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## Observations on the ichthyofauna distribution in the regions of the Scotia Sea and Antarctic Peninsula

**ABSTRACT:** Between December 1978 and March 1979 studies on the ichthyofauna distribution in the regions of the Scotia Sea and Antarctic Peninsula were carried out on board of the r/v "Profesor Siedlecki" during the Fourth Polish Marine Antarctic Expedition. Fisheries were carried out using bottom and pelagic trawls. The presence of about 60 species of 15 families, including among others 17 species of *Nototheniidae*, 9 species of *Chaenichthyidae* and 7 species of *Bathyaconidae* was recorded. In the waters of the west regions of the Antarctic such species as *Trematomus centronotus* and *Austrolycichtys botriocephalus* were found.

Key words: Antarctic, fishes, zoogeography, distribution

### 1. Introduction

Intensity of exploitation of Antarctic fishes increases year by year. And thereupon ichthyological researches are of greater, and greater importance since the results obtained may enrich practical economics in information indispensable for proficient management of rational fisheries. Among other studies these researches include observations of the ichthyofauna distribution.

The first scientists analysing these problems with respect to the Antarctic regions were Regan (1913) and Norman (1937, 1938). Later on, the most important studies of this type were made by Andrjašev (1965) and DeWitt (1971). Nowadays, with an increasing number of the Antarctic expeditions, the previous data are subject to continuous verification (Rembiszewski, Krzeptowski and Linkowski 1978, Linkowski and Rembiszewski 1978, Kock 1978, Kock 1979, Sosiński and Skóra in press).

The aim of study is presentation of the data on the distribution of the Antarctic species of fishes, collected during the Fourth Polish Marine Antarctic Expedition on board of the r/v "Profesor Siedlecki".

## 2. Methods

The material used came from the hauls trawled by the r/v "Profesor Siedlecki" in the course of the Fourth Polish Marine Antarctic Expedition between December 1978 and April 1979. Fisheries were carried out using industrial trawls. Since over 90 per cent of the total number of the 132 analysed hauls were dragged from the sea bottom, therefore, the data given in Table I may be considered as particularly representative for benthic species. Pelagic hauls (15) were performed as a rule using hydroacoustic krill recordings. The recorded species of fishes constituted very small by-catch.

Altogether about 60 species of 15 families were caught. Some of the collected fishes not identifiable into species were classified into genus or family. In classification of the fishes of the "Larseni" group, genus *Notothenia*, the taxonomy proposed by Baluškin (1976) was not taken into consideration. In consequence, under the term *Notothenia larseni* there are probably two different species: *N. larseni* from the region of South Georgia and *N. nybelini* living in the remaining parts of the area under investigations.

## 3. Description of the area

The region under investigations covers the area between latitudes 53°S and 69°S and longitudes 91°W and 25°W (Fig. 1). Its southern boundary is marked by the Antarctic Peninsula and a field of pack-ice making impossible farther penetration into the Weddell Sea and Bellinghousen Sea.

The fisheries were carried out on the shelves of the following islands: South Georgia Island, Shag Rocks, South Sandwich Islands, South Orkney Islands, Elephant Island, Joinville Island, South Shetland Islands, Palmer Archipelago, Biscoe Archipelago, Peter I Island (Fig. 1).

## 4. Results

The most richly represented was the family *Nototheniidae* comprising 17 species of 4 genera: *Notothenia*, *Trematomus*, *Dissostichus* and *Pleurogramma* (Table I). The genera *Notothenia* and *Trematomus* were dominant comprising 7 species each. Among *Nototheniidae* 7 species occurred in quantities predestinating them for industrial exploitation. These species were: *Notothenia gibberifrons*, *Notothenia kempi*, *Notothenia rossi marmorata*, *Notothenia coriiceps neglecta*, *Dissostichus mawsoni*, *Pleurogramma antarcticum*.

The following species of the family *Nototheniidae* were most widespread:

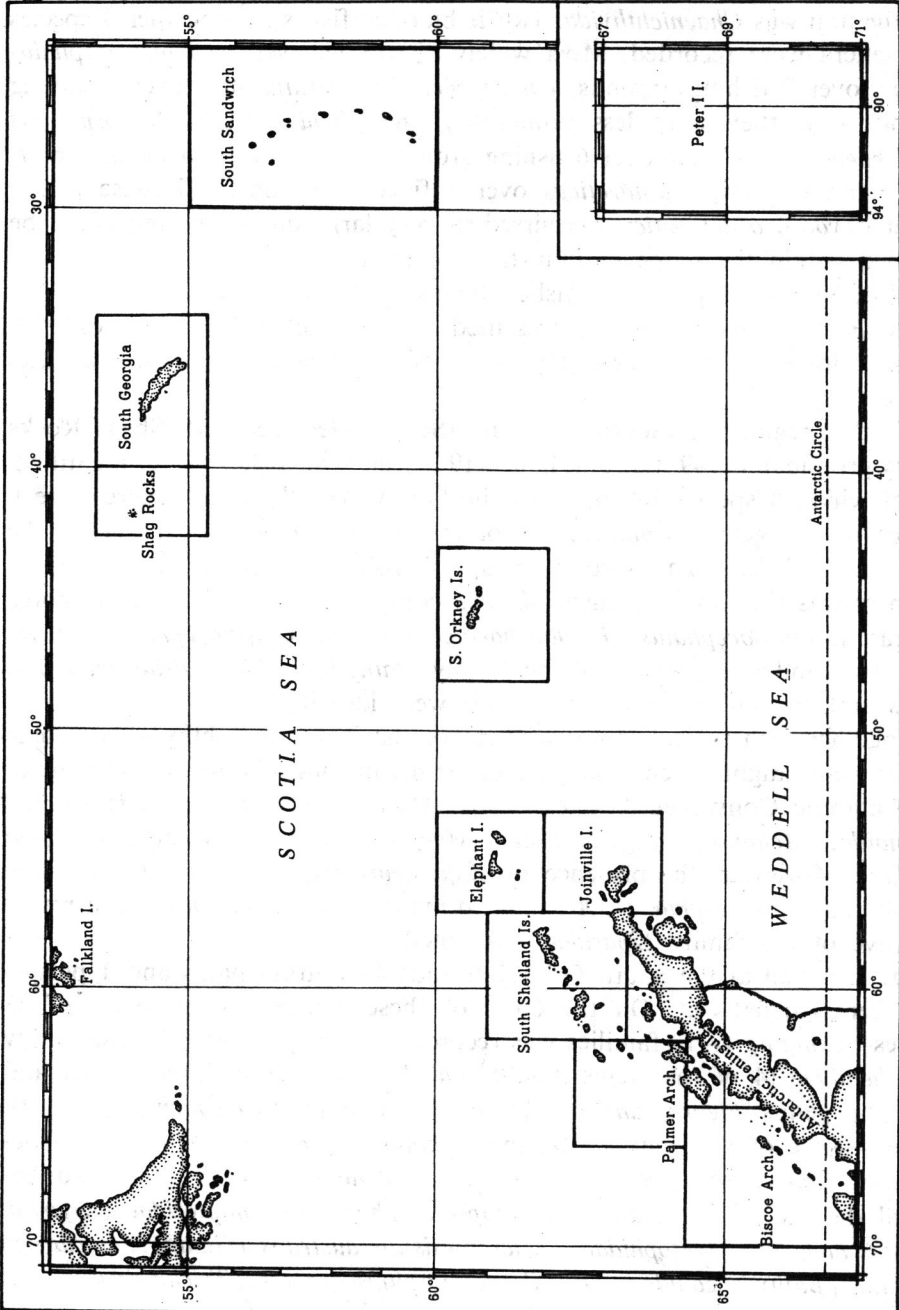


Fig. 1. The regions of the exploration during the Fourth Polish Marine Expedition

*Notothenia gibberifrons* and *Notothenia kemp*i over 8 fishing-grounds and *Trematomus eulepidotus* and *Dissostichus mawsoni* over 6 fishing-grounds.

The second family occurring in greatest numbers in the area under investigation was *Chaenichthyidae* (white-blooded fishes). Altogether 9 species of 9 genera were recorded. Most widely distributed were: *Champocephalus gunnari* over 7 fishing grounds, *Chaenocephalus aceratus* also over 7 fishing grounds (but they were less numerous), then, *Chionodraco rastrospinosus* and *Chaenodraco wilsoni* over 6 fishing grounds and *Pseudochaenichthys georgianus* and *Cryodraco antarcticus* over 5 fishing grounds. All these fishes, except *Cryodraco antarcticus*, occurred in very large quantities and could be included within the scope of industrial exploitation.

Also, the third group of fishes typical for the Antarctic waters, the family *Bathydraconidae*, was represented in the catches by 7 species of 6 genera. However, their quantities were not sufficient for industrial usefulness.

In the region of South Georgia (South Georgia and Shag Rocks fishery-grounds) in 49 bottom hauls 19 species of fishes were identified, out of which 8 species belonged to the family *Nototheniidae*. There were 6 species of the genus *Notothenia*, 1 of the genus *Trematomus* and 1 of the genus *Dissostichus*. The second group of fishes occurring in very great numbers was the family *Chaenichthyidae* comprising representatives of three genera: *Champocephalus*, *Pseudochaenichthys* and *Chaenocephalus*. Moreover, two endemic species of the family *Bathydraconidae* (*Psilodraco breviceps* and *Parachaenichthys georgianus*) were identified.

Together with typical representatives of the Antarctic ichthyofauna some species were caught which usually occur farther northwards, beyond the line of the Antarctic Convergence. These were: *Muraenolepis microps*, *Dissostichus eleginoides*, *Melanostigma gelatinosum*, *Mancopsetta maculata* and *Notothenia guntheri*. Moreover, the presence of *Raja georgiana* (*Rajidae*), *Gymnoscepelus nicholsi* (*Myctophidae*), *Artedidraco mirus* (*Harpagiferidae*) and a representative of the family *Liparidae* was noted.

On the shelf at the South Orkney Islands 11 bottom hauls and 1 pelagic haul were carried out. On the basis of these catches the presence of 23 species belonging to 10 families was recorded. Among them: 9 of the family *Nototheniidae* (4 of the genus *Notothenia*, 4 of the genus *Trematomus* and 1 of the genus *Pleuragramma*) and 6 of the family *Chaenichthyidae* with single species of the genera *Champocephalus*, *Chaenocephalus*, *Pseudochaenichthys*, *Chaenodraco*, *Neopagetopsis* and *Chionodraco*. There was also observed the presence of *Rajidae*, *Anopterus pharao* (*Anopteroideae*), *Gymnoscepelus nicholsi* (*Myctophidae*), *Micromesistius australis* (*Gadidae*), *Gerlachea australis* (*Bathydraconidae*) and *Paradiplospinus gracilis* (*Trichiuridae*).

The region of the Antarctic Peninsula was the largest area of the investigations. It comprised 5 fishing grounds (Joinville Island, South Shetland Islands, Elephant Island, Palmer Archipelago and Biscoe Archipelago)

The distribution of ichthyofauna in the region of the r/v "Profesor Siedlecki" fishing during the IV Polish Marine Antarctic Expedition

Taxa	Fishing areas									
	South Georgia	Shag Rocks	South Sandwich Islands	South Orkney Islands	Elephant Island	Joinville Island	South Shetland Islands	Palmer Archipelago	Biscoe Archipelago	Peter I Island
Fam. <i>Rajidae</i>										
<i>Raja georgiana</i> Norman	+	+								
<i>Raja</i> sp.				+	+	+	+	+	+	
Fam. <i>Bathylagidae</i>										
<i>Bathylagus</i> sp.					+					
Fam. <i>Anotopteridae</i>										
<i>Anotopterus pharao</i> Zugmayer				×						
Fam. <i>Paralepidae</i>										
<i>Notolepis coatsi</i> Dollo										×
Fam. <i>Myctophidae</i>										
<i>Gymnoscopelus nicholsi</i> Gilbert				+			×	+	+×	×
<i>Electrona antarctica</i> (Günther)									×	×
<i>Krefflichthys anderssoni</i> (Lönnberg)										×
<i>Myctophidae</i> gen. sp.			×		+				+	
Fam. <i>Gadidae</i>										
<i>Micromesistius australis</i> Norman				+	+	+	+	+	+	
Fam. <i>Macruridae</i>										
<i>Chalinura whitsoni</i> Regan					+					
Fam. <i>Muraenolepidae</i>										
<i>Muraenolepis microps</i> Lönnberg	+	+		+	+	+		+	+	
Fam. <i>Nototheniidae</i>										
<i>Notothenia gibberifrons</i> Lönnberg	+	+		+	+	+	+	+	+	
<i>N. rossi marmorata</i> Fischer	+			+	+		+			
<i>N. coriiceps neglecta</i> Nybelin					+	+	+			
<i>N. kempii</i> Norman	+	+		+	+	+	+	+	+×	
<i>N. larseni</i> Lönnberg	+	+		+	+	+	+	+	+	
<i>N. nudifrons</i> Lönnberg	+	+			+	+	+			
<i>N. guntheri</i> Norman		+								
<i>Trematomus hansonii</i> Boulenger	+			+		+	+			
<i>T. eulepidotus</i> Regan				+	+	+	+	+	+	
<i>T. scottii</i> (Boulenger)				+		+	+	+	+	
<i>T. newnesi</i> Boulenger						+	+			
<i>T. nicolai</i> (Boulenger)				+		+				
<i>T. bernacchii</i> Boulenger					+	+	+			
<i>T. centronotus</i> Regan						+				
<i>Dissostichus eleginoides</i> Smitt	+	+								
<i>D. mawsoni</i> Norman					+	+	+	+	+	×
<i>Pleuragramma antarcticum</i> Boulenger				+			+	+	+×	×
Fam. <i>Harpagiferidae</i>										
<i>Artedidraco mirus</i> Lönnberg	+	+								
<i>Histiodraco</i> sp.									+	
<i>Pogonophryne marmoratus</i> Norman				+			+		+	
<i>Pogonophryne</i> sp.					+	+				
Fam. <i>Bathydraconidae</i>										
<i>Bathydraco</i> sp.					+		+	+	+	
<i>Gerlachea australis</i> Dollo				+						
<i>Prionodraco evansi</i> Regan						+				
<i>Parachaenichthys georgianus</i> Fischer	+					+	+	+		
<i>P. charcoti</i> Vaillant					+	+	+			
<i>Psilodraco breviceps</i> Regan	+									
<i>Gymnodraco acuticeps</i> Boulenger						+	+	+	+	
Fam. <i>Chaenichthyidae</i>										
<i>Champsocephalus gunnari</i> Lönnberg	+	+		+	+	+	+	+	+	
<i>Pagetopsis macropterus</i> Boulenger					+	+	+		+	
<i>Neopagetopsis ionah</i> Nybelin				+	+	+	+			
<i>Pseudochaenichthys georgianus</i> Norman	+			+	+	+	+	+		
<i>Dacodraco hunteri</i> Waite						+				
<i>Chaenocephalus aceratus</i> (Lönnberg)	+	+		+	+		+	+	+	
<i>Cryodraco antarcticus</i> Dollo					+	+	+	+	+	
<i>Chionodraco rastrospinosus</i> DeWitt & Hureau				+	+	+	+	+	+	
<i>Chaenodraco wilsoni</i> Regan				+	+	+	+	+	+	
Fam. <i>Zoarcidae</i>										
<i>Austrolycichthys</i> sp.					+	+	+			
<i>A. bothriocephalus</i> (Pappenheim)					+		+			
<i>A. concolor</i> (Roula et Despax)							+	+		
<i>Melanostigma gelatinosum</i> Günther										
Fam. <i>Trichiuridae</i>										
<i>Paradiplospinus gracilis</i> Brauer			×	+						
Fam. <i>Liparidae</i>										
<i>Liparidae</i> gen. sp.	+									
Fam. <i>Bothidae</i>										
<i>Mancopsetta maculata</i> Günther	+	+								
Total	19	12	2	23	29	27	32	20	22	6

+ — bottom trawls

× — pelagic trawls

in which the composition of the observed ichthyofauna was greatly differentiated. In the scope of control catches 56 bottom and 5 pelagic trawls were carried out in this region. Altogether 42 species of fishes of 11 families were identified, among them predominated: *Nototheniidae* with 15 species of 4 genera (*Notothenia*, *Trematomus*, *Dissostichus* and *Pleurogramma*) and *Chaenichthyidae* with 9 species of 9 genera (*Champscephalus*, *Pseudochaenichthys*, *Chionodraco*, *Cryodraco*, *Neopagetopsis*, *Pagetopsis*, *Dacodraco*).

Joinville Island fishing-ground, where 27 different species of fishes were identified, was characterized above all by mass-occurrence of the species *Chaenodraco wilsoni*.

The South Shetland Islands fishing-grounds, being under influence of the mixing of waters from the Bellingshausen Sea, Drake Passage and the Weddell Sea, showed the highest specific differentiation of the ichthyofauna. In the carried out haulings 31 species of fishes were identified, out of them 13 species belonged to *Nototheniidae* and as many as 9 species to *Chaenichthyidae*.

The third very distinctive fishing-ground was the shelf of the Biscoe Archipelago, where mass-occurrence of *Pleurogramma antarcticum* (*Nototheniidae*) was observed at the sea bottom. *Notothenia kempfi* occurred likewise in large numbers. Altogether 21 species of fishes were identified in this fishing-ground.

In the region of the South Sandwich Islands only two pelagic trawls were performed in which the presence of two species of fishes was noted, one from the family *Myctophidae* another of the family *Trichiuridae* (*Paradiplospinus gracilis*).

In the regions of Peter I Island 7 pelagic trawls were carried out. It was the only possible way of fishing in this area. The presence of juvenile specimens of *Dissostichus mawsoni* (*Nototheniidae*) among 6 species registered is noteworthy.

## 5. Discussion

The investigations confirmed that the region of the fishery-grounds of the South Georgia shelf and Shag Rocks lying on the northern border of the Antarctic waters is penetrated by some species of fishes living in the waters of the Subantarctic Zone: *Muraenolepis microps*, *Notothenia guntheri*, *Dissostichus eleginoides*, *Melanostigma gelatinosum*, *Mancopsetta maculata* (Andrjašev 1965, De Witt 1971, Rembiszewski, Krzeptowski and Linkowski 1978, Kock 1978, Kock 1979, Sosiński and Skóra, in press). The fact of the presence of only one species of the genus *Trematomus* (*T. hansonii*) very characteristic for the coastal waters of Antarctica may evidence the differences in the prevailing ecological conditions.

A slightly different specific composition was noted in the fishery ground of the South Orkney Islands where the proximity of the Weddell Sea has a great effect upon the existing hydrological phenomena. A greater number of species (4) of the genus *Trematomus*, as compared with the precedent region, was recorded. Among *Chaenichthyidae* *Chionodraco rastrispinosus* was predominant; also other, typically Antarctic white-blooded fishes: *Neopagetopsis ionach* and *Chaenodraco wilsoni* were observed.

In the region of the Antarctic Peninsula, comprising within its range the fishing-grounds of Joinville Island, South Shetland Islands and Palmer and Bischoff Archipelagos, the recorded specific composition of the catches was characteristic for the coastal waters of West Antarctica continent. Among nototheniid fishes of the genus *Trematomus* (7 species) were dominant. *Trematomus centronotus* seems to be recorded for the first time in this region, the presence of *Trematomus nicolai* in the Weddell Sea would corroborate an earlier observation made by Everson (1968). Moreover 4 species of *Bathydraconidae* and as many as 9 representatives of *Chaenichthyidae* were noted as well. The presence of *Dacodraco hunteri* among the latter is noteworthy. It is the second case of the catch of this fish in this region. For the first time a specimen of this species was caught by Rembiszewski, Krzeptowski and Linkowski (1978). Also, the occurrence of *Austrolycichthys bothriocephalus* among this ichthyofauna of the West Antarctic is a new information about its presence hitherto.

In the regions of the South Sandwich Islands and Peter I Island, due to unfavourable configuration of the sea bottom and too great depths; only pelagic trawls was carried out on the basis of the hydroacoustic recordings of krill swarms. The material obtained in this way was very scarce and the collected data supplemented the present knowledge with new information about the occurrence of juvenile fishes of the species *Dissostichus mawsoni* in the region of Peter I Island.

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## 6. Резюме

Во время IV Польской Морской Антарктической Экспедиции на НИС „Профессор Седлецки” с декабря 1978 до апреля 1979 г. в районах Моря Скоша и Антарктического полуострова (рис. 1) было проведено 137 тралений, на основании которых исследовался состав и распределение ихтиофауны, населяющей этот район.

Было установлено присутствие 60 видов рыб из 15 семейств (таблица 1). Среди них было 17 видов из семейства *Notothenidae* 9 из *Chaenichthyidae* и 7 из *Bathydraconidae*. Исследования показали, что виды, населяющие субантарктические воды (*Muraenolepis microps*, *Notothenia guntheri*, *Dissostichus eleginoides*, *Melanostigma gelatinosum*, *Mancopsetta maculata*) выступают ниже линии конвергенции, населяя шельф островов района Южной Георгии.

Впервые в Западной Антарктике были обнаружены такие виды как: *Trematomus*

*centronotus* i *Austrolycichthys bothriocephalus*. Подтвердились также ранние наблюдения, касающиеся наличия в этой части Антарктики рыб из видов *Trematomus nicolai* i *Dacodraco hunteri*. В районе Острова Петра I были уловлены молодые особи *Dissostichus mawsoni*.

## 7. Streszczenie

W czasie IV Polskiej Morskiej Ekspedycji Antarktycznej na r/v "Profesor Siedlecki" od grudnia 1978 do kwietnia 1979 w rejonach Morza Scotia i Półwyspu Antarktycznego (rys. 1) przeprowadzono 137 zaciągów na podstawie których badano skład i rozmieszczenie ichtiofauny zasiedlającej ten obszar.

Określono występowanie około 60 gatunków ryb z 15 rodzin (tabela I). Wśród nich było 17 gatunków z rodziny *Nototheniidae*, 9 z *Chaenichthyidae* i 7 z *Bathydraconidae*. Stwierdzono, że gatunki żyjące w wodach subantarktycznych (*Muraenolepis microps*, *Notothenia guntheri*, *Dissostichus eleginoides*, *Melanostigma gelatinosum*, *Mancopsetta maculata*) występują poniżej linii konwergencji zasiedlając szelfy wysp rejonu Południowej Georgii.

Po raz pierwszy w Zachodniej Antarktyce odnotowano takie gatunki jak *Trematomus centronotus* i *Austrolycichthys bothriocephalus*. Potwierdzono wcześniejsze obserwacje o występowaniu w tej części Antarktyki ryb z gatunków *Trematomus nicolai* oraz *Dacodraco hunteri*. W rejonie Wyspy Piotra I-go złowiono młode osobniki *Dissostichus mawsoni*.

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