

JOINT REPORT OF THE SCIENTISTS ATTENDING THE
"ACADEMICAN KNIPOVICH" -- "JOHAN HJORT" -- "ÆGER" MEETING
HELD AT AKUREYRI JUNE 23rd-24th 1963

Introduction.

The joint investigations started at the end of May or beginning of June. The Norwegian expedition covered the area north of the Faroe Islands, off the East and North east coast of Iceland to Jan Mayen. The Icelandic expedition covered the area west, northwest and off the western North coast of Iceland. The Soviet expeditions of the PINRO covered the area from 60°N to 78°N between 19°E and 14°W in the north and between Iceland and Norway in the southern part of the Norwegian Sea.

Throughout the cruises, hydrographic, phytoplankton, zooplankton and herring investigations were carried out. These were completed on the 22nd of June, the day preceding the joint meeting at Akureyri.

After the opening meeting the charts and the joint report was prepared in three committees which consisted of the following representatives:

HYDROGRAPHIC COMMITTEE

O. Dahl, Sv.Aa.Malmberg, B. Halldorsson,

PLANKTON COMMITTEE

Sig. K. Asserson, Stremilova, A.F.Timochina, Þ.Þórðardóttir, I.Hallgrímsson, G.Sv.Jónsson

HERRING COMMITTEE

O.J.Ostvedt, G. Vestnes, K.A.Ljamin, U.Benko, J.Jakobsson, E.Jónsson

At the final session the reports of the respective committees were presented and accepted.

Mr. Ostvedt invited the next meeting to be held in Bergen during 23rd-24th June 1964. The Icelandic delegates stated that the acceptance of this kind invitation was subject to their authorities' approval.

Dr. K.A.Ljamin convened the joint meetings.

HYDROGRAPHY

Observations were carried out by an Icelandic expedition in the Irminger Sea in May (1st-31st), and in June (11th-19th) observations were carried out in the waters northwest and north of Iceland. The Norwegian expedition ship "Johan Hjort" investigated the region of the East-Icelandic Current and the area east and north of Iceland in the end of May and during the first half of June. In this same period the Soviet expedition ships made an oceanographical survey in the waters of the Norwegian and Greenland Seas up to the ice border.

Preliminary conclusions of the collected material and discussion of various features of the hydrographical condition permit some short remarks on the temperature situation of the Norwegian and Greenland Seas and the west and north Icelandic coastal area during the first half of June 1963.

The average temperature of the eastern branch of the Norwegian Current in the layer from 0-200 m in all sections had a tendency to increase during the period of research. It was somewhat lower than the temperature of the eastern branch in the average year of 1959. In the 0-50 m layer the average temperature of this branch was higher than in 1959.

In the middle part of the Norwegian Current the average temperature increased only at the average of 0.8° in the layer 0-50 m as compared with the year 1962. In the 0-200 m layer it was somewhat lower than in the cold year 1962.

As to the temperature of the 0-200 m layer in the western branch of the Norwegian Current, there was an average increase of 0.4° in the sections from $65^{\circ}45'$ to $69^{\circ}20'N$ only, as compared with the year 1962.

The northwest part of the western branch of the Norwegian Current in the 0-200 m layer has reached a high temperature level during the last years, and this year it was higher than the 1962 level at the average of 0.3° . Similar situation is found in the subsurface layer of 200-500 m.

The most characteristic features of the temperature conditions of the waters of the East-Icelandic Current was a sharp decrease in temperature (up to -1.3° in the layer 75-200 m) as compared with the cold year 1962. The Current has grown stronger, and as a result of this, the 3° -isotherm was situated 120 n.m. more southeast than in 1962. This contributed to a further cooling of the deep layers in the waters of the Norwegian Sea in the region of its activity.

Stronger circulation of Polar water resulted in an anomalously close position of the ice border off the northwest coast of Iceland.

The relatively weak thermal intensity in the Irminger Current, as observed in May off the western coast of Iceland, was also confirmed in the later period of the investigations north of Iceland. The average temperature of this current at all depths was somewhat lower than in the cold year 1962.

It is worth noting that as a result of intense solar radiation, the surface layer (0-20 or 30 m) in the region off Langanes seemed to contain more heat in the last half of June than in 1962. It was observed that in the period between June 11th and 19th the temperature of the surface layer of the coastal waters and the adjacent waters off Langanes had an increase of 1-1.5°.

PLANKTON

a) Phytoplankton.

This year the phytoplankton studies on board "Johan Hjort" and "Ægir" were carried out in the following way:

1. On the "Johan Hjort" the transparency continuous recorder was employed throughout the whole cruise to get an indication of the quantitative distribution of the standing stock of the phytoplankton. Furthermore about 40 samples for chlorophyll measurements were taken.

2. On board the "Ægir" Secchi disc readings were carried out at all stations at daytime, in order to get an indication of the standing stock of phytoplankton. Measurements of primary production were made at 50 stations using the C^{14} technique. Samples were taken at 0, 10, 20 and 30 meters. Temperature regulated incubator with artificial light was used. Furthermore samples for taxonomical and quantitative studies were collected at the same stations where productivity measurements were carried out and at the same depths.

3. On the Soviet ships the quantitative composition of phytoplankton was determined on the basis of catches by Juday net, gauze no.38 (8), the quantity being estimated visually.

Because of the different methods used, no joint phytoplankton chart can be presented.

In the inflowing Atlantic water (Irminger Sea water) NW of Iceland and off the western part of the N-Icelandic coast, no

blooming was observed during the investigation, although it appears possible that the spring blooming had taken place earlier.

In the warm water of the eastern part of the N-coast a considerably higher quantities of phytoplankton were found due to a large scale development of *Chetoceros*.

According to Norwegian investigations in the East-Icelandic Current in the second half of May, a high phytoplankton production was found by continuous transparency recordings. It was also found that this area of production was much bigger than last year at that time.

Soviet investigations in the middle of June on the section Langanes-Jan Mayen showed no intensive blooming of phytoplankton in the East-Icelandic Current. Large quantities of oxygen and absence of silicates indicated that such blooming had taken place.

Soviet investigations in the Norwegian Sea in June showed that the most intensive blooming took place in the zone of inter-mixing between Atlantic and Arctic water and was due to the development of diatom phytoplankton, such as *Rhizosolenia* spp., *Thalassothrix longissima* and *Coscinodiscus* sp.

One of the peculiarities found in the mixed waters of the Norwegian Sea as well as in East-Icelandic waters was a less intensive blooming of *Phaeocystis Pouhettii* compared with last year, the area being smaller as well.

Very small production of phytoplankton was observed in NE-part of the Norwegian Sea.

It is agreed upon, that the research vessels perform Secchi disc measurements in the future to obtain a comparable data.

b) Zooplankton.

This year a Hensen net with silk no.3 was used on board all the research ships. At every station 50-0 m haul was made.

Last year a very rapid increase in the zooplankton density in Icelandic waters was observed during the cruises due to the changeover from winter to summer conditions. No such rapid changeover was registered this time, and it must be emphasized that the temperature in the area investigated was - generally speaking - about 1°C below normal.

Generally stated, the density of zooplankton off the NW, N and NE coasts of Iceland was now found to be considerably below the mean value in comparison with previous years, and much lower than observed last year. In the 1962 zooplankton report it was stressed that the zooplankton maxima on the herring grounds off

the N coast of Iceland were found to be extended further to the W and S than previously. This spring the maximum densities were practically only found E of 20°W, and besides, much further off the coast than last year. The zooplankton maxima off the NE part of the Icelandic herring grounds were now observed between 67° and 68°N.

The percentage frequency of the stages of *Calanus finmarchicus* found S of 67°N off the N coast of Iceland indicates a young population, and when growing up it can thus be expected that the densities in this area will be increasing during the coming weeks in spite of a poor population.

Thus it can generally be stated that the zooplankton density in the N-Icelandic area is now very low in comparison with previous years, most likely due to the before mentioned late upwarming.

It can be mentioned in this connection that the ICNAF survey in the Irminger Sea in May this year indicated a very low zooplankton density in that area.

The biggest concentrations of plankton in the Norwegian Sea were recorded in mixed waters. They were due to mass development of phytoplankton as well as of *Calanus finmarchicus*, *Oncaea borealis*, *Oithona similis*, *Aglantha digitale*, *Collozoum* sp., *Oikopleura* sp. In the coastal waters in the eastern part of the Norwegian Sea the plankton maxima consisted of *Calanus finmarchicus*, stages IV-V, of a new generation, and partly of young *Aglantha digitale*.

In polar waters cold water forms, such as *Calanus hyperboreus*, *Metritia longa* and *Eukrohnia hamata*, were dominant.

In Atlantic water in the Norwegian Current a considerable part of the plankton were Euphausiacea juvenile, *Collozoum* and *Anthometra*. In Atlantic and mixed waters of the Norwegian Sea the I-III stages of *Calanus finmarchicus* dominated, and thus an increase in the biomass of *Calanus finmarchicus* can be expected in the near future in these waters.

It can be mentioned that this year *Aglantha digitale* juvenile appeared earlier than usual in the mixed waters of the Norwegian Sea, which might affect the size of the stock of *Calanus finmarchicus* on which they feed.

As to the plankton volume in the area investigated it was found that the density in the Norwegian Sea was considerably higher than in Icelandic waters.

HERRING

a) Central and Northern Norwegian Sea.

Search for herring in the Greenland Sea did not give positive results. Herring shoals were registered from $71^{\circ}10'N$ to $63^{\circ}N$.

On the line along $71^{\circ}10'N$ herring shoals were observed between $1^{\circ}W$ and $5^{\circ}E$, separate and divided ones with registered density from 1, 2 to 3 points on the depth from 70 to 160 m in the western regions and from 25 to 100 m in the eastern ones, at surface temperature $5-6^{\circ}$.

Biological specimens of herring from drift nets show that here is distributed young herring from 24 to 27 cm in length, intermixed with bigger one (6-10%) 30-34 cm in length.

Along the line $69^{\circ}20'N$ separate shoals of herring were observed with density 1,2 points and registered between $3^{\circ}30'W$ and $9^{\circ}30'E$ on depths from 10 to 80 m with temperature on the surface $6.7-7.8^{\circ}$.

Control specimens included herring 23-27 cm in length.

Herring shoals were registered more often along the $67^{\circ}30'$ line, from $7^{\circ}00'W$ to $6^{\circ}30'E$ at both frequent and distant intervals, with density from 1 to 4 points on depths from 5 to 120 m. In a few cases frequent shoals were met on a line 6.5 miles long.

According to biological analysis the herring was 20-27 cm long.

Along the line $65^{\circ}45'N$, from $10^{\circ}30'W$ to $5^{\circ}30'E$ there was registered the greatest number of herring shoals with density from 1 to 4 points. In the western region there were registered shoals in one layer on the depth of 35 to 180-200 m, and in the eastern region shoals in two or three layers on 30 to 150 m depth.

The length of the herring in the western region was 27-35 cm, in the eastern one young herring, 22-28 cm in length.

On the southern line of $63^{\circ}00'N$ concentrations of herring were observed in limited waters from $1^{\circ}30'$ to $4^{\circ}00'W$, distributed on 10 to 70 m and in one case on 60 to 160 m.

b) Icelandic and Western Norwegian Sea.

During the period 22nd May to 5th June, the herring survey in the area between the Faroes-Jan Mayen and the east and northeast coast of Iceland, herring concentrations were observed in two main

areas, i.e. from 64° - 65° N and at 8° W, and from $65^{\circ}30'$ N to 68° N, mainly between 8° and 10° W. The densest concentrations were found in temperature between 0° - 2° C approximately 150 nautical miles eastnortheast of Langanes. Repeated surveys in this area at the north and northeast coast of Iceland showed that until 10th June no herring concentrations were found west of latitude 12° W.

During the period 11th to 19th June the herring concentrations migrated further west and northwest as far as 17° W and $67^{\circ}30'$ - 68° N. At the same time good herring concentrations were also registered east of Langanes, and scattered shoals were also found further south between $65^{\circ}20'$ and 66° N and from 11° - 12° W.

Samples that were taken from a herring catch 150 miles east of Langanes on 28th May were exclusively of old Norwegian herring with a average length of approximately 38 cm. A sample from the far offshore eastern northcoast area revealed similar age and length composition of the herring concentrations, while another sample taken 60 miles eastnortheast of Langanes on 14th June contained 7% summer spawners.

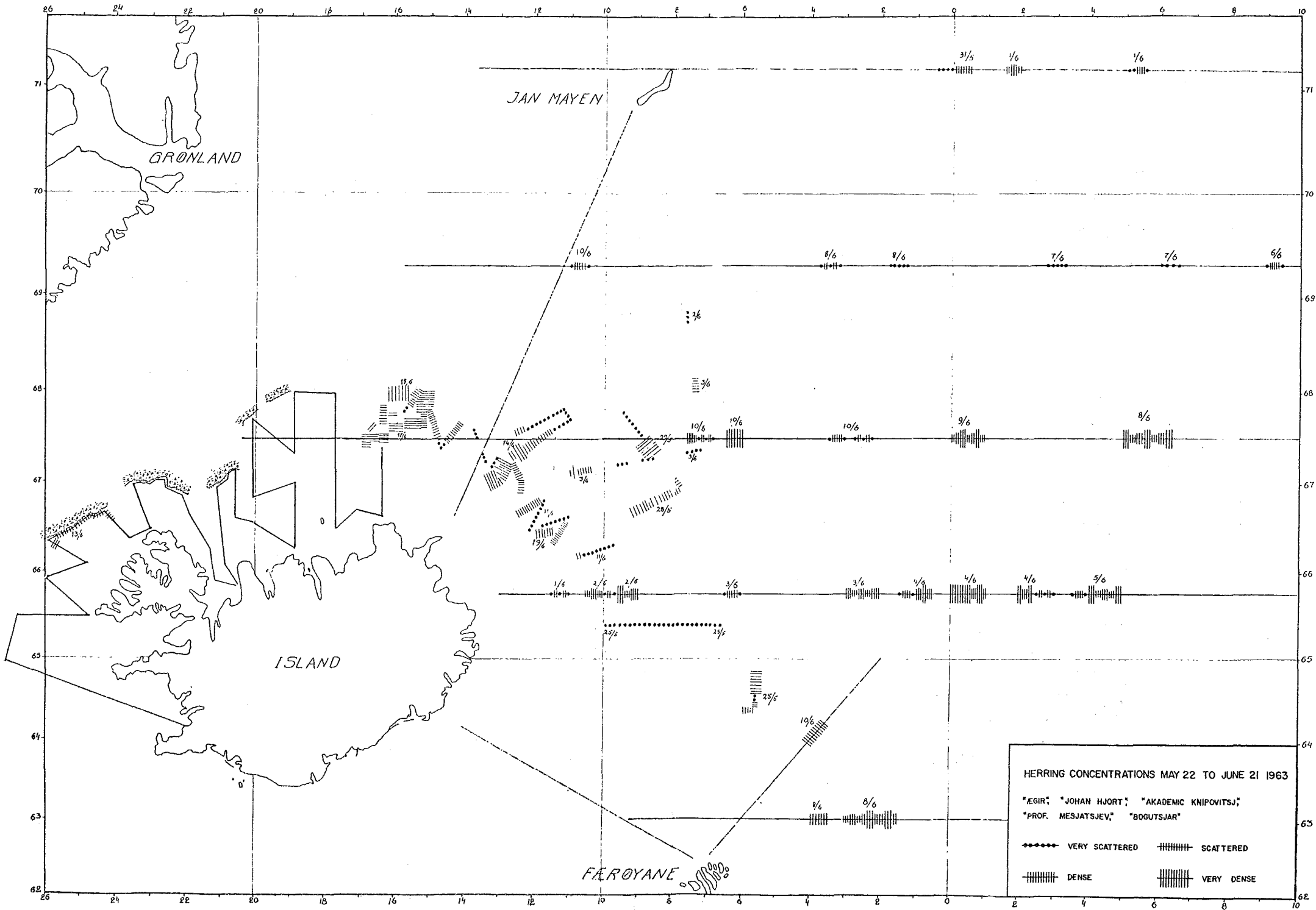
Herring surveys from the west and western northcoast of Iceland showed that until 15th June no invasion of herring from the western areas had entered the northcoast grounds and in fact the only herring concentrations in these regions were found near the ice border off northwestern Iceland, 35-40 miles off the coast.

Thus, as compared with last year, during May and the first half of June the westward migration of the Norwegian herring was clearly delayed by at least two weeks. The distribution of the Norwegian herring entering Icelandic waters this year thus resembles that of 1961. Similarly, the north and eastward migrations of the Icelandic spring spawners from the west coast had not taken place in the middle of June, whereas last year considerable concentrations had invaded the offshore waters of the western northcoast 1st June.

Generally it can be stated that the herring concentrations found during this year's investigations northwest, north and northeast of Iceland were not as extensive as in 1962. This may however be due to the delayed immigration of the Norwegian as well the Icelandic spring spawning stocks towards the north Icelandic waters.

As is shown on the joint chart, the general conclusion from the herring investigations is thus that the younger year-classes of the Norwegian herring were located in the central and eastern part of the Norwegian Sea and these concentrations seem to be migrating in north-northeasterly direction.

The older year-classes of the Norwegian herring were, on the other hand, found in the western Norwegian Sea and in offshore waters NE of Iceland. As compared with last year, the herring migrations of both Icelandic and Norwegian origin to the Icelandic north and east coast feeding grounds seem to be delayed this year, due to the cold hydrographic regime that is now observed and has affected various other environmental factors that concern herring migrations.



JAN MAYEN

GRONLAND

ISLAND

FARØYANE

31/5 1/6 1/6

10/6 8/6 8/6 7/6 7/6 6/6

2/6

3/6

10/6

10/6

10/6

9/6

8/6

1/6

2/6

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9/6

23/5

33/5

25/6

10/6

8/6

8/6