POLISH POLAR RESEARCH (POL. POLAR RES.) POLSKIE BADANIA POLARNE	3	3—4	299—312	1982

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The occurence of juvenile *Notothenioidei (Pisces)* within krill concentrations in the region of the Bransfield Strait and the southern Drake Passage*)

ABSTRACT: Observations on abundance and distribution of juvenile fish within the krill concentrations were made during February—March 1981. Juvenile and scarce postlarval stages belonging to 23 species of the suborder *Notothenioidei* were recorded in the investigated area. *Chionodraco rastrospinosus* and *Chaenodraco wilsoni* were the most frequent and numerous species. Juvenile fish, as well as extensive concentrations of krill, were recorded mainly in the southern part of the Bransfield Strait and in the shelf waters westwards of the Palmer Archipelago. The juveniles were however absent in the open waters of the Drake Passage.

Key words: Antarctic, juvenile *Notothenioidei*, krill

1. Introduction

Observations on the occurrence and abundance of juvenile Antarctic fish accompanying the krill concentrations were made during the international BIOMASS-FIBEX programme (February 14 to March 20, 1981) on board of the research vessel "Profesor Siedlecki". One of the objectives of this study was to draw attention to the necessity of protection of juvenile fish, coexisting with krill concentrations, in circumstances of rapidly developing krill fishery.

Scarce reference to juvenile Antarctic fish is made in the available literature. Preliminary observations on the occurrence and abundance of juvenile fish, inhabiting mainly coastal and subsurface waters covered by pack-ice, are given by Andrjašev (1967, 1968, 1970), DeWitt (1970) and Hureau (1970). First survey of a juvenile ichthyofauna inhabiting the surface waters of the Drake Passage and the Scotia Sea was made by Rembiszewski,

*) The study was made during FIBEX under supervision of Dr S. Rakusa-Suszczewski, the scientist in chief of the r/v "Profesor Siedlecki". The survey was sponsored by the Polish Academy of Sciences as one of the subjects included into the MR-I-29A problem.

Krzeptowski and Linkowski (1978). These observations are supplemented by Chłapowski and Krzeptowski (1978). Ciechomski and Weiss (1976) describe the distribution and population abundance of juvenile *Nototheniidae* inhabiting the patagonian continental shelf (47°–55°S). Ślósarczyk (in press) evaluates the abundance of juvenile *Trematomus bernacchii* Boulenger and *Pagothenia brachysoma* (Pappenheim) in krill concentrations off Balleny Islands applicating the method adopted in the present study.

2. Material and methods

For sampling a standard pelagic krill trawl of a type 40/75 × 4 was used, with a head-rope of 40 m length. A fine-meshed inset was attached to the last segment of the belly (mesh size 20 mm) and the cod-end of a trawl (mesh size 11 mm). Vertical and horizontal openings were about 15 and 22.5 m respectively at the trawling speed 3.2 knots. The openings of the belly and the cod-end, measured at the fastening points of the fine-meshed inset, were 9.5 and 5.0 m respectively. Sampling depths covered the water layer between 24 and 42 m mainly, although in few cases sampling was made in the deeper waters (75–115 m). Plankton samples were obtained by help of the Nansen plankton net from the depths of 0 to 300 m and the Bongo sampler towed at the depths from 0 to 35 m.

Krill catches were examined on 56 trawling stations (Fig. 1). Data on the presence of ichthyoplankton were collected on 70 sampling sites. The numeration of sampling stations (both for fishing and plankton) covers the accepted numeration of the Polish survey zone, except stations outside this area, near Elephant Island, where the ship took shelter against stormy weather.

Juveniles, segregated from the total catch, were preserved in 3% buffered formalin or in Dorogostajski solution [1]). Enzymatically cleared (transparent) and stained with alizarine individuals (according to the method of Taylor, 1967), were used for species identification.

Unsorted samples of krill and juvenile fish, weighting from 20 to 160 kg, were taken at random from 36 hauls for studies of abundance of juvenile fish. The sample size depended on the catch volume of krill and the abundance of fish. In case of a big catch the sample was taken from a dozen places or so in order to avoid biassing caused by uneven mixing of krill and fish. Each sample was examined in detail and juveniles were sorted out. Specimens found outside the sample were registered also for collecting of more precise information on distribution of particular fish species in the area investigated.

Two measures of abundance of juveniles were applied for this study: 1) number of specimens per 100 kg of krill,

[1]) A mixture of 20 g KNO_3, 10 g NaCl, 10 g Na_2SO_4 and 10 g CH_3COONa dissolved in 1000 ml of hot water; after cooling 30 ml of formalin and 20 ml glycerol added, than filtered.

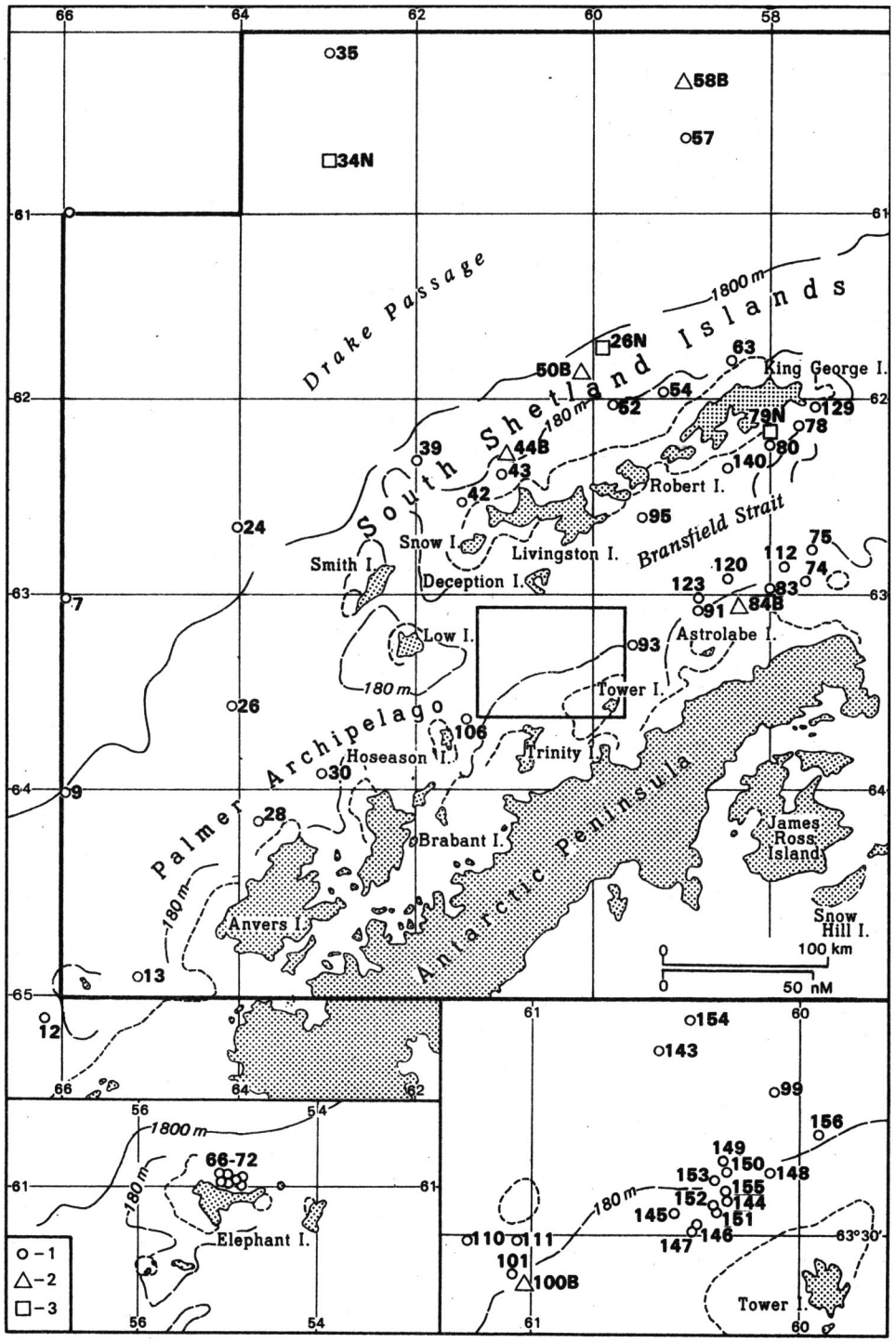


Fig. 1. The distribution of sampling stations of r/v "Profesor Siedlecki" in the Polish survey zone and near the Elephant I. during FIBEX (February-March 1981)
1 — trawling station; 2,3 — plankton stations where the presence of ichthyoplankton was recorded (2 — Bongo sampler, 3 — Nansen sampler).

2) number of specimens caught during 30 min. of trawling (average haul time), defined by the abundance of fish in the sample and the yield of the krill catch.

The latter is in few cases overestimated due to the extremely high yield of krill attained in short hauling time. The value of the index refers to the total catch in this instance.

3. Results

3.1. Distribution

The occurence of postlarval and juvenile *Notothenioidei*, belonging to 23 species, was recorded in 42 krill hauls to 56 examined and in 5 plankton samples from among 70 taken (Table I, Fig. 2a-d).

Juvenile fish were not found in the epipelagic zone of the southern part of the Drake Passage, where depths to the bottom ranged from 1600 to 3700 m. The only exception was the plankton site 26 (Table I).

A common presence of juvenile fish belonging to the family *Channichthyidae* and *Nototheniidae* was observed in the shelf waters of the area investigated. Young *Bathydraconiidae* and *Harpagiferidae* were noted in the Bransfield Strait exclusively (Fig. 2 a–d).

A variety of species within krill concentrations was observed westwards of the Palmer Archipelago, above the continental shelf with depths of 200 to 640 m (Table I). Exceptionally rich was haul 28, made in the shallow area (195 m) near Anvers Island, including among others *Pagothenia brachysoma* — the species rare in the western Antarctic. Fewer species were observed in the relatively shallow water (100–200 m) over the shelf westwards of the South Shetland Islands (Table I). In the coastal zone of the Elephant Island juvemnile *Channichthyidae* were found almost exclusively (Fig. 2d), *Chaenodraco wilsoni* Regan being the most frequent. A remarkable variety of species lives within krill concentrations in the waters of the Bransfield Dtrait, particularly in its southern part. In that area 19 species in postlarval and juvenile stages were found, representing all families of the suborder *Notothenioidei* (Fig. 2). The most frequent were *Channichthyidae* and first of all: *Chaenodraco wilsoni*, *Chionodraco rastrospinosus* De Witt et Hureau and *Cryodraco antarcticus* Dollo (Table I).

3.2. Abundance

The estimated abundance indices of juveniles are tabulated in Tables II and III and illustrated by Fig. 3.

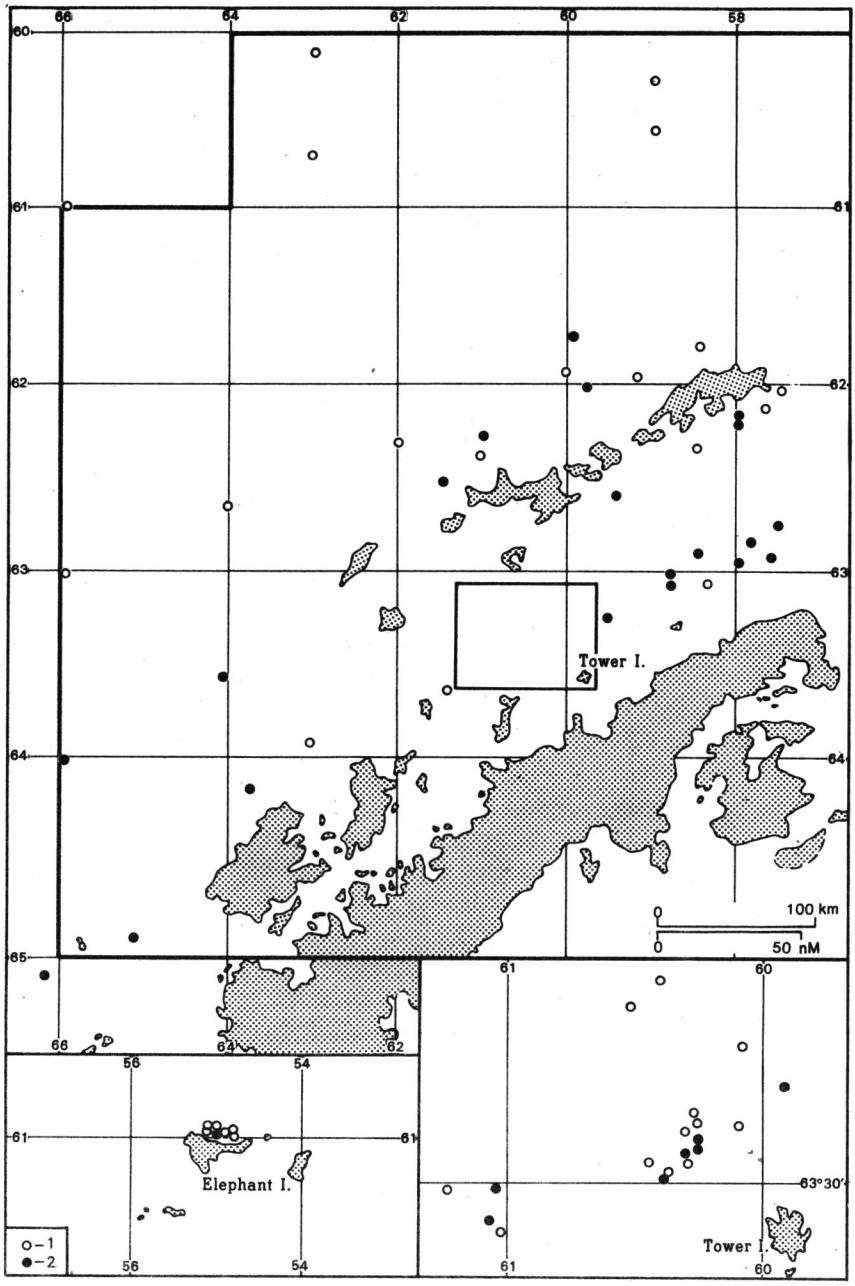
Fairly abundant populations of juvenile *Trematomus bernacchii* Boulenger *T. scotti* Boulenger and *Chionobathyscus dewitti* Andriashev et Neelov (number of specimens per 0.5 h varying widely from 1 to 1421) were discovered westwards of the Palmer Archipelago, where krill concentrations of medium density were also reported (Kalinowski 1982) (Table III).

Table I.

Occurence of juvenile *Notothenioidei* in the Drake Passage and Bransfield Strait midwaters in February—March 1981

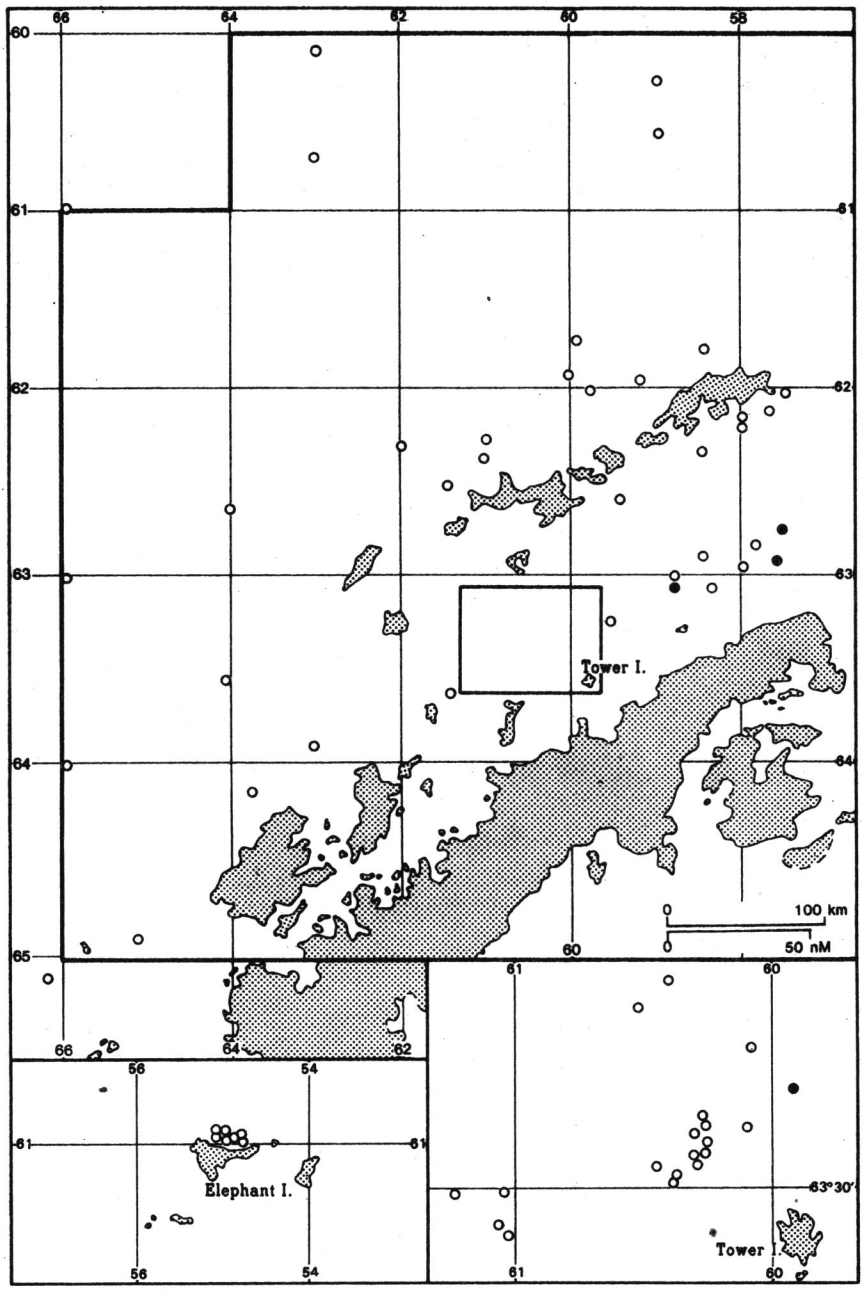
Region		Depth range (m)	Haul No.	*Nototheniidae*				*Harpagiferidae*								*Bathydraconidae*				*Channichthyidae*						
				Trematomus hernacchii	*Trematomus hansoni*	*Trematomus scotti*	*Trematomus loennbergii*	*Trematomus* sp.	*Pagothenia borchgrevinki*	*Pagothenia brachysoma*	*Notothenia nybelini*	*Notothenia kempi*	*Pleuragramma antarcticum*	*Dissostichus mawsoni*	*Artedidraco skottsbergi*	*Parachaenichthys charcoti*	*Gerlachea australis*	*Prionodraco evansi*	*Gymnodraco acuticeps*	*Chaenodraco wilsoni*	*Chionodraco rastrospinosus*	*Chaenocephalus aceratus*	*Champsocephalus gunnari*	*Chionobathyscus dewitti*	*Cryodraco antarcticus*	*Neopagetopsis ionah*
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Drake Passage		1000—3700	3																							
			7																							
			24																							
			26N*)																							
			34N									+														
			39																							
			57																							
			58B																							
Shelf water of the Antarctic Peninsula	West from Palmer Arch.	200—640	9	+																						
			12	+		+								+							+					
			13			+				+											+				+	
			26	+																						
			28	+	+				+		+					+			+	+	+	+			
			30																							
	West from South Shetland Is.	100—200(310)	42	+							+									+	+	+		+	
			43																			+				
			44B	+																						
			50B																							
			52							+																
			54																							
			63																							
	North from Elephant Island	60—340	66																	+						
			67																	+						
			68																	+						
			69			+														+						
			70																	+						
			71																			+				+
			72																							
Shelf waters of the Antarctic Peninsula (cont.)	Bransfield Strait	130—900/1500/	74		+		+	+	+	+	+		+		+					+	+	+			+	
			75		+			+		+		+		+		+				+	+					+
			78																	+	+				+	
			79N									+														
			80									+							+	+	+	+			+	
			83	+							+									+	+				+	+
			84B																		+					
			91		+							+		+					+	+	+				
			93									+								+						
			95		+												+			+	+	+				
			99																	+	+				+	+
			100B																		+					
			101							+								+		+	+					
			106															+		+	+					
			110													+					+					
			111									+								+	+				+	
			112						+			+								+	+				+	
			120						+			+								+	+				+	
			123		+			+			+	+							+	+	+	+			+	
			129																							
			140																							
			143													+				+	+					
			144					+			+									+	+	+			+	+
			145																	+		+				+
			146																						+	
			147						+		+									+	+	+				
			148																	+	+					
			149																						+	+
			150																		+				+	+
			151							+																
			152		+														+	+	+				+	
			153																	+	+					
			154									+								+	+				+	
			155		+							+		+					+	+	+					
			156																	+	+				+	

*) — gear other than trawl: N — Nansen net, B — open Bongo net



2a

Fig. 2. The occurence of juvenile *Notothenioidei* in the southern part of the Drake Passage and in the Bransfield Strait (February–March 1981)
1 — stations without juveniles, 2 — stations where juveniles were found: a) *Nototheniidae*, b) *Harpagiferidae*, c) *Bathydraconidae*, d) *Channichthyidae*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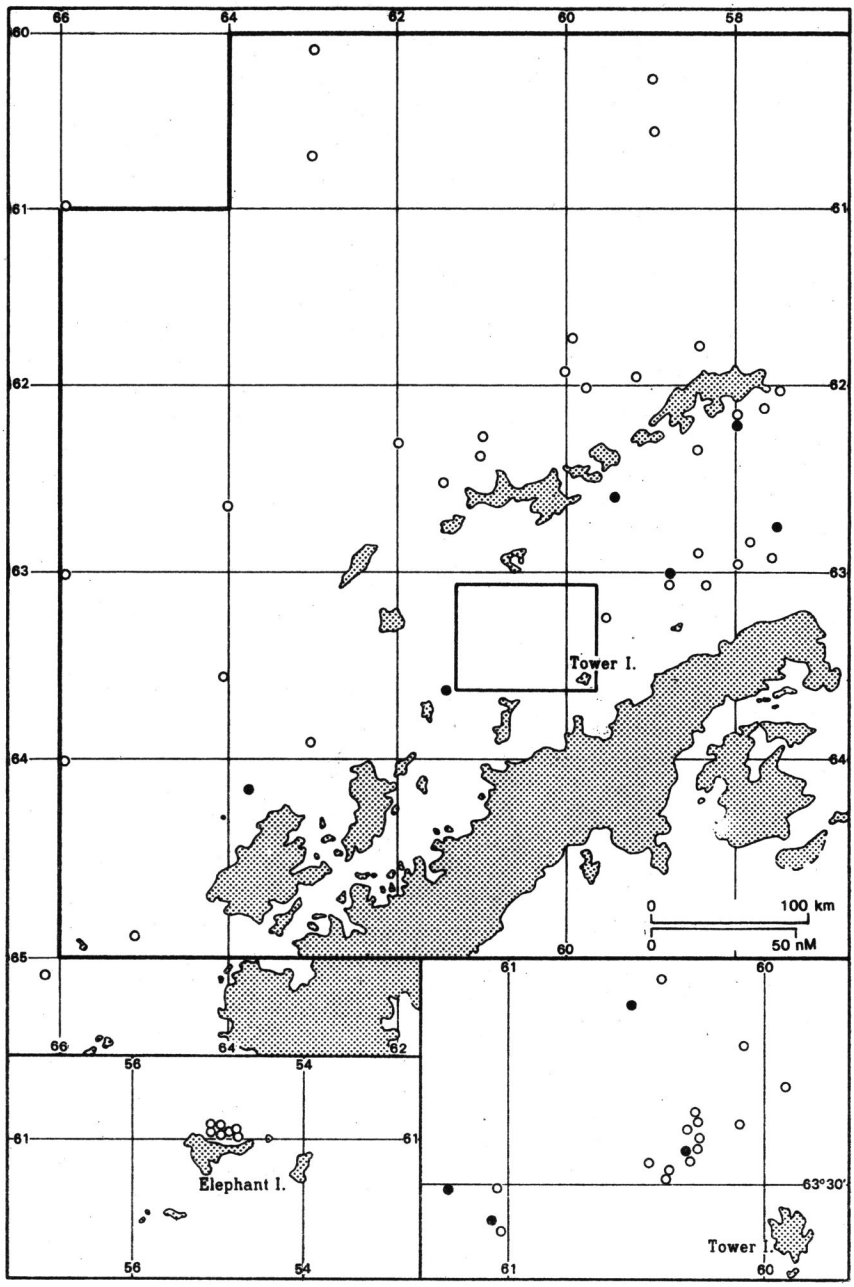
2b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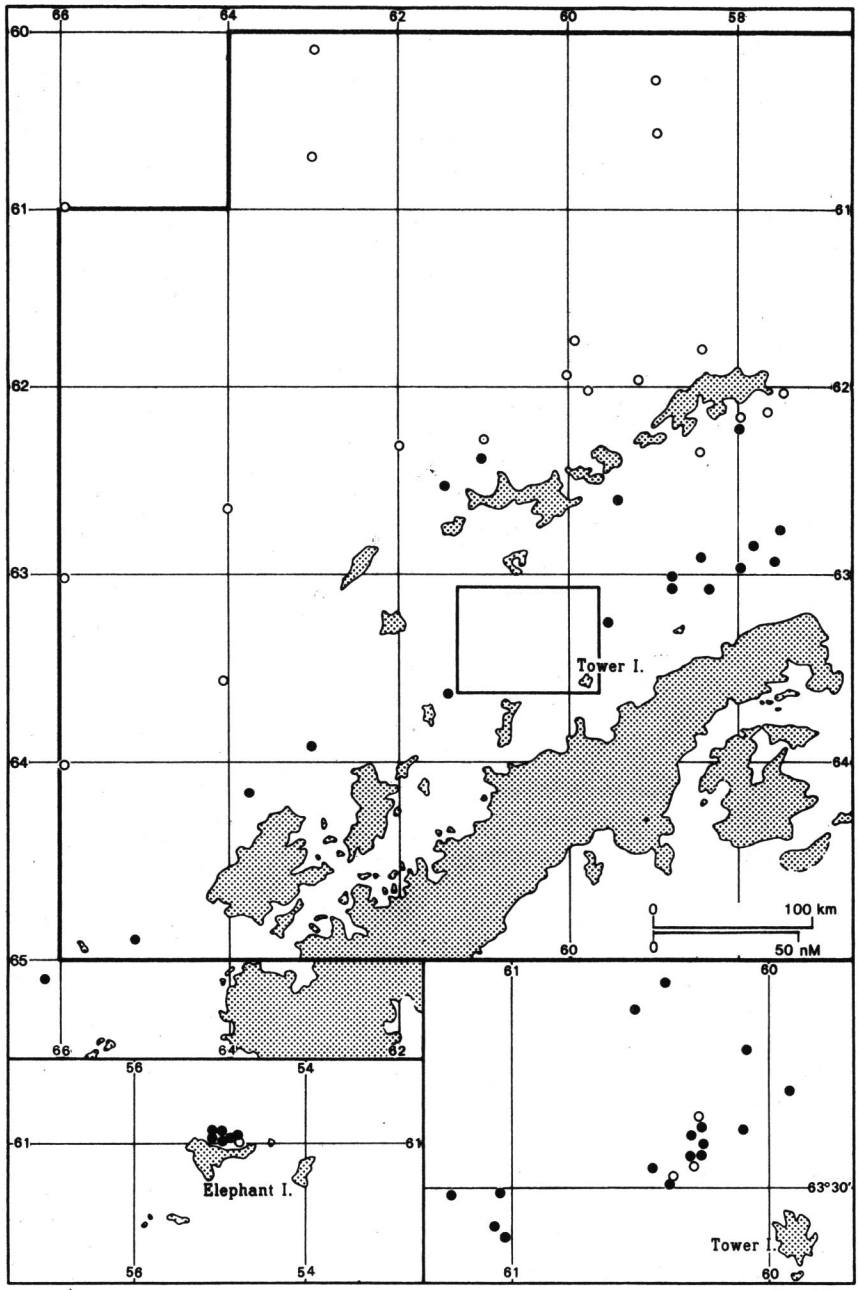
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Elephant I.
63°30'
Tower I.

2d

Table II.

Abundance of juvenile *Nototheniidae* and *Channichthyidae* in concentrations of krill in the Drake Passage and Bransfield Strait midwaters in February—March 1981

Region	Haul No.	Yield of krill (kg per 0,5 h)	Abundance (No. per 100 kg of krill)															Remarks
				Nototheniidae					*Channichthyidae*									
			Sample weight (kg)	*Trematomus bernacchii*	*Trematomus hansoni*	*Trematomus scotti*	*Trematomus* sp.	*Notothenia rybelini*	*Pagothenia brachysoma*	*Pagothenia borchgrevinki*	*Pleuragramma antarcticum*	*Chaenodraco wilsoni*	*Chionobathyscus dewitti*	*Chaenocephalus aceratus*	*Chonodraco rastrospinosus*	*Cryodraco antarcticus*		
West from Palmer Archipelago	9	1	1	+(×)														
	12	7500	49	+		2							+		+	+		
	13	40000	56			7							+		2	+		
	26	24	60	2														
	28	8000	50	4	+							+	+	+	2			
	30	3000	19												+			
West from South Shetland Islands	42	400	21	+								5	5	10		+		
	43	4500	26											+				
	52	6000	100															
North from Elephant J. Island	67	1800	50									+				+		
	68	3750	50									+						
		14000	50											+				— no juveniles
	72	11250	50															
Bransfield Strait	74	1875	52		4		4			+	2	12	4	+		2		
	75	2137	42		+					2	+	12	17					
	78	200	25									+	12			4		
	80	100	18								+	+	+	+		6		
	83	30000	79	+								4	9			+		
	91	15000	79		+						3	+	+	+				
	93	9750	110								+	+						
	95	5538	120		+							+	+	+		+		
	99	6000	52									+	2					
	101	16000	52									4	+			+		
	106	42000	160									+	+					
	110	92	40										+					
	111	2000	50								+	+	+			+		
	120	4000	52							+	+	8	+			+		
	143	4200	53									+	2			2		
	144	4200	79			+						+	3	+				
	145	3750	53									+		+		+		
	147	1800	52					2		2		4	14	+		4		
	150	15000	26										+					
	152	3750	79		+				1			1	13			+		
	153	9000	53									+	4					
	155	6000	27		+						+	+	15	+				
	156	1500	26								+	+	4			+		

+ — juveniles found outside the sample (abundance not estimated)

*) — haul outside the concentrations of krill (index No. per 100 kg of krill not estimated)

Table III.

Abundance of juvenile *Nototheniidae* and *Channichthyidae* in concentrations of krill in the Passage and Bransfield Strait midwaters in February—March 1981

Region	Haul No.	Abundance (No. per. 0,5 h haul)														Remarks
		Nototheniidae							*Channichthyidae*							
		Trematomus bernacchii	*Trematomus hansoni*	*Trematomus scotti*	*Trematomus* sp.	*Notothenia nybelini*	*Pagothenia brachysoma*	*Pagothenia borchgrevinki*	*Pleuragramma antarcticum*	*Chaenodraco wilsoni*	*Chionodraco rastrospinosus*	*Chaenocephalus aceratus*	*Chionobathyscus dewitti*	*Cryodraco antarcticus*		
West from Palmer Archipelago	9	3														
	12			157							+		+	+		
	13			1421*)							+		355*)	+		— hauling time 15 min
	26	1														
	28	320	+							+	+	+	160			
	30												+			
West from South Shetland Island	42	+								19	19	38		+		
	43											+				
	52						+									
North from Elephant Island	67									+				+		
	68									+						
	71											+				
	72															— no juveniles
Bransfield Strait	74		32		32			+	16	96	32	+		16		
	75		+					51	+	254	355					
	78									+	12			4		
	80								+	+	+	+		6		
	83	+								382*)	891*)			+		— hauling time 10 min.
	91		+													
	93								382	+	+	+				
									+	+						
	95		+							+	+	+		+		
	99									+	115					
	101									611	+			+		
	106									+	+					
	110										+					
	111								+	+	+			+		
	120							+	+	305	+			+		
	143									+	80			80		
	144				+					+	107	+				
	145									+		+		+		
	147					35		35		69	242	+		69		
	150										+					
	152		+				47			47	477			+		
	153									+	343					
	155		+						+	+	906	+				
	156								+	+	58			+		

\+ — juveniles found outside the sample (abundance not estimated)

*) — index No. per 0,5 h haul probably overstimated in consequence of very high cotch of krill obtained in short hauling time, therefore the value refers to the total catch

These species, except *T. bernacchii*, are considered as rather scarce, therefore some of the results obtained should be taken as overestimations due to imperfection of the method used. *Channichthyidae* were observed almost exclusively around the South Shetland Islands. The abundance indices of particular species varied at a rather low level 4–38 specimens per 0.5 h of trawling. Few juvenile *Channichthyidae* were found outside the samples in catches taken from the dense and extensive krill concentrations in the region of Elephant Island (Fig. 3). During this study these concentrations were exploited intensively by a fishing fleet. Limited time impeded the estimation of abundance of juveniles in that region. The presence of a rich juvenile ichthyofauna in the southern part of the Bransfield Strait was associated with the occurence of dense krill concentrations extending, according to Kalinowski (1982), along the Antarctic Peninsula, beginning from the Hoseason Island (Palmer Archipelago). The most abundant were juvenile *Channichthyidae* and among them *Chionodraco rastrospinosus* (number of specimens per 0.5 h varying from 12 to 906 and number per 100 kg of krill — from 2 to 17) and *Chaenodraco wilsoni* (indices 47–611 per 0.5 h and 1–12 per 100 kg of ktill). The less numerous family *Nototheniidae* was represented mainly by *Pleuragramma antarcticum* Boulenger and *Pagothenia borchgrevinki* Boulenger (Table II and III, Fig. 3).

The abundant populations of juveniles were recorded exclusively among krill concentrations occuring in the colder water (below 0°C) coming from the Weddell Sea and the Bellingshausen sea (Wojewódzki, in prep.). (Fig. 3).

4. Discussion

Information on the occurence of juvenile fish in krill catches near Anvers Island and King George Island is given by Rembiszewski, Krzeptowski and Linkowski (1978). They found great numbers of juvenile *Notothenia* sp., probably from the "larseni" group and *Chionodraco* sp. (presumably *Ch. kathleenae* = *Ch. rastrospinosus*). Rather few specimens of *Notothenia nybelini* (Balushkin) from the "larseni" group were observed in the Bransfield Strait and Anvers Island regions during FIBEX while in single hauls very abundant *Trematomus bernacchii, T. scottii* and *Pleuragramma antarcticum* were recorded. At the same time juveniles of *Chionodraco rastrospinosus* were found as the most frequent and abundant in the Bransfield Strait region. Among species being of commercial and ecological importance juveniles of *Notothenia rossi marmorata* Fischer and *N. coriiceps neglecta* Nybelin were observed by Rembiszewski et al. (1978) near the King George Island. These species were however not encountered there in 1981. Juvenile *Dissostichus mawsoni* Norman and *Chaenocephalus aceratus* (Lönnberg) were observed quite often by Chłapowski and Krzeptowski (1978) in the region of the Palmer Archipelago. During FIBEX only single specimens belonging to the above mentioned species were found. Valuable information on the occurrence of juvenile fish were collected during January–April 1979 by Wolnomiejski and Boberski (unpublished data). They observed only a few juveniles in the krill fishery off the South Shetland Islands,

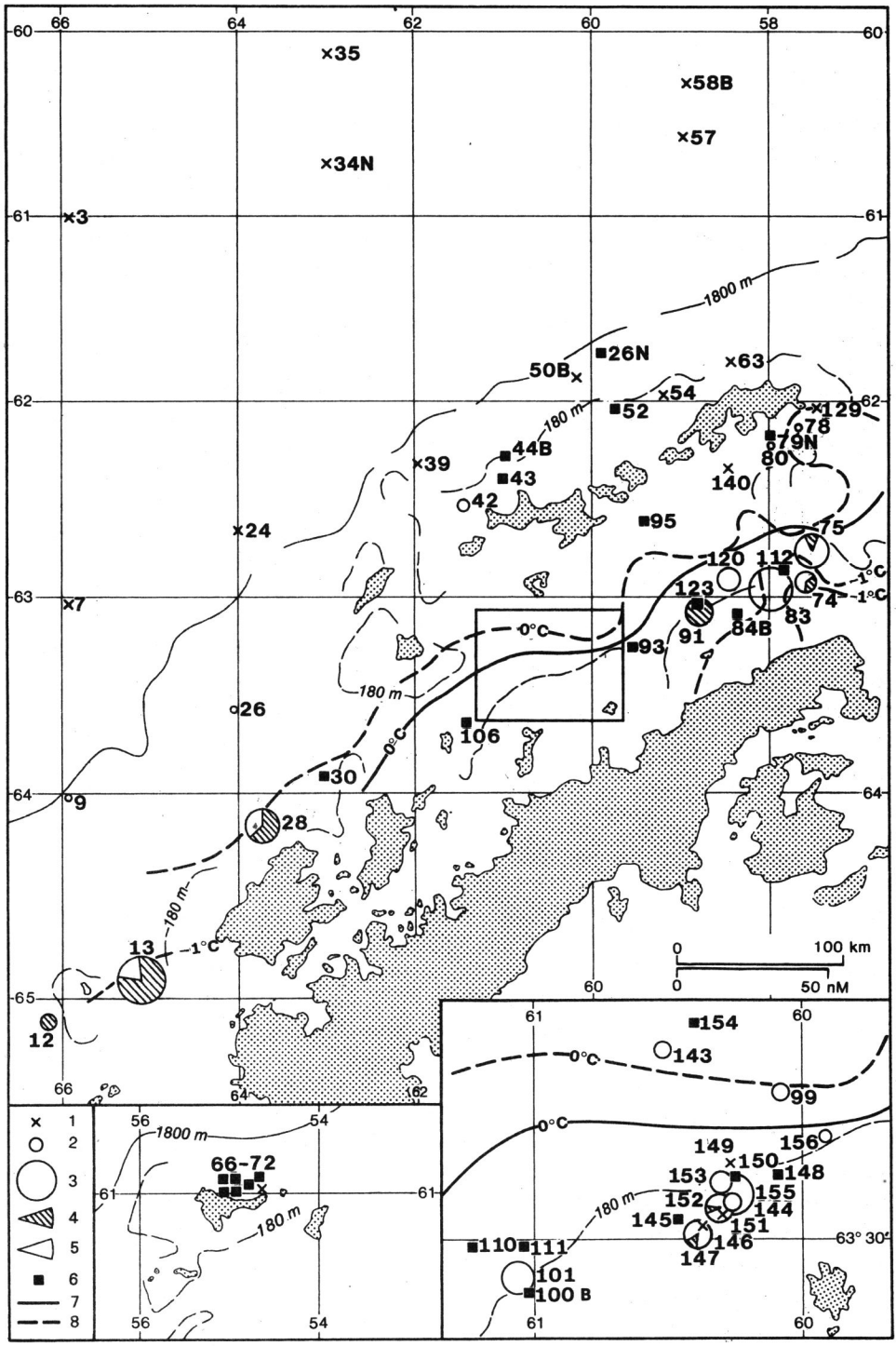

Fig. 3. The abundance of juvenile *Nototheniidae* and *Channichthyidae* in the southern part of the Drake Passage and in the Bransfield Strait (February–March 1981)

and South Orkney Islands, while in the vicinity of South Georgia juveniles, belonging in particular to the *Nototheniidae*, were found in abundance. According to Wolnomiejski and Boberski (unpubl. data) the depth of the fishing grounds is one of the main causes of such phenomenon. The majority of pelagic hauls in the region of the South Shetland Islands and South Orkney Islands was made at the deep waters (exceeding 1000 m) or above the continental slope (600–800 m), whereas hauls made eastwards of South Georgia came generaly from the shallow part of the shelf (150–300 m). The opinion of Wolnomiejski and Boberski agrees with the results presented, which confirm the absence of juvenile fish in the pelagic zone of deeper waters.

There are no published references to the abundance of juvenile fish within krill concentrations in the region of Bransfield Strait and adjoining islands. References are however found in sources describing not very distant waters off South Georgia. Investigations continued in that region during three Polish expeditions proved the existence of abundant populations of juvenile *Patagonotothen larseni* (Lönnberg), *Champsocephalus gunnari* Lönnberg and *Chaenocephalus aceratus* within krill concentrations eastwards of the island (Chłapowski and Krzeptowski 1978, Kompowski 1980 a,b, Wolnomiejski and Boberski, unpubl. data, Ślósarczyk, unpubl. data). Wolnomiejski and Boberski studied the frequency of occurrence and abundance of juvenile fish in the krill fishery in the shelf waters eastwards of South Georgia, during April 1979. The abundance indices calculated at that time for *P. larseni* in three hauls, where juveniles occured in great numbers, were: 880, 1400 and 4500 specimens per 100 kg of krill. The presence of abundant populations of juvenile *Ch. gunnari* and *Ch. aceratus* and was observed by Ślósarczyk (unpublished data) in the krill fishery in the region of Clerke Rocks (South Georgia), during April 1981. For instance, the abundance indices attained to 434 specimens per 100 kg of krill and 13.017 specimens per 0.5 h, exceeding much, similarly to the results obtained by Wolnomiejski and Boberski, any indices for the Bransfield Strait.

For several years, intensive krill fishery has been carried out in the Antarctic. The presence of a fairly big fishing fleet was noted by one of the authors, Kompowski (1980 a) and Wolnomiejski (personal communication) in the investigated area. Some hundreds or thousands of juveniles, if taken in a total catch of 1000 kg of krill are, by units of weight, meaningless in relation to the weight of this catch. However, if the low fecundity of many Antarctic fish species (Hureau 1966, Permitin (acc. to Everson 1977), Kock 1979) is taken under consideration, such abundance of juveniles in catches can be of vital importance. Bearing this in mind, a quite substantial diminishing of recruitment to the stock of some Antarctic fish can occur, particularly in regions exposed to intensive exploitation, in case of further development of the unrestricted krill fishery.

The authors would like to express their gratitude to these colleagues of the research team who contributed to this study by making available the hydrography data and samples on ichthyoplankton.

5. Резюме

В рамах экспедиции ФИБЭКС в феврале и марте 1981 г., во время контрольных уловов криля промысловым пелагическим тралом с длиной нижней подборы 40 м и с мелкоячейной рубашкой (11 мм) в мешке, проводились наблюдения за присутствием и плотностью популяций молоди антарктических рыб в скоплениях криля. Уловы проводились как правило на глубине 24—42 м.

Проведен анализ уловов криля из 56 тралении крылевых концентрации и нескольких тралении планктонными сетями, в которых обнаружено присутствие ихтиопланктон а (рис. 1). В результате, в 42 тралениях тралом и 5 тралениях планктонной сетью было обнаружено 23 видов *Notothenioidei* представителей. Результаты этих наблюдений указаны в таблице I и на рис. 2 а-д. Молодь *Notothenioidei* в эпипелагиали глубоких вод (1600—3700 м) южной части пролива Дрейка не встречалась. Зато чрезнычайно богатая ихтиофауна была обнаружена в скоплениях криля в водах пролива Брансфилда, главным образом в пределах шельфа Антарктического полуострова. В этом раионе было установлено 19 видов подотряда *Notothenioidei*. Чаще всего наблюдались *Channichthyidae*, а среди них: *Chaenodraco wilsoni, Chionodraco rastrospinosus, Cryodraco antarcticus.*

Для определения плотности популяции молоди рыб в скоплениях криля отбирались наугад пробы из 36 тралений. В исследованиях плотность была выражена двумя способами: как число особей, приходящихся на 100 кг пойманного криля, а также как число рыб, пойманных за полчаса траления (средняя продолжительность траления), что определялось на основании численности рыб в пробах и эффективности уловов криля. Результаты вступительных расчетов плотности показаны в таблицах II и III, а также на рис. 3. В шельфовых водах к западу от архипелага Палмера были обнаружены многочисленные (индекс N/0,5 час в широком градиенте от 1 до 1421) популяции молоди *Trematomus bernacchii, T. scotti, Chionobathyscus dewitti.* В проливе Брансфилда численно преобладали *Channichthyidae*, а среди них *Chionodraco rastrospinosus* (индекс N/0,5 час в пределах 12—906, индекс N/100 кг — 2—17) и *Chaenodraco wilsoni* (47—611/0,5 час 1—12/100 кг. Поскольку некоторые из названных видов, к примеру *T. scotti* и *Ch. dewitti*, не считаются многочисленными, то полученные данные, касающиеся этих видов, мы принимаем как преувеличенные, в результате недостатков принятого метода определения численности, особенно в при чрезвычайно высокой эффективности улова криля.

6. Streszczenie

W ramach ekspedycji FIBEX, w lutym i w marcu 1981 r. w trakcie połowów kryla przemysłowym włokiem pelagicznym o długości nadbory 40 m i wkładce drobnooczkowej (11 mm) w worku, prowadzono obserwacje nad występowaniem i liczebnością w skupieniach kryla młodocianych ryb antarktycznych. Głębokość połowów zamykała się przeważnie w granicach 24—42 m.

Dokonano przeglądu 56 zaciągów krylowych oraz kilku zaciągów siatkami planktonowymi, w których wystąpił ichtioplankton (fig. 1). W rezultacie, w 42 zaciągach włokowych oraz w 5 planktonowych stwierdzono wystąpienie 23 gatunków postlarwalnych i młodocianych *Notothenioidei*. Wyniki tych obserwacji przedstawiono w tabeli 1 i na rysunkach 2 a-d. Nie obserwowano młodocianych *Notothenioidei* w epipelagialu głębokich wód (1600–3700 m) południowej części Cieśniny Drake'a. Obecność wyjątkowo bogatej ichtiofauny stwierdzono natomiast w skupieniach krylowych w wodach Cieśniny Bransfielda, głównie ponad szelfem Półwyspu Antarktycznego. Znaleziono tam 19 gatunków z podrzędu *Notothenioidei*. Najczęściej obserwowano *Channichthyidae*, przede wszystkim: *Chaenodraco wilsoni, Chionodraco rastrospinosus* i *Cryodraco antarcticus.*

Do oceny liczebności ryb młodocianych w skupieniach krylowych pobrano losowe próby kryla i ryb z 36 zaciągów. W badaniach zastosowano dwie miary liczebności: liczbę osobników przypadającą na 100 kg złowionego kryla oraz liczbę ryb odłowionych w ciągu 0.5 godziny trałowania (średni czas trałowania), określaną w oparciu o liczebność ryb w próbach i wydajność połowów krylowych. Rezultaty szacunkowych obliczeń zagęszczenia przedstawione zostały w tabelach II i III oraz na rysunku 3. W wodach szelfowych na zachód od Archipelagu Palmera wykryto dość liczne (indeksy N/0,5 h w szerokich granicach od 1 do 1421) populacje młodocianych *Trematomus bernacchii*, *T. scotti* i *Chionobathyscus dewitti*. W Cieśninie Bransfielda wyróżniły się liczebnie *Channicchthyidae*, a wśród nich *Chionodraco rastrospinosus* (indeks N/0.5 h w granicach 12–906, indeks N/100 kg — 2 do 17) i *Chaenodraco wilsoni* (47–611)/0.5 h oraz 1–12/100 kg. Ponieważ niektóre z wymienionych gatunków, na przykład *T. scotti* i *Ch. dewitti*, nie są uznawane za liczne, uzyskane w odniesieniu do nich wyniki traktujemy jako zawyżone, ze względu na wady przyjętej metody szacowania, szczególnie w przypadkach bardzo wysokiej wydajności połowu kryla.

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Paper received 22 April 1982