POLISH POLAR RESEARCH (POL. POLAR RES.) POLSKIE BADANIA POLARNE	4	1—4	33—47	1983

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Copepoda (*Calanoida*) from Prydz Bay (Antarctica, Indian Ocean Sector)

ABSTRACT: Studies were carried out in February 1969. Circulation of waters in Prydz Bay was of a cyclonic character. In the surface water layer higher water temperatures were recorded to the south and lower to the north. The predominant species of *Copepoda* were: *Calanoides acutus*, *Calanus propinquus* and *Metridia gerlachei*. The highest numbers of *Copepoda* were observed in the southern part of the Bay. The development of the tested populations of *Copepoda* is zonated, asynchronous, and occurs earlier in the south than in the north.

Key words: Antarctic, *Copepoda*

1. Introduction

In the world literature there are only few publications concerning *Copepoda* of the coastal waters of Antarctica (Farran 1929, Bradford 1971, Zvereva 1972). Prydz Bay belongs to the areas still unexplored form the biological viewpoint. The characteristic features of plankton distribution in the Southern Ocean are due to the fact that spring comes earlier to the north and moves slowly southward and consequently the nearer to the Antarctic continent the greater delay in the development of plankton (Hart 1942, Voronina 1974).

The aim of this study was to assess qualitative composition and quantitative distribution of *Copepoda* and to analyse age-structure of the populations of dominant species of *Calanoida* in the littoral zone.

2. Material and methods

The planktonic materials form Prydz Bay, constituting the basis of this study, were collected by S. Rakusa-Suszczewski and K. Opaliński during the 14th Soviet Antarctic Expedition (SAE). Samples were collected

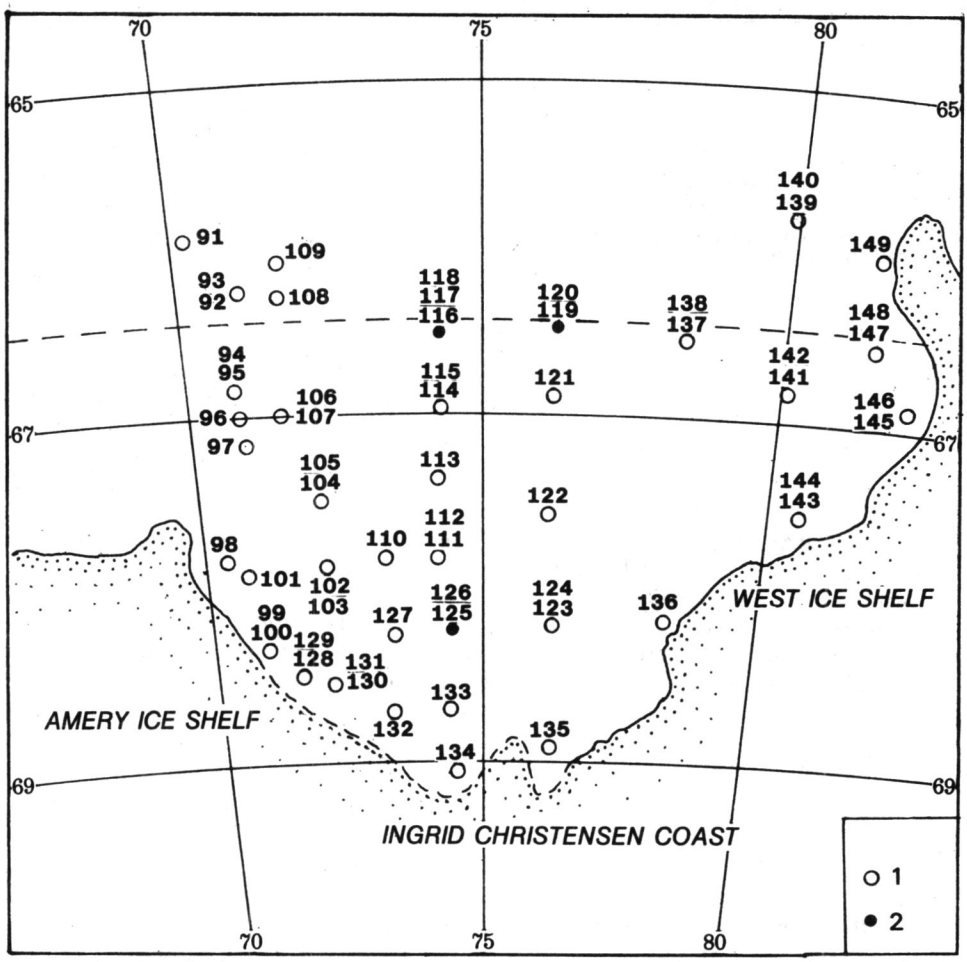

Fig. 1. Distribution of plankton sampling stations in Prydz Bay, February 1969
1 — 220—0 m, 2 — 600—0 m.

on board of the icebreaker r/v "OB" during the period from the 15th to 24th February 1969. The material was sampled from depths of 220—0 m and at three stations, i.e. Nos. 116, 119, and 126, from depths of 600—0 m (Fig. 1).

A Copenhagen net, with inlet-opening 50 cm in diameter, made of 50 μm-mesh bolting-cloth No. 25, was used. Altogether 59 plankton samples were collected at 38 stations. As a rule, every animal found in a sample was analysed. Minute *Calonoida* of the families *Pseudocalanidae* and *Scolecithricidae* were an exception to the rule, in that case the method of three sub-samples was used. This material was collected three times from the samples reduced to the volume of 100 ml by means of a 1 ml plankton pippete. All quantitative data are expressed by the number of individuals per 1 m^2.

3. Investigated area and environmental conditions

Prydz Bay is situated in the Indian Ocean Sector. The Bay is limited by the Amery Ice Shelf to the west, by the West Ice Shelf to the east and by the Ingrid Christensen Coast to the south (Fig. 1). Prydz Bay is, from hydrological viewpoint, one of the most interesting regions of the Southern Ocean (Grigorev 1971, Savatjugin and Kamova 1971). In the time of investigations (latter part of February) southern and central regions of Prydz Bay were ice-free due to the effect of strong föhn winds forcing melting ice toward the northern shores of the Bay. According to observations by Savatjugin and Kamova (1971) in February 1969 the cold surface water layers with temperatures below freezing point extended over the west and northwest parts of the Bay. Waters with temperatures above freezing point lay in the central and southern parts of the Bay (Fig. 2).

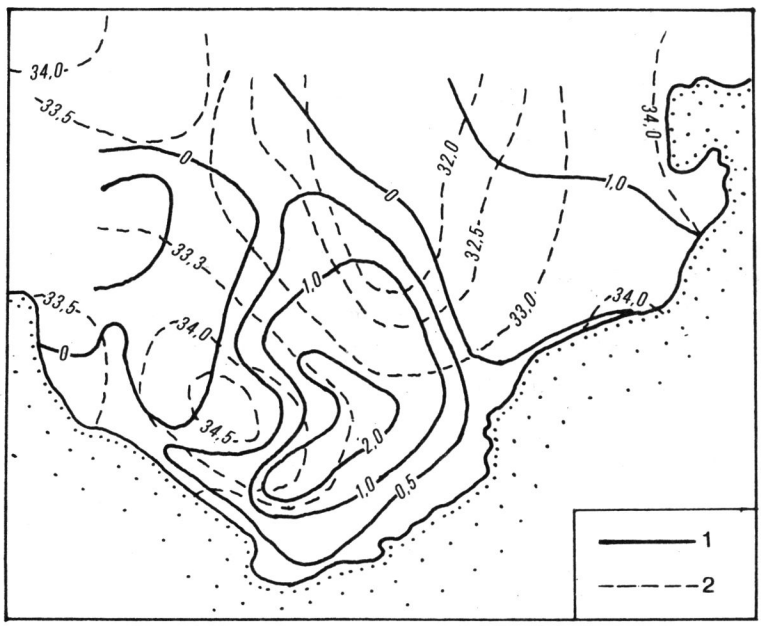

Fig. 2. Distribution of surface water temperature (1) and salinity (2) in Prydz Bay, (acc. Savatjugin and Kamova, 1971), February 1969

The general movement of Antarctic water masses throughout Prydz Bay is influenced mainly by a system eddies of a cyclonic character. It had two centres, one in the south-eastern part and another of less wide range in the eastern part of the Bay (Fig. 3). Cyclonic circulation causes the formation of divergence areas (in the central parts) and convergence areas (in the peripheral parts). The oxygenation of the surface water layers in

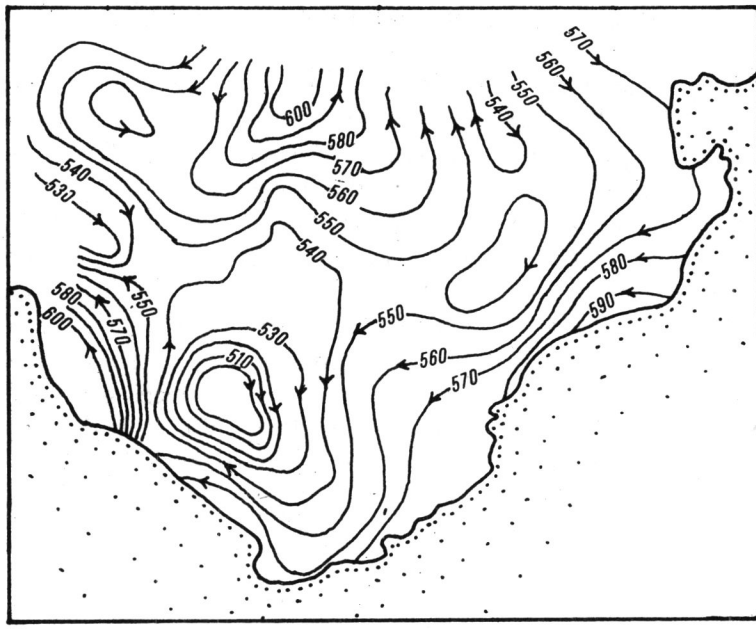

Fig. 3. Diagram of dynamic topography of Prydz Bay, at 50 db reference level (as compared with 30 db reference level, acc. Savatjugin and Kamova 1971)

Prydz Bay was high, ranging from nearly 8 ml/l in the northern to over 8 ml/l in the central and southern parts of the Bay. The decrease in oxygen content in the deeper water layers was inconsiderable and in general at the depth of 250 m oxygen concentration was in the range of 7.07—7.37 ml/l (Savatjugin and Kamova 1971).

4. Results

The following 18 taxa of *Calanoida* were recorded in the analysed material:

Suborder	*CALANIDA*
Family	*CALANIDAE*
	Calanus propinquus Brady, 1883
	Calanoides acutus Giesbrecht, 1902
Family	*EUCALANIDAE*
	Eucalanus sp.
	Rhincalanus gigas Brady, 1883
Family	*PSEUDOCALANIDAE*
	Ctenocalanus vanus Giesbrecht, 1888
	Stephus longipes Giesbrecht, 1902

Family	*AETIDEIDAE*
	Gaidius sp.
	Chiridius polaris Wolfenden, 1911
	Euchirella rostromagna Wolfenden, 1911
Family	*EUCHAETIDAE*
	Euchaeta antarctica Giesbrecht, 1902
	Euchaeta rasa (Farran, 1929)
	Euchaeta sp.
Family	*SCOLECITHRICIDAE*
	Scolecithricella glacialis (Giesbrecht, 1902)
	Racovitzanus antarcticus Giesbrecht, 1902
Family	*METRIDIIDAE*
	Metridia gerlachei Giesbrecht, 1902
Family	*HETERORHABDIDAE*
	Heterorhabdus austrinus Giesbrecht, 1902
	Heterorhabdus sp.
Family	*AUGAPTILIDAE*
	Haloptilus oxycephalus (Giesbrecht, 1888)

Despite of a relatively great variety of species composition the most frequently and most numerously occuring were only such species as *Calanoides acutus, Calanus propinquus,* and *Metridia gerlachei* and out of the species smaller in size: *Ctenocalanus* vanus and *Scolecithricella glacialis. Euchaeta* spp. was observed quite often but in small quantities. The remaining species were recorded sporadically and mainly in trace quantities (Table I).

Calanoides acutus populate the whole area of the Bay (Fig. 4). Mass concentrations of this species (averaging 22 540 specimens/m^2) were observed in a narrow stretch of coastal waters along the Amery Ice Shelf. Along the Ingrid Christensen Coast the density of population was still high despite the inflow of cold waters from the north-east. The lowest density (averaging up to 1500 specimens/m^2) was recorded in the northwest and north-east regions, in the waters of a temperature below freezing point and a relatively low salinity (Fig. 2). A decrease in the density of this copepod population was also observed in the centres of the west and central currents of cyclonic character.

The age structure of *C. acutus* populations was highly differentiated in Prydz Bay. In the northern region of the Bay, along a relatively wide stream of the waters on both sides of the Antarctic Divergence (stations Nos. 91—93, 109, 139, 140, 149) two peaks of *C. acutus* abundance were recorded (Fig. 5). The first refers to the developmental stage II of copepodite, the second to the stages V—VI of the wintering generation. The most advanced development of this species was observed in the south-west and central regions of the Bay, where new generations made up 90% of the population in which stages III—IV dominated, with a marked

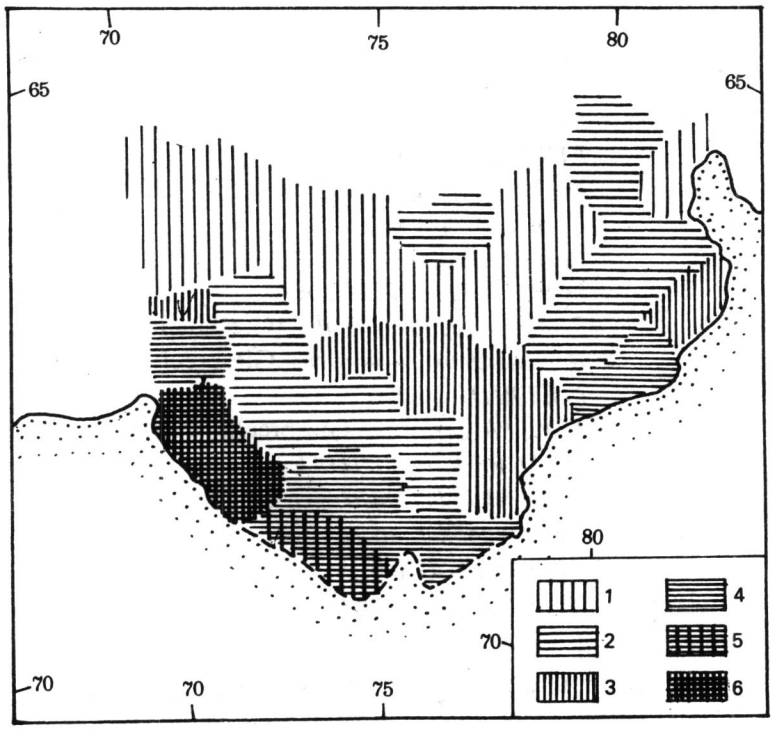

Fig. 4. Distribution of *Calanoides acutus*, February 1969
1 — 100/m², 2 — 101—500/m², 3 — 501—1000/m², 4 — 1001—5000/m², 5 — 5001—15 000/m², 6 — 15 001—52 000 individ./m².

predominance of stage IV. North-southwards the percentage of copepodite IV decreased to the advantage of stage III. In the proximity of the West Ice Shelf, where the waters were coldest, stage II of copepodite played dominant role with a simultaneous increase in the percentage of the animals from the wintering generation (Fig. 5).

Calanus propinquus was found at all the stations but was much less numerous than *C. acutus*. This species was concentrated mainly in the southern regions of the Bay, along the littoral waters zone. The maximum density was recorded at the station No. 134—2172 specimens/m². In the north-eastern regions it occurred in quantities up to 50 specimens/m². In the central part of the Bay it was found more often. An increase in numbers was also noted in the proximity of the West Ice Shelf (Fig. 6). The population structure (Fig. 7) varied, just as that of *C. acutus*. The reproduction started first in the southern part of the Bay, where new generations dominated markedly with the maximum abundance of stage III of copepodite and the percentage of stage IV still insignificant. Northwards the reproduction was delayed — the decisive role was played by the youngest forms in stage II and in the north-west region even in stage I of copepodite.

Table I

Density of the less frequently occuring species of *Calanoida* in Olaf Prydz Bay (individuals/m²)

Station No.	*Eucalanus* sp.	*Rhincalanus gigas*	*Ctenocalanus vanus* (♀ ♂)	*Stephus longipes*	*Gaidius* sp.	*Euchirella rostromagna*	*Chiridius polaris*	*Euchaeta* sp.	*E. antarctica*	*E. rasa*	*Racovitzanus antarcticus*	*Scolecithricella glacialis* (♀ ♂)	*Metridia gerlachei*	*Heterorhabdus* sp.	*H. austrinus*	*H. oxycephalus*	Other copepodites (I—V)
91	—	—	—	—	—	—	—	—	—	—	—	—	138	—	—	—	128
92	—	—	—	—	—	—	—	25	—	—	—	—	45	—	—	—	164
93	—	—	—	—	—	—	—	5	—	—	—	—	65	—	—	—	336
94	—	—	—	—	—	—	—	50	—	—	—	—	111	—	—	—	510
95	—	—	209	—	—	—	—	10	—	—	—	—	111	—	—	5	847
96	—	—	—	—	—	5	—	30	—	—	—	—	112	—	—	—	1020
97	—	—	342	—	—	—	—	40	—	—	—	—	296	—	—	—	3241
98	—	—	2041	—	—	—	—	20	—	—	—	—	291	—	—	—	4755
99	—	—	638	—	—	—	—	10	—	—	—	—	148	—	—	—	11265
100	—	—	138	—	—	—	—	15	—	—	—	—	30	—	—	—	7790
101	—	—	173	—	—	—	—	45	—	—	—	—	96	—	—	—	11739
102	—	—	87	—	—	—	—	40	—	—	—	—	459	—	—	—	2132
103	—	—	15	—	—	—	—	50	—	—	—	—	224	—	—	—	1515
104	—	—	—	—	—	—	—	96	—	—	—	—	413	—	—	—	1759
105	—	—	—	—	—	—	—	96	—	—	—	—	295	—	—	—	1530
106	—	—	—	—	—	—	—	—	—	—	—	—	117	—	—	—	1015
107	—	—	—	—	—	—	—	—	—	—	—	—	45	—	—	—	1530
108	—	5	—	—	—	—	—	30	—	—	—	—	96	5	—	—	562
109	—	—	—	—	—	—	—	10	—	—	—	—	50	—	—	—	383
110	—	—	—	—	—	—	—	106	—	—	—	—	540	—	—	—	511
111	—	—	—	—	—	—	—	30	—	—	—	87	295	—	—	—	1530
112	—	—	—	—	—	—	—	15	—	—	—	15	622	—	—	—	3213
113	—	—	—	—	—	—	—	66	—	—	—	—	1203	—	—	—	1147
114	—	5	—	—	—	—	—	30	—	—	—	143	286	—	—	—	1020
115	—	—	—	—	—	—	—	10	—	—	—	31	86	5	—	5	2520
116	—	25	342	10	—	—	10	102	—	—	—	342	698	41	5	—	1020
117	—	—	255	—	—	—	—	25	—	—	—	87	75	—	—	—	168
118	—	5	255	—	—	—	—	20	—	—	—	31	172	5	—	—	71
119	—	10	255	—	45	—	—	70	—	—	—	510	1203	—	—	5	1275
120	—	5	255	—	—	—	—	51	—	—	—	255	300	—	—	—	546
121	—	—	96	—	—	—	—	30	—	—	5	—	209	—	—	—	1488
122	—	—	—	—	—	—	—	10	—	—	—	—	291	—	—	—	545
123	—	—	87	—	—	—	—	30	—	5	—	—	1090	—	—	—	2219
124	—	—	—	—	—	—	—	5	—	—	—	—	110	—	—	—	342
125	—	—	—	—	—	—	—	75	5	—	—	—	113	—	—	—	3919
126	—	—	—	—	—	—	—	65	—	—	—	—	1347	—	—	—	2807
127	—	—	—	—	—	—	—	25	—	—	—	—	332	—	—	—	3148
128	—	—	+)	—	—	—	—	+	—	—	—	—	+	—	—	—	+
129	—	—	342	—	—	—	—	153	—	—	—	—	963	—	—	—	8673
130	—	—	—	—	—	—	—	76	—	—	—	—	91	—	—	—	22208
131	—	—	—	—	—	—	—	+	—	—	—	—	+	—	—	—	+
132	—	—	—	—	—	—	—	138	—	—	—	—	535	—	—	—	7663
133	—	—	—	—	—	—	—	30	—	—	—	—	551	—	—	—	2215
134	—	—	—	—	—	—	—	137	—	—	—	—	1346	—	—	—	12423
135	—	—	—	—	—	—	—	65	—	—	—	—	485	—	—	—	2811
136	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	255
137	—	10	—	—	—	—	—	15	—	—	—	255	224	—	—	—	1550
138	5	—	—	—	—	—	—	10	—	—	—	255	229	—	—	—	1668
139	—	—	5	—	—	—	—	35	—	—	—	—	356	—	—	—	2127
140	—	—	—	—	—	—	—	77	—	—	—	—	204	—	—	—	2806
141	—	—	102	—	—	—	—	15	—	—	—	87	1871	—	—	—	2647
142	—	—	15	—	—	—	—	—	—	—	—	15	785	—	—	—	3267
143	—	—	—	—	—	—	—	20	—	—	—	—	35	—	—	—	2496
144	—	—	—	—	—	—	—	—	—	—	—	—	50	—	—	—	4209
145	—	—	—	—	—	—	—	10	—	—	—	—	152	—	—	—	342
146	—	—	—	—	—	—	—	136	—	—	—	—	498	—	—	—	511
147	—	—	—	—	—	—	—	15	—	—	—	183	417	—	—	—	5682
148	—	5	—	—	—	—	—	46	—	—	—	342	812	—	—	—	6537
149	—	—	46	—	—	—	—	20	—	—	—	—	30	—	—	—	1373

Stations 116, 119 and 126 from the 600—0 depth.

+) single specimens

♂ males

♀ females

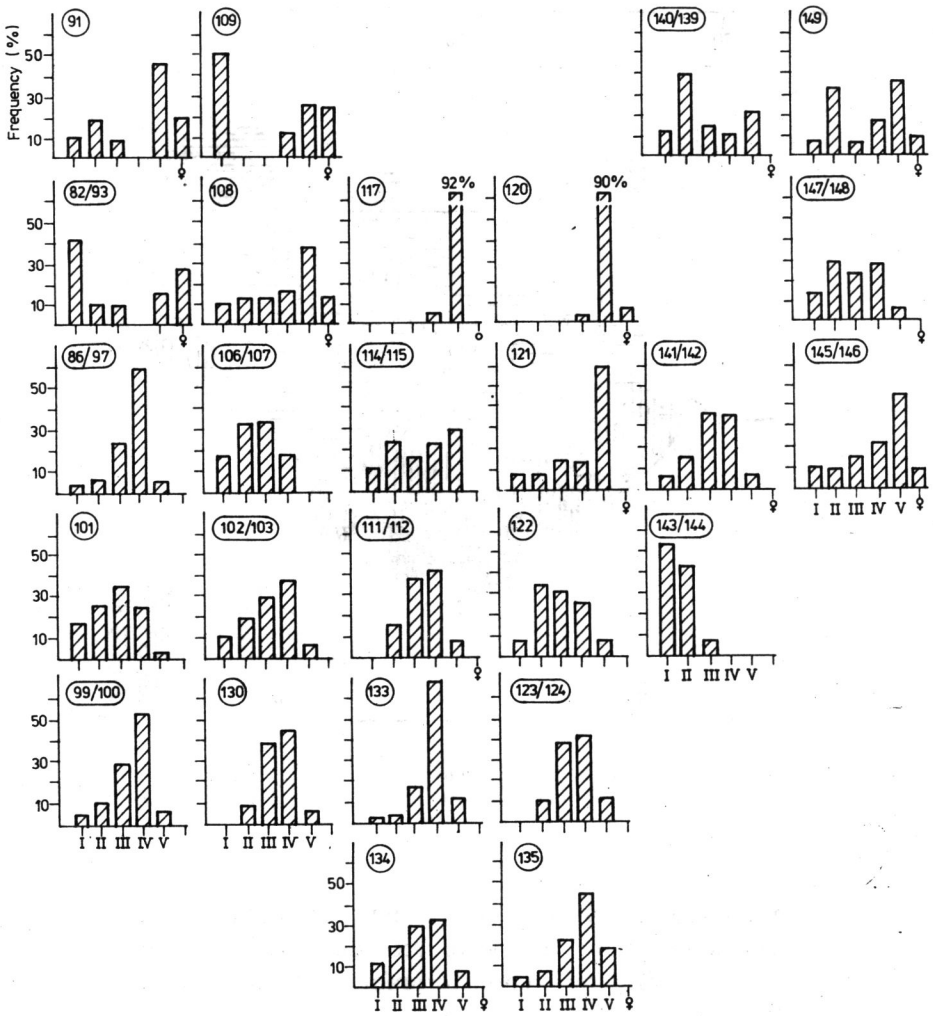

Fig. 5. Age-structure of *Calanoides acutus* populations in Prydz Bay, February 1969
I—VI subsequent developmental stages, ♀ — females.

Metridia gerlachei, unlike the two species mentioned above, preferred open waters of the Bay (Fig. 8). It was found at all the stations in numbers ranging from 30 (station No. 149) up to 1971 specimens/m^2 (station No. 141). The highest mean values of the density of populations were recorded in the central and eastern regions of the Bay and in the littoral zone of the Ingrid Christensen Coast (Fig. 8). A marked increase in the numbers of this species was observed in the hauls from depths 600—0 m at the stations Nos. 116, 119, and 126 (Table I). In the 220—0 m water layers in the southern and south-western regions of the Bay the basic part of the populations was made up of new generations with quantitative predominance of the stages III—IV. The reproduction began

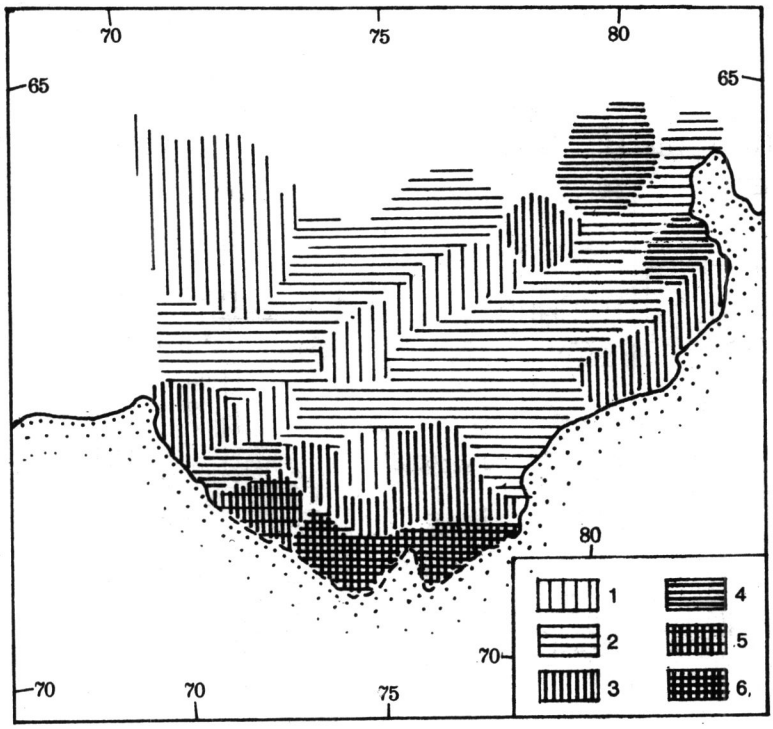

Fig. 6. Distribution of *Calanus propinquus*, February 1969
1 — 50, 2 — 51 — 150, 3 — 151 — 500, 4 — 501 — 1000, 5 — 1001 — 1500, 6 — 1501 — 2200 individ./m^2.

the latest in the coldest waters of the Bay in the north-eastern region, where two peaks of abundance were recorded. The first peak refers to copepodite stages I—VII, the second to animals of the precedent generation (Fig. 9). Adult forms, with predominance of females, most probably from the older generation, dominated only in the hauls from depths of 220—0 m, at the stations Nos. 116, 119, and 126.

Rhincalanus gigas occurred in Prydz Bay only at 8 stations. The maximum number of 25 specimens/m^2 was recorded in the hauls from the 600—0 water layers (station No. 116). This species aggregated in the Antarctic Divergence zone and contiguous waters. The majority of the animals was in the latest stage of the development of copepodite IV—V, nauplii occurred sporadically, the youngest copepodites (I—II) were not found.

Euchaeta rasa. One male and one female of this species were found at the station No. 123 and one female of *E. antarctica* at the station No. 125. The juvenile forms of copepodite of the genus *Euchaeta*, mainly in the developmental stage II, occurred more or less evenly throghout the Bay, with a slight quantitative predominance in the proximity of the Amery Ice

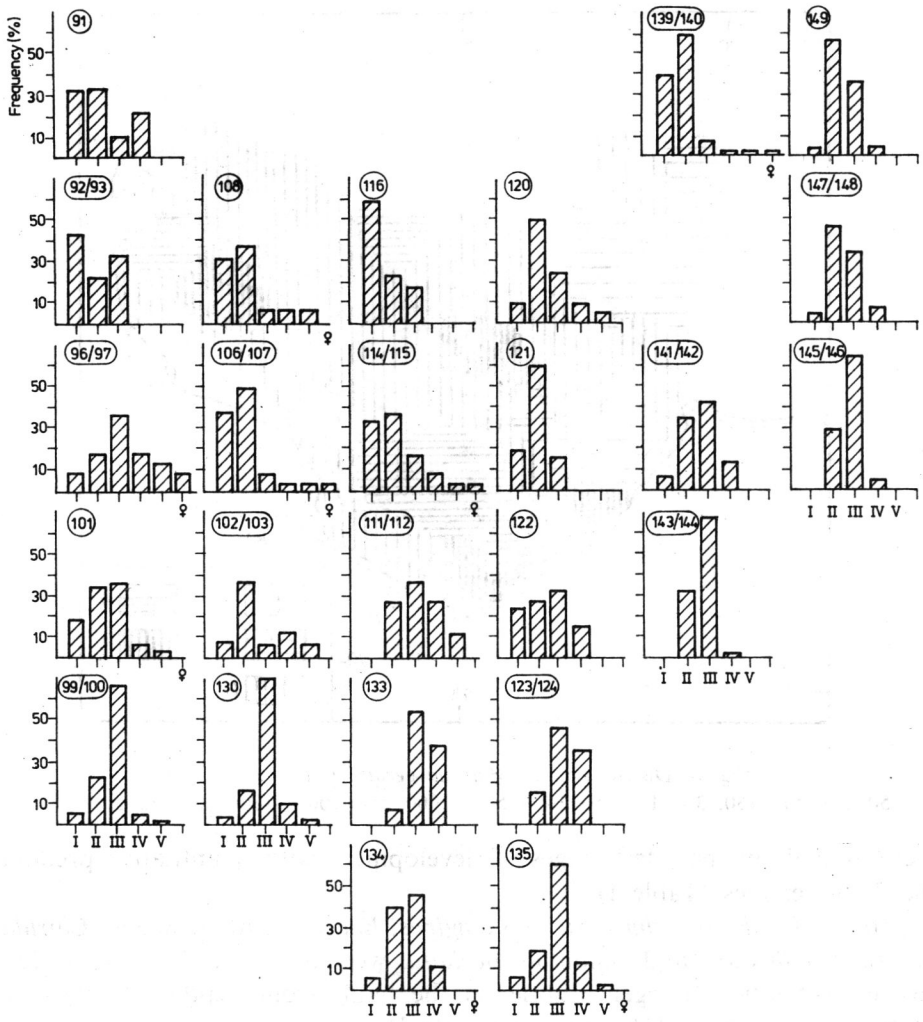

Fig. 7. Age-structure of *Calanus propinquus* populations in Prydz Bay, February 1969

Shelf (Table I). Due to the very early stages of development it was impossible to identify to species the representatives of this genus.

Ctenocalanus vanus aggregated in guite large numbers in the western region of the Bay. The maximum density of population was recorded at the station No. 98—2041 specimens/m^2. This species was represented by copepodite in stage V and adult females, adult males were not observed (Table I).

Scolecithricella glacialis occurred in much smaller quantities than the species discussed above (maximum density — station No. 126, 600—0 m depths). This species aggregated in the central and northern regions of the Bay, distinctly avoiding waters in the littoral zone. For the most part these

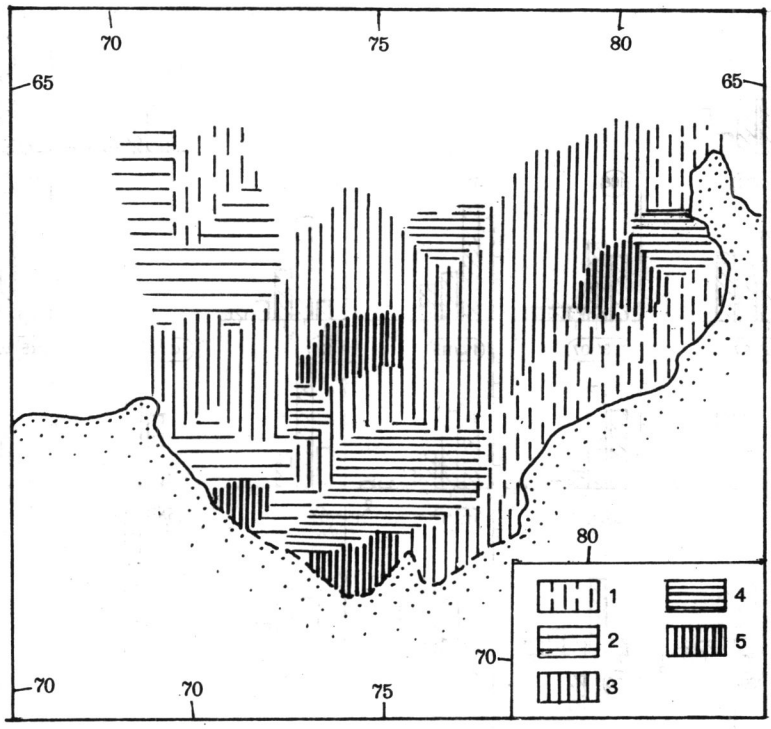

Fig. 8. Distribution of *Metridia gerlachei*, February 1969
1 — 50, 2 — 51—150, 3 — 151—500, 4 — 501—1000, 5 — 1001—1500 individ./m^2.

were animals in the latest stages of development with quantitative predominance of females (Table I).

Heterorhabdus austrinus, Stephus longipes, Euchirella rostromagna, Chiridius polaris, Gaidius sp., and *Haloptilus ocellatus* were observed almost exclusively in the Antarctic Divergence zone, in the hauls from depths of 600—0 m, at the stations Nos. 116 and 119 (Table I).

5. Discussion

The pelagic fauna of the Southern Ocean is represented most abundantly by *Copepoda*. According to the observations by Vervoort (1965) 126 species occur in these waters; of these 28 are characteristic for epipelagic waters, the remaining occupy deep water areas. Bradford(1971) reports, on the basis of the 1958—59 summer season studies in the Ross Sea areas, the occurrence of 35 species of the suborder *Calanoida*. In Prydz Bay 18 species were found. A similar list of species (16) was notified by Zvereva (1972) in the proximity of the Molodeżnaja and Mirnyj stations in the Indian Ocean Sector. A more varied species composition of *Copepoda* from the studies of Bradford (1971) is associated above all with collections from

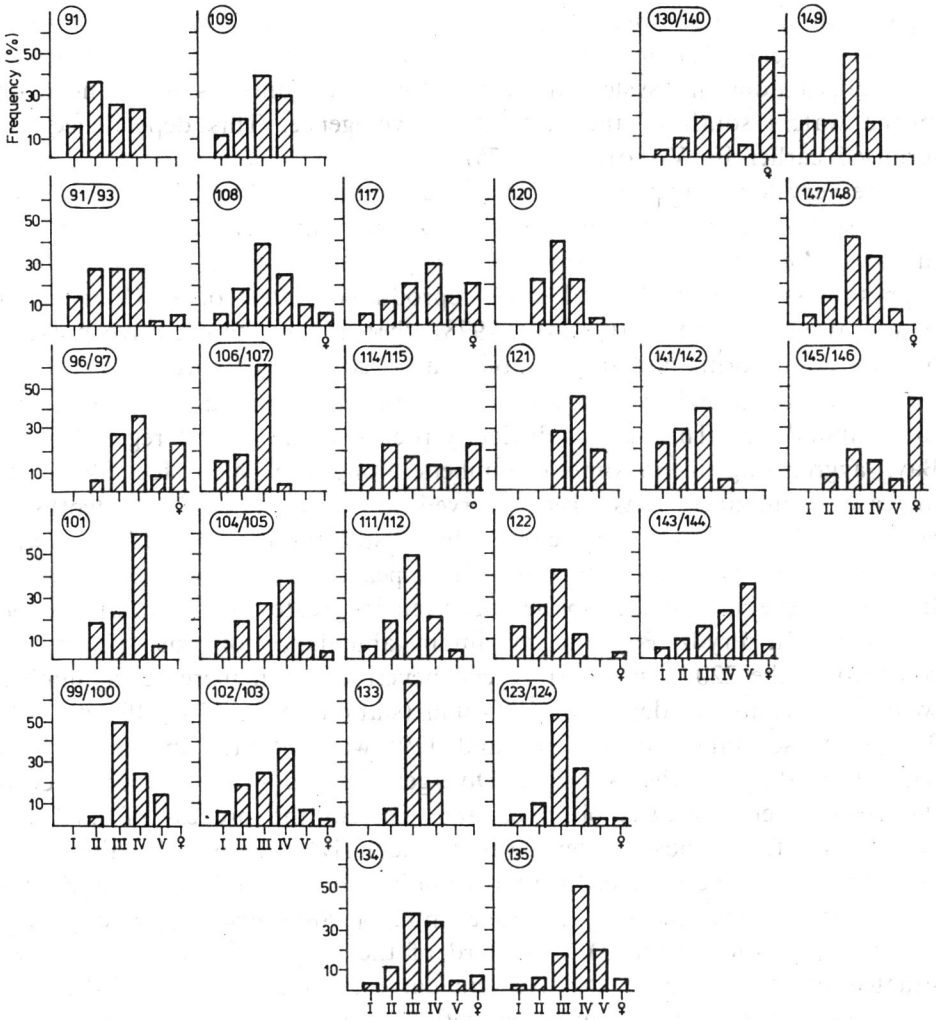

Fig. 9. Age-structure of *Metridia gerlachei* populations in Prydz Bay, February 1969

depths of over 1000 m. According to the studies of Hardy and Gunther (1935) at greater depths an increase in the number of species is observed together with a decrease in the total number of *Copepoda*. A relatively less varied species composition of *Copepoda* in Prydz Bay may be associated with the season of the investigations. The most important cause of a relatively poor species composition of *Copepoda* in Prydz Bay is the limited range of the deep water flow. These waters reach barely the northern edge of the Bay, in the south they can penetrate only partially into the Bay with the north-eastern inshore current (Savatjugin and Kamova, 1971).

Mackintosh (1937) suggested that the majority of the Antarctic plankton species make seasonal migrations and in the wintertime they drift along with deep-sea waters towards Antarctica. The high abundance of

typical Antarctic *Copepoda*, such as: *Calanoides acutus, Calanus propinquus,* or *Metridia gerlachei,* in the southern regions of Prydz Bay indicates that their populations are systematically reinforced by animals living normally in the waters south of the Antarctic Diveregence. This dependence was surmised earlier by Voronina (1975).

The very low percentage of the typical Antarctic form *Rhincalanus gigas* in the species composition in Prydz Bay is puzzling. The trace quantity of this species can be explained by its biology. *R. gigas* is the last to reach the euphotic zone in summer and starts reproduction latest of all (Voronina, Vladimirskaja and Żmijewska 1978), that is why the exclusive presence of only adult forms and first nauplii was observed in Prydz Bay.

In the waters of Prydz Bay *Metridia gerlachei* is placed third, as regards to its abundance. This species distinctly preferred the coldest regions of the Bay, aggregating in maximum numbers along the West Ice Shelf. An increase in numbers was also observed at three stations, in depths of 600—0 m. Vervoort (1965) reports that distribution of *Metridia gerlachei* is determined by −1 C isotherm. It appears from the observations of Bradford (1971) that this species occurred in greatest numbers at a depth of 500 m. In Prydz Bay the maximum abundance of this species was recorded in the 220—0 m water layers, nevertheless an increase in numbers was observed also in depths of 600—0 m (stations Nos. 116, 119 and 126). Two of these stations (Nos. 116 and 119) were situated in the northern part of the Bay, in the Antarctic Divergence zone, where the presence of the deep water flow was observed and wherein the process of migration of animals from those waters was particularly intensive. In this zone, also, higher numbers of other representatives of *Calanoida* were recorded, eg.: *Scolecithricella glacialis, Euchaeta* spp., or *Rhincalanus gigas* appearing in trace quantities (Table I). The third of the deep stations (No. 126) was situated in the centre of the cyclonic current, in an area of a diverging character, where cold bottom water with temperature −1.8 C comes up to 40—45 m below the surface (Savatjugin and Kamova 1971). The limited number of 600—0 m stations does not allow to assert with full reliability whether the phenomenon of divergence is the only factor limiting quantitative distribution of *M. gerlachei* and of some other species in deep water areas. Nevertheless, the quantitative data from 220—0 m hauls, regarding such species as *Metridia gerlachei, Rhincalanus gigas, or Scolecithricella glacialis* are not fully representative. It must be surmised that some of them, adult specimens in particular, are confined to deeper water layers, that is confirmed by the age structure of *M. gerlachei* from depths of 600—0 m, adult females and males made up as much as 90% of the population.

The total numbers of various species of *Copepoda* are conditioned by the degree of the development of their populations. *Calanoides acutus* was the most numerous species in Prydz Bay, reaching simultaneously the

highest degree of the development of new generations and surpassing *Calanus propinquus* by one copepodite stage. In every case the most advanced development was observed in the southern regions of the Bay, where water was warmest. Both, *C. acutus* and *C. propinquus* were represented mainly by new generations, the percentage of the wintering generation was insignificant. Adult forms occurred only in the northern regions of the Bay, in waters with temperatures below freezing point. The percentage of adult specimens of *C. propinquus* was higher than that of *C. acutus*. Thus, the variability of the population age-structure is closely dependent on water temperature with simultaneous preservation of the asynchronic development.

So far the biology of *Metridia gerlachei* is very little known. Vervoort (1965) reports that the reproduction of *M. gerlachei* occurs at the end of the austral summer, but the number of new generations throughout a year is not known. Observations in Prydz Bay showed that the development of young generations was well-advanced (dominance of the copepodite stages III-IV and minimal percentage of specimens from the old generation) already in midsummer. Thus, in favourable conditions *M. gerlachei* may start reproduction earlier than suggested by Vervoort (1965). A very short period of the observations did not allow to ascertain whether *M. gerlachei* is a monocyclic species, as the major part of the Antarctic *Copepoda*, or bicyclic as *R. gigas* (Voronina, Vladimirskaja and Żmijewska, 1978).

A much higher degree of the development of young generations of *Copepoda* in the southern regions of Prydz Bay, as compared with that of the animals in the northern regions of the Bay, refutes the statement that biological spring comes last to the coasts of Antarctica. The anomalous situation in Prydz Bay is conditioned by hydrological specificity of those waters (well-warmed surface water and very cold bottom water).

Atmospheric processes play the most important role in the formation of the Antarctic water masses regimes in Prydz Bay. Strong föhn winds blowing from the continent carry along broken pack-ice from the southern part of the Bay northwards. The water cleared of ice warms up quicker and more intensely, and consequently mass concentrations of the dominant zooplankton species in the most advanced stages of development occur in the southern regions of the Bay. The dominant species of *Copepoda* are phytophagous, without any food preferences. (Voronina and Suchanova 1976). The period of intensive feeding occurs at the time of the appearance of females from the wintering generation in the euphotic zone, or the appearance of the animals from new generations in the later stages of copepodite development, in the summertime. The differentiation in time of the subsequent stages of development of various species of *Copepoda* conduce the optimum food conditions. The succession of life cycles of the dominant zooplankton species, such as e.g. *Copepoda*, is, therefore, of great biological significance.

The author is very grateful to Prof. Dr. S. Rakusa-Suszczewski for rendering accessible all the materials used in this study and also for his valuable advice during the preparation of the manuscript.

6. Резюме

Проведенные в феврале 1969 г. исследования зоопланктона залива Прюдс показали, что самыми частыми и при том наиболее многочисленными были антарктические виды: *Calanoides acutus, Calanus propinquus,* и *Metridia gerlachei.* Количественное распределение, а также структура популяции массовых видов *Copepoda* является отражением сложного гидрологического режима залива Прюдс. Воды залива характеризуются главным образом циклональной циркуляцией течений, а также положительной температурой поверхностных вод южной части. В этом районе были установлены самые большие скопления *Copepoda,* а также последние стадии развития популяций отдельных видов. Приняв во внимание весьма ограниченный объем глубинных вод в заливе Прюдс, следует подчеркнуть, что популяции типичных антарктических *Copepoda* не могут быть мигрантами с севера, как это утверждает Макинтош (1937). Популяции этих видов должны систематически возобновляться за счет животных, постоянно населяющих воды к югу от линии Антарктической дивергении, находящиеся под влиянием Восточного дрейфа.

Проведенные исследования подтвердили зональность и асинхронность развития *Copepoda* с тем, что оно происходит раньше на юге, чем на севере, что не соответствует правилу, что биологическая весна в этом районе Антарктиды наступает более поздно.

7. Streszczenie

Na podstawie przeprowadzonych badań zooplanktonu Zatoki Prydza z lutego 1969 r. stwierdzono, że najczęściej i najliczniej występowały typowo antarktyczne gatunki takie jak: *Calanoides acutus, Calanus propinquus* oraz *Metridia gerlachei.* Ilościowe rozmieszczenie oraz struktura populacji masowo występujących *Copepoda* jest odzwierciedleniem złożonego reżimu hydrologicznego zatoki. Wody zatoki charakteryzują się głównie cyklonalnym układem prądów oraz dodatnią temperaturą wód powierzchniowych w południowej części. W rejonie tym stwierdzono największe koncentracje *Copepoda,* a także najdalej zaawansowany stopień rozwoju populacji poszczególnych gatunków. Z uwagi na bardzo ograniczony zasięg wód głębinowych w Zatoce Prydza, populacje typowo antarktycznych *Copepoda* nie mogą być migrantami z północy, jak twierdzi Mackintosh (1937). Populacje tych gatunków muszą być systematycznie odnawiane przez zwierzęta stale zasiedlające wody na południe od Dywergencji Antarktycznej, pozostające w zasięgu Dryfu Wiatrów Wschodnich.

Przeprowadzone badania potwierdziły strefowość i asynchroniczność rozwoju *Copepoda* z tym, że następuje on wcześniej na południu niż na północy, co nie jest zgodne z zasadą, że biologiczna wiosna najpóźniej pojawia się u wybrzeży Antarktydy, w tym szczególnym rejonie.

8. References

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Paper received 27 January 1982