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Peculiarities of Zooplankton Distribution in
the Flemish Cap Area in 1978

by

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Abstract

The data of plankton catches taken in the 0-50 m layer in the Flemish Cap area in February and May-July 1978 are analysed in the paper.

The areas of the densest concentrations of zooplankton and its main zooplankters are pointed out, the species composition of zooplankton and its changing throughout the season, the location of different age stages of the main dominant Calanus finmarchicus are determined.

The distribution of zooplankton abundance and biomass is compared with the preceding 1977 and the mean long-term data.

This paper is the continuation of regular plankton investigations carried out from 1970 in the Flemish Cap area.

The aim of this work is to detect peculiarities of zooplankton distribution in the Flemish Cap area.

Materials and methods

75 plankton samples taken in the 0-50 m layer by the Juday net (opening diameter is 37 cm, gauze No.38) according to V.A.Yashnov's method (1934) in Cruises 16 and 17 of the RV "Protsion" in February and May-July, 1978, were the material for this paper. The methods of quantitative processing of

plankton were described by the author earlier and are omitted here (Kamotskaya, Plekhanova, 1975).

The areas of plankton sampling are given in Fig.1.

As far as in 1978 the plankton investigations were carried out mainly along 47°00'N on the section 6A (Fig.1) like those in the previous years, mostly the plankton of this area was analysed.

Results of investigations

Processing of the material resulted in determination of the change and distribution of zooplankton species composition, areas of its densest concentrations and the change of age composition of its most abundant specimen - Calanus finmarchicus.

The diagram of abundance and biomass percentage of the main zooplankters (Figs.2,3), diagrams of Calanus age composition (Fig.4), charts of distribution of zooplankton abundance and biomass (Figs. 5,6) and diagrams of the main characteristics of zooplankton in June 1977 and 1978 (Fig.7) are given in the paper.

Zooplankton of the Flemish Cap was represented by 85 species which made up chiefly one oceanic boreal complex in the investigated period (February, May-July, 1978). 20 species out of 85 were met during the whole period, 32 species - in early February, 44 species - in late February, 72 species - in May, 45 species - in June, 57 species - in July. The species composition was the diversest in May, when both spring and summer plankton was met.

Copepoda made up the bulk of the Flemish Cap zooplankton. The most abundant of them during the whole period of observations were Calanus finmarchicus and Oithona similis.

It is necessary to emphasize that in the Flemish Cap Deep area influenced by the Labrador Current the cold water species Calanus hyperboreus and Metridia longa were met together with oceanic boreal species (Figs.2,3), which amounted to

1-2% of the whole abundance and 5-25% of the whole biomass of zooplankton. In the shallow area of the bank (45°30'E, 44°59'E, 44°26'E, 47°00'N) representatives of neritic plankton were registered (Echinodermata juv. - from 5 to 80% of the whole abundance in early spring and small quantities of Temora longicornis and Acartia longiremis - 1%).

Both the data from literature (Kusmorskaya, 1960; Vladimirskaia, 1962) and our data (Kamotskaya, Plekhanova, 1975) characterize the Flemish Cap area as highly productive: according to our data the mean long-term biomass of plankton here totals 323 mg/m³ in May, 552 mg/m³ in June and 248 mg/m³ in July.

The densest concentrations of zooplankton in early February 1978 were found in the western and eastern parts of the bank, along 48°00'N (Figs.5,6), mainly at the expense of Calanus finmarchicus and Oithona similis.

Calanus was represented by copepodite stages V and VI, eggs and nauplii were absent (prespawning state) (Fig.4).

Also the eastern and western parts of the Flemish Cap (along 47°00'N) were more productive in May. Abundance and biomass of zooplankton were here accordingly 991-2130 spec./m³ and 152 - 414 mg/m³.

The age composition of Calanus was represented by all copepodite stages, stages I and II being prevalent in the central part of the bank and stages V and VI in the western and eastern parts; small quantities of nauplii were met, and there were no eggs (young Calanus were growing and developing).

In June zooplankton was as before the most abundant in the eastern and western parts of the bank, its biomass was higher at the eastern stations (Figs.5,6): it amounted to 495 - 1336 mg/m³; mostly at the expense of Calanus finmarchicus; zooplankton abundance was 1598-5420 spec./m³ (Fig.3). Calanus was presented by all copepodite stages, but stages I and II were prevalent at the stations along 46°50'E, 46°29'E and 46°01'E, stages III

and IV - along 44°01'E, 43°45'E and 43°24'E; stage 1 - along 44°59'E (Fig.4d). The predominance of the copepodite stage I at the central station is unusual for this period, and this may be explained by the hydrological peculiarities of the area (Borovkov, Kudlo, 1979) and year (Burmakin, 1979).

On the whole zooplankton species composition and its distribution in the area hardly ever changed as compared with the preceding years. It is also accounted for by the hydrological peculiarities of this area, namely, by stability of its hydrological regime (Yelizarov, 1959).

Zooplankton abundance and biomass increased from February to June 1978, and decreased in July (Table 1). The reduction of zooplankton abundance and biomass occurred in July, probably, because of both sinking down of adult Calanus and of predation (by Chaetognatha, jellyfish and young fish).

The abundance and biomass of the Flemish Cap zooplankton was lower in spring 1978 than in 1977 and lower than the mean long-term values (Table 1). Most likely it may be explained by the irregularity of young zooplankters growth and development which appeared as a result of unfavourable hydrological conditions in 1978 (Burmakin, 1978). However, following the age composition of Calanus, the most abundant representative of zooplankton, it may be assumed that the beginning of spawning was at the same time as in previous years (the middle of April). Growth and development of young Calanus were in 1978 15 days behind the mean long-term data, and 15 days ahead of 1977 (Fig.7).

Conclusions

1. Observations showed that zooplankton species composition in the Flemish Cap area in February, May-July 1978 was presented by 85 species which made up mostly one oceanic boreal complex, and was the same as in 1970-1977.

2. The spawning period of Calanus was going on in the

middle of April. Growth and development of young Calanus were irregular and too long.

3. The highest productivity of zooplankton during the whole investigated period was characteristic of the eastern and western parts of the Flemish Cap.

The maximal abundance (3136 spec./m^3) and biomass (414 mg/m^3) of zooplankton were registered in June.

4. Zooplankton abundance and biomass increased from February till June and decreased in July ($360, 1383, 3176, 1606 \text{ spec./m}^3$ and $107, 271, 414, 248 \text{ mg/m}^3$).

5. Abundance and biomass of the Flemish Cap zooplankton was lower in 1978 than in 1977 and the mean long-term data.

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Table 1 Distribution of zooplankton abundance (spec./m³) and biomass (mg/m³) in the Flemish Cap area in the 0-50 m layer in 1970-1978

Months Years	M a y		J u n e		J U L Y	
	spec./m ³	mg/m ³	spec./m ³	mg/m ³	spec./m ³	mg/m ³
1970	1537	117	-	-	-	-
1971	7147	140	-	-	-	-
1972	3914	849	-	-	-	-
1973	4463	250	-	-	-	-
1974	2608	443	-	-	-	-
1975	-	-	2450	487	-	-
1976	2184	190	-	-	-	-
1977	-	-	3636	781	-	-
1978	1383	371	3176	414	248	1606
Mean long term data	3319	323	2981	552	-	-

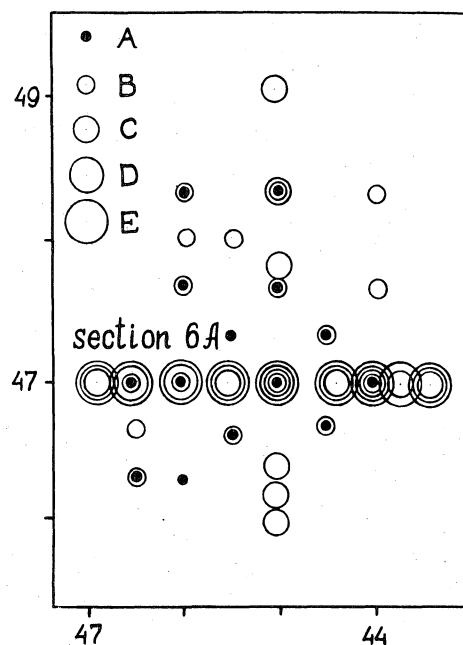


Fig. 1. Areas of plankton sampling on Flemish Cap in 1978. (A - early February, B - late February, C - May, D - June, E - July)

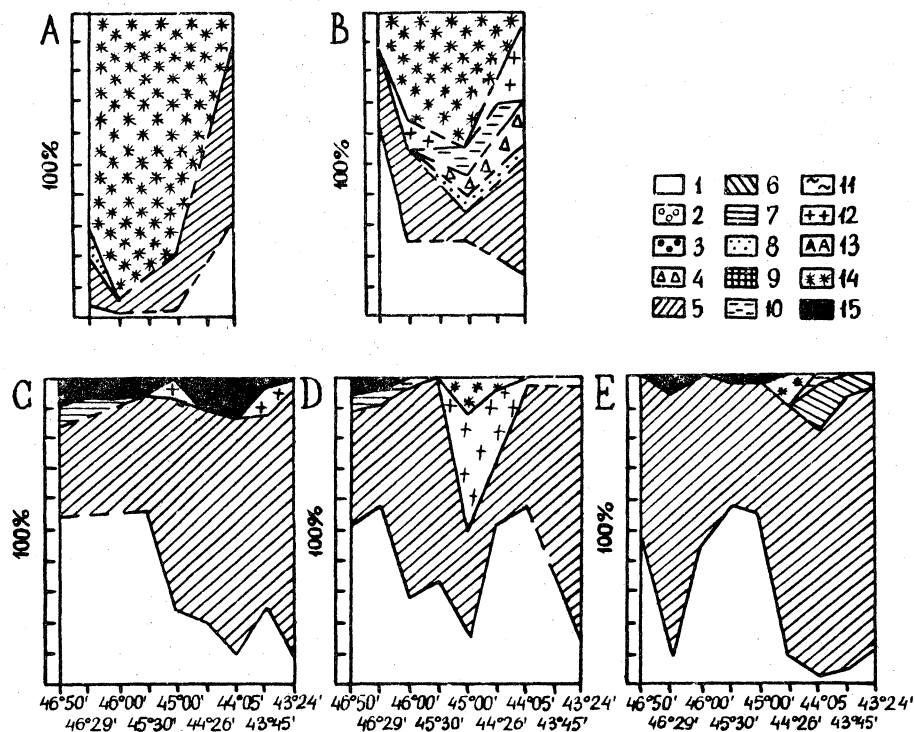


Fig. 2. Abundance percentage of the main plankton organisms on the Flemish Cap. (A - early February, B - late February, C - May, D - June, E - July). Notation: 1 = *C. finmarchicus*, 2 = *C. glacialis*, 3 = *C. hyperborealis*, 4 = *Metridia*, 5 = *O. similis*, 6 = *O. atlantica*, 7 = *Pseudocalanus elongatus*, 8 = *Microcalanus*, 9 = other copepods, 10 = Euphausiacea, 11 = Chaetognatha, 12 = Gastropoda, 13 = Amphipoda, 14 = Echinodermata, 15 = other organisms.

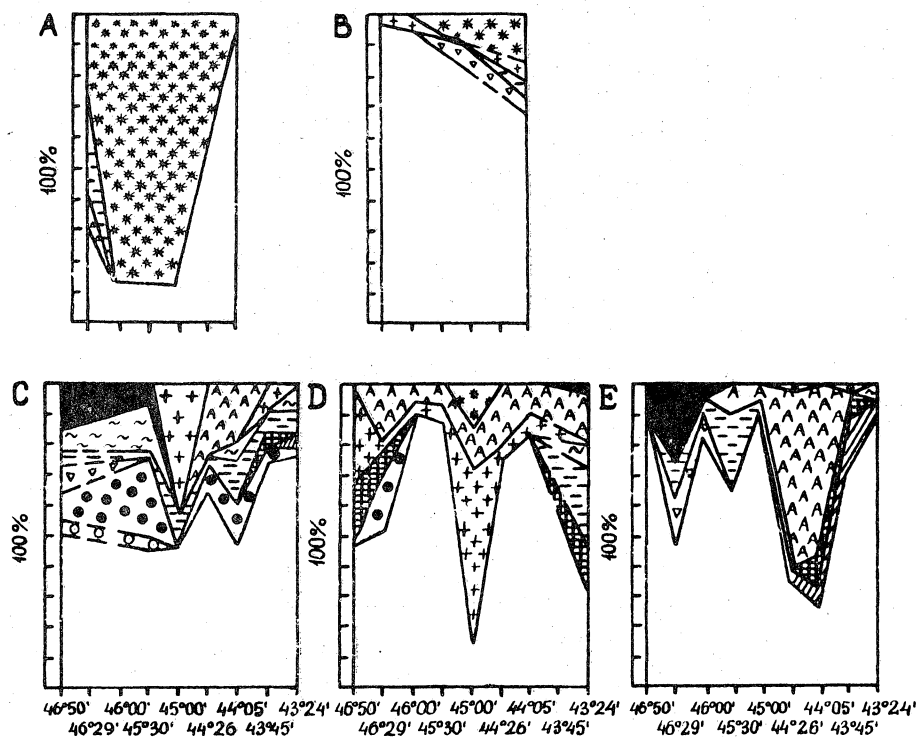


Fig. 3. The biomass percentage of the main plankton organisms in the Flemish Cap area in 1978. (A - early February B - late February, C - May, D - June, E - July). See Fig. 2 for notation.

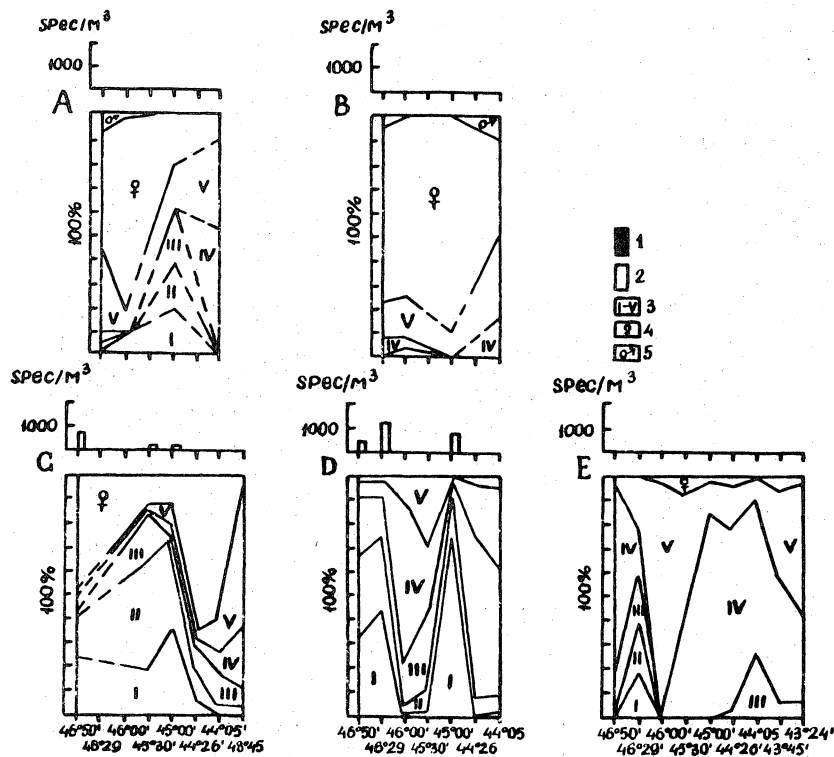


Fig. 4. Age composition of the *Calanus finmarchicus* population in the Flemish Cap area in 1978. (A - early February, B - late February, C - May, D - June, E - July). Notation: 1 = eggs, 2 = nauphlii, 3 = copepodite stages I-V, 4 = females, 5 = male.

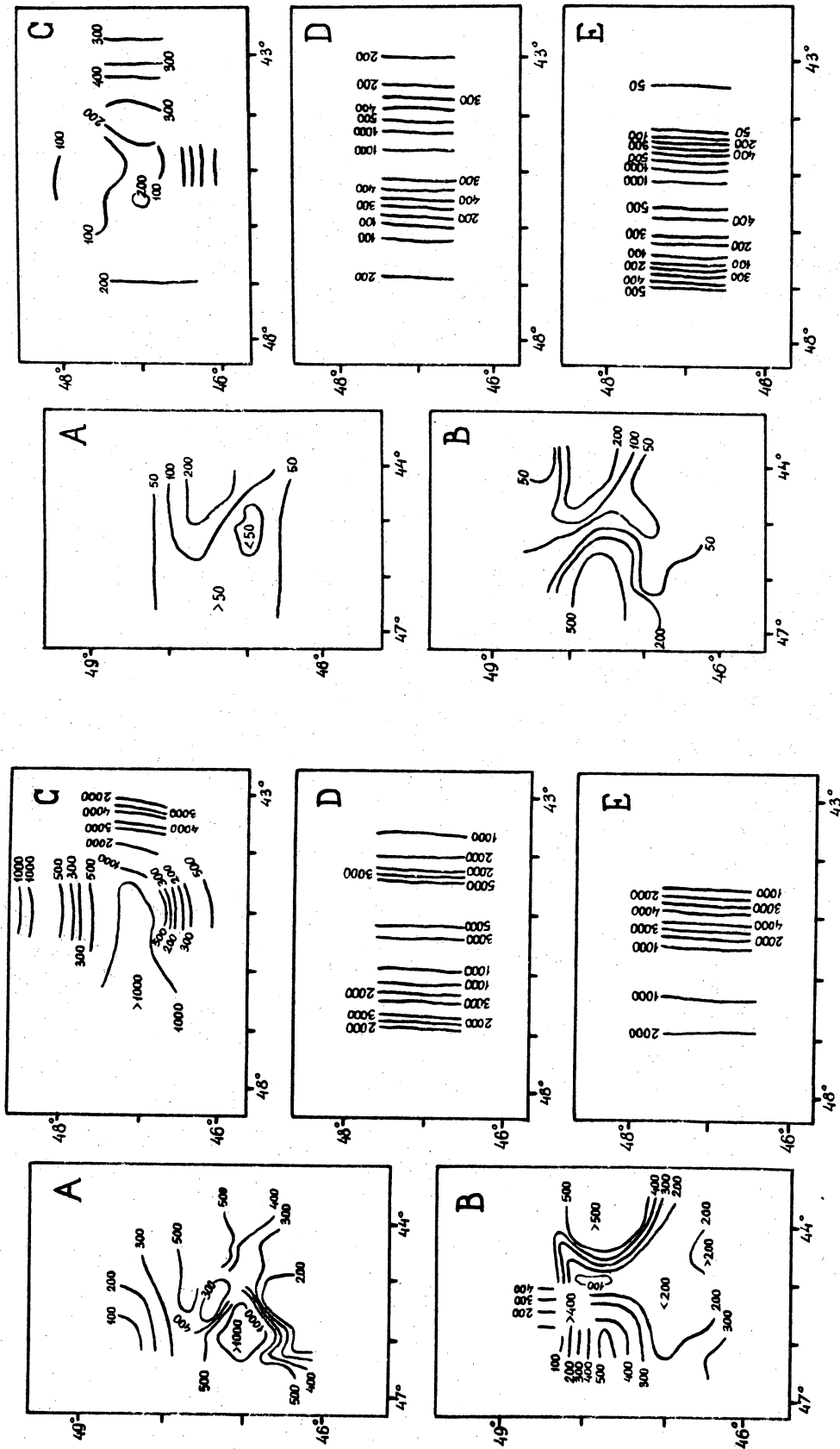


Fig. 5. Distribution of zooplankton abundance (spec./m³) in Flemish Cap area in 1978. (A - early February, B - late February, C - May, D - June, E - July).

Fig. 6. Distribution of zooplankton abundance (mg/m³) in Flemish Cap area in 1978. (A - early February, B - late February, C - May, D - June, E - July).

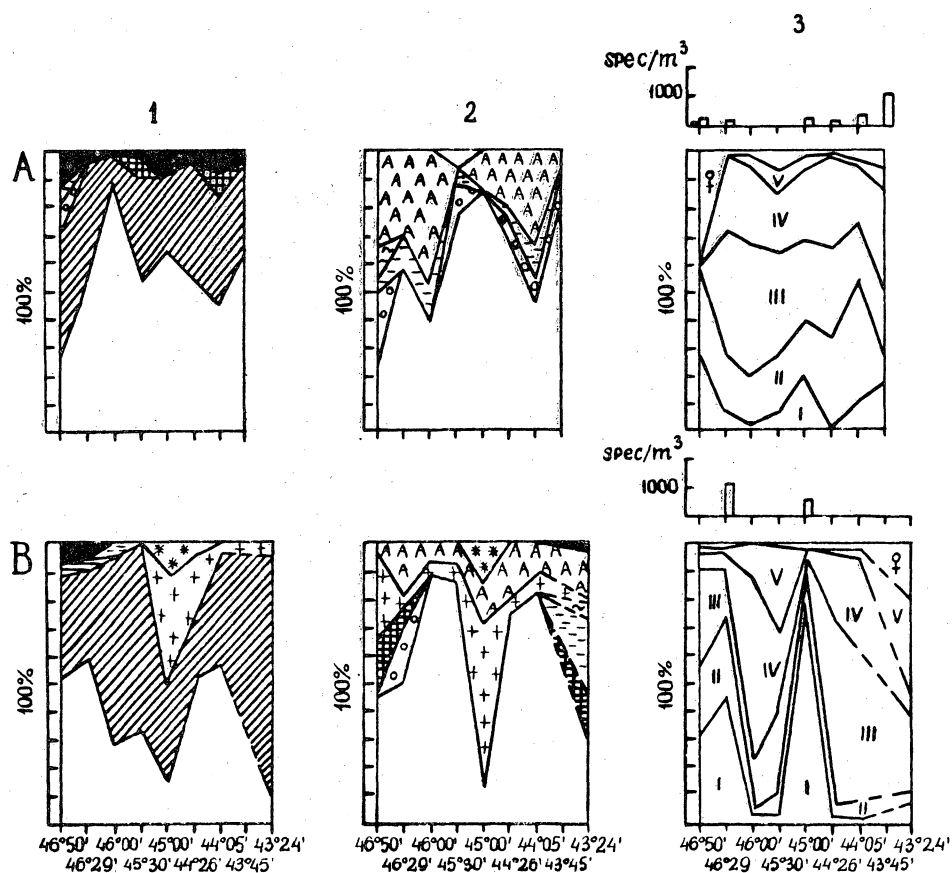


Fig. 7. Main characteristics of the Flemish Cap zooplankton in June 1977 (A) and 1978 (B). (1 = % abundance, 2 = % biomass, 3 = age composition of *Calanus finmarchicus*.) See Fig. 2 and 4 for notation.