Rare abyssal, ophidiid fishes from off the Crozet Islands, Southern Ocean, with a new species of *Apagesoma* Carter, 1983

by

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ABSTRACT. - Seven ophidiid specimens were collected during the benthic Crozet research cruise (RRS Discovery, D300), December 2005-January 2006, Indian sector of the Southern Ocean. Two are *Apagesoma australis* n. sp., which can be distinguished from the two described species in this genus by the number of precaudal vertebrae (15 *vs* 13), body depth at origin of anal fin 9.0-10.5 *vs* 17.0-21.0% SL and the shape of the sagittal otoliths. Four specimens are examples of the rare *Holcomycteronus brucei* (Dollo, 1906), that until now is known from only three specimens. The last specimen is referred to *Bathyonus* Goode & Bean, 1885 a genus in need of revision. The new species is described and additional diagnostic characters are provided for *H. brucei*. Including the present material 13 specimens of Ophidiidae have now been reported from Antarctic/Sub Antarctic waters.

RÉSUMÉ. - Rares ophidiidés abyssaux capturés au large des îles Crozet, océan Austral, avec description d'une nouvelle espèce d'*Apagesoma* Carter, 1983.

Sept spécimens d'Ophidiidae ont été récoltés au cours de la campagne d'exploration benthique D300 du N.O. "Discovery" autour des îles Crozet, dans le secteur indien de l'océan Austral, en décembre 2005 et janvier 2006. Deux spécimens représentent une nouvelle espèce, *Apagesoma australis* sp. nov., qui se distingue des deux autres espèces décrites dans ce genre par le nombre de vertèbres précaudales (15 *vs* 13), la hauteur du corps au niveau de l'anale (9,0-10,65 *vs* 17,0-21,0% LS) et la forme des sagitta. Quatre spécimens appartiennent à l'espèce rare *Holcomycteronus brucei* (Dollo, 1906) qui n'était connue que par trois spécimens. Le dernier spécimen est assigné à *Bathyonus* Goode et Bean, 1885, un genre dont la révision est nécessaire. La nouvelle espèce est décrite, et des caractères diagnostiques complémentaires sont donnés pour *H. brucei*. Avec ce nouveau matériel, 13 spécimens d'Ophidiidae ont maintenant été récoltés dans les eaux antarctiques et subantarctiques.

Key words. - Ophidiidae - *Apagesoma australis* n. sp. - *Holcomycteronus brucei* - *Bathyonus* sp. - Crozet Islands - Southern Ocean.

The Ophidiidae belongs to the Ophidiiformes, an eurybathic order known from all oceans, but rarely from Polar Regions. Seven specimens were collected during the benthic Crozet research cruise (RRS Discovery, D300), December 2005 to January 2006 off the Crozet Islands, Indian sector of the Southern Ocean. Two specimens belong to the genus *Apagesoma* Carter, 1983 but as shown below they differ significantly from the two described *Apagesoma*-species resulting in the description of a new species. Four specimens belong in the genus *Holcomycteronus* Garman, 1899, a genus much in need of revision (Anderson and Stein, 2006). They are referred to *H. brucei* (Dollo, 1906) of which three specimens are already known, and these four new records provide additional diagnostic characters. Finally, one specimen is referred to *Bathyonus* Goode & Bean, 1886 a genus so much in need of revision that it can not be assigned to a known species. Along with three specimens of *Spectrunculus grandis* Günther, 1877, two from Kerguelen (Duhamel *et al*., 2005) and one from 58°36'S, 161°21'E (NMNZ P.041204) there are now 13 ophidiid specimens reported from Antarctic/SubAntarctic waters.

MATERIAL AND METHODS

All seven specimens were caught in a Semi-Balloon-Otter-Trawl (OTSB). Institutional abbreviations follow Eschmeyer (1998). The otolith terminology follows Schwarzhans (1981).

APAGESOMA CARTER, 1983

Apagesoma Carter, 1983: 94 (type species *Apagesoma edentatum* Carter, 1983 by original designation); Nielsen *et al*., 1999: 52.

Diagnosis (including a few modifications of the original diagnosis based on the new species here described)

A neobythitine genus with one pelvic fin ray in each fin and placed below the opercle, preopercle posteriorly expanded, spines on gill cover absent, no teeth on basibranchial plates, eyes small (1.0-1.3% SL), anterior nostril enlarged, long rakers on anterior gill arch 9-12, 116-131 dorsal and

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94-111 anal fin rays, precaudal vertebrae 13-15, total vertebrae 63-73.

Key to the species of *Apagesoma*

1a. Teeth on vomer present, anal fin rays 109-111, pelvic fin length 13.0-16.0% SL . . . . . *delosommatus* Hureau, Staiger & Nielsen, 1979

1b. Teeth on vomer absent, anal fin rays 94-98, pelvic fin length 8.2-8.7% SL. **2**

2a. Body depth at origin of dorsal fin 13.0% SL and at origin of anal fin 9.0-10.5% SL, precaudal vertebrae 15 . . . . . *australis* n. sp.

2b. Body depth at origin of dorsal fin 18.5% SL and at origin of anal fin 17.0% SL, precaudal vertebrae 13. . . . . *edentatum* Carter, 1983.

APAGESOMA AUSTRALIS N. SP.

(Figs 1-3)

Material examined

Holotype. - ZMUC P771525 (SL 595 mm, ♂, ill), off Crozet Islands (49°01'S, 51°04'E), Discovery St. 15775#13, OTSB, 4187-4191 m, 29 Dec. 2005.

Paratype. - ZMUC P771526 (SL 155 mm, immature), off Crozet Islands (45°40'S, 56°35'E), Discovery St. 15773#23, OTSB, 4269-4275 m, 16 Dec. 2005.

Condition of material. - The scales of both specimens were rubbed off in the trawl. The head of the paratype is damaged.

Comparative material. - *Apagesoma delosommatus* Hureau *et al*., 1979 [BMNH 1997.4.7.2, off Mauritania, cf. Merrett and Nielsen (2001)].

Diagnosis

Body elongate (depth at origin of anal fin 9.0-10.5% SL and at origin of dorsal fin 13.0% SL), dorsal fin rays 119-123, anal fin rays 94-96, pectoral fin rays 28, vertebrae 15+50-51, anterior anal fin ray below dorsal fin ray no. 28-31, teeth absent on vomer and on basibranchial plates and long rakers on anterior gill arch 9-11.

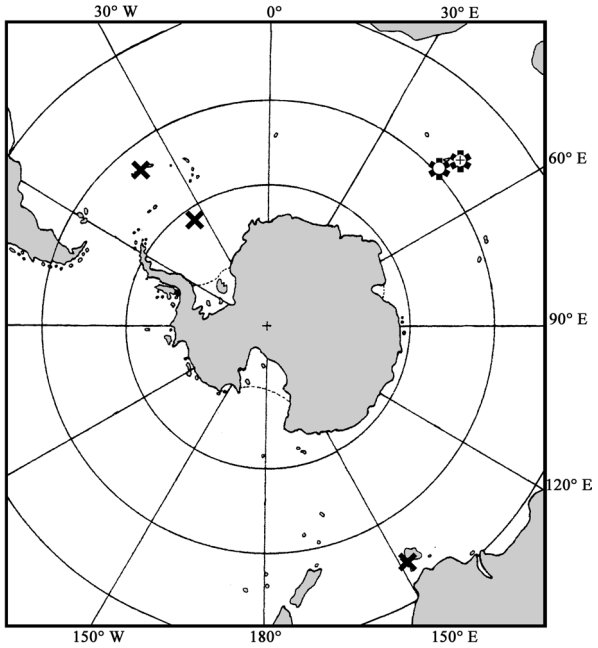

Figure 1. - Records of *Apagesoma australis* (○), *Holcomycteronus brucei* [four present specimens (✱), and three previous specimens (×)] and *Bathyonus* sp. (+).

Similarity

Table I shows that *A. australis* is most similar to *A. edentatum* with: an edentate vomer, short pelvic fin, low number of anal fin rays, and high number of dorsal fin rays anterior to the origin of the anal fin. They differ by the number of precaudal vertebrae (15 *vs* 13), the low body depth at origin of dorsal and anal fin (13.0% SL and 9.0-10.5% SL *vs* 18.5% SL and 17.0% SL, respectively), the shorter distance between base of pelvic fin and origin of anal fin (20.5-23.0% SL *vs* 27.0% SL), and in the form of the sagittal otolith (Fig. 3). *A. australis* is more similar to *A. delosommatus* only in depth at origin of anal fin and distance between base of pelvic fin and origin of anal fin.

Description of holotype

The principal meristic and morphometric characters are

Figure 2. - Holotype of *Apagesoma australis* ZMUC P771525, SL 595 mm.

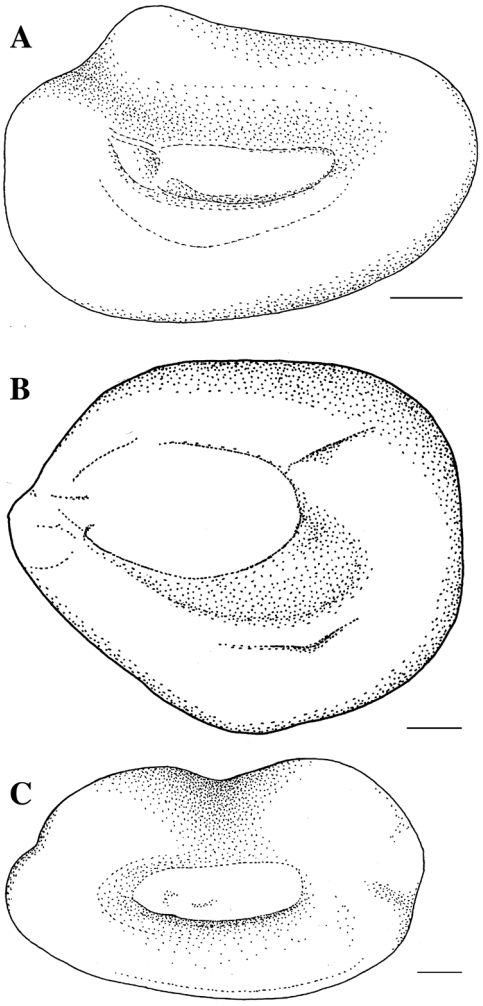

Figure 3. - **A**: Holotype of *Apagesoma australis*: right sagittal otolith; **B**: Holotype of *A. edentatum* USNM 227090, SL 752 mm; **C**: *A. delosommatus* BMNH 1997.4.7.2, SL 350 mm. Scale bars = 1 mm.

shown in table I. Head and body robust with long, elongate, tapering caudal part. All scales rubbed off but scale-pockets show scales on head and body, with body-scales considerably larger than head-scales. Vertical fins joined. Dorsal fin origin above operculum, anal fin origin well in front of midpoint of fish, pectoral fins inserted on midline and the short pelvic fins below operculum. Head short, less than 20% SL. Upper jaw large, more than half head-length, protruding over tip of lower jaw. Posterior end of maxillary slightly sheathed. Eye very small, about 1% SL, placed above midpoint of upper jaw. Nostrils large, the anterior placed midway between upper lip and posterior nostril. Posterior margin of opercle with 15-20 short, soft, bony projections that extend to the middle of the opercle as low, but distinct ridges perpendicular to the edge. Anterior gill arch with four short rakers on upper arm, one long raker at the angle and lower arm with ten long and four short rakers; first arch with a total of 85 gill filaments the longest of which are half the length of the longest raker. Head pores and lateral lines can not be observed due to the condition of the skin.

Sagittal otolith (Fig. 3A)

The oval sagitta has a rounded ventral rim and a bump on the rounded dorsal rim. It is 1.5 times as long as high and twice as long as thick. The undivided sulcus is half as long as the sagittal length and is placed in the centre of sagitta. An osteal channel is absent. (The sulcus of the sagitta from the paratype is only 1/3 the length of the sagitta).

Axial skeleton (from radiograph)

Vertebrae and ribs poorly ossified. Anterior neural spine very short. The following neural spines and the haemal spines thin and pointed decreasing in length posterioad. Parapophyses developed on vertebrae 5-15. Pleural ribs developed on vertebrae 3-13 and epipleural ribs absent.

Dentition

The dentition is weak with all teeth small and close-set. Vomer and basibranchial plates edentate. Palatines with 6 tooth rows in the holotype and 2 rows with 4 and 6 teeth respectively in the paratype. Dentaries with up to 13 tooth rows in the holotype and up to 4 rows in the paratype. Premaxillaries with up to 10 tooth rows in the holotype and 4 rows in the paratype.

Viscera

Holotype. - The major part of the abdominal cavity was taken up by the large liver. The relatively small stomach is thick-walled and empty. Pyloric caeca not developed. The long intestine (37 cm) with remains of crustaceans. The stomach ends 2.5 cm from the anus. The unripe testes are lobed. The swimbladder is thin-walled.

Paratype. - The abdominal cavity was dominated by a thick-walled stomach containing remains of crustaceans. Pyloric caeca not developed. A long intestine (ca. 8 cm) with unidentifiable contents. The stomach ends 0.5 cm from the anus. The immature gonads could not be sexed. The liver is very small. The swimbladder is thin-walled.

Colour

Both specimens appear in the present state whitish with faint bluish abdomen and branchial cavity. This is most probably caused by rough treatment in the trawl as epidermis and all scales are absent. However, below the right pectoral fin of the holotype a tiny piece of brown skin remains indicating that the specimen might have been brown. The peritoneum is dark brown.

Table I. - Comparison of *Apagesoma australis, A. edentatum* and *A. delosommatus*. (1) From Carter (1983) and radiographs. (2) From Hureau *et al*. (1979), Merrett and Nielsen (2001) and re-examination of BMNH 1997.4.7.2.

	A. australis		*A. edentatus* (1)	*A. delosommatus* (2)
	Holotype	Paratype	Holotype	HT, PT and 1 non-type
Standard length	595	155	752	350-563
Meristic characters				
Dorsal fin rays	123	119	116	129-131
Caudal fin rays	8	7	8	8
Anal fin rays	96	94	98	109-111
Pectoral fin rays	28	28	25	25-28
Pelvic fin rays	1	1	1	1
Vertebrae	15+50	15+51	13+50	13+59-60
Total vertebrae	65	66	63	72-73
Long gill rakers	11	9	10	10-12
Pseudobranchial filaments	2	-	-	2
Anterior dorsal ray above vertebra no.	3	4	4	4-5
Anterior anal ray below vertebra no.	18	18	17	17
Anterior anal ray below dorsal ray no.	31	28	29	22-23
Teeth on vomer	no	no	no	yes
Morphometric characters in % SL				
Head length	18.5	19.5	19.5	21.5-22.5
Depth at origin of anal fin	10.5	9.0	17.0	13.0
Depth at origin of dorsal fin	13.0	13.0	18.5	15.5-22.0
Upper jaw length	10.0	11.0	10.5	11.0-11.5
Interorbital length	5.4	-	-	6.5
Postorbital length	12.5	14.0	-	14.0
Diameter of eye window	1.3	-	1.1	1.0
Preanal length	38.0	36.0	39.0	34.0-38.5
Predorsal length	17.5	19.5	22.0	20.5-26.5
Pelvic fin base to anal fin origin	23.0	20.5	27.0	20.0-23.5
Pelvic fin length	8.2	-	8.7	13.0-16.0

Biology

An oviparous species caught at abyssal depths with remains of crustaceans in stomach and intestine. Presumably benthic or benthopelagic.

Distribution

Known from two localities off the Crozet Islands trawled at 4187-4275 m depth (Fig. 1).

Etymology

The specific name refers to the southerly position of the type locality.

HOLCOMYCTERONUS GARMAN, 1899

Holcomycteronus Garman, 1899: 162 (type species *Holcomycteronus digittatus* Garman, 1899 by monotypy); Nielsen *et al*. (1999: 67).

Diagnosis

A neobythitine genus with a robust body and a rounded snout, diameter of eye much shorter than snout, opercular spine strong, 2 median basibranchial tooth patches and a pair of tooth patches placed between the two median ones, developed rakers on anterior gill arch 7-11, pectoral fin rays 16-21 and pelvic fins with two rays in each.

Species

Six of the seven species described are considered valid (Nielsen *et al*., 1999: 68). However, the descriptions of six of the species are based on single specimens only so the variation is not known and very few additional specimens have been reported. Evidently, a revision of the genus is needed.

HOLCOMYCTERONUS BRUCEI (DOLLO, 1906)

(Figs 1, 4-6)

Material examined

ZMUC P771527 (SL 162 mm, sex unknown), off Crozet Islands (48°56'S, 51°03'E), Discovery St. 15775#4, OTSB, 4182-4195 m, 27 Dec. 2005. - ZMUC P771528-1529 (SL

Figure 4. - *Holcomycteronus brucei*. **A**: ZMUC P771529, SL 353 mm; **B**: Holotype NMSZ 1921,143,484, SL 307 mm. (Illustrated by Robert Nielsen).

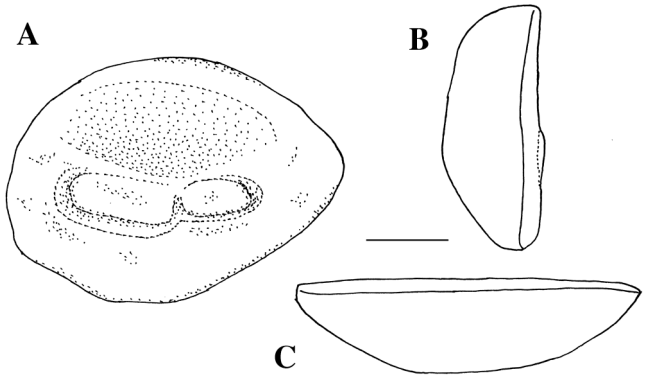

Figure 5. - Right sagittal otolith of *Holcomycteronus brucei* ZMUC P771529, SL 316 mm. **A**: Median view; **B**: Frontal view; **C**: Ventral view. Scale bar = 1 mm.

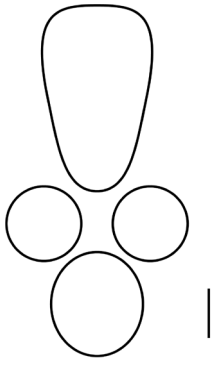

Figure 6. - Diagrams of basibranchial tooth patches of holotype of *Holcomycteronus brucei* NMSZ 1921,143,484, SL 307 mm. Scale bar = 2 mm.

173 mm, unripe female - 316 mm, unripe male), off Crozet Islands (49°01'S, 51°04'E), Discovery St. 15775#13, OTSB, 4187-4191 m, 29 Dec. 2005. - ZMUC P771530 (SL 353 mm, unripe female), off Crozet Islands (45°40'S, 56°35'E), Discovery St. 15773#23, OTSB, 4269-4275 m, 16 Dec. 2005.

Comparative material

Holcomycteronus aequatoris (Smith & Radcliffe *in* Radcliffe, 1913) (4 specimens - holotype USNM 74137, USNM 206941, ZMUC P771563-1564); *H. brucei* (Dollo, 1906) (Holotype NMSZ 1921.143.484 and LACM 11452-5); *H. digittatus* Garman, 1899 (19 spms - holotype MCZ 28639, 7 paratypes MCZ 28638, 28640, 28641, 28642 and USNM 57872, UMML 30278 (4), SIO58-420-61A, SIO65-221-61 and ZMUC P551558-1562); *H. profundissimus* (Roule, 1913) (4 spms - holotype MOM 0091-0563, NHMG Pi. 1740-1741, ZMUC P77387); *H. pterosus* (Alcock, 1890) (3 spms - holotype ZSI 12832; ZSI 12863 and 13046); *H. squamosus* (Roule, 1916) (3 spms - holotype MOM 0091-0235, ZMB 3342, UMML 28536).

Diagnosis

Holcomycteronus brucei is defined by the following combination of characters based on examination of the holotype, LACM 11452-5 and the four present specimens: Dorsal fin rays 104-123, anal fin rays 79-97, pectoral fin rays 17-19, vertebrae 20 + 48-52, long rakers on anterior gill arch 8-10, small subcircular sagittal otolith with ostium almost twice as long as cauda (Fig. 5), paired basibranchial

Table II. - Meristic and morphometric characters of *Holcomycteronus brucei*.

	Holotype	LACM 11452-5	ZMUC P771527	ZMUC P771528	ZMUC P771529	ZMUC P771530
Standard length	307	254	162	176	316	353
Meristic characters						
Dorsal fin rays	104	123	108	108	105	112
Caudal fin rays	8	8	8	8	8	8
Anal fin rays	83	97	90	88	79	85
Pectoral fin rays	18	19	17	17	17	17
Pelvic fin rays	2	2	2	2	2	2
Vertebrae	20+49	20+52	20+50	20+51	20+48	20+49
Total vertebrae	69	72	70	71	68	69
Long gill rakers	8	9	9	8	9	10
Pseudobranchial filaments	2	2	2	2	2	2
Anterior dorsal fin ray above vertebra no.	7	7	7	7	7	7
Anterior anal fin ray below dorsal fin ray no.	22	24	23	24	24	24
Anterior anal fin ray below vertebra no.	27	32	26	26	29	29
Morphometric characters in % of SL						
Head length	18.0	21.0	18.5	20.0	20.5	20.0
Depth at origin of anal fin			13.5	12.5	14.5	16.0
Upper jaw length	10.0	13.5	10.5	10.5	11.0	11.0
Interorbital length	6.2	7.9	6.2	6.8	6.9	6.9
Postorbital length	12.0	14.0	11.0	12.5	13.0	13.0
Diameter of eye window	1.1	1,7	1.7	1.9	2.0	2.1
Preanal length	42.5	45.0	44.0	44.0	47.5	48.5
Predorsal length	21.0	24.0	20.5	21.5	23.5	24.0
Pelvic fin base to anal fin origin	25.5	32.0	28.5	28.0	33.5	34.0
Pelvic fin length	7.5		9.3	8.7	9.6	8.3

tooth patches overlapping the posterior end of anterior median patch and almost as large as posterior median patch, colour of body pale with bluish head.

Similarity

Holcomycteronus brucei differs from *H. pterosus*, *H. aequatoris* and *H. squamosus* by having a subcircular sagitta (*vs* elongate) and small sagitta (1.3% SL *vs* 2.8-3.0% SL (Schwarzhans 1981)), from *H. pterosus*, *H. profundissimus* and *H. squamosus* by the paired basibranchial tooth patches being almost as large as the posterior median patch (*vs* much smaller), from *H. pterosus* by the fewer anal fin rays (79-97 *vs* 99-106), from *H. profundissimus* by the higher pectoral fin ray count (17-19 *vs* 15-16), and from *H. digittatus* by the pale body (*vs* brownish), smaller sagitta (1.3% SL *vs* 2.1% SL) and by the ostium being twice the length of cauda (*vs* ostium and cauda equally long).

Description

Besides the original description of *H. brucei* the holotype was redescribed by Nielsen (1990) and two additional specimens by Anderson and Stein (2006). On the basis of the present four specimens new information on the meristic and morphometric characters are provided (Tab. II).

Otolith (Fig. 5)

The rather thick sagittal otolith is slightly longer than high and subcircular of form. The sulcus is 2/3 the length of the sagitta and placed ventrally. Ostium almost twice the length of cauda and an osteal channel is not developed.

Basibranchial tooth patches (Fig. 6)

The median patches are placed rather close together and the posterior is almost half the size of the anterior patch. The paired patches are almost as large as and overlapping the posterior patch.

Biology

An oviparous species caught at abyssal depths. Bottom temperature 0.8°C. The stomach and intestine of P771530 hold remains of the following crustaceans: 5-6 specimens of the benthic isopod *Storthyngura* sp. (1.5-2.5 cm long) and a 2 cm long unidentifiable isopod (identified by Torben Wolff, ZMUC).

Distribution

The present records from off the Crozet Islands (Southwest Indian Ocean) greatly increase the distribution of *H. brucei*, earlier known only from the Southwest Atlantic

Ocean and from south of Tasmania. Trawled at the bottom between 2705 and 4575 m.

BATHYONUS GOODE & BEAN, 1885

Bathyonus Goode & Bean, 1885: 603 (type species *Bathynectes laticeps* Günther, 1878 by subsequent designation); Nielsen *et al*., 1999: 58.

Comparative material

Bathyonus caudalis (Garman, 1899) (ZMUC P77846, off New Caledonia), *Bathyonus laticeps* (Günther, 1878) (ZMUC P77721, Gulf of Guinea).

Diagnosis

A neobythitine genus as defined by Nielsen *et al*. (1999: 58) with two rays in each pelvic fin placed below the opercle, poorly developed opercular spine, two basibranchial tooth plates, diameter of eye shorter than length of snout, long rakers on anterior gill arch more than ten, lower pectoral rays free and longer than upper rays, caudal fin rays 6, and precaudal vertebrae 17-19.

Figure 7. - Diagram of basibranchial tooth patch of *Bathyonus* sp. ZMUC P771531, SL 177 mm. Scale bar = 2 mm.

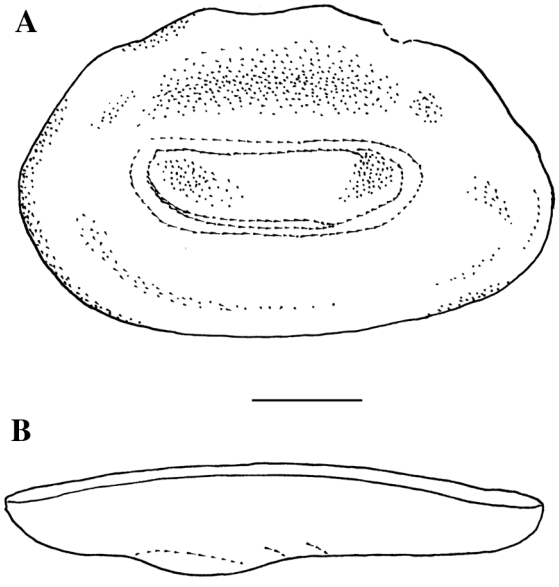

Figure 8. - Right sagital otolith of *Bathyonus* sp. ZMUC P771531, SL 177 mm. **A**: Median view; **B**: Dorsal view. Scale bar = 1 mm.

Remarks

According to Nielsen *et al*. (1999) *Bathyonus* includes three valid species, but a taxonomic revision is needed.

BATHYONUS SP.

(Figs 1, 7-8)

Material examined

ZMUC P771531 (SL 177 mm, male), Crozet Islands (45°40'S, 56°35'E), Discovery St. 15773#23, OTSB, 4269-4275 m, 17 Dec. 2005.

Condition

Almost all scales have been rubbed off and the gill covers are torn.

Remarks

The specimen fits the generic diagnosis except for the presence of only one basibranchial tooth patch (Fig. 7).

Description

Meristic characters: Fin rays in dorsal fin 96, caudal fin 6, anal fin 71, pectoral fin 18, pelvic fin 2. Vertebrae 18+44. Pseudobranchial filaments 2. One long and narrow basibranchial tooth patch. Anterior gill arch with four short rakers on upper branch followed by 12-13 long rakers and 6-7 very short rakers ventrally. Anterior dorsal fin ray above vertebra no. 7, anterior anal fin ray below dorsal fin ray no. 26 and vertebra no. 21.

Morphometric characters (in % of standard length): Depth at dorsal fin origin 15.0, depth at anal fin origin 10.0, upper jaw length 11.0, diameter of eye 1.8, interorbital width 4.6, preanal length 43.0, predorsal length 22.5, distance from base of pelvic fins to anal fin origin 23.5, pectoral fin length 21.0, pelvic fin length 11.5.

Biology

An unripe male from abyssal depths (4269-4275 m). Bottom temperature 0.8° C.

Distribution

Bathyonus is distributed in the warmer parts of all oceans. The present specimen is the first recorded from Polar waters.

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