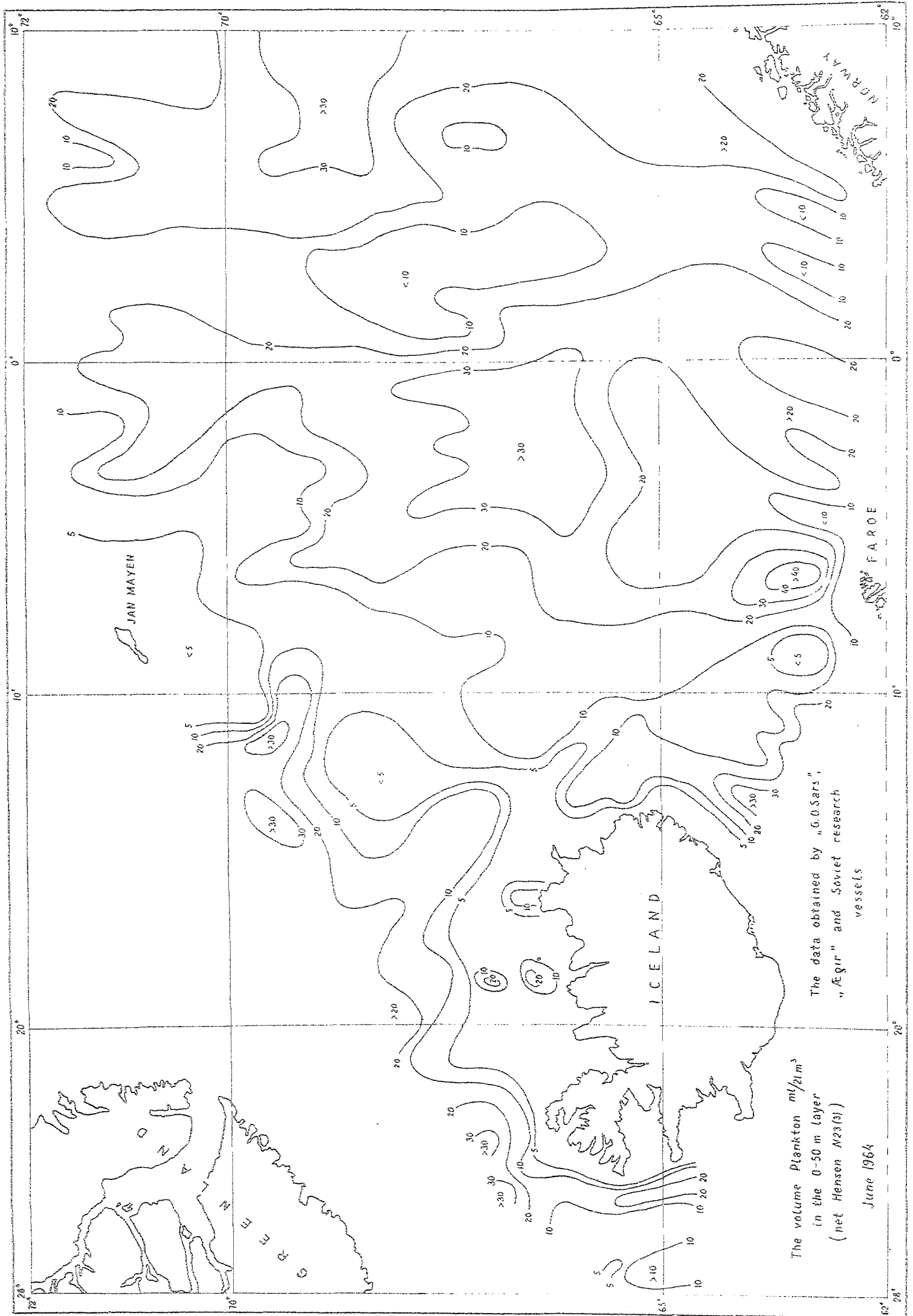
The Herring Committee discussed in detail the distribution of the herring concentrations during June and their possible movements later or during the summer and concluded that:-

1. The distribution of the first invasion of herring to the area off north-east Iceland was similar to that in 1963 and it had a westerly direction until about 10th June when it dispersed or moved NE and consequently purse-seine fishing took place further north than in any previous year. This was probably due to the small quantities of zooplankton in the coastal and near-offshore waters as compared with the far-offshore and east-coast areas as shown on the plankton charts.
2. The dense concentrations of herring that are already assembled in the middle of June off the east coast are expected to remain in this area where one can also expect increasing quantities of food (C.firmarchicus).
3. The herring concentrations that were located in the central Norwegian Sea will probably first move in a north-easterly direction. During the second half of the summer and in the early autumn they will probably migrate towards Jan Mayen and the east coast areas of Iceland.

Members of the Herring Committee:- Dr. K. A. Ljamin (Chairman),
and MM. Yu. K. Benko, Jakob Jakobsson, D. S. Danielsen, W. Løtvedt, O. J. Østvedt.



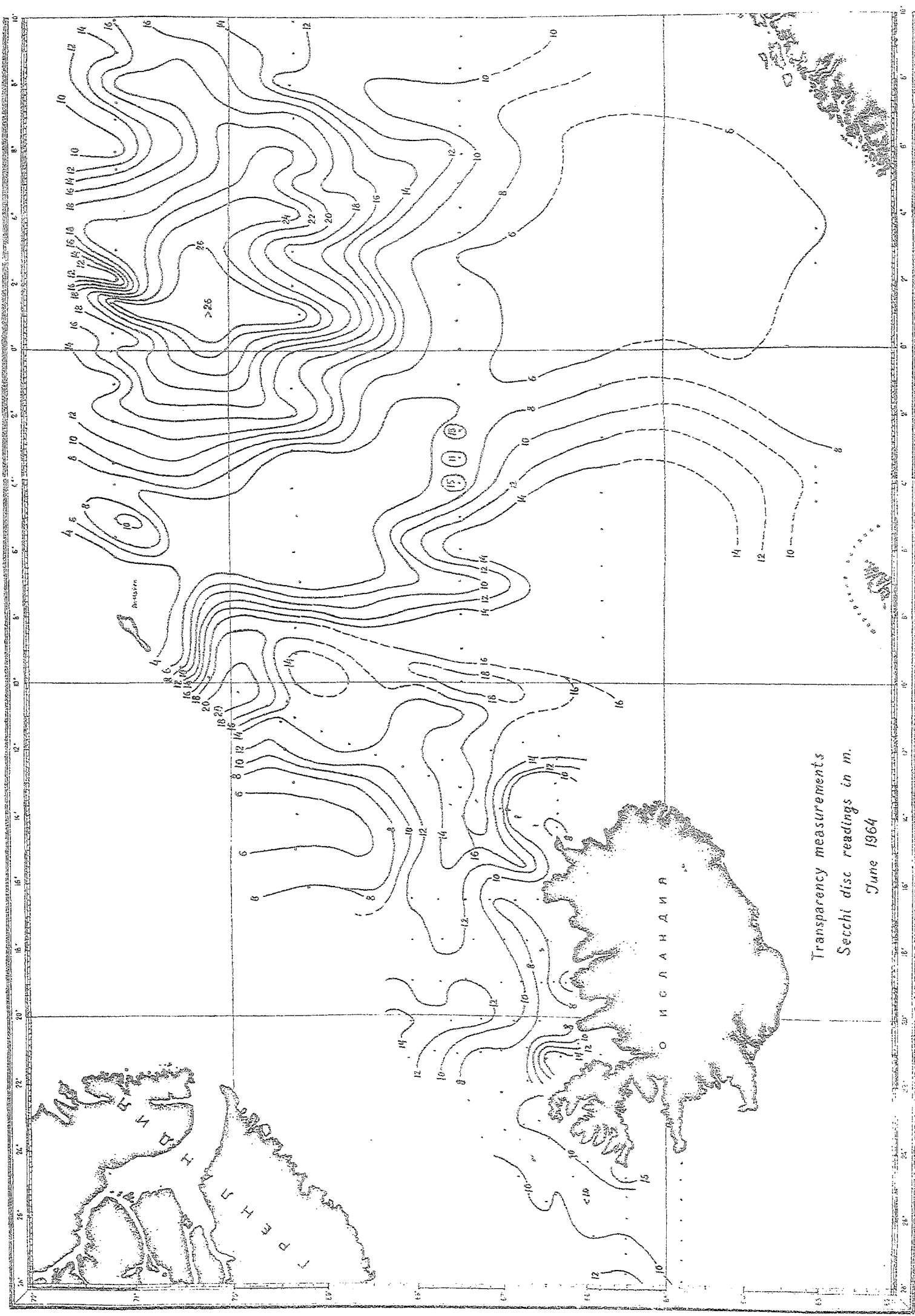




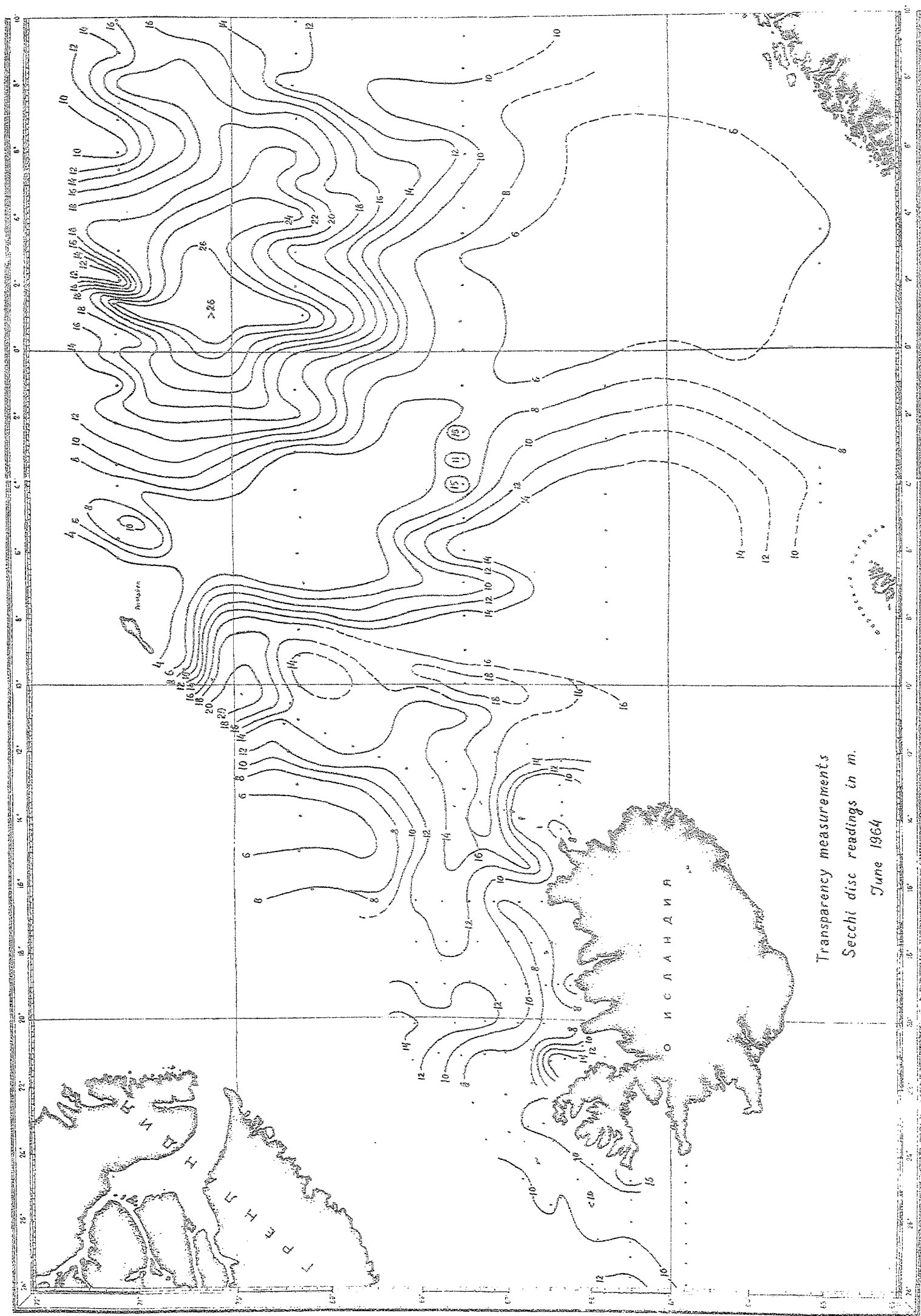
The volume Plankton $ml/21m^3$
 in the 0-50 m layer
 (net Hensen M23(3))

June 1964

The data obtained by "G.O.Sars",
 "Aegir" and Soviet research
 vessels



Transparency measurements
 Secchi disc readings in m.
 June 1964



Transparency measurements
 Secchi disc readings in m.
 June 1964