ICHTHYOPLANKTON OF BRANSFIELD STRAIT — ANTARCTICA

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ABSTRACT

A preliminary study on the distribution and abundance of ichthyoplankton related with ecological data were made during the southern summer 1982/83 from material collected from the oceanographic R/V "Professor W. Besnard" in the Bransfield Strait — Antarctica.

From 210 larvae caught in the area, 10 species were identified: **Pleuragramma antarcticum, Notothenia larseni, Notothenia gibberifons, Notothenia kempi, Notothenia nudifrons** (Nototheniidae); **Notolepis coatsi** (Paralepididae); **Electrona antarctica** (Myctophidae); **Artedidraco skottsbergi, Harpagifer bispinis** (Harpagiferidae) and **Champsocephalus gunnari** (Channichthyidae).

Besides this, the spawning period and occurrence of larvae related with water masses were considered.
Key words: Ichthyplankton, Antarctica, Distribution.

RESUMO

ICTIOPLÂNCTON DO ESTREITO DE BRANSFIELD — ANTÁRTICA

Estudo preliminar sobre distribuição e abundância de ictioplâncton relacionado com os dados ecológicos foi realizado durante o verão austral 1982/83 com o material coletado a bordo do N/Oc. "Professor W. Besnard", no Estreito de Bransfield — Antártica. Dos 210 exemplares de larvas capturadas na área, 10

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espécies foram identificadas: **Pleuragramma antarcticum, Notothenia larseni, Notothenia gibberifrons, Notothenia kempi, Notothenia nudifrons** (Nototheniidae); **Notolepis coatsi** (Paralepididae); **Electrona antarctica** (Myctophidae); **Artedidraco skottsbergi, Harpagifer bispinis** (Harpagiferidae) and **Champsocephalus gunnari** (Channichthyidae).

Paralelamente foram considerados o período de desova e a ocorrência das larvas relacionada com massas de água.

Palavra chave: Ictioplâncton, Antártica, Distribuição.

INTRODUCTION

A preliminary study on ichthyoplankton in the Bransfield Strait — Antarctica was conducted on board of the oceanographic R/V "Professor W. Besnard" as a preparation for the Second International BIOMASS Experiment during southern summer 1982/83 (PROANTAR I — Primeiro Programa Antártico Brasileiro).

According to Clowes (1934), Bransfield Strait is bounded, on the northwest side, by the various island of the South Shetland group; on the southeast side by the Antarctic Peninsula; on the west by Smith, Low and Hoseason Islands and on the east there is a free communication with the Weddel Sea (Fig. 1). The water in this area is a complex result of the interaction of Bellingshausen Sea and Weddel Sea waters and local influence (SCAR/SCOR/IABO/ACMRR — 1982, 1983).

Considering that the fish are key components within the Antarctic ecosystem (Hureau, 1982), the objective of this study was to describe the distribution and abundance of ichthyoplankton related with some ecological data in Bransfield Strait.

Many aspects on adults of Antartic fish fauna, like distribution, composition, behaviour, reproductive biology and morphology have been reported by several authors: Norman (1940); De Witt and Tyler (1960); Andriashev (1965); Everson (1969); Permitin and Sil'Yanova (1971); Permitin (1973); Hureau and Tomo (1977); Anderson and Hureau (1979); Moreno (1980); Rembiszewiski (1981); Iwani and Abe (1982); Burchett et al. (1983); Eastman (1985); Kock (1985). Concerning the larval, postlarval and juvenile stages information has been reported

as follows: Regan (1916) described Antarctic and sub-Antarctic fishes; Marshall (1953) compared the egg size of Arctic, Antarctic and deep-sea fishes; Pertseeva and Osshtrounova (1967) described the larval stages of **Protomyctophum** and **Electrona** in the Southern parte of the Indian Ocean and the Northern Pacific; Robertson and Mito (1979) reported ichthyoplankton of the Southeastern coast of New Zealand; Rakusa-Suszczewski (1981) found considerable quantities of Nototheniidae on the northern side of the South Shetland Islands; Wörner and James (1981) contributed with early life history of **Notothenia gibberifrons;** Slosarczyk and Rembiszewski (1982) informed about the occurrence and abundance of the Nothotenioidei group; White et al. (1982) described the development of **Notothenia neglecta;** Keller (1983) contributed with an early life history of **P. antarcticum** of Weddel Sea; Mujica and Torres (1983), studying Antarctic zooplankton, gave the distribution of ichthyoplankton in Bransfield Strait; Rasoanarivo and Aboussouan (1983) noticed the geographical distribution and description of **Electrona antarctica;** Kellermann and Kock (1985) described the distribution of notothenioids in the southern Scotia Sea and northern Weddel Sea and Kellermann and Slosarczyk (1985) informed about the distribution of Notothenioidei in the Atlantic Sector of the Southern Ocean.

In the Bransfield Strait scarce reference is made about the early development of fishes and this paper adds some data to the knowledge of early life cicle in this area.

MATERIAL AND METHODS

The plankton collections used for analysis in this study were obtained from the oceanographic R/V "Prof. W. Besnard" during the PRAONTAR I in two cruises: the first From January 10th to 19th (28 stations) and the second from January 31th to February 9th (28 stations) along Bransfield Strait (Fig. 2).

Double oblique tows were made at all stations with the paired 60cm bongo (B) net sampler provided with flowmeter. Towing speed was 2 to 3 knots.

Stratified plankton samples were made with 60cm closing (C) net, fitted with 330 μm monyl mesh provided with flowmeter. Plankton sampling was conducted at two strata, mainly from 300-150m and 150-0m.

All plankton collected by the nets was fixed and preserved in 4% buffered seawater formaldehyde. In the laboratory the ichthyoplankton were sorted, identified, counted and measured using an ocular micrometer mounted in a Wild M-8 setereozoom dissecting microscope. The identification of larvae was based on Regan (1916); Hureau (1982); North and White (1982) and Efremenko (1983).

The number of fish larvae was reported as number per 1.000m^3 of water sampled, given an estimative of abundance for each station.

Temperature, salinity and dissolved oxygen were obtained at each tow with Nansen bottles equipped with reversing thermometer. The hydrographic data were provided by pysical oceanographers from the "Universidade de São Paulo".

The distribution of the larvae was related to 7 different water masses reported by Ikeda et al. (1983); Inshore water (S), Bellingshausen water (B), Bransfield-Shetland water (BRS), Bransfield Central water (BRC), Bransfield-Weddel water (BRW), Weddel-Bransfield water (WBR) and Weddel water (W).

RESULTS AND DISCUSSION

A total of 210 larvae were caught in two cruises with 28 stations each one along Bransfield Strait-Antarctica. Of this material, 10 species were identified belonging to the Nototheniidae, Paralepididae, Myctophidae, Harpagiferidae and Channichthyidae.

NOTOTHENIIDAE

Nototheniidae or so-called Antarctic cods consist of 5 genera (Andriashev, 1965) and in the Bransfield Strait 2 were found: **Pleuragramma** represented by **P. antarcticum** (Boulenger, 1902) an **Notothenia** represented by **N. kempi** (Norman, 1937), **N. nudifrons** (Lönnberg, 1905), **N. gibberifrons** (Lönnberg, 1905)

and **N. larseni** (Lönnberg, 1905). The genus **Notothenia** according to Andriashev, (op. cit.) is the most abundant in species containing not less than 30, however, in the considered area, only 5 species were found. This information is confirmed by Mujica and Torres (1983) studying the same area.

Pleuragramma antarcticum Boulenger, 1902, or antartic hering was the most abundant species, representing 35.24% of all fish larvae. Hubold (1985), studying postlarvae in the Weddel Sea, obtained the same result. Mujica and Torres (1983) also found high number of this species in the considered area. Distribution of density and absolute number of larvae related with hydrographic data show the highest incidence in station 4409 (TABLE I). The maxima and minima values of temperature, salinity and dissolved oxygen in positively sampled stations varied from (-1.19)-2.61°C; 33.02 — 34.84‰ and 2.29-8.01ml/l, respectively.

The spatial distribution (Figs. 3 and 4) shows the occurrence of **P. antarcticum** in 5 different water masses with dominance in S type (TABLE XI). The size of the larvae ranged from 6.00 to 46.00mm SL. The predominat length frequency was 16.00mm SL (Fig. 5). The presence of small larvae indicates that the probable spawning period extends to the summer season. According to Efremenko, (1983) the spawning period of **P. antarcticum** is the end of winter and beginning of spring. Regan (1916) and De Witt and Tyler (1960) found larvae from October to December. The mean density of the larvae in positively sampled stations is given in TABLE XII.

Notothenia larseni Lönnberg, 1905, was the second most abundant species, represented by 22.40% of the total larvae caugth. The occurrence of the larvae was also observed by Mujica and Torres (1983), in the same region. Distribution of density and absolute number of larvae related with hydrographic data show the highest value at station 4395 (TABLE II).

The maxima and minima values of temperature, salinity and dissolved oxygen in positively sampled stations were, respectively: (-1.75)-2.42°C; 23.53-34.55% and 3.19-8.68ml/l.

The larvae were found in all water masses with dominance in BRC type (Figs. 3-4 and TABLE XI). The size of the considered

species ranged from 6.80 to 20.70mm SL (Fig. 6). The spawning period of **N. larseni** is the same of **N. gibberifrons** (Efremenko, 1983) and the larvae occur from Spetember to April. Permitin and Sil'Yanova (1971) and Kock (1985) established autumn and winter as the spawning seasons. The percentage of larvae for each water mass and mean density in positively sampled station are indicated in TABLES XI and XII. The occurrence of small larvae in our samples confirmed the spawning period as autumn and winter.

Notothenia gibberifrons Lönnberg, 1905, was represented by 1.43% of the total larvae caugth. Distribution of density and absolute number of larvae related with hydrographic data are shown in TABLE III. The maxima and minima values of temperature, salinity ond dissolved oxygen in positively sampled stations were, respectively: (-0.06)-2.30°C; 32.08-34.33% and 5,21-7,58ml/l. The occurrence of the larvae in 2 different water masses (BRC and B), as well as the percentage for each one, are indicated in Fig. 4 and TABLE XI. The size of the larvae ranged from 29.00 to 35.00mm SL. The spawning period of **N. gibberifrons,** according to Regan (1916), extends from May to September, but Efremenko (1983) reported it as the end of winter and beginning of spring. Wörner and James (1981) and Kock (1985) informed that **N. gibberifrons** spawned during the Antartic winter around the S. Georgia, S. Orkney and S. Shetland Islands. The mean density of the larvae in positively sampled stations is given in TABLE XII.

Notothenia kempi Norman, 1937, was represented by 15.71% of the total larvae caught. Distribution of density and absolute number of larvae related with hydrographic data are shown in TABLE IV, with the highest value at station 4428. The maxima and minima values of temperature, salinity and dissolved oxygen in positively sampled stations were, respectively: (-1.17)-1.98°C; 33.02-34.60% and 2.29-8.68ml/l.

The percentage and spatial distribution of the larvae in 5 different water masses are indicated in Fig. 4 and TABLE XI. The size ranged from 9.49 to 40.78mm SL with dominant length frequency in 11.00mm SL (Fig. 7). The spawning seasons are spring or early summer according to Efremenko, (1983) and Kock (1985). Efremenko (op. cit.) studying the Scotia Sea off South Orkney and

South Shetland Islands, found larvae from January to March. Permitin and Sil'Yanova (1971) established autumn and winter as the spawing seasons. The mean density of the larvae in positively sampled stations is indicated in TABLE XII. Our resuts confirm the period of spawning reported by Efremenko (1983) and Kock (1985).

Notothenia nudifrons Lönnberg, 1905, was represented by 3.81% of the total larvae caught. Distribuition of density and absolute number of larvae related with ecological data are shown in TABLE V. .The maxima and minima values of temperature, salinity and dissolved oxygen in positively sampled station were (-0.98)-2.42°C; 33.50-34.66% and 2.29-7.55ml/l, respectively. According to the Figs. 3 and 4 the species occurred in 4 water masses in different percentage (TABLE XI). The size of the larvae ranged from 10.2mm to 18.2mm SL. The spawning period according to Permitin and Sil'Yanova (1971) and Kock (1985) takes place during autumn season. The mean density of the larvae in positively sampled stations is given in TABLE XII.

PARALEPIDIDAE

Notolepis coatsi Dollo, 1908. In this family only one species, **Notolepis coatsi** was registered in the sampled area representing 9.05% of all fish larvae. Distribution of density and absolute number of larvae related with ecological data show the maximum value at station 4408 (TABLE VI). The maxima and minima values of temperature, salinity and dissolved oxygen in positively sampled stations were, respectively: (-1.59)-1.66°C; 33.60-34.66% and 4.25-8.19 ml/l.

According to the Figs. 3 and 4 the species occurred in 5 different water masses. The highest incidence of larvae in BRW water (TABLE XI) indicates, probably, a preference of **N. coatsi** for that specific water, however, to improve the present information, more study will be necessary. The size of the larvae ranged from 6.27 to 42.00mm SL. The occurrence of small larvae indicates a probable spawning period in early summer. Efremenko (1983) studying larvae from Scotia Sea, Bellingshausen and "Lazarev" Seas south of the Antarctic Convergence reported the catch period of larvae from August to May but in the Scotia

Sea, the larvae and postlarvae were found throughout the year. He also mentioned the spawning depth as not less than 200m. The mean density of the larvae in positively sampled stations is given in TABLE XII.

MYCTOPHIDAE

Myctophidae are represented by about 6 genera including 14 species (Andriashev, 1965). In Bransfield Strait only **Electrona antarctica** GÜNTHER, 1878 was identified corresponding to 4.30% of the total larvae caught. 6.19% of this family could not be classified to species level but probaly belong to the genus **Protomyctophum.** Distribution of density and absolute number of larvae related with ecological data show the highest value in station 4432 (TABLE VII). The maxima and minima values of temperature, salinity and dissolved oxygen in positively sampled stations were, respectively: (-0.92)-1.92°C; 33.70-34.52% and 5.15-8.62ml/l. The spatial distribution and percentage of the larae related with different water masses (Fig. 4 and TABLE XI) shows a probable preference of **E. antarctica** to B water. The size of the larvae ranged from 6.27 to 7.34mm SL. The occurrence period of the larvae is August to May according to Efremenko (1983) in the Scotia Sea, Bellingshausen and "Lazarev" Seas south of Antarctic Convergence. The same author also informed that all the eggs and prelarvae were collected between 200-1,000m depths and larvae and postlarvae were found throughout the year in the Scotia Sea. The mean density of the larvae in positively sampled stations is given in TABLE XII.

CHANNICHTHYIDAE

Channichthyidae or ice fishes consist of 9 genera of which 8 are confined to the Antarctic zone (Norman, 1940). According to Andriashev (1965), 17 species are known, belonging to 10 genera. The great majority inhabits the Antarctic region living at a depth not less than 100 — 200 m. From material caught in Bransfield Strait, **Champsocephalus gunnari** Lönnberg, 1905 was poorly registered (19.84/1,000m^3), represented by one specimen, corresponding 0.47% of the total larvae caught. The occurrence of the larva related with ecological data is given in

TABLE VIII. The specimen with 29.00mm SL was caught in BRS water mass (Fig. 3 and TABLE XI), with temperature, salinity and dissoveld oxygen ranging from 0.01-0.68°C; 33.88-34.32% and 5.82-6.96ml/l., respectively. Regan (1916), studying a mature female caught in South Georgia, reported May as the spawning month. Efremenko (1983) cites the end of autumn or beginning of winter as the spawning season. He also caught larvae from August to March in Scotia Sea and the South Orkney Islands. Kock (1985) obtained identical results studying the same area. Permitin, 1973, established March — April as the spawning period around the S. Georgia. According to Burchett et al. (1983) the spawning period extends from March to May.

HARPAGIFERIDAE

Harpagiferidae or Plunder-fishes are small bottom fishes. In this family 5 genera with 11 species are know (Andriashev, 1965). In the studied area 2 species occurred: **Artedidraco skottsbergi** (Lönnberg, 195) and **Harpagifer bispinis** (Schneider, 1801).

Artedidraco skottsbergi Lönnbergi, 1905, was found representing 0.95% or 2 specimen of all fish larvae. The lowest density related with hydrographic data is shown in TABLE IX. Temperature, salinity and dissolved oxygen ranged from: (-1.39)-2.30°C, 33.00-34.53% and 4.00-7.58ml/l, respectively. **A. skottsbergi** occurred in B and BRS water masses with 17.5mm and 25.00mm SL (Fig. 4 and TABLE XI). Regan (1916), studying the material caught in Hut Point and Ross Islands, reported occurrence period in the summer season. The mean density of the larvae in positively sampled stations in given in TABLE XII.

Harpagifer bispinis Schneider, 1801, was represented only by one specimen corresponding to 0.47% of the total larvae caught. The occurrence of the larva related with ecological data is indicated in TABLE X. The specimen with 6,8mm SL occurred in B water mass with temperature, salinity and dissolved oxygen ranging between 0.46-0.68°C; 34.45-34.54‰ and 2.59-3.74 ml/l, respectively (Fig. 3 and TABLE XI). The spawning season of the species is spring or early summer (Efremenko 1983), but according to Kock (1985) it is antumn, in the Antarctic Peninsula.

SUGGESTION

The dynamics of sea water and interaction of different water masses in Bransfield Strait can contribute in many aspects of sea fishes, however, the material analysed in the present paper is not enough to make general conclusions. Further investigations will be necessary to have more precise information about distribution and abundance of distinctive species of fish larvae.

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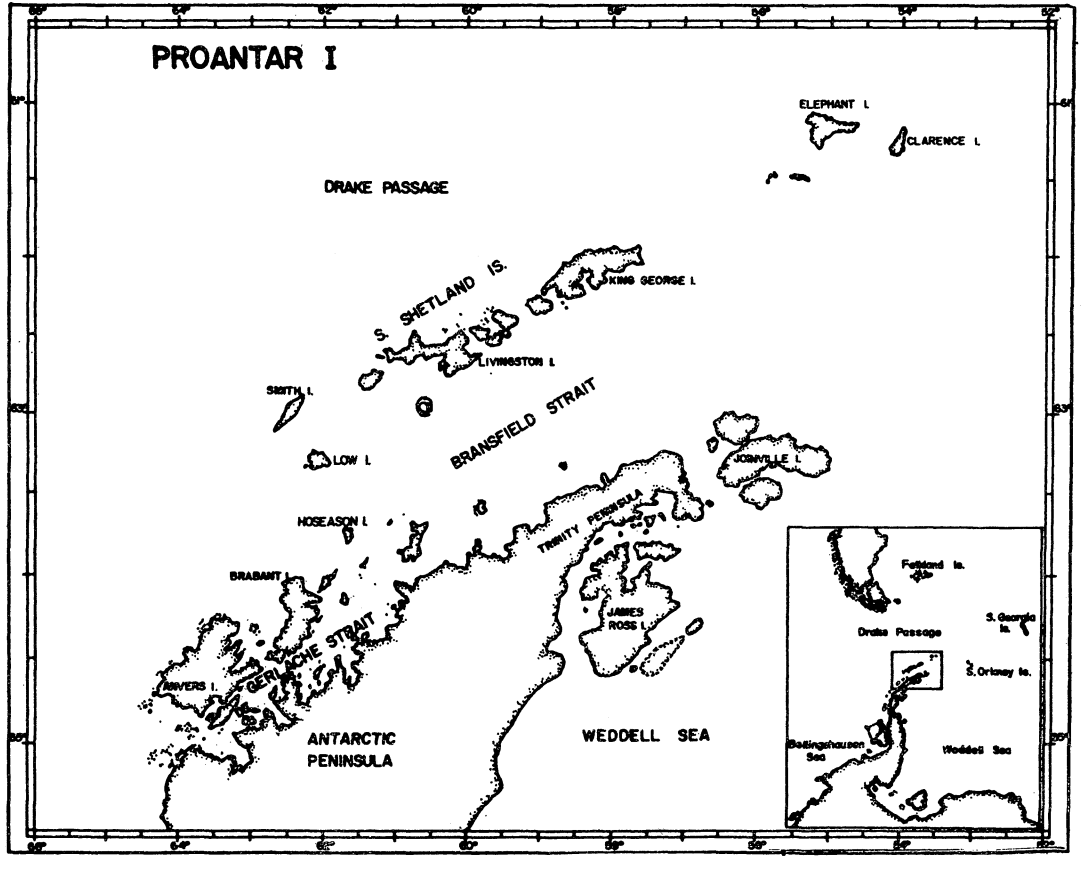

Fig. 1. The investigation area in the Bransfield Strait — Antarctica.

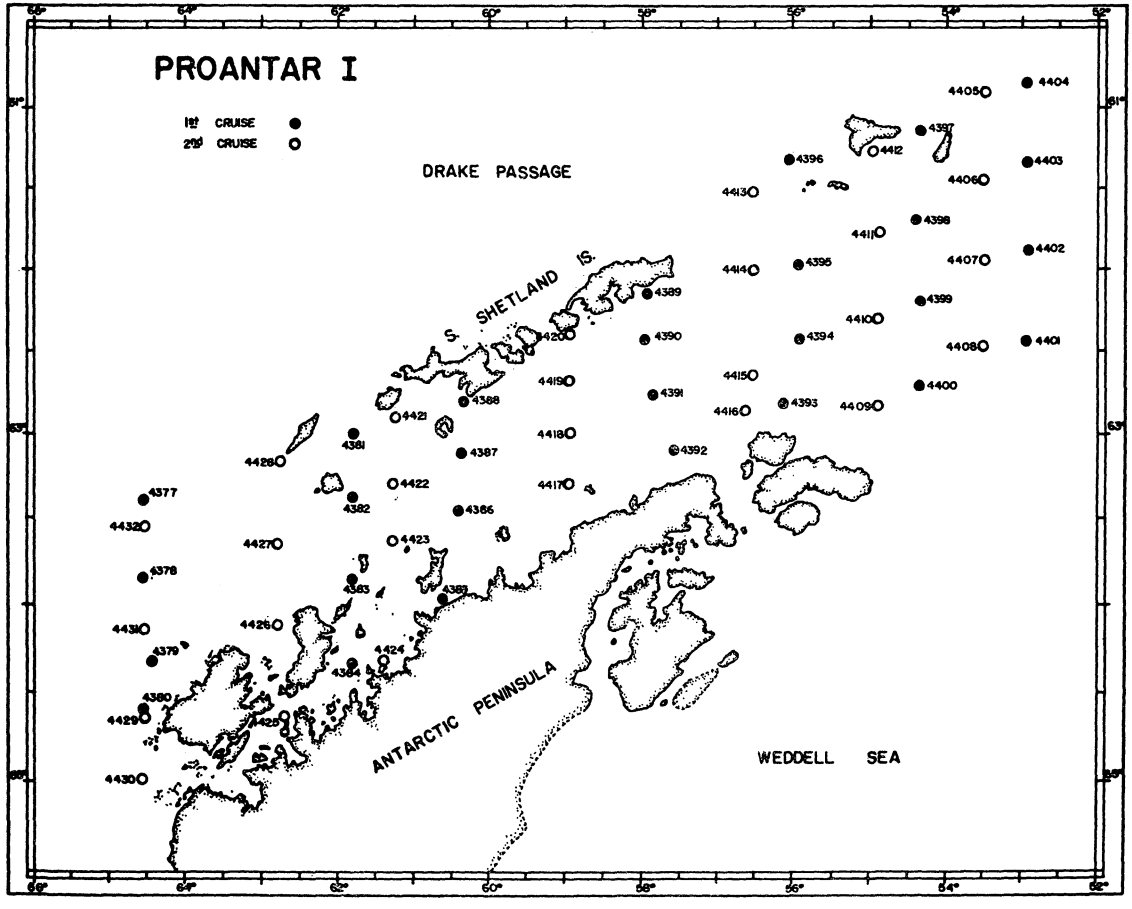

Fig. 2. Ichtyoplankton sampling stations in the Bransfield Strait during the PROANTAR I (1982/83).

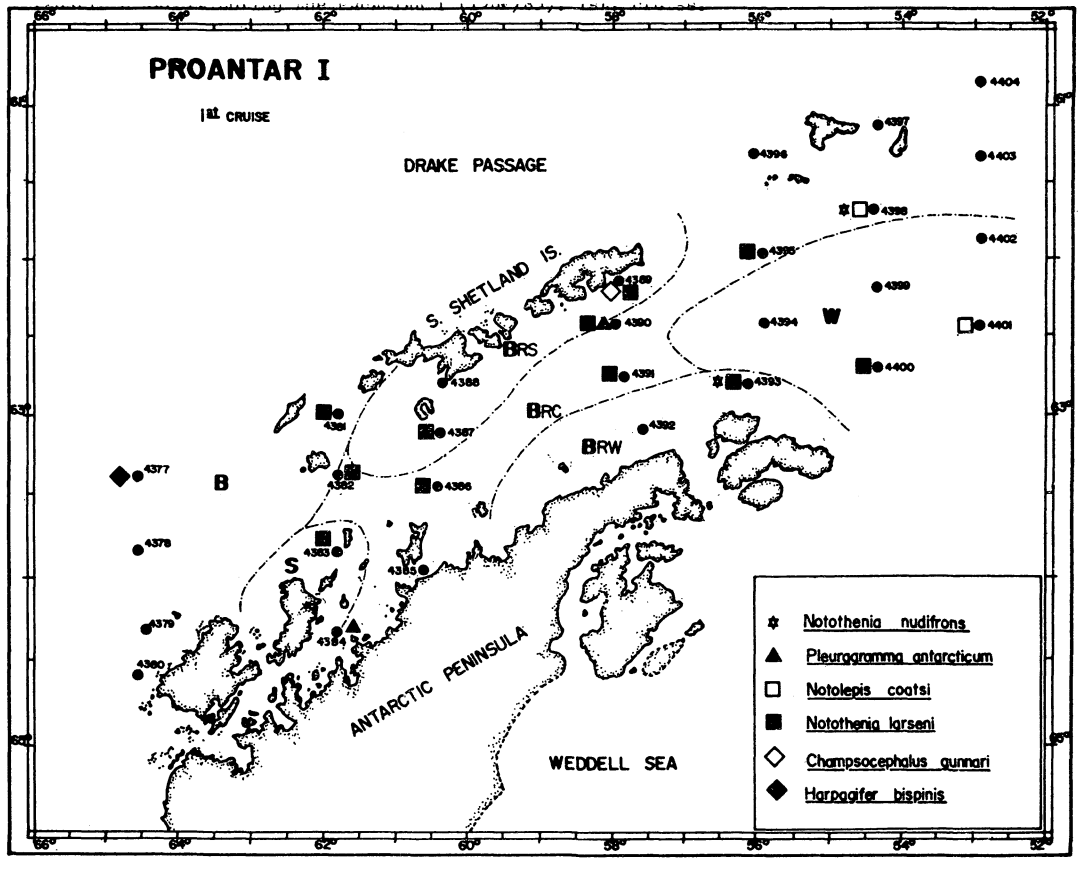

Fig. 3. Distribution of Antarctic fish larvae related with different water masses in the Bransfield Strait during the PROANTAR I (1982/83). Ist. cruise.

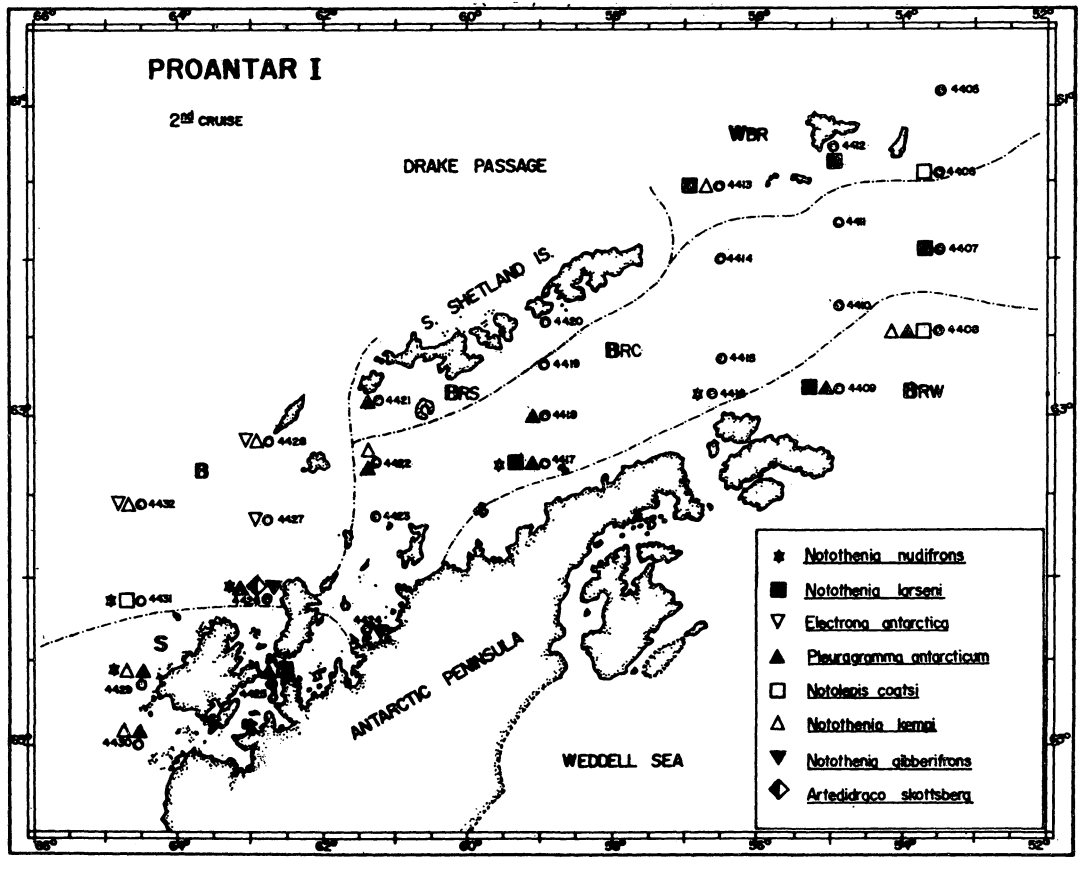

Fig. 4. Distribution of Antarctic fish larvae related with different water masses in the Branfield Strait during the PROANTAR I (1982/83). 2nd. cruise.

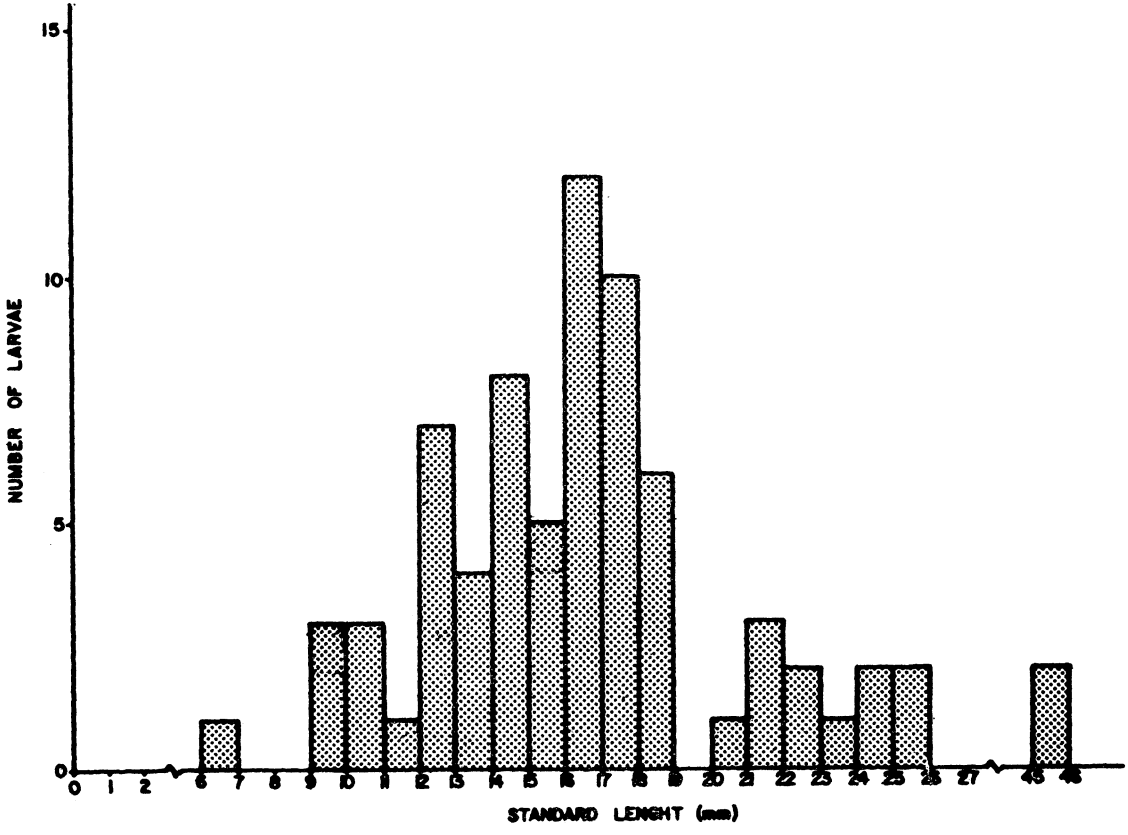

Fig. 5. Size frequency distribution of **Pleuragramma antarcticum** caugth in the Bransfield Strait during the PROANTAR I (1982/83).

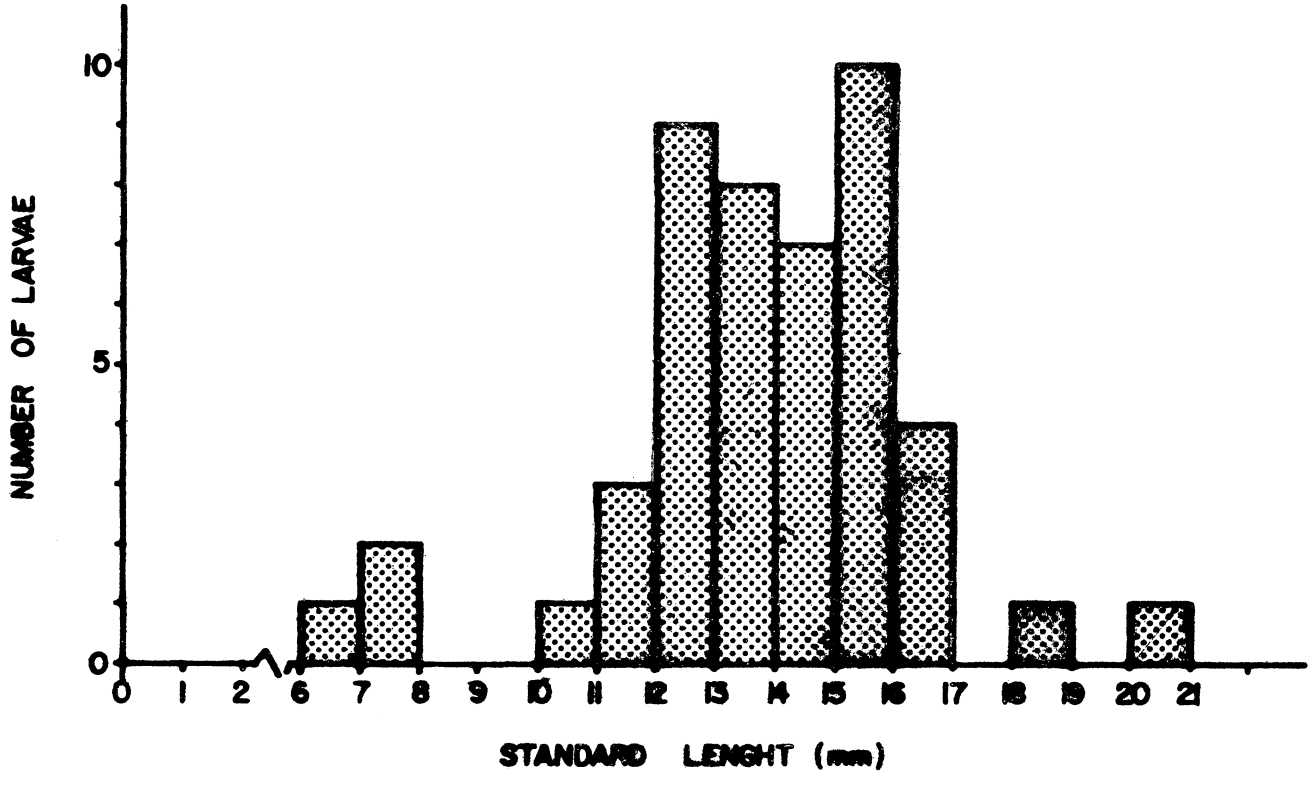

Fig. 6. Size frequency distribution of **Notothenia larseni** caugth in the Bransfield Strait during the PROANTAR I (1982/83).

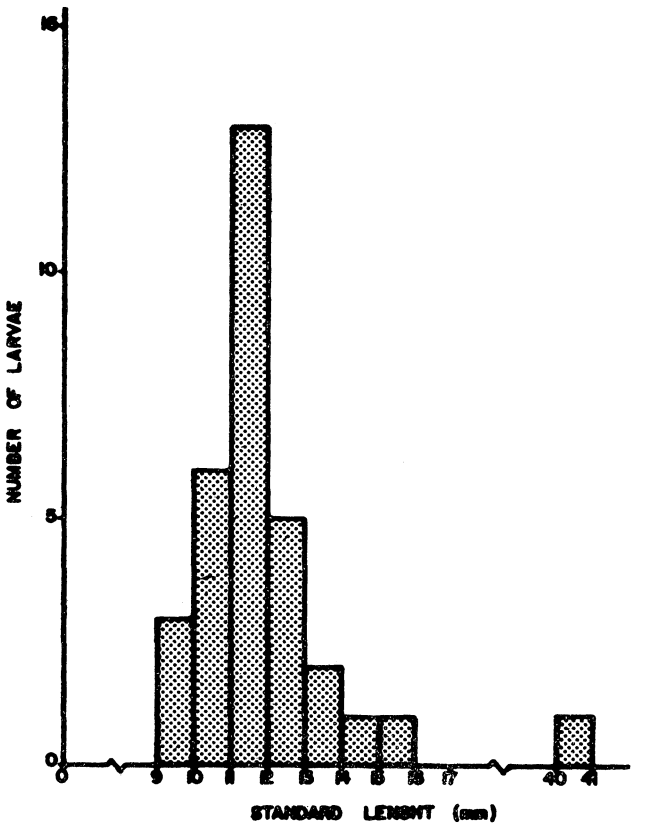

Fig. 7. Size frequency distribution of **Notothenia kempi** caught in the Bransfield Strait during the PROANTAR I (1982/83).

TABLE I — Stations and hydrographic data of **Pleuragramma antarcticum**

Stn no.	Position		Date 1983	Time GMT.	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4384	64°20'	61°50'	Jan. 11	23:00	I	B	930	150-0	6	10	2.61	0.12	33.62	34.53	6.23	4.12
4390	62°25'	58°00'	Jan. 15	03:00	I	B	2080	150-0	1	10	1.07	-0.34	34.05	34.41	4.89	4.76
4408	62°28'	53°35'	Jan. 31	23:00	II	C	1480	300/150	1	24	-0.68	0.03	34.26	34.84	7.62	4.88
4409	62°50'	55°00'	Feb. 01	08:00	II	B	105	78-0	23	128	-1.12	-1.19	34.29	34.30	7.57	3.02
4417	63°18'	59°00'	Feb. 02	15:00	II	B	890	168-0	3	8	0.72	-0.98	34.22	34.45	7.54	6.88
4418	63°00'	59°00'	Feb. 03	20:00	II	C	630	300/150	3	71	0.48	-1.14	34.23	34.55	7.55	6.91
4421	62°54'	61°18'	Feb. 05	19:00	II	B	156	133-0	1	9	1.42	0.45	33.92	34.17	7.46	5.35
4422	63°18'	61°18'	Feb. 06	00:00	II	B	1160	150-0	1	4	1.98	0.09	33.77	34.58	7.47	6.44
4425	64°39'	62°38'	Feb. 07	00:00	II	B	150	140-0	13	34	2.23	0.06	33.53	34.46	7.33	5.61
4426	64°08'	62°47'	Feb. 07	05:05	II	B	180	142-0	2	13	2.30	0.15	33.57	34.33	7.55	5.21
4429	64°39'	64°33'	Feb. 08	05:00	II	B	240	173-0	1	6	1.12	0.87	33.50	34.54	3.45	2.29
4430	65°01'	64°33'	Feb. 08	10:00	II	B	500	150-0	19	38	1.55	0.34	33.02	34.25	3.38	2.32

TABLE II — Stations and hydrographic data of **Notothenia larseni**

Stn no.	Position		Date 1983	Time GMT.	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (°C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1.000 m^3	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4381	63°00'	61°50'	Jan 11	08:20	I	B	270	150-0	1	4	— 1.21	— 1.53	34.15	34.48	5.76	6.11
4382	63°23'	61°50'	Jan 11	13:08	I	B	955	150-0	1	3	0.57	— 0.46	34.19	34.49	7.96	3.83
4383	63°51'	61°50'	Jan 11	18:37	I	B	280	150-0	1	3	0.73	— 0.03	34.32	34.41	5.42	5.49
4386	63°28'	60°25'	Jan 12	16:19	I	B	640	150-0	4	11	0.79	— 1.75	34.22	34.29	7.93	7.66
4387	63°07'	60°25'	Jan 12	21:19	I	B	755	150-0	2	25	— 0.56	— 1.39	33.88	34.52	4.72	4.01
4389	62°07'	57°59'	Jan 14	08:49	I	B	250	150-0	3	14	— 0.89	— 1.19	34.36	34.49	4.83	4.82
4390	62°25'	58°00'	Jan 15	04:08	I	B	2,080	150-0	1	5	0.24	— 1.24	34.02	34.51	7.54	6.39
4391	62°45'	57°52'	Jan 15	11:31	I	B	800	150-0	3	32	1.07	— 0.34	34.05	34.40	4.89	4.76
4393	62°47'	56°12'	Jan 15	23:19	I	B	290	150-0	4	44	0.84	0.79	33.93	33.96	4.49	4.14
4395	61°57'	56°00'	Jan 16	18:10	I	B	1,950	150-0	11	139	1.14	— 0.63	34.21	34.48	5.22	3.88
4400	62°43'	54°24'	Jan 18	10:09	I	C	280	250/150	3	38	0.32	— 0.20	33.86	34.39	6.44	5.56
4407	61°57'	53°33'	Jan. 31	16:21	II	C	950	300/150	1	24	0.58	— 0.36	34.19	34.52	7.33	6.44
4409	62°50'	55°00'	Feb. 01	08:45	II	B	105	90-0	5	20	— 1.12	— 1.20	34.29	34.29	7.57	3.19
4412	61°16'	55°05'	Feb. 02	02:20	II	B	60	50-0	1	5	0.82	0.84	34.54	34.21	7.25	7.03
4413	61°31'	56°36'	Feb. 02	11:45	II	B	495	150-0	4	17	1.10	0.16	34.01	34.27	8.68	6.50
4417	63°18'	59°00'	Feb. 03	15:04	II	B	890	150-0	1	12	0.72	— 0.98	34.21	34.44	7.54	6.88
4425	64°39'	62°43'	Feb. 07	00:30	II	B	130	110-0	1	8	2.23	0.06	33.53	34.45	7.33	5.61

TABLE III — Stations and hydrographic data of **Notothenia gibberifrons**

Stn no.	Position		Date 1983	Time GMT.	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4424	64°20'	61°26'	Feb. 06	16:00	II	B	49	40-0	1	7	2.14	0.34	32.04	34.25	7.55	6.54
4426	64°08'	62°47'	Feb. 07	06:00	II	B	185	42-0	2	8	2.30	0.15	33.57	34.33	7.55	5.21

TABLE IV — Stations and hydrographic data of **Notothenia kempi**

Stn no.	Position		Date 1983	Time GMT.	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4408	62°28'	53°35'	Jan. 31	23:04	II	B	1480	150-0	2	11	-0.68	-1.13	34.25	34.55	7.62	6.22
4413	61°31'	56°36'	Feb. 02	11:45	II	B	495	150-0	1	4	1.10	0.16	34.01	34.27	8.68	6.50
4422	63°18'	61°18'	Feb. 06	00:13	II	B	1160	150-0	7	30	1.98	0.09	33.76	34.58	7.47	6.44
4428	63°11'	62°47'	Feb. 07	16:35	II	B	0510	150-0	10	60	1.92	-0.36	33.75	34.29	7.83	5.50
4429	64°39'	64°33'	Feb. 08	05:10	II	B	0240	150-0	1	6	1.12	0.87	33.50	34.54	3.45	2.29
4430	65°01'	64°33'	Feb. 08	10:00	II	B	0500	150-0	6	36	1.55	0.34	33.02	34.25	3.38	2.32
4432	63°35'	64°35'	Feb. 09	10:44	II	B	0440	150-0	6	41	1.79	0.29	33.76	34.51	7.75	6.22

TABLE V — Stations and hydrographic data of **Notothenia nudifrons**

Stn no.	Position		Date 1983	Time GMT	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	depth Sampled	Surface	Sampled depth
4393	62°47'	56°12'	Jan. 15	23:19	I	C	290	200-0	1	4	0.84	0.79	33.93	33.96	4.49	4.14
4398	61°39'	54°28'	Jan. 17	21:51	I	B	1080	150-0	1	10	2.42	0.18	33.73	34.50	6.41	5.80
4416	62°52'	56°41'	Feb. 03	05:15	II	B	200	150-0	1	12	1.60	-0.42	34.00	34.47	6.72	6.91
4417	63°18'	59°00'	Feb. 03	15:04	II	B	890	150-0	1	6	0.72	-0.98	34.22	34.45	7.54	6.88
4425	64°39'	62°43'	Feb. 07	00:30	II	B	130	110-0	1	8	2.23	0.06	33.53	34.46	7.33	5.61
4426	64°08'	62°47'	Feb. 07	05:50	II	B	180	150-0	1	7	2.30	0.69	33.57	34.48	7.55	5.47
4429	64°39'	64°33'	Feb. 08	05:10	II	B	250	150-0	1	6	1.12	0.87	33.50	34.54	3.45	2.29
4431	64°09'	64°33'	Feb. 09	04:50	II	B	540	150-0	1	5	1.66	0.75	33.60	34.66	7.37	5.61

TABLE VI — Stations and hydrographic data of **Notolepis coatsi**

Stn no.	Position		Date 1983	Time GMT	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4398	61°39'	54°28'	Jan. 17	21:00	I	B	1080	150-0	1	15	0.73	-0.03	34.32	34.41	5.42	5.49
4401	62°25'	52°58'	Jan. 19	00:00	I	B	2800	150-0	1	5	0.63	-0.98	33.73	34.53	8.19	6.29
4406	61°25'	53°33'	Jan. 31	01:00	II	B	820	260-0	1	6	0.11	-0.61	34.39	34.50	7.25	6.25
4408	62°28'	53°35'	Jan. 31	23:00	II	B	1480	239-0	15	23	-0.68	-0.28	34.26	34.60	7.62	5.17
4431	64°09'	64°33'	Feb. 09	04:00	II	B	550	150-0	1	5	1.66	-0.75	33.60	34.66	7.37	5.61

TABLE VII — Stations and hydrographic data of **Electrona antarctica**

Stn no.	Position		Date 1983	Time GMT	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4427	63°40'	62°47'	Feb. 07	11:00	II	B	340	185-0	1	5	1.88	0.50	33.71	34.52	7.49	5.15
4428	63°11'	62°47'	Feb. 07	17:00	II	B	510	168-0	1	6	1.92	-0.36	33.75	34.30	7.83	5.50
4432	63°35'	64°35'	Feb. 09	10:00	II	B	440	193-0	7	14	1.79	0.29	33.77	34.51	7.75	6.22

TABLE VIII — Station and hydrographic data of **Champsocephalus gunnari**

Stn no.	Position		Date 1983	Time GMT	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4389	62°07'	57°59'	Feb. 14	08:00	I	B	250	150-0	1	20	0.61	0.01	33.88	34.32	6.39	5.82

TABLE IX — Stations and hydrographic data of **Artedidraco skottsbergi**

Stn no.	Position		Date 1983	Time GMT.	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4387	63°07'	60°25'	Jan. 12	21:19	I	B	755	150-0	1	12	-0.56	-1.39	33.88	34.53	4.72	4.01
4426	64°08'	62°47'	Feb. 07	6:00	II	B	185	142-0	1	7	2.30	0.15	33.57	34.33	7.55	5.21

TABLE X — Stations and hydrographic data of **Harpagifer bispinis**

Stn no.	Position		Date 1983	Time GMT.	Cruise	Net Type	Local Depth (m)	Depth of tow (m)	Larvae		Temperature (° C)		Salinity (x10³)		Oxygen (ml/l)	
	Lat. (° S)	Long. (° W)							Absolute number	Density in 1,000m³	Surface	Sampled depth	Surface	Sampled depth	Surface	Sampled depth
4377	63°24'	64°34'	Jan. 01	01:14	I	B	335	150-0	1	4	0.68	0.46	34.45	34.54	3.74	2.59

TABLE XI — Percentual distribution of ichtyoplankton related with different water masses in the Bransfield Strait during the southern summer 1982/83.

SPECIES / WATER MASSES	Pleuragramma antarcticum	Notothenia nudifrons	Notothenia kempi	Notolepis coatsi	Electrona antarctica	Notothenia gibberifrons	Notothenia larseni	Artedidraco skottsbergi	Champsocephalus gunnari	Harpagifer bispinis
S	44.59	25.00	21.21	0	0	0	4.25	0	0	0
BRC	18.91	37.50	21.21	5.55	0	33.33	46.81	0	0	0
BRS	1.35	0	0	0	0	0	10.64	50.00	100.00	0
BRW	32.43	12.50	6.07	77.80	0	0	19.15	0	0	0
WBR	0	0	3.03	5.55	0	0	10.64	0	0	0
B	2.70	25.00	48.48	5.55	100.00	66.67	2.13	50.00	0	100.00
W	0	0	0	5.55	0	0	6.35	0	0	0

TABLE XII — Number and percentage of larvae in positively sampled stations and mean density of larvae per station in the Bransfield Strait during the southern summer 1982/83.

SPÉCIES	Positively sampled stations				Mean density of larvae per station	
	Number		Percentage			
	1.° cruise	2.° cruise	1.° cruise	2.° cruise	1.° cruise	2.° cruise
Pleuragramma antarcticum	2	10	7.14	35.71	9.95	33.51
Notothenia nudifrons	2	5	7.14	17.85	7.14	7.17
Notothenia kempi	0	7	0	25.00	0	10.23
Notolepis coatsi	2	3	7.14	10.71	10.35	11.61
Electrona antarctica	0	3	0	10.71	0	8.30
Notothenia gibberifrons	0	2	0	10.71	0	7.42
Champsocephalus gunnari	1	0	3.57	0	19.84	0
Notothenia larseni	11	6	39.28	21.43	28.87	14.11
Artedidraco skottsbergi	1	1	3.57	3.57	0	9.45
Harpagifer bispinis	1	0	3.57	0	3.65	0