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ANNUAL MEETING - JUNE 1976Plankton development in the Newfoundland banks areas in June, 1975

by

N.V. Plekhanova &amp; V.M. Ryzhov

**Abstract**

Data on plankton samples collected from the 0-50 m depth in June 1975 in the Great Newfoundland and Flemish Cap Banks areas have been analysed.

The areas of maximum seston concentrations and distribution of food zooplankton are given. Species zooplankton composition and the areas of occurrence of different age stages of the main dominant *Calanus finmarchicus* have been revealed. The relationship between the origin phytoplankton "blooming" zone and the areas of hydrological fronts location has been corroborated. It is shown how the separate copepods stages of *C.finmarchicus* are timed to vegetation of certain phytoplankton species. A seasonal characteristics of planktonic complexes in different parts of the area is given.

**Material and methods**

The main plankton samples were collected in the areas of the Great Newfoundland and Flemish Cap Banks in the period from 23 to 30 June 1975. The plankton was collected with Juday net (a 37 cm diameter of opening, gas No.38) from the 0-50 m depth on standard hydrological sections 6A and "triangular" On the whole, 38 plankton stations (Fig.1) were carried out and 38 plankton samples were collected.

## Results of research

As a result of analysis there were revealed the areas of the greatest concentrations of plankton, the main species distribution and age composition of the most numerous zooplankton *C. finmarchicus*. The charts of seston (Fig.2) and food zooplankton (Fig.3) biomass distributions are presented.

Due to average temperatures for the 0-50 m layer (Fig.2) calculated by temperature measurements made simultaneously with plankton sampling the isotherms have been compiled. A particular relationship between the phytoplankton complexes and interaction zones different by heat content of water masses (Fig.2) was fairly clearly expressed in the planktonic flora in the area investigated.

For instance, in the north-east Great Newfoundland Bank, on the boundary of interaction of the water mass with the temperature  $+2, +3^{\circ}\text{C}$  in the 0-50 m layer and warm water mass with temperature  $6^{\circ}-11^{\circ}\text{C}$ , the patch of intensive diatoms "blooming", considerably extended in the latitude direction was observed. In this area (stations 2742-2746) *Rhizosolenia styliiformis* ( $10-75 \text{ thou. cells/m}^3$ ) and *Coscinodiscus oculus-iridis* ( $20-50 \text{ cells/m}^3$ ) reached a considerable development.

The second patch of diatoms complex was also registered in the frontal zone area (stations 2718-2721). *Chaetoceros decipiens* ( $100-1\,000 \text{ cells/m}^3$ ) made up the bulk of abundance, *Coscinodiscus oculus-iridis* ( $70-150 \text{ cells/m}^3$ ) was fairly numerous too.

*Peredinium* complex represented mainly by two species of genus *Ceratium*: *Ceratium longipes* ( $2-3 \text{ thou. cells/m}^3$ ) and *Ceratium tripos* ( $30-70 \text{ cells/m}^3$ ) intensively developed in the area of stations 2752-2754, where the  $4^{\circ}\text{C}$ -isotherm had been passed. Zooplankton in the area investigated was mainly presented with copepods. *C. finmarchicus* was predominant among them. Its distribution of abundance and bio-

mass coincided with that of biomasses of seston and food zooplankton.

Cold water organisms *Calanus hyperboreus*, *C. glacialis*, *Metridia longa* and *Oikopleura labradoriensis* were mainly observed in the northern part of the Great Newfoundland Bank. *Metridia longa* was marked in great quantities at the station 2725. Its abundance was equal to 555 spec./m<sup>3</sup>.

Warm water *Limacina retroversa*, *Thysanoessa longicauda* and *Oithona atlantica* were chiefly observed in the north-eastern part of the Great Newfoundland Bank (area of high radiation heating) and on the Flemish Cap Bank (area of the Atlantic waters influence). The highest abundance in the north-eastern part of the Great Newfoundland Bank amounted to 49 spec./m<sup>3</sup>.

Neritic organisms *Pseudocalanus elongatus*, *Oithona similis*, *Centropages hamatus*, *Temora longicornis*, *Acartia longiremis*, *Fritillaria borealis*, *Sagitta elegans* and larvae of demersal invertebrates *Lamellibranchiata*, *Echinodermata*, *Polychaeta* were mainly observed on the shallows of the Great Newfoundland Bank (coastal stations) and on the Flemish Cap shallows. The average abundance 200-300 spec./m<sup>3</sup> and the greatest one of 930 spec./m<sup>3</sup> (station 2729) were marked. It should be noted that the *Echinodermata* larvae were mostly observed in the Flemish Cap area, but nauplii of the *Cirripedia* and their larvae occurred only on the Great Newfoundland Bank Shallows.

The greatest concentrations of zooplankton were observed in the north-eastern part of the Great Newfoundland Bank (average biomass of zooplankton - 592 mg/m<sup>3</sup>) and in the Flemish Cap area (average zooplankton biomass - 432 mg/m<sup>3</sup>). *C. finmarchicus* made up the main bulk of the abundance and biomass of zooplankton in these areas. Its abundance in the north-eastern part of the Great Newfoundland Bank constituted from 400 to 4 578 spec./m<sup>3</sup>. *Calanus* in this area was presented by nauplii and all copepods stages (from I to VI) with predominance of I, II and III.

Its eggs were observed singly. The fry of Euphausiids (Calyptopsis, Furcilia, Cyrtopia) was registered in this area in great quantities. Their greatest abundance was equal to 221 spec./m<sup>3</sup>.

The abundance of Calanus in the Flemish Cap area constituted 200-4 213 spec./m<sup>3</sup>.

IV-V copepods stages dominated in Calanus population. Its nauplii were registered in small quantities, the eggs were not observed.

The zooplankton on the coastal stations of the Great Newfoundland Bank was poorly presented both due to its composition, and to abundance. The greatest abundance was 1 579 spec./m<sup>3</sup>, the smallest one - 10-20 spec./m<sup>3</sup>. Average biomass of zooplankton was equal to 78 mg/m<sup>3</sup>.

C. finmarchicus was singly observed or absolutely not. It was presented by I-II copepods stages, nauplii were registered in small quantities. The fry of Euphausiids (Calyptopsis, Furcilia, Cyrtopia) was marked near the frontal zone (stations 2721-2725). Their abundance was 17-25 mg/m<sup>3</sup>.

It is interesting to note that mass development of C. finmarchicus fry (I, II, III copepods stages) and Euphausiacea fry took place in the areas of intensive vegetation of diatoms Rhizosolenia styliformis and Coscinodiscus oculus-iridis, that was corresponding to the spring-summer season of plankton.

At the same time in the area, where Calanus of IV-V copepods stages (the Flemish Cap area) was predominant in plankton, Chaetoceros decipiens and Coscinodiscus oculus-iridis had been developed, but in the area with insignificant content of Calanus in plankton, in general, (coastal stations of the Great Newfoundland Bank) Ceratium longipes and Ceratium tripos developed. That was the evidence of summer season in plankton in these areas.

Besides, the seston biomass in the areas of mass phyto-

plankton development exceeded the food zooplankton biomass by 10-12 times, at the small content of phytoplankton - by 2-3 times (Fig. 2, 3).

Similar plankton state of these areas was observed in early July 1960 and 1961 (Semenova, 1964).

### Conclusions

1. The observations showed, that the greatest productivity of plankton societies in June 1975 was observed in the north-eastern part of the Great Newfoundland Bank and in the Flemish Cap area.

2. Mass development of *Calanus finmarchicus* and Euphausiacea fry was registered in the areas of phytoplankton "blooming".

3. The plankton of the north-eastern slope of the Great Newfoundland Bank was in the state of late spring, and plankton of the Flemish Cap and Great Newfoundland Banks Shallows were in state of early summer stage.

### References

Semenova, T.N., 1964. On the Seasonal Phenomena in Plankton on the Labrador Shelf, Newfoundland Bank and Flemish Cap Bank. Trudy PINRO, vyp. XVI.

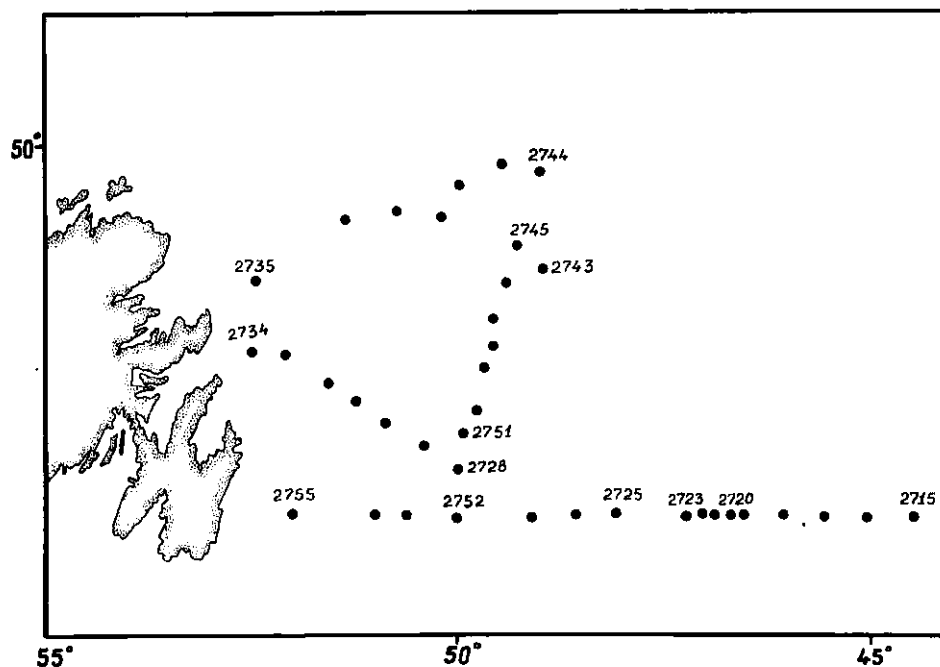


Figure 1. Chart of stations carried out from 23 to 30 June 1975 in the area of the Great Newfoundland and Flemish Cap banks

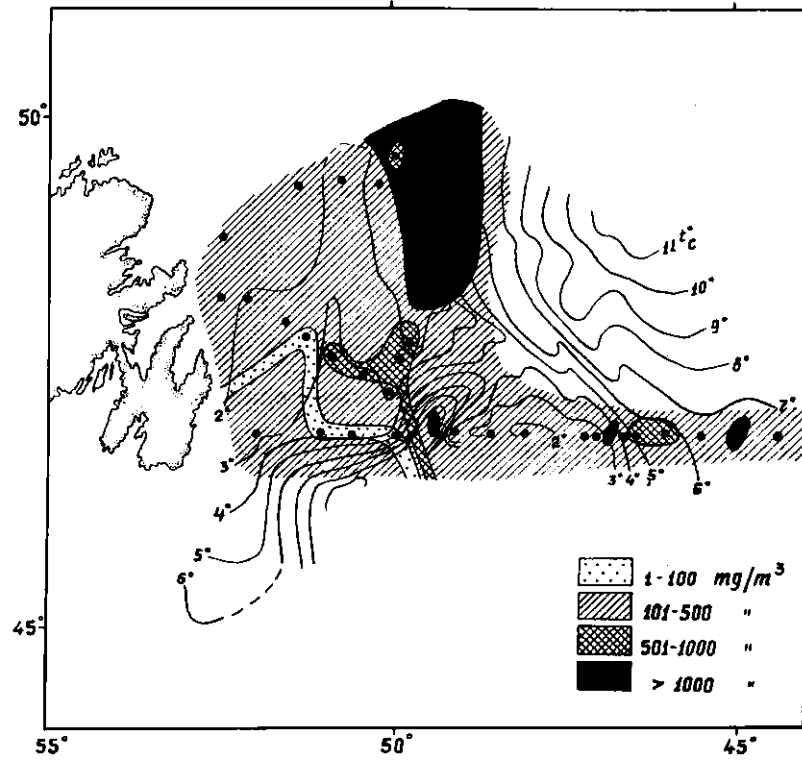


Figure 2. Seston biomass distribution in the 0-50m layer in the areas of the Great Newfoundland and Flemish Cap banks in June 1975.

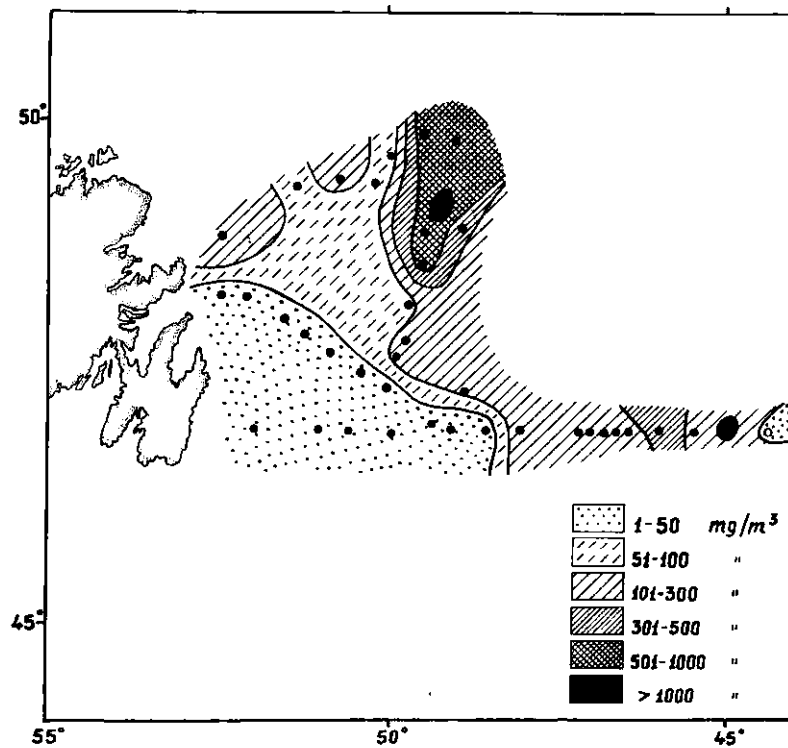


Figure 3. Food zooplankton biomass distribution in the 0-50m layer in the areas of the Great Newfoundland and Flemish Cap banks in summer 1975.