

New species of *Pogonophryne* (Pisces, Artedidraconidae) from the Bellingshausen Sea, Antarctica

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Abstract A new species of notothenioid fish, *Pogonophryne bellingshausenensis* n. sp., is described from the Bellingshausen Sea, Antarctica. The new species belongs to the dorsally-spotted “mentella” group of the genus and is characterized by having a short (about 13% SL) mental barbel with a short (about 16% of barbel length), narrow (barely wider than the stalk), and relatively inconspicuous terminal expansion composed of short, irregular, fingerlike processes. Compared to most other dorsally-spotted species of *Pogonophryne* (“barsukovi”, “marmorata”, and “mentella” groups), *P. bellingshausenensis* has a relatively wide (about 7% SL) interorbital region. An unspotted patch on the median dorsal surface of the head, posterior to the post-temporal ridges and anterior to the first dorsal fin, has not been observed previously in any dorsally-spotted species. The holotype was collected at 1,947 m, one of the deepest records for any species of *Pogonophryne*. A revised key to the ten species of the “mentella” group of *Pogonophryne* is also provided.

Keywords Taxonomy · Notothenioidei · “Mentella” group · Mental barbel

Introduction

Because it is remote from scientific stations and has persistent sea ice, the southern Bellingshausen Sea is little studied compared to other high Antarctic areas. During a recent cruise, a new species of artedidraconid of the genus *Pogonophryne* was collected (Matallanas and Olaso 2007). This specimen, referred to as *Pogonophryne* sp. 1 in Matallanas and Olaso (2007), is notable as the genus has not previously been recorded from the Bellingshausen Sea and the specimen was captured at a greater than usual depth for the genus. This capture also highlights the paucity of sampling on the lower slope of the Southern Ocean.

Materials and methods

Fishes were collected from the Bellingshausen Sea and waters around Peter I Island during the Spanish Bentart 2003 expedition of R/V *Hespérides* from 30 January to 20 February 2003 (Matallanas and Olaso 2007). This cruise was supported by the Spanish Antarctic Programme (CICYT). Specimens were measured and weighed, fixed in 10% formalin and stored in 70% ethanol. Measurements (summarized in Table 1) were taken to the nearest 0.1 mm with dial calipers and are given as percent of standard length (SL) unless otherwise indicated. Vertebrae were counted from radiographs. UAB refers to Universidad Autónoma de Barcelona.

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Table 1 Measurements and counts for *Pogonophryne bellingshausenensis*

	Holotype UAB-BS03-172A
Total length (mm)	234
Standard length (mm)	187
Head length	37.7
Head depth at posttemporal ridges	19.5
Head width	28.9
Orbital diameter	7.8
Narrowest bony interorbital width	7.0
Mental barbel length	13.2
Terminal expansion of mental barbel/mental barbel length	15.8
Snout length	9.5
Internostril distance	8.7
Upper jaw length	16.7
Jaw width	21.1
Postorbital length of head	21.9
Opercular-subopercular distance	14.6
Body width at origin of anal fin	8.0
Body depth at origin of anal fin	12.7
Body depth at origin of second dorsal fin	20.4
Depth of caudal peduncle	5.1
First antedorsal distance	33.7
Second antedorsal distance	43.4
Anteanal distance	66.0
Length of longest spine in first dorsal fin	6.7
Length of longest ray in second dorsal fin	13.4
Interdorsal distance	8.6
Length of base of second dorsal fin	55.0
Length of base of anal fin	32.2
Length of caudal fin	21.2
Length of pectoral fin	24.9
Width of base of pectoral fin	10.6
Length of pelvic fin	16.4
Spines in first dorsal fin	2
Rays in second dorsal fin	27
Anal fin rays	17
Pectoral fin rays	20 and 20
Anterior gill rakers on first gill arch	8
Posterior gill rakers on first gill arch	8
Scales (pores) in upper lateral line	22 and 24
Scales (pores) in middle lateral line	13 and 12
Vertebrae (abdominal + caudal)	15 + 23 = 38

Unless indicated otherwise, measurements are expressed as percent of standard length

Results and discussion

Species description

Pogonophryne bellingshausenensis n. sp.

Holotype. UAB-BS03-172A, male, 187 mm SL (234 mm TL, wt in alcohol 128 g); R/V *Hesperides*, station 172, Bellingshausen Sea, Antarctica (68°91'S, 78°23'W), 1,947 m; 18 February 2003. The holotype was collected using an Agassiz trawl (2.01 m wide and 1.12 m high) with mesh size 10 mm. Other fish species collected during the same trawl included *Coryphaenoides lecointei*, *Macrourus whitsoni*, *Bathylagus antarcticus*, and *Electrona antarctica* (Fig. 1).

Diagnosis. A dorsally-spotted species of *Pogonophryne* distinguished from others in the “mentella” group by a combination of: a short (13% SL), light-colored mental barbel (Fig. 2); terminal expansion short (16% of barbel length), barely wider than stalk, and composed of short, irregular fingerlike processes which continue onto anterior part of stalk; a median, unspotted patch on dorsal surface of head, posterior to posttemporal ridges and anterior to first dorsal fin (Fig. 3); a wide interorbital region (7% SL).

Description of holotype. Body robust anteriorly, tapering to low, narrow caudal peduncle. Head length 37.7; posttemporal ridges slightly developed, depth of head at this level 19.5; head width at preoperculars 28.9. Body depth at second dorsal fin origin 20.4; body depth at anal fin origin 12.7; body width at anal fin origin 8.0; caudal peduncle depth 5.1. Snout rounded in dorsal view; internostril distance 8.7; snout length 9.5; eye filling orbit; diameter of orbit 7.8. Interorbital region wide, least bony distance 7.0. Opercular–subopercular distance 14.6. Postorbital length of head 21.9. Jaw width at posterior ends of maxillaries 21.1. Upper jaw length 16.7; lower jaw projecting beyond upper a distance 6.4 of head length. Teeth of upper jaw short, conical, 3 rows anteriorly, 2 rows posteriorly. Teeth of lower jaw long, thin conical; 2 rows anteriorly, 1 row posteriorly. Skin on anterior floor of mouth and proximal lower oral valve darkly pigmented (Fig. 3). Mental barbel (Fig. 2) short with an inconspicuous terminal expansion composed of short, irregular, fingerlike processes which continue, in reduced size, onto the anterior part of the stalk; barbel length 13.2; terminal expansion 15.8 of barbel length and barely wider than stalk. Anterior gillrakers on first arch 7 + 0 + 1 = 8; posterior gillrakers 7 + 0 + 1 = 8; total 16. First antedorsal distance 33.7; second antedorsal distance 43.4; anteanal distance 66.0. Length of second dorsal fin base 55.0; length of anal fin base 32.2; length of caudal fin 21.2; length of pectoral fin 24.9; width of pectoral fin base 10.6; length of pelvic fin 16.4. Interdorsal distance 8.6.

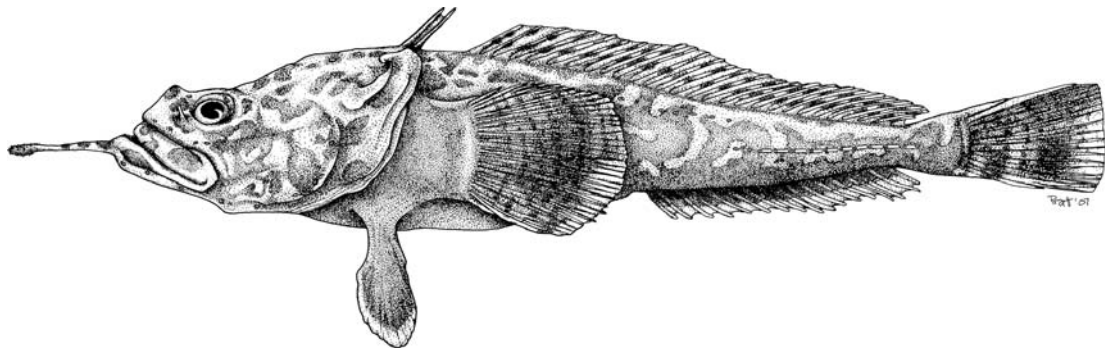


Fig. 1 *Pogonophryne bellingshausenensis* n. sp., UAB-BS03-172A, holotype. $\times 0.6$



Fig. 2 Dorsal view of terminal expansion of mental barbel of holotype of *Pogonophryne bellingshausenensis*. The short, irregular fingerlike processes can be seen projecting from the terminal expansion. $\times 5$

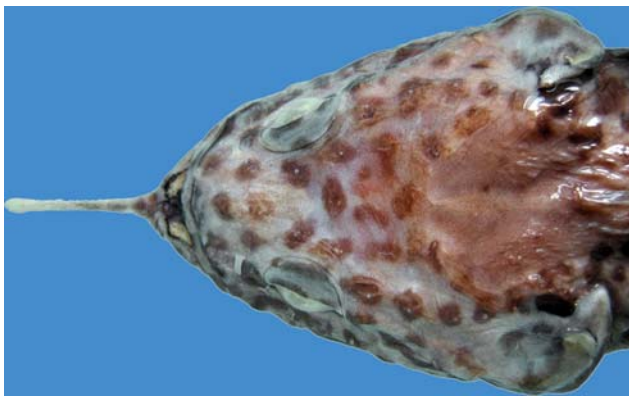


Fig. 3 Dorsal view of head and mental barbel of *P. bellingshausenensis* showing median, unspotted patch of skin posterior to posttemporal ridges and anterior to first dorsal fin. The darkly pigmented skin on the anterior floor of mouth and proximal lower oral valve is also evident. $\times 0.7$

First dorsal fin with two spines of about equal length; length of longest (second) spine 6.7. Second dorsal fin with 27 rays; length of longest (fifth) ray 13.4. Ratio of longest first dorsal spine to longest second dorsal ray 0.502. Anal rays 17. Pectoral rays 20 and 20. Upper lateral line with about 22 (left) and 24 (right) pores (tubular scales). Middle lateral line with about 13 (left) and 12 (right) pores and tubular scales arranged as 2 pores + 10 tubular scales + 1 pore (left) and 2 pores + 9 tubular scales + 1 pore (right). Cephalic lateral line pores: preoperculo-mandibular canal 9; infraorbital canal 7; supraorbital canals with 2 nasal pores, 2 interorbital pores, and 1 unpaired coronal pore; temporal canal 6; supratemporal canal incomplete across occiput with 1 pore on each side. Vertebrae 15 + 23 = 38.

Color of holotype in alcohol. Most of the head and trunk covered dorsally and laterally with medium brown spots and

vermiculations on a light tan background. Trunk ventral to second dorsal fin less heavily marked. Markings variable in size, with relatively small spots on top of head except for a distinctive unspotted patch on the dorsoposterior aspect, posterior to the posttemporal ridges and anterior to the first dorsal fin (Fig. 3). Spotted skin extends over dorsal one-third of eye. Nostrils unpigmented. Jaws with paler spots than rest of head; posterior tips of maxillaries cream colored and unspotted. Mandibular oral valve darkly pigmented and visible in dorsal view of head (Fig. 3). Terminal expansion of mental barbel cream colored; proximal one-half of stalk of barbel with pale spots. Ventral surface of head and trunk without spots; abdomen uniformly dark brown in contrast to lighter head. Skin over pectoral and pelvic girdles unspotted and dark. First dorsal fin with lightly pigmented spines and membranes. Second dorsal fin with alternating dark and light bands on rays, forming oblique stripes; membranes between first 10 rays dark brown (not shown). Anal fin rays and membranes dark proximally and white distally. Pectoral fin with about 6 irregular dark vertical stripes; distal rays and membranes lighter, especially ventrally. Pelvic fin pigmented proximally, with distal whitish margin. Caudal fin with 5–6 dark vertical stripes; distal portions of central rays and rays at dorsal and ventral margins whitish.

Remarks. The 2003 survey of the little-known benthic ichthyofauna of the Bellingshausen Sea yielded a rich diversity of notothenioids and other fishes, including several undescribed taxa (Matallanas and Olaso 2007). Notable among these was the new species of *Pogonophryne* described herein. The appearance of yet another new *Pogonophryne* is not surprising, given the recent discovery of undescribed notothenioid (and other) species, as well as new color morphs of known species, from comparatively well-sampled waters such as the Ross Sea (e.g., Eakin and Eastman 1998; Eastman and Eakin 1999; La Mesa and Vacchi 2005; Cziko and Cheng 2006). This new species belongs to the dorsally-spotted “mentella” group of the genus which is characterized by having a greatly projecting lower jaw (exposing anterior teeth and often the tip of the tongue), a gradually sloping snout (45° or less from the

horizontal), and relatively large and sparsely-distributed spots and vermiculations (covering somewhat less than half the dorsal surface of the head) (Balushkin and Eakin 1998; Eakin updated key to *Pogonophryne* at <http://www.oucom.ohiou.edu/dbms-eastman>). This speciose group includes most of the recent additions to artedidraconid diversity, the limits of which are yet to be determined. A revised key to the “mentella” group, encompassing 10 of the 18 known species of *Pogonophryne*, is provided below.

A notable feature of the “mentella” group is the development of the mental barbel, generally characterized by exceptional length (about 15–30% SL) and/or elaborate skin ornamentation on the terminal expansion (Balushkin and Eakin 1998). In well-developed barbels, typically the terminal expansion is considerably wider (2–3×) than the stalk and composed of processes and folds, constituting about 40–70% of the barbel length. Among currently recognized species of the “mentella” group, the barbel may be long (often more than 20% SL) with a well-developed (as in *P. lanceobarbata* and *P. macropogon*) or weakly-developed (as in *P. eakini* and *P. orangiensis*) terminal expansion, or it may be short (less than 15% SL) with a well-developed terminal expansion, as in *P. ventrimaculata*. Although significant intraspecific variation in artedidraconid barbel structure has recently been documented (Eastman and Eakin 2001; Eakin et al. 2001, 2006), this organ nonetheless remains

a useful and important taxonomic character for the family. The distinctive appearance of the mental barbel, together with other morphological features of the holotype, supports the validity of this new species.

Pogonophryne bellingshausenensis exhibits the gradually sloping snout and general spotting pattern of the “mentella” group but possesses a relatively weakly-developed mental barbel, both in its modest length (about 13% SL) and in its inconspicuous terminal expansion which is short (about 16% of barbel length), narrow (barely wider than the stalk), and composed of fairly short, irregular fingerlike processes which continue posteriorly onto the stalk. A distinctive feature is the unspotted, median patch covering approximately one-third of the dorsal surface of the head, between the temporal canals, posterior to the posttemporal ridges, and anterior to the first dorsal fin. This pattern has not been observed previously in any dorsally-spotted species of *Pogonophryne*. The undamaged condition of the skin and the presence of chromatophores in this region indicate that the lack of spots is natural and not an artifact. The wide interorbital region (7% SL) is near the upper limit for dorsally-spotted species.

Etymology. The new species is named for its type locality, the Bellingshausen Sea.

Key to species of the “mentella” group of *Pogonophryne*

1a	Ventral surface of head and abdomen with large, conspicuous dark spots	<i>P. ventrimaculata</i> Eakin 1987
1b	Ventral surface of head and abdomen without large, conspicuous dark spots	2
2a	Terminal expansion of mental barbel with overlapping, bluntly palmate (resembling a cat's paw) processes or flattened, jagged processes arranged mainly in rows	3
2b	Terminal expansion of mental barbel not as in 2a	4
3a	Terminal expansion of mental barbel with bluntly palmate processes arranged in a densely-packed, overlapping scale-like pattern	<i>P. squamibarbata</i> Eakin and Balushkin 2000
3b	Terminal expansion of mental barbel with flattened, jagged processes arranged mainly in rows	<i>P. fusca</i> Balushkin and Eakin 1998
4a	Terminal expansion of mental barbel wider than stalk and without fingerlike processes; not orange colored in fresh condition	5
4b	Terminal expansion of mental barbel barely wider than stalk and with somewhat flattened, fingerlike processes, some of which may be branched	9
5a	Stalk of mental barbel relatively stout; longest spine of first dorsal fin usually less than 60% as long as longest ray of second dorsal fin	7
5b	Stalk of mental barbel relatively slender; longest spine of first dorsal fin usually more than 60% as long as longest ray of second dorsal fin	6
6a	Terminal expansion of mental barbel usually less than one-third of barbel length	8
6b	Terminal expansion of mental barbel usually more than one-third of barbel length	<i>P. lanceobarbata</i> Eakin 1987
7a	Terminal expansion of mental barbel with irregular, tapered processes (convolutions sometimes present), its length greater than 60% of barbel length	<i>P. macropogon</i> Eakin 1981
7b	Terminal expansion of mental barbel with brainlike convolutions, its length less than 60% of barbel length	<i>P. cerebropogon</i> Eakin and Eastman 1998

8a	Terminal expansion of mental barbel with interconnected, irregular flattened folds oriented longitudinally	<i>P. eakini</i> Balushkin 1999
8b	Terminal expansion of mental barbel with unconnected, bluntly palmate (resembling a cat's paw) processes	<i>P. mentella</i> Andriashev 1967
9a	Mental barbel 19.6–26.7% SL, its terminal expansion tapered and orange-colored in fresh (unpreserved) condition; bony interorbital width about 5–6% SL; top of head with relatively few large, rounded, sparsely distributed spots covering entire surface	<i>P. orangiensis</i> Eakin and Balushkin 1998
9b	Mental barbel 13% SL, its terminal expansion rounded and not orange-colored in fresh (unpreserved) condition; bony interorbital width about 7% SL; posterior central region of top of head anterior to D1 unspotted	<i>P. bellingshausenensis</i> sp. n. Eakin, Eastman and Matallanas

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