

**A NEW SPECIES AND ADDITIONAL RECORDS OF *PARALIPARIS*
(SCORPAENIFORMES: LIPARIDAE) FROM THE SOUTHERN OCEAN
WITH A PROVISIONAL FIELD KEY TO JUVENILES**

by

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ABSTRACT. - A small collection of liparid fishes was made by French scientific or fishing cruises off the Kerguelen and Crozet Islands in the recent years. A new species, *P. obliquosus* sp. n., is described. Other species collected included: *Paraliparis copei kerguelensis*, *P. copei wilsoni*, *P. gracilis*, *P. neelovi* with a closely related form designated as *P. cf. neelovi*, *P. operculosus*, *P. thalassobathyalis*, and also one young fish of an undescribed species, *Paraliparis* sp. Additional diagnostic characters were found for *P. copei wilsoni* and *P. copei kerguelensis*. They include: chin pores open separately (*vs* in a common pit), interneural of the first dorsal ray situated between vertebrae 5/6 to 8/9 (*vs* between 3/4 to 5/6), skin of specimens in alcohol cream-brown (*vs* milky pale), chin and snout blackish-brown (*vs* pale), anus slightly behind a vertical through the gill opening (*vs* slightly in front of it). The Crozet islands constitute an extension of the geographical distribution and of the bathymetric range (700-1040 m *vs* 960-1134 m) for *P.c. wilsoni*. Some differences in *Paraliparis gracilis* were found between specimens from South Georgia (Atlantic sector of Southern Ocean) and those from the Crozet islands (Indian sector). *Paraliparis operculosus* occurred deeper than previously (1129-1295 m *vs* 380-1010 m). *Paraliparis thalassobathyalis* appeared polymorphic, with three different types, mainly recognized by the shape of head and body and colour patterns. They might represent sexual dimorphic differences, or epibenthic and pelagic forms, although our material was insufficient for final conclusion. Juveniles of 13.2 - 44.0 mm SL of *P. obliquosus*, *P. neelovi*, *P. cf. neelovi*, *P. operculosus*, *P. thalassobathyalis* and *Paraliparis sp.* were found pelagically. A field key to early juveniles of the nine *Paraliparis* is proposed.

RÉSUMÉ. - Nouvelle espèce et nouveaux signalements de *Paraliparis* (Scorpaeniformes : Liparidae) de l'océan Austral, et clé provisoire pour identifier les juvéniles.

Une petite collection de Liparidae a été réalisée ces dernières années au cours de campagnes océanographiques ou de pêches françaises au large des îles Kerguelen et Crozet. Une nouvelle espèce, *P. obliquosus* n. sp. est décrite. Les autres espèces récoltées étaient : *Paraliparis copei kerguelensis*, *P. copei wilsoni*, *P. gracilis*, *P. neelovi*, ainsi qu'une forme proche, désignée comme *P. cf. neelovi*, *P. operculosus*, *P. thalassobathyalis*, ainsi qu'un juvénile d'une espèce non décrite, *Paraliparis* sp. Des critères d'identification supplémentaires sont trouvés pour *P. copei wilsoni* et *P. copei kerguelensis*. Ils comprennent : les pores mentonniers qui s'ouvrent individuellement (*vs* dans une fossette commune), l'interneural du premier rayon de la nageoire dorsale situé entre les vertèbres 5/6 à 8/9 (*vs* entre 3/4 à 5/6), la peau de couleur brun crème (*vs* laiteux pale), le menton et le museau brun noirâtre (*vs* pale), la position de l'anus située légèrement derrière la verticale de l'ouverture branchiale (*vs* légèrement en avant de celle-ci). Les îles Crozet constituent une extension de l'aire de distribution géographique et bathymétrique (700-1040 m *vs* 960-1134 m) de *P. c. wilsoni*. Quelques différences sont trouvées entre les spécimens de Géorgie du Sud (secteur atlantique de l'océan Austral) et des îles Crozet (secteur indien) chez *Paraliparis gracilis*. *Paraliparis operculosus* a été capturé plus profondément (1129-1295 m *vs* 380-1010 m). *Paraliparis thalassobathyalis* semble polymorphe avec trois différents types reconnus d'après la forme de la tête et du corps, et des critères de coloration. Cela pourrait représenter un dimorphisme sexuel ou des formes épibenthiques et pélagiques, mais notre matériel n'était pas suffisant pour aboutir à une conclusion définitive. Enfin, des juvéniles de 13,2 - 44,0 mm de *P. obliquosus*, *P. neelovi*, *P. cf. neelovi*, *P. operculosus*, *P. thalassobathyalis* et *Paraliparis sp.* ont été collectés dans le domaine pélagique. Une clé d'identification des stades juvéniles des neuf espèces de *Paraliparis* est proposée.

Key words. - Liparidae - *Paraliparis copei kerguelensis* - *P. copei wilsoni* - *P. gracilis* - *P. neelovi* - *P. obliquosus* sp. n. - *P. operculosus* - *P. thalassobathyalis* - Southern Ocean - Kerguelen Islands - Crozet Islands - New species - New records.

Liparid fishes of the Southern ocean and adjacent seas have been intensively studied (Andriashev, 1986, Stein and Tompkins, 1989, Andriashev and Stein 1998, Stein *et al.*, 2001 and others). Knowledge of the diversity in the family has substantially increased, and more than a hundred species are known from the Southern Ocean and the adjacent

waters. However, many of the species are known from few or single specimens. For these reasons every new capture of liparids from the Southern ocean is of interest.

French scientific or fishing cruises off the Kerguelen and Crozet Islands recently have provided interesting liparid collections adding information to previous regional

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studies (Andriashev, 1979, 1982, 1986; Duhamel, 1992). These collections contained early juveniles, 13–48 mm SL, of nine *Paraliparis* species including a new one. For each of them some new details in morphology, intraspecific variability, geographic or vertical distribution were found.

It is difficult or often impossible to identify juvenile liparids as existing keys usually are based mainly on characters from radiographs or pectoral girdle preparations of adults. Size-related variability in proportions is mostly unknown. We describe early juveniles of the species here and provide a preliminary field key to identify juvenile of some species in the genus *Paraliparis* from the Crozet-Kerguelen area.

MATERIALS AND METHODS

Most specimens were collected during the 1995–2000 cruises (“IPEKER” and “ICHTYOKER”) of R.V. “La Curieuse” in the polar frontal zone off the Kerguelen Islands (Fig. 1). The gear used was an International Young Gadoid Pelagic trawl (IYGPT, 10 mm mesh size). The cruises were described by Duhamel (1998). Additional specimens were collected in trawl and longline fisheries near the Kerguelen and Crozet Islands. Some other material examined by Duhamel (1992) was reanalyzed. Total number of fish includes 45 specimens from 31 stations.

Recent revisions (Andriashev, 1986; Stein and Andriashev, 1990; Chernova, 2001; Stein *et al.*, 2001) were used for species identification. Methods traditionally used in liparids studies, including radiography and pectoral girdle preparation, were previously described (Burke, 1930; Stein, 1978; Andriashev, 1986; Kido, 1988; Andriashev and Stein, 1998; Chernova, 2001; Stein *et al.*, 2001).

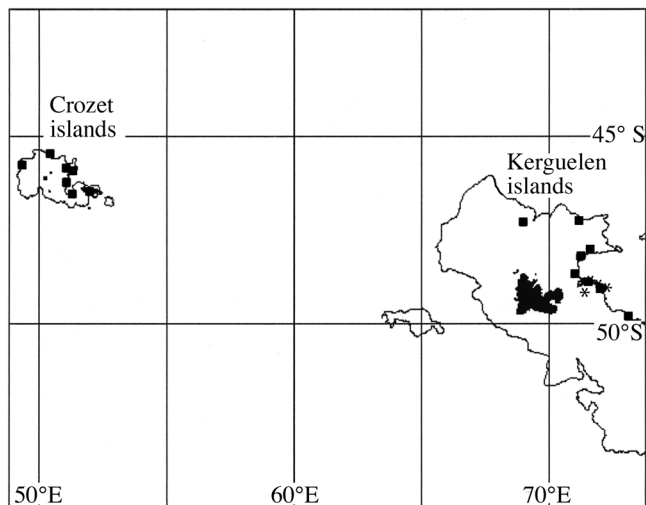


Figure 1. - Map of the area showing the localities of *Paraliparis* captures (stars: midwater hauls; square: demersal longline or trawl by-catch; depth contour 1000 m).

Meristics were taken from radiographs using: D: number of rays for the dorsal fin; A: number of rays for the anal fin; P: number of rays for the pectoral fin; C: number of rays for the caudal fin.

Numbers of vertebrae (urostyle included) were obtained separately for abdominal and caudal vertebrae.

The principal caudal-fin rays are those supported by hypural plates. Dorsal (ventral) procurrent rays, when present, are those shifted forward to the upper-posterior (lower-posterior) edge of the hypural plates (Kido, 1988).

Liparids teeth are arranged in oblique rows, with a similar number of rows on right and left jaws. We counted the rows on half of each jaw (usually left), from the posterior forward, and also the number of teeth in full rows near the symphysis of the jaws. One of the exceptions is the *copei*-group, which possess uniserial teeth in both jaws arranged in a single row. The diastema is a toothless interspace between tooth plates of the right and left jaws.

Proportions are given as percentage of standard length (SL) or head length (HL), the latter in parentheses. Abbreviations for measurements are as follow (after Stein *et al.*, 2001): aAf: distance from center of anus to anal-fin origin; bd: maximum body depth; bdA: body depth at anal-fin origin; E: eye diameter horizontally; go: length of gill opening; HL: head length; hd: head depth; 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 center of anus; NL: length of shortest notch ray; op: length of opercular bone; 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.

Traditional full description is provided for the new species but for the others we give only the important characters (including counts and main proportions), depending on state of knowledge. Juveniles were described separately in details. It is specially the case in *P. neelovi* for which adults were correctly described but no information exists about juvenile. Material of *P. thalassobathyalis* occurred polymorphic, so we give its description more complete than others. Fish illustrations were made by the senior author.

PARALIPARIS OBLIQUOSUS SP. N. (Fig. 2)

Material examined

Holotype. - MNHN 2002-1089, HL 21,5 mm, Crozet Islands, 45°27'S, 50°25'E, longliner “Cap Kersaint”, 3 Oct. 1999, depth 550–1345 m, coll. J. Maison. Poor condition in stomach contents of *Dissostichus eleginoides*, specimen in two fragments, the end of caudal part, skin and eyes missing. Length 86 mm (first fragment) + 15 mm (second). Sex unknown.

Paratype. - MNHN 2002-1075, juvenile 36 mm SL, 43 mm TL, Kerguelen Islands 48°56'S, 71°58'E, R.V. "La Curieuse", cruise "ICTHYOKER", Station 690, 5 Dec. 1999, IYGPT trawl, ca. 350 m over > 1000 m.

Diagnosis

Vertebrae 56 (9+47), D 49. Interneural of first dorsal ray between vertebrae 7 and 8 or 9 and 10. Mouth oblique. C 5. P 19 (11+3+4), notch rays not rudimentary. Pectoral radials 2 (2+0+0). Teeth with small lateral lobes. Gill opening reaching over 3-4 pectoral rays. Stomach black. Pyloric caeca 7, pale.

Counts. - Holotype. Vertebrae 9+33+? (tail missing). Interneural of first dorsal-fin ray between vertebrae 9 and 10, anterior 4 dorsal rays short, thin. In paratype vertebrae 56 (9+47), D 49, A 44; interneural of first dorsal ray between vertebrae 7 and 8, C 5.

Measurements. - The results are given in table I.

Description

Body not humpbacked, dorsal contour of body straighter than curved ventral contour. Head depth about 70% HL, width lesser than depth. Dorsal contour of head almost straight. Snout slanted, not projecting beyond upper jaw, its length slightly less than orbit. In dorsal view, snout widely rounded, tip of lower jaw visible. Orbit large, about 1/3 head length, not touching dorsal contour of head. Eye not large, 18% HL in paratype. Interorbital slightly rounded, wide, about equal to length of orbit or 1/3 HL. Mouth strongly oblique, symphysis of upper jaw level with center of orbit. End of mouth cleft below center of orbit, posterior end of upper jaw below second third of orbit. Teeth with small lateral lobes, in about 16 rows in upper jaw, 6 teeth in row near symphysis, lower jaw with about 23 rows up to 5 teeth per row. Gill opening damaged in holotype, extending over base of 3-4 pectoral rays in paratype. Operculum long, slightly less than 1/3 of head length, its tip level with lower margin of orbit. End of operculum not projecting far behind vertical of the pectoral-fin base. Opercular flap prominent, triangular, sharp in paratype. Gill rakers 7.

Preanal length about twice HL in holotype. Depth at anal fin origin about equal to HL. Uppermost pectoral fin ray on horizontal with lower margin of orbit. Lowermost pectoral ray below center of orbit in holotype and posterior half of eye in paratype. Pectoral rays 19 (11+3+4); notch rays broken, not rudimentary, widely spaced. Lower lobe length about 78% upper-lobe length. Pectoral upper lobe not reaching anal fin origin.

Intestine missing. Pyloric caeca seven, elongated. Anus slightly behind vertical through gill opening in paratype but not possible to determine in holotype.

Skin on head and body missing in holotype, only present on anterior portion of head (including snout and chin) and blackish in paratype. Slight blackish subdermal pigmentation for muscles of the top of head and caudal part of body in paratype, consisting of small stellate melanophores; dorsal and anal fins blackish at margins. Lips gray. Stomach and peritoneum ink-black. Pyloric caeca pale. Mouth and gill cavities almost black, tongue slightly lighter than palate. Gill arches black.

Etymology

The name is from the latin *obliquus* (oblique), and *os* (mouth).

Distribution

The adult was found in a stomach content of *Dissostichus eleginoides* caught near the Crozet Islands at a depth of 550-1345 m; the juvenile was collected by net in mid-water, at about 350 m in up to 1000 m east of the Kerguelen Islands.

Comparative notes

Paraliparis obliquosus is distinguished from all other congeners in the Southern Ocean in the combination of characters: mouth oblique, interneural of the first dorsal ray between vertebrae 7 to 10, pectoral radials 2, rudimentary rays absent, tri-lobed teeth, stomach black, pyloric caeca pale. It differs from all three known species of *Paraliparis* with an oblique mouth in Antarctic and adjacent waters

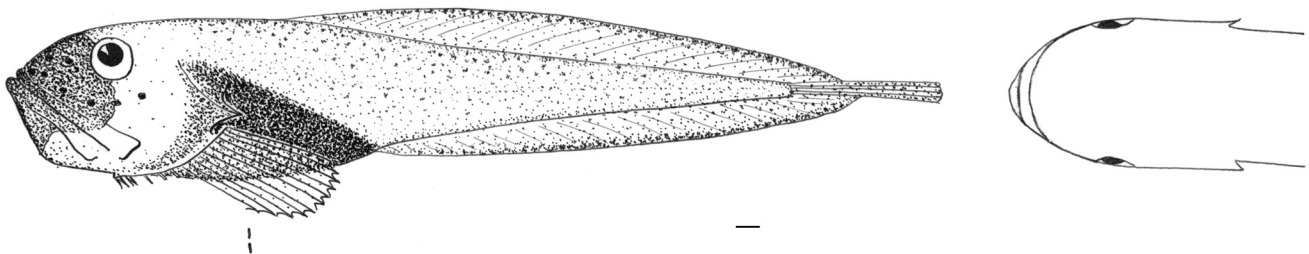


Figure 2. - *Paraliparis obliquosus* sp.n. MNHN 2002-1075. Paratype, 36 mm SL. Scale = 1 mm. Pectoral lower and notch rays missing, reconstructed from the holotype. Skin present on anterior part of head only.

Table I. - Meristic and morphometric characters (in % of SL or HL) taken on *Paraliparis* specimens. *: Measurements for the 150 mm SL specimen only; **: Measurements excluding the 13.2 mm SL specimen.

Species	<i>P. obliquosus</i> sp. n.		<i>P. copei kerguelensis</i>	<i>P. copei wilsoni</i> *	<i>P. gracilis</i>	<i>P. neelovi</i>	<i>P. cf. neelovi</i>	<i>P. operculosus</i> **	<i>P. thalassobathyalis</i>	<i>Paraliparis</i> sp.
	Holotype	Paratype								
Counts										
Vertebrae										
D		56	65-66	65-67	67-70	58	56	61-62	56-58	58
A		49	59-61	56-59	62-64	51	48	55-56	50-53	52
P	19	44	52-53	50-52	57	45	44	50	43-46	41
C		5	20-22	20-22	15-18	17	16	20	15-17 (19)	<19
			8	8	8	6	6	9	5	7
Measurements in % SL (in % HL)										
HL		30.6	15.6-16.0	17.3		26.8	28.6	23-24	23.8-24.8	25
hd	(69.8)	18.9 (62)	12.6-13.6 (78-86)	14.0 (85)		20.3 (76)	22.3 (78)		19.0-21.8 (77-89.5)	20.5 (82)
hw	(60.5)	19.7 (62)	9.5-10.9 (61-69)	11.3 (65)		20.0 (75)	18 (63)		13.4-15.5 (55-63)	13.6 (55)
sn	(27.9)	10 (33)	4.8-5.6 (30-35)	6.0 (35)		10.1 (37.9)	5.7 (20)		7.5-8.6 (30.9-35.3)	4.5 (18)
E	(32.6)	5.6 (18)	4.1-5.0 (26-31)	4.0 (23)		5.4 (20)	15.1 (53)		5.4-6.5 (22.1-26.9)	9.1 (36)
io	(32.5)	12.5 (40.9)	7.5-8.8 (48-54)	9.0 (31)		15.5 (58)	3.1 (11)		11.1-12.5 (45.3-51.5)	ca. 4.5 (18)
go		5 (16.4)	2.0-2.3 (9-15)	1.7 (9.6)		5.6 (21.1)	16 (56)		3.4-4.6 (14.0-18.7)	13.9 (55)
uj	(58)	16.7 (55)	6.4-7.8 (34-39)	6.7(38.5)		14.1 (53)	14.3 (50)			15 (60)
lj	(59.5)	17.2 (56)	6.0-7.1 (38-45)	6.1 (35)		14.1 (53)	6.3 (22)			34
op	(28)	9.4 (30)				8.5 (31.6)		(38-39)		27.7
preD			18.4-25.5	26		25.6			26.4-32.1	
preA	(214)	47	37-42	38		34.3	37		38.0-38.1; 41-47 in adult females	
bdA	(72)	5.3 (53)	14.6-17.2 (90-109)	15 (87)		16.3 (61)	17.7 (62)		15.1-19.5 (62.5-78.5)	37.5
ma		ca. 36	14.2-16.0	17		22	23.1		15.0-17.9	
aAF		ca. 19.4	21.5-26.3	20.7		19.2	11.4		20.4-31.0	
UPL	>(84)	16.7 (54.5)	11.6-11.9 (73-76)	11.7		16.3 (61)	ca. 18.3 (64)		13.4-16.7 (55-69)	
NL			4.4-4.8						7.6-10.9	
LPL	>(65)		10.2-10.9	12				(87-94)	14.7-19.5	

(*P. balgueriasi*, *P. molinai* and *P. debueni*) in having radials 2 (2+0+0) vs 3 or 4. It differs in addition from *P. balgueriasi* in stomach and peritoneum black (vs unpigmented), not rudimentary pectoral notch rays (vs rudimentary) (Mattalanas, 1999). It differs from *P. molinai* in having upper jaw teeth in about 16 rows (vs in two), stomach black (vs yellow) (Stein *et al.*, 1991). It differs from *P. debueni* in having pyloric caeca 7, pale (vs 3, dark brown) (Andriashev, 1986).

“PARALIPARIS COPEI” GROUP

“copei” group of Andriashev, 1986: 48.

Diagnosis

Vertebrae 65-74. Pectoral radials 4 (3+1). Teeth uniserial in both jaws. Gill opening very small, equal to about 1/2-1/3 of pupil, entirely above pectoral fin base. Opercular flap not developed. Caudal-fin rays eight. Peritoneum and orobranchial cavity black.

The group includes, excepted nominative form from the North Atlantic, *Paraliparis copei kerguelensis*, *P. c. wilsoni*, *P. c. gibbericeps* from the Southern Ocean and a few undescribed forms from Atlantic and Indian Oceans (Andriashev, 1986).

PARALIPARIS COPEI KERGUELENSIS ANDRIASHEV, 1982

Paraliparis copei kerguelensis Andriashev, 1982: 722, figs 1, 2 (Kerguelen). - Andriashev, 1986: 49, figs 18, 19 (in revision of the genus *Paraliparis*). - Stein and Andriashev, 1990: 240, fig. 13. - Duhamel, 1992: 198, fig. 1d (part, not off Crozet Islands). - Andriashev, 1994: 294 (southward to Heard Island).

Material

7 specimens 81-170 mm SL. Kerguelen Islands. - MNHN 1997-13, female 170 mm SL, trawler “Kerguelen de Trémarec”, 1 Apr. 1996, 48°01'S - 71°38'E, depth 610 m. - MNHN 1998-610, 147 mm SL, trawler “Kerguelen de Trémarec”, 26 Jan. 1998, 48°12'S - 71°14'E, depth 655-825 m, collector J. Maison. - MNHN 2000-0171, MNHN 2000-0170, subadult female 81 mm SL and male 92 mm SL, trawler “Kerguelen de Trémarec”, 14 Feb. 1999, haul 120, 48°12'S - 71°17'E, depth 790-985 m. - MNHN 2000-1380, 137 mm SL, trawler “Kerguelen de Trémarec”, 7 Jan. 2000, haul 173, 47°15'S - 71°12'E, depth 450-538 m. - MNHN 2000-1381, juv. 83 mm SL, trawler “Kerguelen de Trémarec”, 15 Dec. 1999, haul 92, 47°16'S - 68°59'E, depth 372-

613 m. - MNHN 2002-1076, 128 mm SL, 139 mm TL, longliner “Antarctic 1”, 25 Oct. 2000, haul 70, 49°47'S - 73°07'E, depth 927-1055 m, coll. J. Maison.

Diagnosis

Colour (in alcohol) milky pale, snout and chin pale, only lips brownish-black. Chin pores in a common oval pore-like pit. Interneural of first dorsal ray between vertebrae 3/4 or 5/6 (Tab. II). Head length 15-16.5% SL. Eye 26-31% HL. Anus on vertical through gill opening or slightly in front of it.

Counts. - Vertebrae 65-66 (11-13+52-55), D 59-61, A 52-53, C 8; P 20-22 (14-16+2+2-4) (n 4).

Measurements. - The results are given in table I. In addition NL 37-40% UPL and LPL 87-94% UPL. Dorsal and anal fins overlap ca. 60% of caudal fin.

Colouration. - Colour (in alcohol) milky pale, end of caudal part blackish. Snout and chin pale, only lips brownish-black. Peritoneum ink-black, mouth and gill cavities black. In life, « body with residual pink lilac shade, more intensive caudally and especially along the anal fin border » (Andriashev, 1986).

Distribution

Paraliparis copei kerguelensis was previously reported from the Kerguelen Islands and along the Kerguelen Plateau at 580-1050 m (Andriashev, 1982, 1986, 1994). Our adult specimens were collected near the Kerguelen Islands at 790-1055 m; the juvenile of 83 mm SL was collected between 372-613 m. Juvenile specimens recorded earlier from off Crozet Islands (Duhamel, 1992) are *P. c. wilsoni* (see below).

PARALIPARIS COPEI WILSONI RICHARDS, 1966

Paraliparis copei (non Goode & Bean) Barnard, 1927: 926 (off Cape Point, 900-1000 fathoms). - Smith, 1953: 380 (after Barnard).

Paraliparis wilsoni Richards, 1966: 171, Fig. 1 (West Africa off Gabon, 1134 m).

Paraliparis copei wilsoni Andriashev, 1986: 53, Fig. 20 (as subspecies of *P. copei*; south-western Africa, Walvis Ridge, Meteor seamount).

Table II. - Insertion of interneural of the first dorsal ray in *Paraliparis copei kerguelensis* and *P. copei wilsoni*.

Subspecies	Insertion between vertebrae					
	3/4	4/5	5/6	6/7	7/8	8/9
<i>P. c. kerguelensis</i>	1	1	1			
<i>P. c. wilsoni</i>	-	-	1	2	1	1

Paraliparis copei kerguelensis (non Andriashev, 1982):
Duhamel, 1992: 198, Fig. 1d (part, off Crozet Islands).

Material

9 specimens 37-64 mm SL. Crozet Islands. - MNHN 1988-66, juv. 62 mm SL, R.V. "Marion-Dufresne", cruise "MD30-Biomass", 28 Feb. 1982, station 81, CP 293, 42°52'S - 51°06'E, depth 700 m. - MNHN 1988-67, 2 juv. 45 and 53 mm SL, R.V. "Marion-Dufresne", cruise "MD30-Biomass", 28 Feb. 1982, station 82, CP 294, 45°54'S - 51°18'E, depth 945-995 m. - MNHN 1988-68, 4 juv. 54-64 mm SL, R.V. "Marion-Dufresne", cruise "MD30-Biomass", 18 Feb. 1982, station 54, CP 180, 45°44'S - 49°20'E, depth 1015 m. - MNHN 1988-69, 2 juv. 37 and 61 mm SL, R.V. "Marion-Dufresne", cruise "MD30-Biomass", 1 Mar. 1982, station 75, CP 297, 46°14'S - 51°04'E, depth 1010 - 1040 m.

Comparative material

Meteor seamount. - MNHN 1992-1398 (from ZISP 46818), female 150 mm SL, 165 mm TL, FRV "Evrika", 22 Mar. 1981, trawl 172, 48°04'S - 08°15'E, depth 960-970 m.

Diagnosis

Colour (in alcohol) cream-brown, snout and chin blackish-brown, lips blackish. Chin pores pair not in a common pit. Interneural of first dorsal ray between vertebrae 5/6 to 8/9 (Tab. II). Head length 17.3%SL. Eye 23%HL. Anus slightly behind vertical through gill opening.

Counts. - Vertebrae 65-67 (12-13+52-55), D 56-59, A 50-52, C 8, P 20-22 (15-16+2-3+2-4) (n=8).

Measurements. - The results are given in table I.

Colouration. - Colour (in alcohol) light, uniform cream-brown, margins of dorsal and anal fins darker. Snout and chin blackish-brown, lips and rostral fold blackish. Peritoneum black. Oropharyngeal cavities brown. Colour in life blackish-grey (Andriashev, 1986).

Distribution

Paraliparis copei wilsoni was known from the Meteor Seamount and along Walvis Ridge to South-West Africa, at 960-1134 m (Andriashev, 1986). Our specimens, 37-64 mm SL, were collected around the Crozet Islands at 700-1040 m and extends both the geographical and bathymetric range of the sub-species.

Comparative notes

Andriashev (1986) distinguished *P.c.wilsoni* from *P.c.kerguelensis* by body colour (blackish-gray in life vs rose-lilac), larger head (17.2-18.1 vs 15-16.5% SL) and greater preA (37-40 vs 35.8-37% SL). In our material preA proportions in two forms overlap (Tab. III). Besides, it is also recognized that HL proportions usually correlated with length of fish. Thus, identification of the two forms, especially when the skin was missing, remains difficult. We found additional morphological differences allowing easy distinction. This includes juvenile specimens 37-81 mm SL. *Paraliparis c.wilsoni* differs from *P.c.kerguelensis* in having chin pores open separately (vs in a common pit), interneural of the first dorsal ray between vertebrae 5/6 to 8/9 (vs between 3/4 to 5/6), skin of specimens in alcohol cream-brown (vs milky pale), chin and snout blackish-brown (vs pale). The head in the former is also larger (17.2-19.6 vs 15-16.5% SL) and the eye seems to be smaller (21-25.4 vs 26-31% HL, including Andriashev's data, 21-27 vs 25-36% HL) (Tab. III). In the former the anus is slightly behind a vertical through the gill opening (vs slightly in front of it) and the mandible to anus length is obviously shorter (13-15 vs 16-20% SL).

PARALIPARIS GRACILIS NORMAN, 1930 (Fig. 3)

Paraliparis gracilis Norman, 1930: 353, fig. 42 (South Georgia Island). - Norman, 1938: 86, fig. 56 (South Georgia Island, common; TL to 115 mm). - Andriashev *et al.*, 1977: 146, fig. 1 (pectoral girdle). - Andriashev, 1982: 185, fig. 3

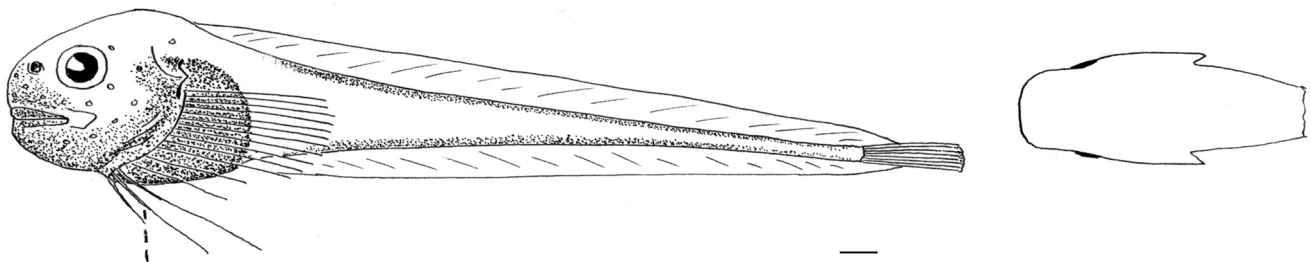


Figure 3. - *Paraliparis gracilis*. MNHN 1988-64, 48 mm SL. Scale = 2 mm. Skinned.

Table III. - Measurements and counts distinguishing *Paraliparis copei kerguelensis* from *P. c. wilsoni*. *: Insertion of the interneural of the first dorsal fin ray between vertebrae; **: Data for 3 juveniles 56-64 mm SL in parentheses.

Characters	<i>P. c. kerguelensis</i>			<i>P. c. wilsoni</i>		
	Our data	Andriashev, 1986	Range	Our data**	Andriashev, 1986	Range
InD*	3/4 - 5/6	4/5-5/6	3/4 -5/6	5/6 (6/7-8/9)	5/6	5/6-8/9
HL	15.6-16.0	15.0-16.5	15.0-16.5	17.3 (18.6-19.6)	17.2-18.1	17.2-19.6
PreA	37-42	35.8-37.0	35.8-42.0	38.0 (34.0-37.5)	37-40	34-40
Mandible to anus	14-16	13-15	13-15	17 (16-20)	10.8-16.0	(10.8)16-20
Eye	26-31	25-36	25-36	23.0 (20.8-25.4)	26-27	20.8-27.0

(South Orkney Islands; variability). - Andriashev, 1986: 74, figs 17, 31, 32; redescription). - Stein & Andriashev, 1990: 243, fig. 18 (South Orkney Islands, South Sandwich Islands). - Duhamel, 1992, fig. 1c (Crozet Islands, 945-1055 m). - Andriashev, 1994: 296 (TL to 122 mm).

Material

7 specimens 48-83 mm SL. Crozet Islands. - MNHN 1988-62, 63 mm SL. - MNHN 1988-63, 55 mm SL, RV "Marion-Dufresne", cruise "MD30-Biomass", station 75, 27 Feb. 1982. - MNHN 1988-64, female 83 mm SL and 3 juv 48-52 mm SL, R.V. "Marion-Dufresne", cruise "MD30-Biomass", station 54, 18 Feb. 1982. - MNHN 1988-65, female 74 mm and male 73 mm SL.

Comparative material

One specimen from South Georgia. - MNHN 1992-1896 (from ZISP 45653), female 77 mm SL, R.V. "Akademik Knipowich", trawl 137, 3 Mar. 1967, coll. Y. Permitin.

Diagnostic characters and counts

Specimens from the Crozet Islands were identified as *P. gracilis* based on the following characters. Vertebrae 67-70 (9-10+58-61), D 62-64, A 57, C 8, Pectoral fin rays 15-18 (11-13+1-2+3-4). Anterior 3 neural spines long. First dorsal ray between vertebrae 5 and 6. Radials 4 (3+1) (preparation MNHN 1988-64), round; interradial fenestra absent, coracoid with a long helve. Pyloric caeca absent. Transverse skin fold present on isthmus. Gill opening extending over 1-2 pectoral fin rays. Anus below 1/3-2/3 of postorbital length. Gill cavity and peritoneum black. Skin

on upper part of head and on body pale.

Specimens from the Crozet Islands differ from those of the type locality (South Georgia) in the following (Andriashev, 1986): pectoral fin distinctly notched, notch ray length 50-58% of upper lobe length (*vs* almost unnotched). Distinct dark brown subdermal pigmentation along bases of dorsal and anal fins (*vs* absent). Main part of stomach pale, intestine entirely pale, only oesophagus and anterior part of stomach black (*vs* stomach and anterior part of intestine dark brown). Lips, snout and chin, isthmus and belly between pectoral lower lobes chocolate-brown (*vs* entirely pale).

We also found characters that are not mentioned in the original description of the species. A thin but deep (ca. 5% SL) skin fold connects the lower pectoral fin lobes in front of the anus and the coracoid distinctly projects from the ventral contour of body. The urogenital papilla in males is unusually thin and long (ca. 4% SL), vermiform, brown in colour.

Distribution

The species was described from South Georgia and later recorded from South Orkney, South Sandwich and Crozet islands at a depth 210-1055 m, mostly in midwater (Andriashev, 1982, 1986; Stein and Andriashev, 1990; Duhamel, 1992; Andriashev, 1994). Our records fit with these ranges.

Comparative notes

Differences between specimens from Crozet and South Georgia may have at least subspecies level, but our material was presently not enough for final conclusions. Our speci-

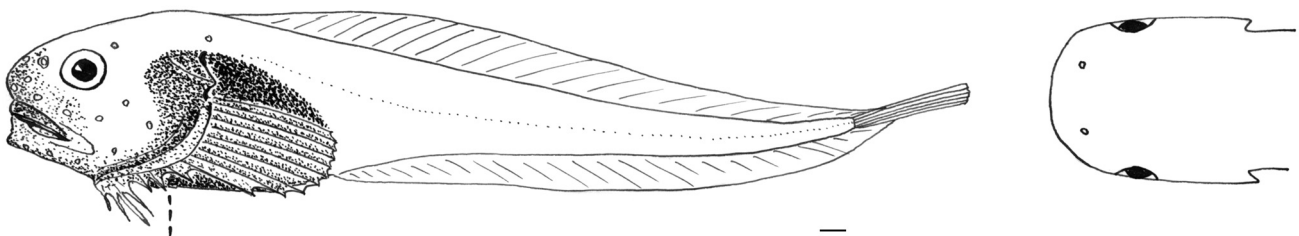


Figure 4. - *Paraliparis neelovi*. MNHN 2002-1077, 35.5 mm SL. Scale = 1 mm.

mens of *Paraliparis gracilis* differs from sympatric *P. operculosus* by having 8 caudal fin rays (*vs* 9-10), P 15-18 (*vs* 18-20), smaller opercular flap, dark brown pigmentation present under skin on musculature along dorsal- and anal-fin bases (*vs* absent), pectoral fin distinctly notched (*vs* unnotched).

PARALIPARIS NEELOVI ANDRIASHEV, 1982

(Fig. 4)

Paraliparis neelovi Andriashev, 1982: 721, figs 1, 2 (Banzare Banks, 1070-1575 m). - Andriashev, 1986: 117, figs 51-53 (in revision of the genus *Paraliparis*). - Stein & Andriashev, 1990: 249, fig. 27 (diagnosis). - Duhamel, 1992: 202, fig. 5b (Banzare Banks, 1740-2000 m).

Material studied

MNHN 2002-1077, juvenile 35.5 mm SL, Kerguelen Islands, R.V. "La Curieuse", IYGPT trawl, cruise "ICHTYOKER", 6 Dec. 1999, station 700, 48°50'S - 71°28'E, fishing depth ca. 350 m over 1111 m.

Comparative material

Banzare Bank. Paratype of *P. neelovi*. - MNHN 1992-1393 (from ZISP 45822), 204 mm SL, 8 Jan. 1978, 57°07'S - 68°44'E, depth 1420-1510 m, det. A. Andriashev. - MNHN 1988-198, 235 mm SL, R.V. "Marion-Dufresne", cruise MD42/SIBEX, 19 Jan. 1985, station 13, CP 41, 59°20'S - 81°55'E, depth 1740-1760 m. - MNHN 1988-199, 145 and 191 mm SL, R.V. "Marion-Dufresne" cruise MD42/SIBEX, 21 Jan. 1985, station 15 CP 45, 59°24'S - 79°34'E, depth 1820-2000 m.

Diagnosis

Counts. - Vertebrae 58 (10+48), D ca. 51, A ca. 45, C 6. Interneural of first dorsal ray between vertebrae 6 and 7. P 17 (10+3+4). Pores 2-5-7-1 (postorbital pore absent).

Measurements. - The results are given in table I.

Description

In juvenile mouth slightly oblique, cleft reaching to ver-

tical of anterior margin of pupil, posterior end of upper jaw reaching posterior margin of eye. Teeth simple, not uniserial posteriorly (adults with uniserial teeth posteriorly), placed in oblique rows along entire jaw. Gill opening entirely above pectoral fin base. Opercular flap triangular, upper edge about twice as long as lower (Fig. 4). Chin with thick subcutaneous gelatinous layer. Chin pores not closely set. Subcutaneous skin layer gelatinous. Uppermost pectoral ray level with lower margin of eye. Lowermost pectoral ray based below posterior margin of eye. Pectoral fin lower lobe rays and notch rays fleshy, distinctly protruding from fin membrane. Greatest depth of dorsal fin at anterior third of the fin. Anus positioned on vertical through second third of postorbital space. Skin on head and body pale, with exclusion of snout, slightly brownish. Black peritoneum visible externally. Orobranchial cavity chocolate-brown.

In two adults (MNHN 1988-199), an unusual deep skin fold present on internal surface of gill cover inside gill cavity mirrors the shape of the first gill arch, with two finger-like projections on margin. Its function is unclear.

Distribution

P. neelovi, known previously from adult specimens, reported from Banzare and Elan banks at depths 1070-2000 m, was suggested to be more widely distributed in bathyal and thalassobathyal zones of the Southern Ocean (Andriashev, 1982; Duhamel, 1992). Our records confirm this assumption. Juvenile 35.5 mm SL found at depth ca. 350 m over 1111 m indicates that young are pelagic.

Comparative notes

Paraliparis neelovi is the only known species in the Southern Ocean with six caudal fin rays (Andriashev, 1986). It is also characterized by having a small gill opening above the pectoral fin base and uniserial teeth on the posterior half of each jaw. Our juvenile is similar to the adult paratype of *P. neelovi* from main characters but differs in having teeth in rows on the entire jaw and skin on head and body entirely pale (*vs* nut brown). These are probably age or size-related characters.

Juvenile *P. neelovi* and sympatric *P. thalassobathyalis* (see below) differ in having caudal fin ray count 6 (*vs* 5),

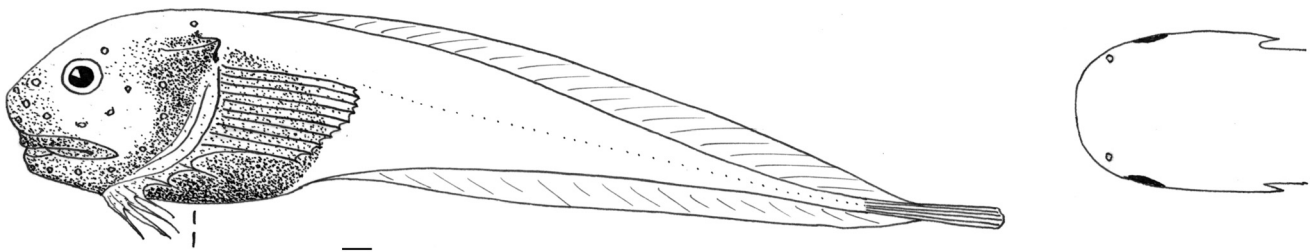


Figure 5. - *Paraliparis cf. neelovi*. MNHN 2002-1078, 35 mm SL. Scale = 1 mm.

mouth oblique (*vs* horizontal), subdermal brown pigmentation on caudal part of body absent (*vs* present), branchial cavity chocolate brown (*vs* black), lips, chin and snout brownish *vs* blackish.

PARALIPARIS cf. NEELOVI ANDRIASHEV, 1982

(Fig. 5)

Material studied

MNHN 2002-1078, juvenile 35 mm SL, good condition, Kerguelen Islands, R.V. "La Curieuse", cruise "ICHTYOKER", 6 Dec. 1999, IYGPT trawl, station 701, 48°50'S - 71°24'E, depth ca. 250 m over 1253 m.

Diagnosis

Counts. - Vertebrae 56 (10+46), D 48, A 44, C 6. Internural of the first dorsal ray between vertebrae 5 and 6. P 16 (10+2+4).

Measurements. - The results are given in table I.

Description

Mouth horizontal, large, mouth cleft reaching to vertical through posterior margin of pupil, posterior end of upper jaw reaching well behind eye. Teeth simple, not uniserial posteriorly, rarely in a few oblique rows, 3-4 teeth in a row anteriorly. Gill opening entirely above pectoral fin base. Opercular flap rectangular (Fig. 5), tip almost a right angle, ventral end posterior to upper. Cephalic pores: 2-6-7-1. Chin pores not closely set, not in a common pit. Uppermost pectoral ray level with upper margin of eye. Base of lowest pectoral ray below posterior margin of eye. Lower lobe and notch rays not fleshy, thin. Anus on vertical through gill opening. Skin on head and body pale, only snout brownish. Black peritoneum visible externally. Orobranchial cavity brown.

Comparative notes

Our juvenile is most similar to *P. neelovi*, having common counts, including six caudal-fin rays and a short gill opening. *P. neelovi* is the only Southern Ocean species with C6. Nevertheless, our young specimen differs from the

juvenile of *P. neelovi* (above) in general shape of head and body, mouth horizontal (*vs* oblique), upper pectoral ray level with upper margin of eye (*vs* with lower margin), opercular flap rectangular, with equal sides (*vs* triangular with upper side twice longer than lower side). More material is needed for taxonomic conclusions.

This specimen is similar in general appearance to juveniles of sympatric *P. copei kerguelensis* but differs having teeth in a few oblique rows (*vs* uniserial on each jaw), P 16 (10+2+4) *vs* P 20-22 (14-16+2+2-4), C 6 (*vs* 8), opercular flap small, rectangular (*vs* not developed).

PARALIPARIS OPERCULOSUS ANDRIASHEV, 1979

(Fig. 6)

Paraliparis operculosus Andriashev, 1979:32, fig. 3 (Kerguelen Islands). - Andriashev, 1982: 724, fig. 2 (in a key; fig. of pectoral girdle). - Andriashev, 1986: 123, figs 53, 54 (in revision). - Stein & Andriashev, 1990: 250, fig. 28 (diagnosis). - Duhamel, 1992: 205 (Kerguelen and Heard Islands, Skif Bank, 454-937 m). - Andriashev, 1994: 296 (in review of liparids off subantarctic islands).

Material

3 specimens 78-110 mm SL and juv 13.2 mm SL. Kerguelen Islands. - MNHN 1992-935 (cited in Duhamel, 1992), juvenile 13.2 (fresh 14.5) mm SL, FRV "Skif", 28 Feb. 1988, Rectangular Midwater Trawl (RMT), 48°66'S - 71°02'E, over depth 700-750 m. - MNHN 2002-1080, female 110 mm SL, skin and eye are missing, longliner "Antarctic 1", haul 165, 19 Nov. 2000, 49°04'S - 72°03'E, depth 1129-1295 m. - MNHN 2002-1081, juv. 78 mm SL, no accurate collection data. - MNHN 2002-1079, juv. 94 mm SL, no accurate collection data.

Diagnosis

Counts. - Vertebrae 61-62, D 55-56, A 50, C 9 (1+8), P 20 (12-13+3+4).

Measurements. - The results are given in table I.

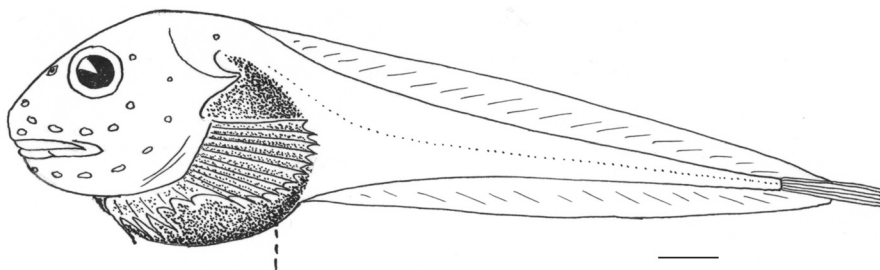


Figure 6. - *Paraliparis operculosus*. MNHN 1992-935, 13.2 mm SL. Scale = 1 mm.

Description

Hypural unslit. Opercular lobe. Gill opening reaching to 2-4 pectoral ray. Pectoral fin unnotched; lower 5-6 rays of pectoral fin almost entirely free from common fin membrane. Four pectoral radials, equidistant. Lowermost pectoral ray positioned below anterior margin of orbit. Coracoid projecting from ventral contour of body. Teeth mainly simple, posterior in rows shouldered. Mandibular symphyseal pores closely set. Peritoneum black, stomach dark brown to black.

Juvenile 13.2 mm SL similar to adults in general appearance, main diagnostic characters (including large, projecting opercular flap) and coloration (Fig. 6); all pores already present (2-6-7-1). Juvenile differs from larger specimens by anus closer to anal-fin origin, lowermost pectoral ray based more backward (below posterior margin of eye), gill opening above the pectoral fin base, chin pores in a distinct common pore-like pit.

Proportions. - HL 30, preA 39.4, ma 36.4, bd 30.3 (100), bdA 15 (50), E 7.6 (25).

Distribution

Paraliparis operculosus is common near the Kerguelen Islands at depths of 380 to 935 m, usually at 600-700 m. It was previously recorded from the Kerguelen ridge southward to 51°34'S at 786-800 m and 1000-1010 m (Andriashev, 1986) and off Heard Island and on Skif Bank at 454-937 m (Duhamel, 1992). Our specimen was collected deeper than previous records (1129-1295 vs 380-1010 m). Pelagic juvenile (13.2 mm SL) has been collected near the Kerguelen Islands at 700-750 m (Duhamel, 1992 and this study).

PARALIPARIS THALASSOBATHYALIS ANDRIASHEV, 1982 (Fig. 7)

Paraliparis thalassobathyalis Andriashev, 1982. - 1986: 143, figs 63, 64 (Banzare Bank). - Duhamel, 1992: 203, fig. 5d (Crozet Islands). - Andriashev, 1994: 296, 297 (in a key).

Material

12 specimens 75-112 mm SL and 1 juvenile 28 mm SL. R.V. "La Curieuse", cruise "ICHTYOKER" off the Kerguelen Islands, IYGPT trawl. - MNHN 2000-4970, female 105 mm SL, 118 mm TL, 6 Dec. 1999, station 697, 48°49'S - 71°34'E, depth ca. 160 m over 1072 m. - MNHN 2000-4974, female 94 mm SL, 105 mm TL and male 105 mm SL, 120 mm TL, 5 Dec. 1999, station 690, 48°56'S - 71°58'E, depth ca. 350 m over larger depth. - MNHN 2002-1082, two females 108 and 92 mm SL, 120 and 105 mm TL

and one male 113 mm SL, 131 mm TL, 3 Jun. 2000, station 791, 48°50'S - 71°38'E, depth ca. 350 m over larger depth. - MNHN 2002-1083, female 110 mm SL, TL unknown, 4 Jun. 2000, station 796, 48°49'S - 71°22'E, depth ca. 250 m over 1291 m. - MNHN 2002-1084, female 112 mm SL, 124 mm TL and sub-adult 90 mm SL, 113 mm TL, 5 Dec. 1999, station 696, 48°49'S - 71°42'E, depth ca. 250 m over 1192 m. - MNHN 2002-1085, 75 mm SL, 6 Dec. 1999, station 698, 48°49'S - 71°36'E, depth ca. 45 m over 1018 m. - MNHN 2002-1086, juvenile 28 mm SL, 12 Jan. 2000, station 713, 49°09'S - 71°27'E, depth ca. 250 m over 663 m. Longliner "Anyo-Maru n°22", Crozet Islands, collector J. Maison. - MNHN 2000-0172, male 101 mm SL, 46°32'S - 51°18'E, 12 Apr. 1997, depth 756-1026 m. - MNHN 2000-0173, female 105 mm SL, 113 mm TL, position unknown, date Jan. to Apr. 1997.

Diagnosis

Counts. - Vertebrae 56-58 (9-11+45-49), D 50-53, A 43-46, C 5 (n = 8). P 15-17 (19) (n = 11). Pyloric caeca 5-6 (n = 3), their length ca. 10-15% SL. Gill rakers 5 (n = 1).

Measurements. - The results are given in table I. In addition LPL 97-125%UPL. Dorsal and anal fin overlap 33-63 and 33-58% caudal fin respectively.

Description

Head deep and compressed, width ca. 58-82% HL. Mouth terminal, horizontal. Lower jaw slightly shorter than upper, usually not included. Mouth cleft extending to vertical through eye center or slightly posterior to it, posterior end of upper jaw reaching almost to vertical through posterior margin of eye or behind it. Rostral fold not well developed. Lips thin, not fleshy. Teeth simple, posterior teeth in rows with small lateral lobes. Teeth in upper jaw in 20-22 rows (4-6 teeth in a lull row at symphysis), in lower jaw in 18-25 rows (5-6 teeth). Musculus adductor mandibulare large and externally visible, as originally described (Andriashev, 1982). Pores 2-6-7-1. Chin pores not closely set. Gill opening above base of pectoral fin, rarely reaching to 2nd pectoral ray. Opercular flap small, triangular with rounded tip. Gill rakers in specimen 100 mm SL, 5 on outer side arch, 7 on inner side.

Variability in characters from radiographs reading comparatively high. Abdominal vertebrae 9 (n = 2), 10 (3) or 11 (3). Caudal vertebrae 45 (n = 1), 46 (2), 47 (2), 48 (1), 49 (2). Interneural of first dorsal-fin ray inserted between vertebrae 4 and 5 (n = 1), 5 and 6 (n = 5) or 6 and 7 (n = 2). One (n = 3) or two (n = 4) free (from dorsal fin) pterygiophores anterior to dorsal fin origin (between vertebrae 3-6). The first haemal spine half length of the second one which is long and reaches the first anal-fin ray pterygiophore (n =

2), or first haemal spine long and reaching the first anal-fin ray pterygiophore ($n = 3$). Posterior most dorsal and anal-fin rays associated with the last pre-urostyler vertebrae or with the urostyler vertebrae. Dorsal fin rays gradually larger posteriorly; sometimes first dorsal-fin ray rudimentary (very short and thin) ($n = 2$ of 7). Hypural plate one, posteriorly slit ($n = 3$) or unslit ($n = 4$). Caudal fin rays 5.

Pectoral fin with 9-10 rays in upper lobe, 2-4 widely spaced rays in notch, 3-5 rays in lower lobe. Notch not deep. Lower lobe rays free for 1/3 to 1/2 length. Pectoral fin not reaching anal fin. Uppermost pectoral ray level with center or upper margin of eye, base of lowest ray below center or posterior margin of eye. Anus positioned below middle postorbital region. Anus covered by thin anterior transverse skin fold.

Skin pale, semitransparent. Snout and chin usually more or less blackish. Caudal region in some specimens pale but in others fin with blackish margins. Blackish margin may be wide, distinct and bright, midline of tail may also be blackish. Pectoral fin usually with blackish margin. Branchial cavity and gill arches black. Mouth gray. Stomach and peritoneum black. Pyloric caeca pale.

Three forms are present in our material. They differ in general shape of body, color patterns and other characters.

Form A. - MNHN 2002-1082 female 108 mm, MNHN 2002-1083, female 110 mm, MNHN 2002-1084 female 112 mm. Body not humpbacked in front of dorsal fin origin. Uppermost pectoral ray level with eye center. Snout deep and blunt, chin deep. Gill opening level with eye. Snout and chin slightly pigmented, lips blackish. End of caudal part of body pale. Pectoral-fin margins not blackish. Females 105-110 mm SL have ovarian eggs ca. 2.0-2.8 mm in diameter. Remains of crustaceans present in stomach.

Form B. - MNHN 2002-1082 male 113 mm, MNHN 2002-1084 male 90 mm, MNHN 2002-1085 juvenile male 75 mm. Body humpbacked in front of dorsal fin origin. Uppermost pectoral ray level with upper margin of eye. Snout more low and slanted than in form A, chin low. Gill opening above level of eye. Snout and chin grayish, lips blackish. End of dorsal and anal fin with blackish margins. Margins of pectoral fin and gill opening blackish.

Form C. - MNHN 2002-1082 female 92 mm. Body not humpbacked. Uppermost pectoral fin ray level with eye center. Snout widely rounded, chin deep, anterior end of mouth cleft at mid-depth of frontal contour of head. Gill opening placed lower than in forms A and B, extending ventrally to pectoral ray 2. Dorsal and anal fins with wide and bright blackish margin. The belly around the genital opening is protruding antero-ventrally as a cone-shaped sack, this condition in liparids usually recognized as pre-spawning condition, but ovaries of the specimen contains unripe eggs and a large, empty central cavity, thus we questionably regard the condition as post-spawning.

In juvenile 28 mm SL:

Counts. - P 15 (9+2+4), C 5.

Proportions. - HL 26.4, sn 8.9 (33.8), E 5.7 (21.6), io 14.3 (54), go 6.4 (24.3), hw 19.6 (74), hd 21.8 (82), bdA 16.1 (61), preD 29.3, preA 36.4, ma 25.7, aAf 10.7, UPL 12.5 (47).

Skin on body pale, but head and body appear black because the black peritoneum and orobranchial cavities are visible through body wall (Fig. 7). Snout and chin also black. Skin on body pale. Subdermal pigmentation brown with melanophores present on muscles in dorsal and caudal regions of body.

Distribution

Described from the southern part of the Kerguelen Plateau (Elan and Banzare banks, 56°20' to 59°42'S - 68°04' to 76°32'E) (Andriashev, 1986), *P. thalassobathyalis* was recorded near the Crozet Islands (45°49'5 to 46°46'4S - 50°33'2 to 51°17'E) (Duhamel, 1992), Shag Rocks and the Meteor seamount (48°02'S - 08°25'E) (Andriashev, 1986). All previous records are benthic or epibenthic between 620-1600 m depth. Our collection come from pelagic hauls in midwater, at depths of ca. 45-350 m in much deeper water (1018-1291 m), suggesting that this species lives pelagically as an adult, not only as juvenile. Deep-water bottom trawls are not closed and could have captured *P. thalassobathyalis* from the water column, or *P. thalassobathyalis* may use both the pelagic and the benthic/epibenthic environments.

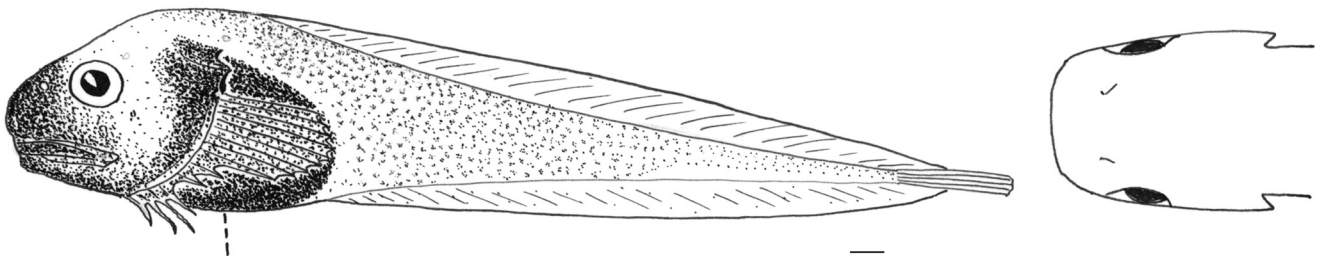


Figure 7. - *Paraliparis thalassobathyalis*. MNHN 2002-1086, 28 mm SL. Scale = 1 mm. Not all pores on head discernible.

Comparative notes

P. thalassobathyalis are distinguished from all south-ocean congeners in the following combination of unique characters: 5 caudal fin rays, 15-17 pectoral fin rays, black stomach, few gill rakers (4-6), two pectoral radials, reduced number of vertebrae (56-59). The characters of all our specimens fit *P. thalassobathyalis* well. Counts from our specimens slightly extend the ranges in the original description: A 43-46 (vs 44-46), abdominal vertebrae 9-11 (vs 9-10), caudal vertebrae 45-49 (vs 47-50), P 15-19 (vs 15-17) pyloric caeca 5-6 (vs 6-7), all of which may be normal intraspecific variability. Some proportions differ slightly: head length 23.8-24.8 (vs 20.6-22.7% SL in 5 specimens 114-119 mm SL of the type series), predorsal 26-32 (vs 25), preanal 38 (41-47 in adult females) vs 38-41, upper pectoral lobe 14.7-19.5 (vs 13.9-16.3), eye 22-27 (vs 25-26% HHL), gill opening 3.4-4.6 (vs 2.5-2.9)% SL or 14-18 (vs 11-13)% HL. Blackish caudal pigmentation was not previously described. Thus, our material expand the range of variability in the species.

Three types of specimens are present in our material (above A, B, C), which may occur in one trawl (station 791). We suggest two hypothesis. First is that sexual dimorphism may exist in body shape and color. Females are not hump-backed and are pale caudally (form A), males are hump-backed and have a blackish tail (form B), and spawning females have bright blackish margins of unpaired fins (form C). Doubts are that blackish caudal pigmentation was not previously described in the species and that sexual dimorphism was not documented in *Paraliparis*. The second is that we are in front of two morphological forms: one caudally pale (type A, females only in our materials) and the other caudally blackish (type B males and type C females). Wide range in counts and proportions may be indicating this. One form may be epibenthic, another one pelagic. Additional specimens are needed to verify these hypothesis.

PARALIPARIS SP. - PALEHEAD PARALIPARIS

(Fig. 8)

Material

MNHN 2002-1087, juvenile 44 mm SL, R.V. "La

Curieuse", cruise "IPEKER", 4 Mar. 1995, station 22, 49°01'S - 72°17'E, depth ca. 400 m over depth up to 1000 m, temperature at sea surface 3.6°C.

Diagnosis

Vertebrae 58, D 52. C 7. Peritoneum and eye brown, orobranchial cavities pale. Skin in alcohol pale. Teeth arranged in oblique rows, anterior teeth simple, posterior ones with small lateral shoulders. Mouth horizontal, terminal.

Counts. - Vertebrae 58 (10+48), D 52, A 41. C 7 (1+6). Interneural of first dorsal ray between vertebrae 4 and 5. Pectoral rays 11 in upper lobe, total fewer than 19.

Measurements. - The results are given in table I.

Description

Head 1/4 of SL, deep and compressed, its width 4/5 head length, width slightly more than half of HL. Eye ca. 1/5 HL, iris brown. Mouth terminal, horizontal. Oral cleft reaching to below eye center, posterior end of upper jaw behind vertical through eye. Teeth arranged in oblique rows, including posterior part of jaws; in each row anterior teeth simple, posterior ones with small lateral shoulders. Gill opening above pectoral fin base, its length ca. 1/5 of HL. Opercular flap small triangular. Pectoral rays 11 in upper lobe, other rays damaged, clearly 19 or fewer. Uppermost pectoral fin-ray level with lower half of eye, lowermost ray slightly behind vertical through posterior margin of orbit. Anus damaged. Skin in alcohol pale, including snout and lips. Peritoneum and eye brown, branchial cavity pale. Mouth pale, tongue slightly dotted by brown melanophores. Pyloric caeca not discernible, but all inner organs pale.

Distribution

The specimen was found near Kerguelen islands in mid-water at depth 400 m over depth up to 1000 m.

Comparative notes

This *Paraliparis* sp. differs from other species known from area by the pale orobranchial cavity and C 7. Seven caudal fin rays in Antarctic congeners occur only in *P. cerasinus*, *P. devriesi*, *P. mawsoni*, *P. monoporos*, *P. stehmanni*,

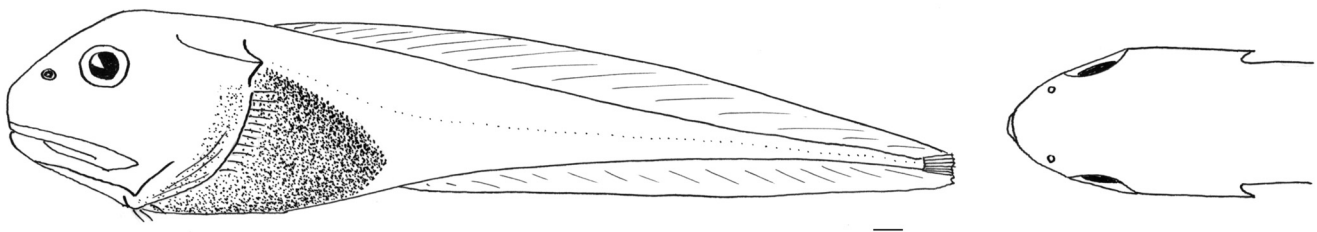


Figure 8. - *Paraliparis* sp. MNHN 2002-1087, 44 mm SL. Scale = 1 mm. Left eye reconstructed from the right side.

and *P. tetrapteryx*, but all these species have vertebrae 68-81 (Andriashev, 1986) (*vs* 58 in our specimen). Among short-tailed species with vertebrae fewer than 63 (Andriashev, 1986) our specimen obviously belongs to the group with few pectoral-fin ray counts (14-19), including *P. australis*, *P. eltanini*, *P. aspersus*, *P. charcoti*, *P. thalassobathyalis* and *P. operculosus*. All of these species have caudal fin rays 4-5 (*P. eltanini* and *P. thalassobathyalis*) or 8-9 (*P. australis*, *P. aspersus*, *P. charcoti*, *P. operculosus*) *vs* 7 in our specimen. The specimen differs from *P. duhameli* from bathyal depths of Crozet Island by C 7 (6 principal +1 ventral procurent) *vs* 8 (principal, 4/4), posterior teeth with small lobes (*vs* simple), upper pectoral fin rays 11 *vs* 19, all internal organs pale (*vs* pyloric caeca black) (Andriashev, 1994).

The specimen is clearly an undescribed species, but because it is a juvenile and in poor condition, we refer to it as *Paraliparis* sp. until more material becomes available for examination.

The following key synthesizes all data from early juveniles collected during these cruises.

PRELIMINARY FIELD KEY TO JUVENILES (28-36 mm SL) OF *PARALIPARIS* OFF THE KERGUELEN AND CROZET ISLANDS

- 1a.** - Mouth distinctly oblique. P 19 (11+3+4), C 5. Gill opening extending over 2-3 pectoral rays
..... *P. obliquosus*
- 1b.** - Mouth horizontal. P, C and gill opening not as above2
- 2a.** - Caudal fin rays 5. Lower lobe and notch rays of pectoral fin extended beyond membrane. P 15-19 (9-10+2-4+3-5).....*P. thalassobathyalis*
- 2b.** - Caudal fin rays 6-9.....3
- 3a.** - Caudal fin rays 64
- 3b.** - Caudal fin rays 7-9.....5
- 4a.** - Mouth slightly oblique, upper pectoral ray level with lower margin of eye, opercular flap triangular with upper margin twice as long as lower*P. neelovi*
- 4b.** - Mouth horizontal, upper pectoral ray level with upper margin of eye, opercular flap rectangular, with equal sides.*P. cf. neelovi*
- 5a.** - Caudal fin rays 7 (6+1). (Vertebrae 58, upper pectoral lobe rays 11).....*Paraliparis* sp.
- 5b.** - Caudal fin rays 8-10.....6
- 6a.** - Teeth in a few oblique rows. Opercular flap well developed, large or moderately large. P 15-20.....8
- 6b.** - Teeth uniserial. Opercular flap almost absent. P 20-22(*P. copei* group) 7

7a. - Chin pores open in a common pit. Skin (in alcohol) milky-pale, lips black, chin and snout pale. Head 15-16.5% SL. Eye large, 26-31 %HL. Anus slightly in front of vertical through gill opening.....*P. copei kerguelensis*

7b. - Chin pores open separately (not in a common pit). Skin (in alcohol) cream-brown; lips, chin and snout blackish-brown. Head 17.0-19.6% SL. Eye 21.0-25.4% HL. Anus slightly behind vertical through gill opening
..... *P. copei wilsoni*

8a. - P 15-18. C 8. Opercular flap moderately large. Dark brown pigmentation under skin on musculature along dorsal- and anal-fin bases including caudal region.....
..... *P. gracilis*

8b. - P 18-20. C 9-10. Opercular flap large, forming a prominent projection above pectoral fin. Caudal part of body entirely pale*P. operculosus*

DISCUSSION

Study of a small liparid collection off the Kerguelen and Crozet islands, provided new and interesting results. This comparatively well studied area of the Southern Ocean is quite often visited by research vessels. Finding of a new species *P. obliquosus* and the presence of palehead *Paraliparis*, which obviously belong to undescribed species, show that there still are wide fields for faunistic research activity.

Results on species, previously reported in the area, are also informative. We found two closely related forms of the "*P. copei*" group, *P. c. kerguelensis* in the vicinity of the Kerguelen islands and *P. c. wilsoni* near the Crozet islands. Additional characters to distinguish them are defined. It is obvious, that differences between two forms reach level of separate species. However we prefer not to change their taxonomic status at present because full revision of the *P. copei*-group is needed which should include more comparative materials. The *P. copei*-group includes a few closely related forms from Western North and Eastern North Atlantic, Southern Atlantic and Indian Oceans, which are regarded at present as subspecies. They all distinctly distinguish from other species by a complex of characters, including uniserial teeth on both jaws and undeveloped opercular flap.

We found specimens of *P. gracilis* in our materials from Crozet Island which was originally described off South Georgia. Our specimens fit well in species diagnosis and undoubtedly not belong to other known species. On the other hand, they differ from those ones from South Georgia mainly with size of pectoral-fin notch, coloration patterns and the skin fold connecting lower pectoral-fin lobes not mentioned in the description of *P. gracilis* from South

Georgia. Mentioned differences, if confirmed, reach at least the subspecies level. But much more comparative materials are needed for final taxonomic conclusions.

Paraliparis neelovi was known previously from adult specimens from Banzare and Elan banks at depths 1070-2000 m. Our juvenile record was found at depth ca. 350 m over 1111 m close to the Kerguelen Plateau. It indicates that young of this species are pelagic and thus can spread by currents. It confirms the hypothesis that the species may be more widely distributed in bathyal and thalassobathyal zones of the Southern Ocean (Andriashev, 1982; Duhamel, 1992). Juveniles of *P. obliquosus*, *P. cf. neelovi*, *P. operculosus*, *P. thalassobathyalis* and *Paraliparis* sp. (13.2-44.0 mm SL) also are found pelagically. It shows that pelagic young are quite common among Antarctic deep-sea *Paraliparis*.

We found also another juvenile which, using existing key, was identified as *Paraliparis neelovi*. It has similar counts, including C number. The latter character is discriminant because at present the only species in the Southern Ocean to possess it is *Paraliparis neelovi*. When comparing our young specimen with the juvenile *Paraliparis neelovi* of similar length directly, we found differences in general shape of head and body, angle of mouth cleft, upper pectoral-fin ray level, opercular flap shape. Taking in consideration that differences in adults may be even more pronounced, it may indicate that (1) we probably have a pair of closely related forms, or (2) we have an example of intraspecific variability. It needed much more materials to solve this question. Until that we prefer to leave *Paraliparis cf. neelovi* separately.

Materials of *P. thalassobathyalis* occur polymorphic. We found specimens of three types (A, B and C) differing mainly in general shape of head and body and coloration patterns. Our materials were not adequate for a definitive conclusion, and we may suggest two hypothesis. One is that they may represent sexual dimorphic differences. Females are not humpbacked and have pale caudal part (form A), males are humpbacked and have blackish tail (form B), specimens in spawning condition have bright blackish margins of unpaired fins (form C). The doubt is that such a form of sexual dimorphism (as between forms A and B) was not described for species of the genus *Paraliparis*. At least it is not known for South Ocean species, and also for any other *Paraliparis*. On the other hand, studying radiographs of *P. thalassobathyalis*, we found comparatively wide range of variability in characters: abdominal and caudal vertebrae counts, insertion of interneural of the first dorsal-fin ray, number of free pterygiophores, and others. For example, abdominal vertebrae varies from 9 to 11 (usually in *Paraliparis* they are mainly 9, or mainly 11, rarely 10). Thus, intraspecific variability of these characters was wider than in other species. It gives some basis for alternative

hypothesis, that we have two morphological forms: typical which is pale caudally (presented only by females in our materials, type A) and blackish caudally (males of type B and females of type C). One form may be epibenthic, another one pelagic. It remains an open question for further taxonomic investigation.

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