NOTES ON THE FISHES COLLECTED DURING THE 1980–1981 EXPLORATORY BOTTOM TRAWL FISHING OFF THE SOUTH SHETLAND ISLANDS

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Abstract: Species composition of the bottom trawl collection from the adjacent waters of the South Shetland Islands was represented by the number of species and specimens. Descriptions of the embryos and the egg-capsules of the rajid fishes and of *Trematomus hansoni* with abnormally developed lower lateral line were given. Two species discovered for the first time from West Antarctica were also described.

A total of 3576 specimens examined were referred to 9 families and 36 species. *Notothenia gibberifrons* was by far the commonest (50.2% of fishes examined) and was the dominant species at most of stations. *Gymnoscopelus nicholsi* and *Chionodraco rastrospinosus* were the second in abundance. In comparison with the channichthyid fishes collected from the Ross Sea in 1979, it seemed that the genus *Chionodraco* was the dominant genus among the family Channichthyidae in both areas.

Pogonophryne scotti and *Chionodraco myersi*, which had been recorded only from East Antarctica, were collected for the first time. The circumpolar distribution of *P. scotti* and *C. myersi* was inferred from the present records of these species from West Antarctica.

1. Introduction

In the Scotia Sea, biological surveys have been made resulting in some ichthyological works reviewed by ANDRIASHEV (1965), DEWITT (1971) and PERMITIN (1977). However, most of the works discussed the distribution of fish species, and the information on the species composition of fishes was still lacking. Therefore, it was thought advisable to report some aspects of the benthic fish fauna off the South Shetland Islands using the fishes collected by Japan Marine Fishery Resource Research Center during the austral summer months of 1980–1981. As it also seemed that the general biological information in this area was still insufficient, some morphological data of the specimens were described.

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2. Materials and Methods

The fishing stations of the present study are represented in Table 1 and Fig. 1. Each haul was trawled for about 15–40 min. At each station, only one net haul was performed (4.0 knot), and the depth distribution was from 189 m to 429 m.

All the specimens were frozen on board the YOSHINO MARU (3265 t) at about −20°C. After thawing in the laboratory, most of the specimens were measured and weighed, and were fixed in 10% formalin. Measurements and counts represented in this paper were taken from the preserved specimens.

Table 1. List of the stations for the bottom trawl.

Station	Date	Lat. S	Long. W	Depth (m)
1	January 8, 1981	62°34′	63°11′	225–258
2	〃	62°29′	61°52′	189
3	〃	62°10′	60°47′	406–420
4	〃	62°06′	60°32′	285–305
5	January 9, 1981	62°02′	60°17′	360–370
6	〃	61°59′	59°48′	250–258
7	〃	62°02′	62°21′	350–429
8	〃	62°31′	62°06′	295–300

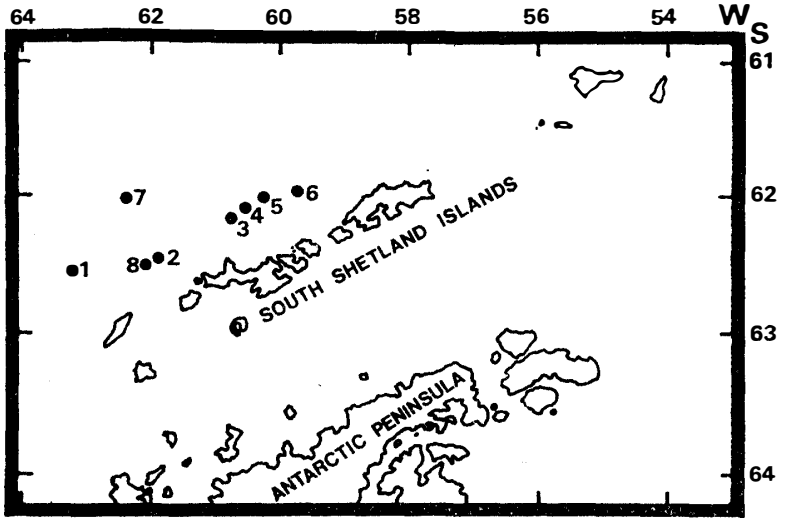

Fig. 1. Locations of the stations for the bottom trawl (Arabic numerals represent station numbers listed in Table 1).

Abbreviations used in the text are as follows: AFR, anal fin ray count; DF1, first dorsal fin ray count; DF2, second dorsal fin ray count; DSW, disc width; ED, eye diameter; EW, egg-capsule width; IBUT, Institute of Biological Sciences, the University of Tsukuba; IW, interorbital width; LWH, length of egg-capsule without horns; PFR, pectoral fin ray count; S, snout length; S-DF1, length from tip of snout to anterior base of first dorsal fin; SL, standard length; TL, total length; ULL, upper lateral line scales; and VER, total vertebrate.

3. Species Composition of the Bottom Trawl Collection

A total of 3576 specimens examined were referred to 9 families and 36 species. Species name and the number of specimens collected from 8 stations are listed in Table 2. PERMITIN (1977) reviewed many data reported previously and listed 10 families and 57 species from the adjacent waters of the South Shetland Islands. The present collection contains about 80% of the species listed by PERMITIN (1977), and two species are discovered for the first time from West Antarctica. The remaining 20% consist of the nearshore-sublittoral species (*Trematomus bernacchii*, *T. newnesi* and *Harpagifer bispinis*) and the deepwater-bathyal species (*Lycodichthys antarcticus*, *Lycenchelys anatrirostris*, *Paraliparis* spp. and *Geneoliparis lindbergi*). These species are thought to be difficult to collect at the depths of the present survey.

As seen from the percentage composition in Fig. 2, the dominance of the suborder Notothenioidei, to which 81.0% of the specimens and 75.0% of species belong, is noted. In the list of PERMITIN (1977), the number of species of the suborder Notothenioidei attains to 66.0%. The difference in the percentage between the data of PERMITIN (1977) and of the present survey seems to be resulting from the lack of deepwater species in the present collection. According to the data of the species composition of the Ross Sea (DEWITT, 1971; IWAMI and ABE, 1981), more than 90% of fishes (92.4% of specimens and 91.7% of species) are referred to the suborder Notothenioidei. The common aspect of the Antarctic bottom fish fauna, which is dominated by the notothenioids in the number of specimens and species, has been recognized in the area of the South Shetland Islands. And this trend is more apparent in the collection of the Ross Sea.

The most abundant species among the present collection is *Notothenia gibberifrons*, and the number of this species attains to 50.2% of total specimens examined. At 7 stations, *N. gibberifrons* is the dominant species. The dominance of the suborder Notothenioidei in the number of specimens results from the large amount of the specimens of *N. gibberifrons*. The percentage of the number of specimens of this species in that of Notothenioidei is 62.1%.

Rajid fishes of the present collection, which consist of 2 species, were caught at all the stations. Both of the species are endemic to the Scotia Sea region, and a relatively large number of specimens (7.9% of total specimens) were collected.

Most of the specimens of the family Myctophidae in the collection are referred to *Gymnoscopelus nicholsi*. A large number of specimens (333 specimens) of this pelagic species were obtained at Stn. 7. The reason of the abundant catch at Stn. 7 is thought that this station is the farthest offshore and deepest station and a school

Table 2. List of species name and the number of fishes collected from 8 stations.

Species \ Stn. No.	1	2	3	4	5	6	7	8	Total
Rajidae									
Bathyraja griseocauda	21	3	140	13	39	4	57	4	281
B. maccaini									
Myctophidae									
Gymnoscopelus nicholsi	1	—	10	2	6	2	333	26	380
Myctophidae sp.	—	—	—	—	—	—	5	—	5
Gadidae									
Micromesistius australis	—	—	—	1	—	—	—	—	1
Zoarcidae									
Austrolycichthys sp. 1	—	—	6	—	—	4	1	—	11
A. sp. 2									
Notothenidae									
Notothenia gibberifrons	107	485	157	181	144	488	146	90	1798
N. nybelini	14	1	8	25	7	34	10	2	101
N. kempi	3	—	3	—	—	—	3	10	19
N. rossii marmorata	—	1	—	—	—	—	—	—	1
Trematomus hansoni	—	—	2	—	—	—	—	—	2
? *T. tokarevi*	—	—	—	—	2	—	—	—	2
T. eulepidotus	7	3	1	—	—	—	1	3	15
T. scotti	1	—	—	—	—	—	—	—	1
Pagothenia brachysoma	—	—	—	2	2	—	—	—	4
Dissostichus mawsoni	—	—	—	1	—	—	—	—	1
Pleuragramma antarcticum	—	—	76	15	35	—	5	15	146
Aethotaxis mitoptryx	—	—	4	6	—	—	—	—	10
Harpagiferidae									
Pogonophryne scotti	1	—	—	—	—	—	—	—	1
? *P. dolichobranchiata*	1	—	—	—	—	—	—	1	2
P. sp.	Station unknown								1
Bathydraconidae									
Racovitzia glacialis	—	—	—	—	—	—	1	—	1
Gerlachea australis	—	—	2	—	8	1	3	—	14
Gymnodraco acuticeps	—	2	3	2	14	—	3	1	25
Channichthyidae									
Champsocephalus gunnari	1	9	6	38	9	53	7	38	161
Pseudochaenichtys georgianus	3	43	—	1	—	1	3	6	57
Neopagetopsis ionah	—	—	—	1	—	—	—	—	1
Pagetopsis macropterus	—	—	—	—	—	—	—	1	1
Chaenocephalus aceratus	2	13	5	2	9	29	6	24	90
Cryodraco antarcticus	—	—	37	3	47	2	24	6	119
Chionodraco rastrospinosus	10	90	44	67	33	20	47	3	314
C. myersi	—	—	1	—	4	—	1	—	6
Chaenodraco wilsoni	—	—	—	1	—	2	—	—	3
Liparidae									
Paraliparis somovi	—	—	1	—	—	—	—	—	1
P. sp.	—	—	1	—	—	—	—	—	1

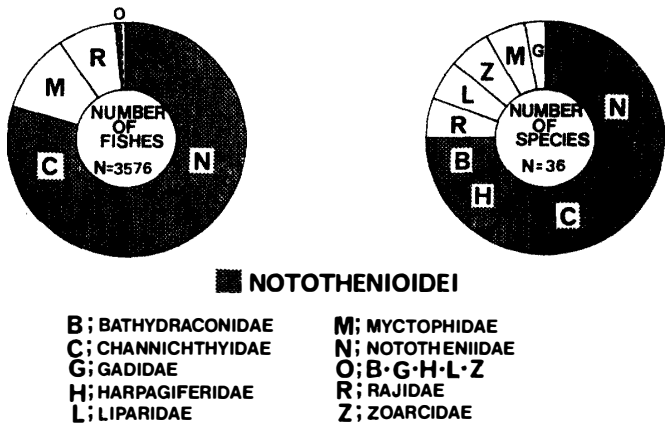

Fig. 2. Percentage composition by families in the bottom trawl collection.

of *G. nicholsi* were caught near the bottom.

The only one species in the family Gadidae, which penetrates into the Southern Ocean, is *Micromesistius australis.* This species is thought to be a seasonal migrant from the Patagonian-Falkland region (DEWITT, 1971; PERMITIN, 1977) and only one specimen of this species was collected from Stn. 4.

Eleven specimens of the family Zoarcidae apparently belonging to 2 different species were obtained at 3 stations, Stns. 3, 6 and 7. The depths of these 3 stations suggest that these species are distributed in the deeper water.

The family Nototheniidae is the most abundant family in the number of species and specimens, and most of the notothenid fishes of the present collection are referred to *N. gibberifrons* (85.6% of notothenid fishes examined). *Pleuragramma antarcticum* was the most abundant species in the collection of the previous survey of the Ross Sea (IWAMI and ABE, 1981), while only 146 specimens (7.0% of notothenid fishes examined) of *P. antarcticum* are contained in the present collection.

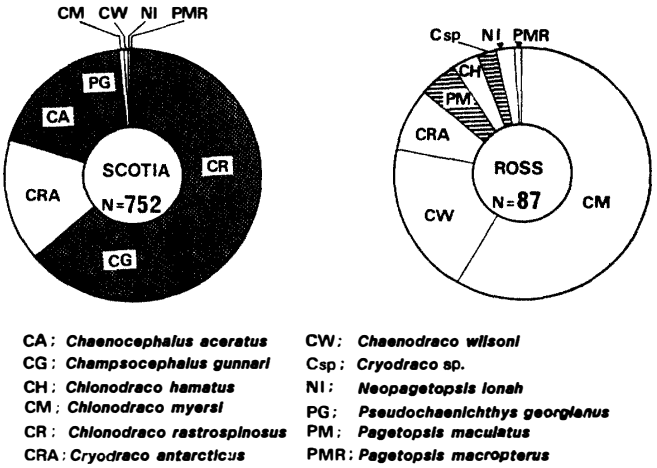

Fig. 3. Species composition of the channichthyid fishes collected from the vicinity of the South Shetland Islands and from the Ross Sea (cited from IWAMI and ABE, 1981). Species endemic to the Scotia Sea are shown by dots, and those found only from East Antarctica are represented by lateral stripes.

A total of 4 specimens referable to the family Harpagiferidae were caught. One specimen of *Pogonophryne scotti* is the first specimen collected from West Antarctica.

Gymnodraco acuticeps of the family Bathydraconidae has been thought as a near-shore species and the distribution range of depth of *G. acuticeps* was represented as 0–15 m by DEWITT (1971). The present specimens of this species were collected from the depths of 189–429 m. This is undoubtedly that the these records of catch are the deepest record for *G. acuticeps*.

The family Channichthyidae is the second in abundance with the number of specimens 21.0% (752 specimens) and of species 25% (9 species) of total fishes examined. *Chionodraco rastrospinosus* is the dominant species among the channichthyid fishes of this collection, and it attains to 41.8% in the number of specimens of the family Channichthyidae. The similar trend of the dominance of the genus *Chionodraco* (*Chionodraco myersi*) is observed in the species composition of the channichthyid fishes collected from the Ross Sea (58.6% of specimens of this family) as reported by IWAMI and ABE (1981) (Fig. 3). A remarkable difference of the channichthyid fish fauna between the area of the South Shetland Islands and the Ross Sea is observed in the percentages of the endemic species to each area. In the present collection, species endemic to West Antarctica including the islands to the east attain to 82.7% of the channichthyid fishes of the collection. However, in the collection from the Ross Sea, only 6.9% of the number of specimens are endemic to East Antarctica (Fig. 3). *Pagetopsis macropterus*, *Neopagetopsis ionah*, *Cryodraco antarcticus*, *Chionodraco myersi* and *Chaenodraco wilsoni* were collected from both areas.

Only 2 species of the family Liparidae were collected from the deepest station, Stn. 3. According to the list of PERMITIN (1977), 5 species of this family were recorded from the adjacent waters of the South Shetland Islands. Most of species of the Antarctic liparid fishes are rather deepwater dwellers. Therefore, deeper fishing for the bottom trawl in this area may obtain more specimens of the family Liparidae.

4. Some Morphological Notes on the Collection

Family Rajidae

Embryos and egg-capsules of the rajid fishes had been recorded previously (NORMAN, 1937; REMBISZEWSKI, 1980; REMBISZEWSKI and ZIELIŃSK, 1980), while the identification of them have not been made. One of the present materials of embryos is advanced in development enough to identify it. And the feature of the egg-capsule which in this embryo was enclosed made it possible to identify some of the other embryos and egg-capsules.

Bathyraja griseocauda NORMAN, 1937

Embryos

IBUT 81–902, Stn. 5, TL 100 mm.

IBUT 81–903, Stn. 3, TL 39.2 mm (head broken).

IBUT 81–904, Stn. 7, TL 46.0 mm.

The largest embryo, IBUT 81–902, shows a body form decidedly like a skate. This male embryo with short claspers has well developed pectoral fins, two dorsal

fins situated in the posterior part of the tail and notched ventral fins. It is yet attached to the york sac and only the eyes are pigmented. No trace of praeocular, postocular and scapular spines is observed. Twenty spines are recognizable in the median dorsal series of the tail.

The large number of the median spine commencing above the origin of the ventral fins makes it identifiable as *B. griseocauda*.

The egg-capsule, in which the embryo was enclosed, is 78.8 mm in LWH and 42.3 mm in EW. Surface of the egg-capsule is covered with fibloid hairs externally and being smooth and goldish brown in color internally.

Proportional measurements in percent of TL of this embryo are as follows: DSW, 34.3%; S, 5.7%; ED, 4.2%; IW, 3.6%; and S-DF1, 75.6%.

Other 2 embryos, IBUT 81–903 and 904, bearing large york sacs are almost the same in developmental and stage. The filaments of the external gills are apparent on both specimens.

While the specific features do not appear on both of the embryos, they seem to be referred to *B. griseocauda* from the size and the shape of their egg-capsules. Sizes of the egg-capsules are 78.4 mm (77.6 mm) in LWH and 42.3 mm (44.3 mm) in EW (figures in parentheses are those of IBUT 81–904).

Rajidae spp.

Egg-capsules (without embryos)

IBUT 81–905, Stn. 3, LWH 124 mm, EW 57.7 mm (dried).
IBUT 81–906, Stn. 4, LWH 72.0 mm, EW 43.4 mm.
IBUT 81–907, Station unknown, LWH 76.0 mm, EW 43.8 mm.
IBUT 81–908, Station unknown, LWH 65.3 mm, EW 37.0 mm (dried).
IBUT 81–909, Station unknown, LWH 65.2 mm, EW 38.8 mm (dried).
IBUT 81–910, Station unknown, LWH 66.8 mm, EW 33.6 mm (dried).
IBUT 81–911, Station unknown, LWH 72.1 mm, EW 37.9 mm (dried).

IBUT 81–905 appears to belong to the different species from *B. griseocauda*. This egg-capsule is probably referred to the same egg-capsule reported by REMBISZEWSKI (1980). IBUT 81–906 and 907 are similar to *B. griseocauda* in size and shape, and they are tentatively identified as *B. griseocauda* in this paper. The other egg-capsules, different in size and state of preservation, cannot be identified.

Family Nototheniidae

Trematomus hansoni (BOULENGER, 1902)

IBUT 81–098, Stn. 3, TL 271 mm, SL 235 mm, female.
IBUT 81–099, Stn. 3, SL 299 mm, female.

Most of the specific characters, such as color pattern, proportional measurements, meristic counts and the arrangement of cephalic lateral line pores, agree well with the previous descriptions of *T. hansoni* (NORMAN, 1938; DEWITT and TYLER, 1960; YAKUBOESKI, 1970). A noteworthy feature is the presence of the well developed lower lateral line with tubular scales recognized in the larger specimen, IBUT 81–098. This feature has not been described before. The number of the tubular scales of the lower lateral line is 31 on the left side and 27 on the right side. The lower lateral line originates underneath the base of the 16th ray of the second dorsal fin

and the 17th on the right side.

Meristic counts of this specimen, IBUT 81–098, are represented as follows: DF1, VI; DF2, 37; AFR, 32; PFR, 29 (left and right); VER, 56; and ULL, 44 (left and right).

Family Harpagiferidae

Pogonophryne scotti REGAN, 1914

IBUT 81–844, Stn. 1, TL 272 mm, SL 219 mm, male.

This species has been known only from East Antarctica, but the present record from the Scotia Sea indicates a circumpolar distribution of this species.

The present specimen has counts as follows: DF1, II; DF2, 25; AFR, 17; PFR, 20 (left and right); and VER, 35.

In studying the specimens of the family Harpagiferidae, it is conscious that there was a misidentification of fish collected from the Ross Sea (IWAMI and ABE, 1981). An identification of "*Pogonophryne scotti*" was an error, the specimen (A. 19068') being *Pogonophryne barsukovi*. The original description of *P. barsukovi* mentioned the presence of a tassel on the barbel, whereas the specimen, A. 19068', has no tassel, and the other features prove it to belong to *P. barsukovi*.

Family Channichthyidae

Chionodraco myersi DEWITT and TYLER, 1960

IBUT 81–108, Stn. 3, TL 278 mm, SL 248 mm.
IBUT 81–912, Stn. 5, TL 231 mm, SL 202 mm.
IBUT 81–913, Stn. 5, TL 222 mm, SL 191 mm.
IBUT 81–914, Stn. 5, TL 210 mm, SL 182 mm.
IBUT 81–915, Stn. 5, TL 136 mm, SL 120 mm.
IBUT 81–533, Stn. 7, TL 237 mm, SL 213 mm.

The collection contains six specimens of *C. myersi* which constitute the first record of this species from the West Antarctica. This reveals that *C. myersi* is circumpolar in distribution.

This species is very close to *C. rastrospinosus* and *C. hamatus*, but different from them in the reduced rostral spine and the preoperculo-mandibular canal joined to the temporal canal as reported by DEWITT and HUREAU (1979).

The range of meristic counts of the six specimens are represented as follows: DF1, VI-VIII; DF2, 35–38; AFR, 34–35; PFR, 20–22; and VER, 56–60.

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