

# Deep-sea snailfish (Scorpaeniformes: Liparidae) of genera *Careproctus* and *Paraliparis* from the Crozet Basin (Southern Ocean)

by

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**ABSTRACT.** - Three recent deep-sea trawls (4182-4270 m) close to the Crozet Islands have provided five specimens of previously unknown liparid fishes. Four of these represent three new species and are described herein: *Careproctus crozetensis*, *C. discoveryae* and *Paraliparis wolffi*; the fifth specimen belongs to another species but it is badly damaged and could be partially described only.

**RÉSUMÉ.** - Poissons-limaces (Scorpaeniformes : Liparidae) des genres *Careproctus* et *Paraliparis* du bassin de Crozet (océan Austral).

Trois chalutages très profonds (4182-4270 m) réalisés récemment au large des îles Crozet ont permis la capture de cinq spécimens inconnus de la famille des Liparidae. Quatre d'entre eux représentent trois espèces nouvelles : *Careproctus crozetensis*, *C. discoveryae* et *Paraliparis wolffi*. En raison de son mauvais état, seule une description partielle a été possible pour le dernier spécimen qui appartient probablement à une autre espèce.

Key words. - Liparidae - *Careproctus discoveryae* - *Careproctus crozetensis* - *Paraliparis wolffi* - PSE - Southern Ocean - Crozet Basin - New species.

The liparid fishes are probably the most speciose group of deep-sea fishes within the Southern Ocean, and knowledge of them has greatly improved recently (Andriashev, 1986, 2003; Stein and Tompkins, 1989; Stein *et al.*, 1991, 2001; Andriashev and Stein 1998; Chernova and Duhamel 2003; Chernova, 2006; Stein, 2006). In the Southern Ocean, the family now includes 136 species, the majority of which being endemic (Stein *et al.*, 2001; Andriashev, 2003).

During the multidisciplinary benthic Crozet research cruise (RRS Discovery, D300, December 2005-January 2006), in the vicinity of the Crozet Islands, Indian sector of the Southern Ocean, five specimens of Liparidae were collected. They included three previously unknown species of *Careproctus* and *Paraliparis* (two and one, respectively), and are described herein. In addition, one specimen that cannot be assigned is discussed herein.

## MATERIALS AND METHODS

Specimens were collected using a Semi-Balloon Otter Trawl (OTSB14; 8.6 m wing-end spread and a 13 mm stretch mesh cod-end liner). Sampling sites (three stations) are shown in figure 1. The specimens initially had tissue

samples taken (ICTI registration numbers) for phylogenetic analyses, and then were fixed in 10% formalin and later transferred to 70% ethanol. They are conserved in the MNHN collection, No 2006-1230 to 1234.

We follow Burke (1930), Stein (1978), Andriashev (1986, 2003), Andriashev and Stein (1998), for methods of describing liparids. Counts, such as dorsal, anal and caudal fin rays, and vertebrae were taken from radiographs. Abbreviations for counts are D, dorsal fin rays; A, anal fin rays; P, pectoral fin rays; C caudal fin rays; gr, gill rakers outside first arch; Vert., vertebrae (including urostyle). Measurements are given as percentage of standard length (SL) or head length (HL) in the case of the extensively damaged specimen where part of the tail is missing. Abbreviations for measurements follow Andriashev and Stein (1998) and Stein and Tompkins (1989) only for Hw:

aAf: distance from centre of anus to anal-fin origin; bd: maximum body depth; bdA: body depth at anal-fin origin; da: posterior edge of disk (when present) to centre of anus; disk: length of ventral sucker (when present); E: eye diameter horizontally; gs: length of gill opening; HL: head length; Hw: head width; io: interorbital width; lj: lower jaw length; LPL: greatest length of lower lobe of pectoral fin; ma: length from mandibular symphysis to centre of anus; mD: length

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from mandibular symphysis to anterior edge of disk; NL: length of shortest notch ray; preA: preanal-fin length; preD: predorsal-fin length; sn: snout length; SL: standard length; TL: total length; uj: upper jaw length; UPL: greatest length of upper lobe of pectoral fin.

As radial numbers, arrangement, shape and presence/absence of fenestrae are important characters in liparids, the right pectoral girdles were removed and then cleared and stained following the method of Dingerkus and Uhler (1977) and stored in glycerine.

Illustrations were made by the senior author. Measurements were made with a dial caliper to the nearest 0.1 mm. Institutional abbreviations follow Leviton *et al.* (1985).

## RESULTS

Three specimens of different species (same genus) were caught to the northeast in a eutrophic region; two specimens of another species and genus, were collected in oligotrophic waters to the south of the Crozet Islands (Fig. 1).

Eight liparid genera occur in the Antarctic and adjacent waters of the Southern Hemisphere (Andriashev, 2003).

The two specimens collected at the southern station, with no disk, do not fit within the characters of endemic and monotypic genera (*Eknoliparis*, *Genioliparis*, *Praematoliparis*, *Edentoliparis*) and the clearly humpbacked at occiput genus *Pseudnos*. They belong to *Paraliparis*. The three remaining specimens of the northern station have large and well-developed ventral disks; sensory canals are visible on

two specimens, but combined with the absence of coronal pores they lead away from *Notoliparis* (with three described species: Stein and Andriashev, 1990; Andriashev, 2003). They indicate a clear relationships to *Careproctus* (with 49 described species: Andriashev *et al.*, 1998; Andriashev, 2003; Chernova, 2006; Stein, 2006). However, the external characters and counts split these three specimens into two different *Careproctus* species.

The poor state of the fifth specimen (an additional larger species) with the presence of a disk (skin and flesh on head and body stripped preventing the examination for the pores of the cephalic canal system, eyes and tail missing) did not allow to conclusively determine the genus to which the specimen belongs: *?Careproctus* or *?Notoliparis*. However, additional systematic and ecological criteria are suggestive of the genus *Careproctus*.

Complete descriptions follow and table I summarises all morphometric and meristic data.

### *CAREPROCTUS CROZETENSIS* SP. NOV.

(Figs 2, 3A-C)

#### Material examined

*Holotype*. - MNHN 2006-1231, SL 100.3 mm, Crozet Islands, 45°43,06'S-56°32,16'E, RRS Discovery, 12 Dec. 2005, station # 15773#8, depth 4258-4290 m, OTSB14. Partly skinned. Right pectoral girdle and first gill arch dissected, cleared and stained and preserved with the specimen. Tissue sample: ICTI-1400.

*Comparative material*. - *Careproctus longipectoralis* Duhamel, 1992, MNHN 1991-356.

#### Diagnosis

Distinguished from other *Careproctus* species in the following combination of characters: vertebrae 60 (12+48), P 29, C 9, radials 4, round, large without fenestrae. Teeth simple, stout. Small mandibular symphyseal pores closely set. Gill opening above pectoral base. Opercular flap very long extending largely behind pectoral base. Head 25.2% SL, PreA 41.1%, Bda 12.8%. Peritoneum black.

#### Description

*Counts*. - D 55, A 47, P 29, radials 4, C 9, Vert. 60 (12+48), gr 11 (1+10); pyloric caeca apparently absent.

*Ratios (% SL)*. - HL 25.3, Hw 13.2, io 6.5, E 6.1, gs 7.2, sn 7.5, uj 10.6, lj 9.0, bd 14.5, bda 12.8, preA 41.1, preD 24.9, UPL 20.3, disk 8.2, da 6.8, mD 7.7, aAf 14.7, ma 23.8.

Head compressed, width about half its length. Dorsal profile of head concave. Snout slightly protruding anteriorly. Mouth terminal, slightly oblique. Upper jaw extending to below anterior part of eye. Teeth simple, conical, densely set. Oblique rows (19-20 and 17-18) of teeth, 5-6 each, on

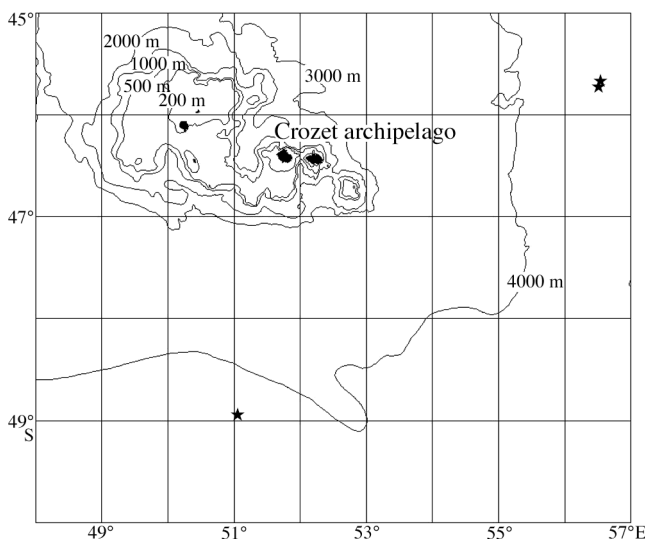


Figure 1. - Sampling area showing (★) the localities of the Liparidae collected off the Crozet Islands during the 2005-2006 RRS Discovery Benthic Crozet cruise (depth contour in m). [Zone d'échantillonnage montrant (★) les positions de collecte de Liparidae au large des îles Crozet pendant la campagne 2005-2006 Benthic Crozet du RRS Discovery (isobathes en m).]

Table 1. - Meristic (counts) and morphometric (in mm and % of SL or HL) characters taken from the *Careproctus* and *Paraliparis* specimens of the 2005-2006 RRS Discovery Benthic Crozet cruise. [*Caractères méristiques et morphométriques (en mm et en % of LS ou HL) des spécimens de Careproctus et Paraliparis de la campagne 2005-2006 Benthic Crozet du RRS Discovery.*]

Ventral sucker? Measurements	MINHN 2006-1231 <i>Careproctus crozetensis</i>			MINHN 2006-1232 <i>Careproctus discoveryae</i>			MINHN 2006-1233 <i>Paraliparis wolffi</i>			MINHN 2006-1234 <i>?Careproctus sp.</i>						
	yes			yes			no			no						
	mm	NOTES	% SL	mm	NOTES	% SL	mm	NOTES	% SL	mm	NOTES	% SL	mm	NOTES	% HL	
TL	115.1			(73.8)	approx.		120.9		18.3	-		107.6	> 175. ~195			
SL	100.3		25.3	69.9		25.2	22.1		11.2	17.7	16.4	17.7	> 175	tail missing	65.5	
HL	25.4		13.2	17.6		16.3	13.6		3.2	12.1	11.2	12.1	34.8	tail missing	32.2	
Hw	13.2		6.5	11.4		6.0	3.9		5.5	3.1	2.9	3.1	22.8		21.6	
io	6.5		6.1	4.4		6.3	6.7		11.6	5.4	5.0	6.7	11.2		47.1	
E	6.1		7.2	5.1		7.3	14.0		5.3	(10.1)	approx.	5.4	16.4		34.2	
gs	7.2		7.5	5.3		7.6	6.4		7.9	5.7	6.2	5.7	11.9		21.6	
sn	7.5		10.6	8.9		12.7	9.5		12.3	6.7	6.0	6.7	16.5		47.4	
uj	10.6		14.5	12.4		17.7	7.5		8.7	6.5	6.0	6.5	15.2		43.7	
lj	9.0		12.8	8.9		8.4	14.9		32.2	13.3	12.4	13.3	32.4		93.1	
bd	14.5		41.1	12.8		37.8	10.5		21.9	9.8	9.1	9.8	28.9		83.0	
bdA	12.8		24.9	26.4		31.5	38.9		7.0	8.4	27.8	29.9	56.0		160.9	
preA	41.2		20.3	22.0		15.5	26.5		approx.	22.8	21.2	22.8	42.5		122.1	
preD	25.0		not specific	10.8		13.7	(8.5)		2.9	(15.9)	14.8	(15.9)	21.3		66.1	
UPL	20.4		not specific	9.6		4.4	(3.5)		approx.	8.2	8.2	15.0	30.3		48.3	
LPL	/			3.1		4.4	/			5.3	4.9	5.3	11.7		33.6	
NL	/			6.2		8.9	-			-	10.6	-	10.6		30.5	
disk	8.2			4.1		5.9	-			-	13.6	-	13.6		39.1	
da	6.8			7.7		9.3	-			-	15.5	-	15.5		44.5	
md	7.7			14.7		12.9	13.9			11.3	10.5	11.3	14.9		42.8	
aAf	14.7			9.0		24.2	24.5			19.7	18.3	19.7	36.2		104.0	
ma	23.9			16.9												
Counts																
D	55			41			70			70		70	>59, ~67			
A	47			35			63			66		66	>50, ~58			
P	29			22 (12, 5, 5)			16 (11, 2, 3)			16 (11+2+3)		16 (11+2+3)	28 (17+3+8)			
radials	4			/			/			2		2	4			
C	9			?			?			?		?	?			tail missing
gr	11 (1+10)			9			/			13		13	10			
Vert. (abd + cau)	60 (12+ 48)			45 (9+ 36)			75 (10+ 65)			76 (9+ 67)		76 (9+ 67)	>64, total ~70 (12 + ?)			

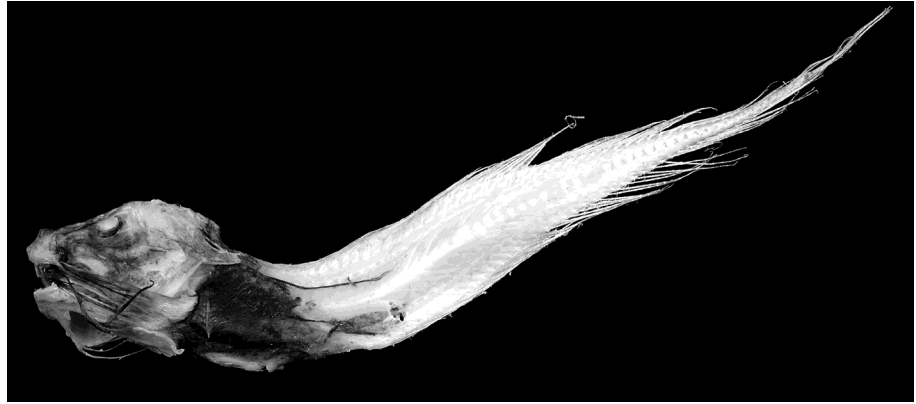


Figure 2. - *Careproctus crozetensis* sp. nov., holotype MNHN 2006-1231, 115.1 mm TL (photo C. Ferrara).

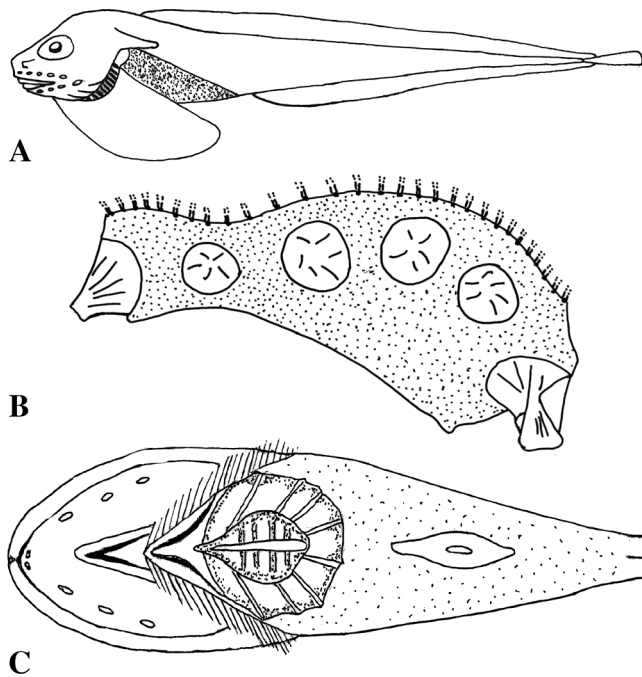


Figure 3. - *Careproctus crozetensis* sp. nov. **A**: Lateral view; **B**: Detail of the pectoral girdle (length 13.4 mm; upper width 5.6 mm); **C**: Anterior ventral view. [A : Vue latérale ; B : Détail de la ceinture pectorale (longueur : 13,4 mm ; plus grande largeur : 5,6 mm) ; C : Vue ventrale antérieure.]

upper and lower jaw, respectively. Circumoral pores large. Smaller mandibular symphyseal pores spaced but closely set. Size of orbit moderate, eye low, on a horizontal with first pectoral fin ray. Opercular flap well developed, tongue-like, extending largely behind pectoral base. Gill opening above pectoral fin and extending to its uppermost ray. Pectoral fin (29) not notched, length of rays decreasing regularly from upper to lower part and free distally from the membrane. Longest rays just reaching anal fin origin. Four radials, round and large, equidistantly spaced (Fig. 3B). No fenestrae. Tuberos gill rakers on upper (1) and lower (10) part of first arches with prickles. Disk large, nearly round (anterior-

ly compressed) with outer fleshy rim and complete margin, posteriorly sculptured undulating, and a visible central muscular area (Fig. 3C). Distance anus-posterior edge of disk less than the length of disk. Body moderately long. Pyloric caeca apparently absent.

In ethanol, head and body dark (part of skin missing). Pectoral fins black. Orobranchial cavity dusky with grey patches on the roof of mouth, peritoneum dark. Stomach pale.

#### Distribution

Known from holotype only, from abyssal depths of the Crozet Basin (at 4250 m).

#### Etymology

The new species is named after the collection location.

#### Comments

Three southern *Careproctus* species (mandibular symphyseal pores spaced, teeth simple, gill slit vertical) have similar counts to Vert. 60, D 55, A 47, P 29: *C. longipectoralis* Duhamel, 1992, *C. pseudoprofundicola* Andriashev & Stein, 1998 and *C. scaphopterus* Andriashev & Stein, 1998. The type specimen of *C. longipectoralis* has a massive and deep head (26.5 vs 14.5% SL), and a pectoral fin shape which eliminates this species as a possible candidate. *C. pseudoprofundicola* has not a similar opercular flap shape, has only two radials (vs four), and an extended gill slit (vs short above pectoral fin). Finally, *C. scaphopterus* has large circumoral pores (vs small), lower number of rays in the caudal fin (10 vs 9), and widely set radials (vs closely set). Therefore, we consider this a new species.

#### **CAREPROCTUS DISCOVERYAE SP. NOV.**

(Figs 4, 5A, B)

#### Material examined

Holotype. - MNHN 2006-1232, SL 69.9 mm, Crozet

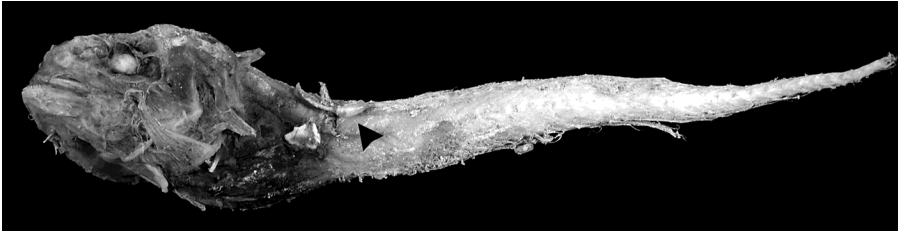


Figure 4. - *Careproctus discoveryae* sp. nov., holotype MNHN 2006-1232, 69.9 mm SL (photo C. Ferrara). The arrowhead points to two parasitic copepods.

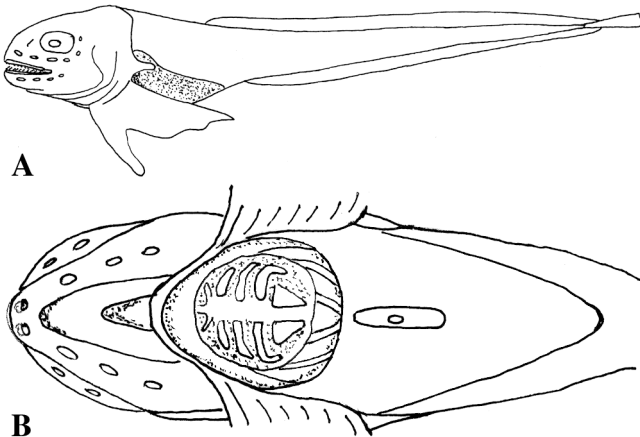


Figure 5. - *Careproctus discoveryae* sp. nov. **A**: Lateral view; **B**: Anterior ventral view. [**A** : Vue latérale ; **B** : Vue ventrale antérieure.]

Islands, 45°40,45'S-56°33,70'E, RRS Discovery, 20 Dec. 2005, station # 15773#32, depth 4267-4270 m, OTSB14. Good condition (tissue sample number: ICTI-1401).

### Diagnosis

Distinguished from other *Careproctus* species in the following combination of characters: P 22, C apparently ?5, median count of vertebrae 45. Gill opening reaching base of first pectoral fin ray. Opercular flap extending behind pectoral base. Head 25.2% SL, PreA 37.8%. Peritoneum dark.

### Description

**Counts.** - D 41, A 35, P 22 (12+5+5), C (?5), Vert. 45 (9+36); gr 9 (0+9); Pyloric caeca apparently absent.

**Ratios (% SL).** - HL 25.2, Hw 16.3, io 6.0, E 6.3, gs 7.3, sn 7.6, uj 12.7, lj 11.2, bd 17.7, bdA 8.4, preA 37.8, preD 31.5, UPL 15.5, LPL 12.0, disk 8.9, da 5.9, md 9.3, aAf 12.9, ma 24.2.

Massive and globular head (tadpole like). Dorsal profile of head convex. Snout not protruding anteriorly. Mouth terminal. Upper jaw extending to below anterior part of eye. Teeth simple, conical and acute, densely set; 23 oblique rows of 4-5 teeth each on lower jaw. Circumoral pores large. Smaller mandibular symphyseal pair of pores closely set.

Size of orbit moderate, eye low. Opercular flap well developed, tongue-like, extending behind pectoral base. Nostril single. Gill opening above pectoral and extending to the first uppermost ray. Pectoral fin clearly notched (12+5+5), the longest rays reaching anal fin origin. Radials unknown due to destruction of the right pectoral girdle. Tuberosus gill rakers (9) with prickles only on lower part of arch. Disk large, pyriform, outer fleshy rim with complete margin, central muscular area visible (Fig. 5B). Distance anus-posterior rim of disk less than length of disk. Body moderately short. Pyloric caeca apparently absent.

In ethanol, body greyish. Skin absent. Orobranchial cavity pale with grey patches on the roof of mouth and elsewhere. Peritoneum dark. Stomach pale.

The specimen has two parasitic copepods attached behind the head, dorsally (Fig. 4).

### Distribution

Known from the holotype only, from abyssal depths of the Crozet Basin (at 4250 m).

### Etymology

The new species honours the RRS Discovery, her officers, and her crew who have collected the specimen.

### Comments

Similar numbers of vertebrae (44-46), dorsal (39-44) and anal fin rays (33-37) occur only in *C. armatus* Andriashev, 1991, *C. cactiformis* Andriashev, 1961, *C. catherinae* Andriashev & Stein, 1998, *C. herwigi* Andriashev, 1991, *C. lacmi* Andriashev & Stein, 1998, *C. minimus* Andriashev & Stein, 1998, and *C. parini* Andriashev & Prirodina, 1990; these species have a higher number of pectoral fin rays (28-30 for *C. minimus*, *C. armatus*, *C. lacmi* and *C. cactiformis*, 33-35 for *C. parini* and 36-38 for *C. herwigi* and *C. catherinae*) than in *C. discoveryae* (22). Depth range of all the other species is shallower 124-2154 m (vs 4267-4270 m), with the exception of *C. lacmi*, which occurs between 3817 and 3931 m. *C. lacmi* differs in its typical high, compressed head (vs globular), cephalic profile, smaller circumoral pores (vs large), peritoneum dark (vs light), and more caudal rays (11 vs about 5).

Figure 6. - *Paraliparis wolffi* sp. nov., holotype MNHN 2006-1233, female, 120.9 mm SL (photo C. Ferrara).



**PARALIPARIS WOLFFI SP. NOV.**

(Figs 6, 7A, B)

**Material examined**

*Holotype.* - MNHN 2006-1233, Female. SL 120.9 mm, off Crozet Islands, 48°56,21 S-51°03,90' E, RRS Discovery, 27 Dec. 2005, station # 15775#4, depth 4182-4195 m, OTSB14. Eyes lost, skinned, stomach and liver visible through damage to viscera, pectoral fin damaged (tissue sample number: ICTI-1402).

*Paratype.* - MNHN 2006-1234, SL 115.1 mm, same station, extensive head damage. One eye lens. Right pectoral girdle, first gill arch removed and preserved with the specimen (tissue sample number ICTI-1403).

**Diagnosis**

Distinguished from other *Paraliparis* species in the following combination of characters: Vertebrae 75-76 (9-10 + 65-67), P 16, and two large and round upper pectoral radials. Gill rakers 6-7. Teeth simple. Gill slit apparently large. Head 16.4-18.4% SL, preA short 27.8-32.2%. Peritoneum, orobranchial cavity, stomach and intestine black.

**Description**

*Counts.* - D 70, A 63-66, P 16 (11+2+3), radials (2+0+0), C ?, Vert. 75-76 (9-10 + 65-67), gr 13; Pyloric caeca: 6 in the paratype.

*Ratios (% SL).* - HL 16.4-18.3, Hw 11.2, io 2.9-3.2, E 5.0-5.5, gs (9.4)-11.6, sn 5.3, uj 6.2-7.9, lj 6.0-6.2, bd 12.3-12.4, bda 8.7-9.1, preA 27.8-32.2, preD 21.2-21.9, UPL (7.0-14.8), LPL (2.9)-8.2, NL ?-4.9, aAf 10.5-11.5, ma 18.3-20.3.

Head moderately large, snout high, blunt, barely projecting. Mouth terminal, oblique. Jaw extending below anterior part of eye. Teeth in both jaws sharp, simple, in 17-20 oblique rows of 3-4 teeth each decreasing in size from the inner to outer margin of jaw. Teeth absent at symphysis. Mandibular symphyseal pores spaced. Opercular flap damaged. Gill slit apparently rather long, extending ventrally in front of dorsal pectoral fin rays. Gill rakers 13 on lower part of arch; tubercle-like, armed with upward facing prickles. Upper pectoral fin rays reaching level of 10th anal fin rays. Pectoral fin notched with two intermediate, well separated (but not rudimentary) rays. Pectoral girdle with only two, large, round upper radials without fenestrae or notches

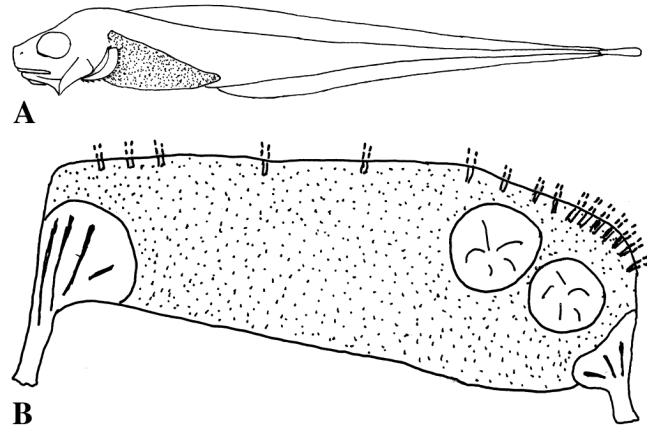


Figure 7. - *Paraliparis wolffi* sp. nov. **A:** Lateral view of holotype, 120.9 mm SL; **B:** Detail of the pectoral girdle (length 11.2 mm; upper width 4.2 mm) in paratype MNHN 2006-1234, 115.1 mm SL. [A : Vue latérale de l'holotype ; B : Détail de la ceinture pectorale du paratype (longueur : 11,2 mm ; plus grande largeur : 4,2 mm).]

(Fig. 7B). Caudal fin ray count unknown (rays missing). Body elongated. Holotype with approximately 5 pale oocytes (diameter of two: 3.9, 5.2 mm). Pyloric caeca: 6 in the paratype, digitated.

In ethanol: head blackish; skin dark; partly lost peritoneum, orobranchial cavity, oesophagus, stomach and intestine black. Pyloric caeca with patches of dark pigmentation.

**Distribution**

Known only from the holotype and paratype collected at the abyssal depth of 4180 m in the Crozet Basin.

**Etymology**

Named after Professor George Wolff, University of Liverpool, for his contributions to marine biogeochemistry and for always being happy on Mondays throughout an arduous cruise.

**Comments**

*Paraliparis wolffi* sp. nov. is similar to *P. krefftii* Andriašev, 1986, which has 73-77 vertebrae (vs 75-76), the same number of pectoral rays (16) and only two pectoral radials. However, *P. krefftii* differs greatly in having 6-7 gill rakers (vs 13), a short gill slit (4.4% SL vs 9.4-11.6%), and a larger bdA (14% SL vs about 9%). In addition, *P. krefftii* is known

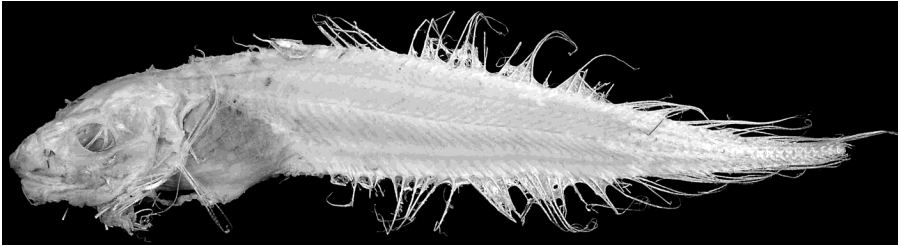


Figure 8. - ?*Careproctus* sp. MNHN 2006-1230. SL > 175 mm (estimated 195 mm) (photo C. Ferrara.).

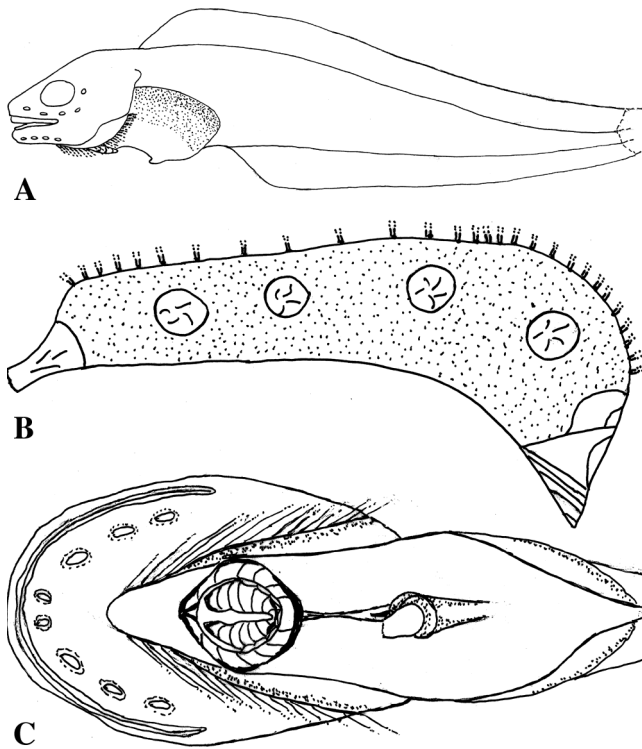


Figure 9. - ?*Careproctus* sp., MNHN 2006-1230, 34.8 mm HL. A: Lateral view; B: Detail of the pectoral girdle (length 23.9 mm; upper width 12.8 mm); C: Anterior ventral view. [A : *Vue latérale*; B : *Détail de la ceinture pectorale (longueur : 23,9 mm ; plus grande largeur : 12,8 mm)* ; C : *Vue antérieure ventrale.*]

between South Georgia and Shag Rocks (Atlantic sector of Southern Ocean) and at a shallower depth of 2600 m (vs 4180 m).

**?*CAREPROCTUS* SP.**  
(Figs 8, 9A-C)

**Material examined**

MNHN 2006-1230, SL > 175 mm (estimated 195 mm), HL 34.8 mm, Crozet Islands, 45°40,45'S-56°33,70'E, RRS Discovery station # 15773#32, 20 Dec. 2005, depth 4267-4270 m, OTSB14. Poor condition (skin, flesh stripped, eyes and tail missing). Right pectoral girdle and first gill arch extracted and preserved with the specimen.

**Diagnosis**

A liparid with sucking disk present and complete, vertebrae > 64 (estimated 70), P 28, pectoral radials 4, equally spaced. Teeth simple. Mandibular symphyseal pair of pores spaced. Peritoneum moderately pigmented.

**Description**

*Counts.* - D > 59 (estimated at approximately 67), A 50+ (estimated at 60), P 28 (17+3+8), radials 4, C missing, Vert. > 64 (estimated at 70), gr 10.

*Ratios (% HL).* - Hw: 65.5, Bd 93.1, bdA 83.0, io 32.2, E 21.6, gs 47.1, sn 34.2, uj 47.4, Lj 43.7, preA 160.9, preD 122.1, UPL 66.1, LPL 48.3, NL 33.6, disk 30.5, da 39.1, md 44.5, aAf 42.8, ma 104.0.

Head short, compressed laterally, body elongated. Snout moderate deep, slightly blunted. Dorsal outline of head straight, gently sloping to snout. Orbit moderately large, eye low. Mouth nearly terminal. Upper jaw extending to below middle of orbit. Teeth simple, conical, forming transverse rows (17 and 14 on upper and lower jaws, respectively) of 5/6 regularly spaced teeth. Teeth absent at symphysis. Mandibular symphyseal pair of pores spaced. Gill slit apparently wide but ventral end and opercular flap form difficult to determine due to poor condition of the specimen. Gill rakers on lower arch tuberosus with prickles. Pectoral fin notch moderately deep with next to lowest ray longer than upper rays. No rudimentary rays. Four round radials, equidistant on the girdle (Fig. 9B) and of moderate size. No fenestrae. Disk large, nearly round and complete (Fig. 9C). Distance anus-posterior edge of disk equal to length of disk. Urogenital papilla present. Pyloric caeca digitate (minimum 4). Caudal fin missing.

In ethanol: Body pale; orobranchial cavity pale; peritoneum moderately pigmented (patchy), more intensively dorsally; stomach pale.

**Comments**

*Notoliparis kermadecensis* (Nielsen, 1964) has the nearest comparable values (Vert. 65, D 57, A 53). However, the counts for our specimen (Vert. ca 70, D ca 67, A ca 58) are higher, and in addition it lacks (Fig. 5A) the typical shape of the snout found in *Notoliparis* species (snout shallow, rounded, projecting with mouth horizontal). The large eye diameter (20.6% HL, > 4% SL) also differs from the original

description (Nielsen, 1964) of *N. kermadecensis* (about 8 to 9% HL) and of other *Notoliparis* species, which have an eye diameter of about 2.5% SL (Stein and Andriashev, 1990). The known depth range of *Notoliparis* 5400-6770 m, vs 4270 m. Therefore, assignment of this specimen to *Notoliparis* is highly doubtful.

The high number of vertebrae, and dorsal and anal fin rays occur in a few Southern Ocean *Careproctus* species (Andriashev and Stein, 1998; Stein *et al.*, 2001; Andriashev, 2003). The highest number (Vert. 64, D 60, A 54, P 26) is found in *C. inflexidens* Andriashev & Stein, 1998, a recently described species only known from the holotype. Even if we accept variation in the range of these meristic characters, it seems too low when compared to the values in our specimen (Vert. ca 70, D ca 67, A ca 58, P 28). The pectoral radial formula (3+1 vs 4 regularly spaced radials), the number of tooth rows on upper jaw (10-11 vs 17) are also different, and the distance between disk and anus is smaller (35.5 vs 39.1% HL). Capture depth greatly exceeds the range (2049-2089 m) of *C. inflexidens*. Therefore our specimen is unlikely to be *C. inflexidens*.

Because of the poor condition of the specimen, we did not describe and name it. It should be described when additional specimens become available.

## DISCUSSION

There are now eight liparid species known from the Crozet region: the three new species, *Paraliparis copei wilsoni* Andriashev, 1986, *P. duhameli* Andriashev, 1994, *P. gracilis* Norman, 1930, *P. obliquosus* Chernova & Duhamel, 2003 and *P. thalassobathyalis* Andriashev, 1986. The previously known species are from shallower depths (550-1600 m), probably because extensive abyssal trawling has not been conducted before in the region. The new species of *Paraliparis* extends the currently known geographic range of this genus (Andriashev, 1979, 1982, 1986, 1994; Stein and Andriashev, 1990; Duhamel, 1992; Chernova and Duhamel, 2003; Duhamel *et al.*, 2005) to the abyssal depths of the Crozet basin.

The discovery of probably four new species of Liparidae at such poorly investigated depths is not unusual and it is likely that other species occur deeper and in the intermediate bathyal to abyssal depth range (1000-4000 m). Stein (1978) described 11 species of Liparidae in an extensive investigation of the abyssal plain (2200-3600 m) off the coast of Oregon, and Stein *et al.* (2001) described 30 new species from the slopes (~1000 m) of Southern Australia. Descriptions of new liparid species will undoubtedly continue as the Southern Hemisphere will be explored and sampled more extensively in the future. Five just described *Careproctus* and

*Paraliparis* species, both from shallow waters and deep sea of the Southern Ocean, confirm that assumption (Chernova, 2006; Stein, 2006).

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