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Pelagic Polychaeta in the Scotia Front west of Elephant Island (BIOMASS III, October—November 1986)

ABSTRACT: The distribution of pelagic Polychaeta in the Scotia Front region is presented. 6 polychaete taxa were recorded in the material with the most abundant *Pelagobia longicirrata* which constituted 86% of all collected specimens. The mixing of water masses in the frontal zone influence the quantitative distribution of polychaetes in the water column.

Key words: Antarctica, pelagic Polychaeta, BIOMASS III.

1. Introduction

Hydrologists and biologists take recently much interest in the region of the Weddell-Scotia Confluence, because of the particularly high dynamics of water masses in this region (Patterson and Sievers 1980; Stein 1986) and of its influence upon the distribution of pelagic organisms (Nast 1986; Kittel, Siciński and Łuczak 1988).

The present paper aimed at the complement of our knowledge on the species composition, distribution and abundance of pelagic Polychaeta in the area of Scotia Front which is a northern margin of the Weddell-Scotia Confluence (Gordon, Georgi and Taylor 1977).

2. Study area, material and methods

Zooplankton samples were collected in 9 stations situated between King George Island and Elephant Island (Fig. 1) at the end of October and in the beginning of November 1986. Several hauls were made in each of the

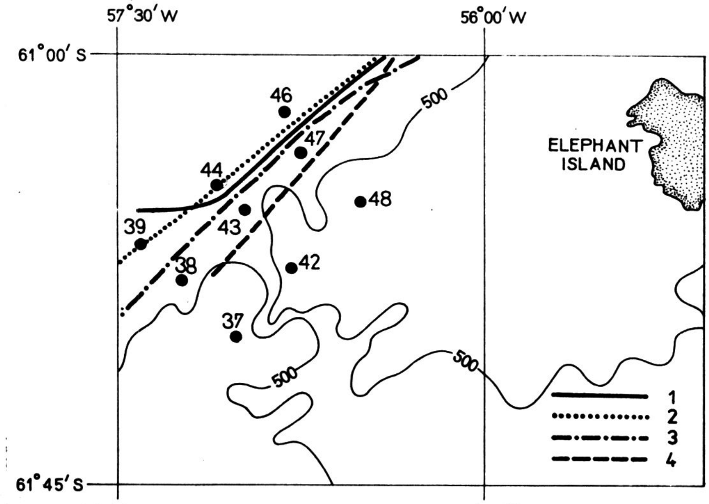

Fig. 1. Investigated area and positions of the stations. Line 1 denote the course of Scotia Front according to Rakusa-Suszczewski (1988); lines 2, 3 and 4 — according to Stein (1986) in 1983, 1984 and 1985, respectively

stations, beginning from the near bottom to the surface layers. The depth of the layers was determined according to the precedent temperature characteristics of particular station (Grelowski and Wojewódzki 1988). Depth ranges of particular layer were usually between 0—100, 100—300, 300—600 and below 600 m, but actual limits were sometimes shifted (see tab. 1). However for the sake of clarity we have used in the text above mentioned conventional rounded ranges. Data on catchings with their depth ranges are given in table 1.

Nansen net with 200 µm meshes and mouth opening area of 0.4 m^2 was used. Material collected was preserved in a 4% formaline solution. Species were identified after Hartman (1964); Orensanz, Ramirez and Dinofrio (1974); Støp-Bowitz (1981) and O'Sullivan (1984).

3. Results and discussion

Six taxa of polychaetes were recorded in the material collected (Tab. 1). Part of specimens of the genus *Tomopteris* whose specific characters were not visible were left unidentified. *Pelagobia longicirrata*, the most abundant and common pelagic polychaete of the Antarctic zone (Tebble 1968; Orensanz, Ramirez and Dinofrio 1974; Jażdżewski, Kittel and Łotocki 1982; Witek et al. 1985) was the most abundant species and constituted about 86% of all collected specimens. The shares of other species were low and amounted to 4.8% for *Typhloscolex mülleri*, 3.4% for *Tomopteris planktonis*,

Table 1

Abundance of the polychaetes in investigated water masses

STATION No	48			47				46				42			43				44				37			38			39			
SOUNDING (m)	420			930				1900				400			1300				1600				500			700			1500			
HAUL DEPH (m)	0—100	100—300	300—400	0—100	100—350	350—500	500—880	0—75	75—200	200—600	600—1800	0—100	100—250	250—400	0—100	100—300	300—500	500—1200	0—75	75—250	250—700	700—1500	0—100	100—300	300—450	0—100	150—300	300—680	0—150	100—400	400—700	700—1400
FILTRATED WATER VOLUME (m^3)	40	80	40	40	100	60	152	30	50	160	480	—	60	60	40	80	—	700	30	70	180	320	40	80	60	60	60	152	40	120	120	280
TOTAL WET WEIGHT (mg $1000 m^{-3}$)	0	12,5	25,0	0	10,0	16,7	6,6	0	20,0	6,3	4,2	—	16,7	16,7	0	33,0	—	263,0	0	42,8	16,7	12,5	25,0	1,4	33,3	16,7	33,0	17,9	0	8,3	8,3	21,4
1 *Pelagobia longicirrata* Greeff., 1879		200	87		160	83	151		20	31	21	lack of data	50	67		120	lack of data	14		43	27	9	100	237	33	100	133	36		83	50	21
2 *Typhloscolex mülleri* Busch, 1851			12										17					2			5			12	33		17				8	
3 *Tomopteris planktonis* Apstein, 1900							20				4					50																
4 *Tomopteris carpenteri* Quatrefages, 1865					10											10		4														
5 *Tomopteris* spp.										6			17					2			5							9				
6 Spionidae gen.sp.juv. (larvae)																12				43	5	3										
Total abudance of Polychatea (ind. $1000 m^{-3}$)	0	200	99	0	170	83	171	0	20	37	25	—	84	67	0	192	—	22	0	86	42	12	100	249	66	100	150	45	0	83	58	21

1.1% for *Tomopteris carpenteri*, 1.8% for *Tomopteris* spp., and to 2.9% for unidentified juvenile forms of benthic Spionidae. The last ones were observed only in station 44 at all depths and in station 43 at depth of 100—300 m. Larval forms or epitocous stages of non-pelagic families were frequently caught in the waters of the Southern Ocean, mainly in shelf zone (Hartman 1966; Orensanz, Ramirez and Dinofrio 1974; Minoda and Hoshiai 1982; O'Sullivan 1984). It seems moreover that larvae of Spionidae were found more frequently than the representatives of other non-pelagic families (Ehlers 1912, 1913; Benham 1927; Augener 1929 and Fauvel 1936 — cited after Hartman 1966; Støp-Bowitz 1951, 1981; Witek et al. 1985; Tanimura, Fukuchi and Hoshiai 1986). So, the analysed material comprises 4 or 5 typically pelagic species of Polychaeta. O'Sullivan (1984) estimated that there were 18 of all such species in the Southern Ocean (area south of Subtropical Convergence). In the area of the Antarctic Peninsula, along with species discussed in the present paper several other pelagic polychaetes were hitherto recorded. They were namely: *Vanadis antarctica* (McIntosh), *Rhynchonerella bongraini* (Gravier), *Tomopteris septentrionalis* Steenstrup, *Travisiopsis levinseni* (Southern), *Phalacroporus pictus* Greef and *Maupasia caeca* Vignier (Orensanz, Ramirez and Dinofrio 1974; Jażdżewski, Kittel and Łotocki 1982 and Witek et al. 1985). Consequently, it seems that the planktonic Polychaeta assemblages in the study area was rather poor in species.

Vertical abundance distribution of Polychaeta is presented in Table 2. Note that due to the strong domination of *Pelagobia longicirrata* the present discussion concern mainly this species.

Table 2

Total abundance of the polychetes in the particular water layers (ind. $1000\,m^{-3}$) (Depth ranges are rounded here; actual haul depths are given in tab. 1).

DEPTH RANGE / STATION	46	44	39	47	43	38	48	42	37
0—100 m	0	0	0	0	0	100	0	—	100
100—300 m	20	86	83	170	192	150	200	84	249
300—600 m	37	42	58	83	—	45	99	67	66
>600 m	25	12	21	171	22	shelf	shelf	shelf	shelf

Polychaetes were not recorded in the surface layer (0—100 m) of the majority of the stations. Exceptions were stations 37 and 38, where their abundance in the uppermost layer was relatively high. At depths ranging between 100 m and 300 m polychaetes were most abundant. It is justified to stress the difference in Polychaeta density between stations 39, 44 and 46 on the one hand and the other stations on the other hand and to relate this to the line of Scotia Front. A particularly low density of Polychaeta was recorded in station 46, where a rather uniform density in the whole water column, except the surface layer (0—100 m), was observed. In most stations situated south of the front zone polychaete density in the layer 100—300 m particularly and in the layer 300—600 m less distinctly, was on the average higher than in stations 39, 44 and 46.

Mean density of Polychaeta in stations 39, 44 and 46 at depths from 100 to 600 ($n = 6$) was 54.3 ind. 1000 m^{-3}, whereas such mean for remaining stations in the same depth range ($n = 11$) was 127.7 ind. 1000 m^{-3}. The difference between these mean values is statistically significant at the 95% probability level (Mann-Whitney U-test).

In the water layer ranging approximately from 300 to 600 m polychaete density was on the average twice lower and more uniform in the whole study area than at depths 100—300 m.

In the deepest water layer of station 47, a relatively high abundance of polychaetes was observed, whereas in other stations these deepest layer were inhabited by a small number of planktonic Polychaeta, dominated by *Pelagobia longicirrata*. This is interesting because the maximal density of this species occurred usually at the depth of 100—300 m (Hardy and Gunther 1935; Støp-Bowitz 1949, 1977; Jażdżewski, Kittel and Łotocki 1982). In the investigated region a decrease in abundance of Polychaeta with depth increase generally occurred. The nontypical vertical distribution of *P. longicirrata* in station 47 can be related to the specific water masses dynamics at this place. Station 47 was situated in the zone of strong vertical movements of water masses (Grelowski and Wojewódzki 1988; Rakusa-Suszczewski 1988, Fig. 5).

The above remarks concerning the horizontal and vertical abundance distribution of Polychaeta can be summarized as follows. One can observe the relation between the three types of water masses distinguished in the investigated area by Rakusa-Suszczewski (1988) and the distribution of pelagic polychaetes. The surface waters of the winter modification, excepting stations 37 and 38, were not inhabited by Polychaeta at all. Warm, deep water masses in stations 44 and 46 are characterized by the lower mean abundance of Polychaeta than the waters of the eastern part of the Bransfield Strait; this is especially distinct for the depth range of abt. 100—300 m. The structure of the pelagic polychaetes assemblage in station 39, situated, according to Rakusa-Suszczewski (1988), south of the Scotia Front border line and characterized by the different hydrological regime, is similar to those observed in stations 44 and 46. This is the reason why in the present paper these three stations (39, 44 and 46) are treated as a uniform group (Tab. 2).

Phenomena connected with water mixing in the frontal zone influence the distribution of pelagic Polychaeta in the water column. It was especially distinct in station 47. A non-typical distribution of polychaetes (especially of *P. longicirrata*), consisting in their comparatively high density in the deepest water layer, was here observed. It was probably caused by a downwelling.

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5. Streszczenie

Przedstawiono rozkład liczebności pelagicznych Polychaeta w rejonie Frontu Scotia. W 9-ciu stacjach (rys. 1) na przełomie października i listopada 1986 r. dokonano połowów, poczynając od warstw przydennych, do warstwy powierzchniowej (tab. 1). W zebranym materiale stwierdzono 6 taksonów Polychaeta, z najliczniejszym i najpospolitszym *Pelagobia longicirrata*, stanowiącym ok. 86% wszystkich złowionych osobników. Udział pozostałych był niewielki i wynosił odpowiednio: *Typhloscolex mülleri* (4,4%), *Tomopteris planktonis* (3,4%), *Tomopteris carpenteri* (1,1%), *Tomopteris* spp. (1,8%) oraz stadia larwalne bentosowych Spionidae (2,9%).

W warstwie powierzchniowej (0—100 m), z wyjątkiem stacji 37 i 38, wieloszczetów nie stwierdzono. Najliczniejsze były na głębokościach 100—300 m (tab. 2), gdzie szczególnie wyraźnie zaobserwowano różnicę w ich liczebności w stacjach 39, 44 i 46 z jednej strony, a pozostałymi stacjami z drugiej. Sugeruje to, że obie grupy stacji położone były w obrębie różnych mas wodnych. W warstwie obejmującej w przybliżeniu zakres głębokości 300—600 m liczebność Polychaeta była ok. dwukrotnie mniejsza, aniżeli na głębokościach 100—300 m. Najmniejszą liczebność zaobserwowano w warstwach najgłębszych, z wyjątkiem stacji 47 (tab. 2).

Dał się zauważyć związek między trzema typami mas wodnych, wyróżnionymi w obszarze badań przez Rakusę-Suszczewskiego (1988), a rozkładem liczebności pelagicznych Polychaeta. Wody powierzchniowe modyfikacji zimowej nie były, z wyjątkiem stacji 37 i 38, zasiedlone przez wieloszczety. Masy ciepłych wód głębinowych w stacjach 44 i 46 odznaczały się niższą liczebnością Polychaeta, niż strefa wód wschodniej części Cieśniny Bransfielda, położona na południe od linii frontu. Wyraźnie zakłócenie pionowego rozmieszczenia Polychaeta w stacji 47, polegające na ich wysokiej gęstości w najgłębszej warstwie, wskazuje na szczególnie intensywne ruchy pionowe wód w tym miejscu.