A NEW SISORID CATFISH OF THE GENUS *EXOSTOMA* BLYTH FROM MANIPUR, INDIA

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ABSTRACT

A new sisorid catfish, *Exostoma barakensis* is described from the Iyei River (Barak drainage) of Manipur, India. It is distinguished from *E. berdmorei* in having deeper body, its depth 15.6 (14.0-16.5) vs. 10.9 % SL; less numbers of anal fin rays ii, 4½ -5 vs. i, 6; broadly rounded vs. pointed snout; emarginated vs. deeply forked caudal fin. It differs from *E. labiatum* in having deeper caudal peduncle, its height 49.8 (44.1-56.7) vs. 31.2-38.7 % caudal peduncle length; interdorsal space present vs. absent; less number of pectoral fin rays i, 10-11 vs. i, 12-13; caudal emarginated vs. forked. It differs from *E. vinciguerrae* in having wider head, its width 88.9 (85.2-91.6) vs.105.1 (105-108) % HL; smaller eye, its diameter 9.6 (7.3-11.6) vs.16.2 (16.0-16.4) % HL. It also differs from *E. stuarti* in having shallower body, its depth 15.8 (14.2-16.9) vs. 18.1 % SL; longer snout, its length 59.5 (58.1-61.5) vs. 47.6 % HL; larger eye, its diameter 9.6 (7.3-11.6) vs. 4.7 % HL; deeper caudal peduncle, its height 49.8 (44.1-56.7) vs. 42.8 % caudal peduncle length.
Exostoma vinciguerrae and *E. stuarti* that synonymised under *E. labiatum* have been examined and found to have distinguishable differences from *E. labiatum*, and therefore have been resurrected as valid species.

KEYWORDS

Exostoma barakensis sp. nov., India, Manipur, sisorid catfish.

ABBREVIATIONS

ASB - Asiatic Society of Bengal; CPH - caudal peduncle height; CPL - caudal peduncle length; HL - head length; HW - head width; MUMF - Manipur University Museum of Fish; SL - standard length

Blyth (1860), while describing a new genus *Exostoma*, with *E. berdmorei* as the type species, included *Glyptosternon labiatus* McClelland also in the genus, considering its form of mouth and extremely small gill openings. As conceived by Blyth this species is now considered to belong to the genus *Exostoma* (Eschmeyer, 2006). The sisorid catfish *Exostoma* is distinct by the presence of large, movable, oar-shaped, distally flattened teeth directed backwards and are arranged in two distinct patches in the upper jaw; gill opening restricted to dorsal surface above pectoral base (Jayaram, 1999). It belongs to the subfamily Glyptosterninae and its humeral process is poorly developed or absent, pectoral fin rays 11 or more (de Pinna, 1996). Glyptosternine catfishes are distinguished from other catfishes by their strongly depressed head and body and greatly enlarged paired fins modified to form adhesive apparatus (Ng & Freyhof, 2001; Ng & Rainboth, 2001; Ng, 2004).

Misra (1976); Jayaram (1979); Talwar & Jhingran (1991) and Jayaram (1999) recognized four species of *Exostoma, viz., E. vinciguerrae* Regan, *E. stuarti* (Hora), *E. berdmorei* Blyth from Myanmar and *E. labiatum* (McClelland) from Mishmee hills, India.

Specimens of *Exostoma* collected from the Iyei River, Manipur has been found to be different from its congeners and is described here as *Exostoma barakensis* sp. nov.

MATERIALS AND METHODS

Counts and measurements follow Ng & Rainboth (2001) with the following additional measurements: mouth width presented as proportion of HW and caudal peduncle height in its length. Subunits of the head are presented as proportions of HL. Head length and measurements of other body parts are given as proportions of SL. Fin rays were counted using stereoscopic microscope under transmitted light. Numbers in parentheses following a particular count indicate the number of specimens examined for count. The material examined in this study is deposited in the MUMF.

EXOSTOMA BARAKENSIS SP. NOV.

(Images 1-3[W])

Materials examined

Holotype: 10.xii.2004, Iyei River, Tamenglong district, Manipur, India, 87.3mm SL, coll. H. Joyshree, MUMF 8098.
Paratypes: 6 exs, data same as holotype, 65.7-98mm SL, MUMF 8096, 8097, 8099, 8100-8102.

Distribution

Iyei River, tributary of the Barak in Manipur, Brahmaputra basin, India.

Etymology

Named after Barak drainage, its distribution.

Diagnosis

Exostoma species is distinguished from other related genera by the following unique combination of characters: nostrils midway between snout tip and anterior margin of eye; wider interorbital space, its width 29.5 (26.9-33.1) % HL; anal fin rays ii, 4½–5; adipose fin long, uniformly deep all along its length and extend to caudal fin base with a small depression anterior to vertical from caudal fin base; adipose about thrice the length of dorsal fin base; caudal fin emarginate; proximally 1/3 length of outer rays and ½ length of median rays are dark greyish and distally 1/3 length of lower lobe and 1/5 length of upper lobe rays are also dark greyish.

Description

Morphometric data are in Table 1. Head and body

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Manuscript 1546; © ZOO; Date of publication 21 December 2006
Received 01 April 2006; Revised received 13 November 2006
Finally accepted 08 December 2006

Table 1. Morphometric data of* Exostoma barakensis *sp. nov.

	Holotype (MUMF-8098)	Paratypes (MUMF-8096, 8097, 8099, 8100, 8101, 8102) Mean (Range) n = 6	SD
Standard length (mm)	87.3	65.7-98	
In % of SL			
Head length	23.2	23.1 (21.1-25.4)	±1.4
Body depth (anus)	16.1	15.6 (14.0-16.5)	±1.2
Head height (occiput)	11.4	11.8 (10.6-13.2)	±1.1
Head width	19.8	20.5 (19.1-22.2)	±1.2
Mouth width	9.2	9.3 (8.5-10.3)	±0.8
Caudal peduncle length	20.5	20.6 (19.5-21.6)	±0.8
Caudal peduncle height	10.1	10.2 (9.5-11.1)	±0.6
Predorsal length	39.7	40.1 (38.2-42.6)	±1.1
Prepectoral length	14.8	14.4 (13.4-16.2)	±1.1
Pre pelvic length	47.1	47 4 (45.1-53.7)	±3.2
Pre anal length	74.7	76.0 (72.2-83.7)	±3.9
Pre anus length	66.6	67.9 (64.6-76.4)	±3.9
Interdorsal space	13.2	15.9 (12.6-19.2)	±3.0
Distance between Anal origin and caudal peduncle length	25.7	25.3 (23.0-27.2)	±1.3
Distance ben Pelvic and Anal fin origin	27.7	28.3 (26.0-32.3)	±2.3
Distance betn tip of snout and ant. nostrils	6.3	6.0 (5.3-7.1)	±0.7
Distance betn tip of snout and post. nostrils	8.2	8.4 (7.9-9.5)	±0.7
Dorsal fin height	12.6	13.6 (12.2-15.8)	±1.3
Adipose dorsal fin height	5.4	5.2 (4.7-5.8)	±0.4
In % of HL			
Snout length	58.1	59.5 (58.1-61.5)	±1.4
Eye diameter	9.8	9.6 (7.3-11.6)	±1.4
Interorbital space	28.0	29.5 (26.9-33.1)	±2.4
Mouth width	39.9	40.7 (39.6-43.5)	±1.3
Maxillary barbel	50.7	49.1 (46.1-56.5)	±3.8
Nasal barbel	28.5	29.2 (27.2-32)	±2.4
Inner Mandibular barbel	6.4	6.2 (4.9-7)	±0.4
Outer Mandibular barbel	18.7	17.7 (14.1-20)	±3.2
In % of HW			
Gape width	46.8	45.8 (43.4-49.6)	±2.1
In % of CPL			
Caudal peduncle height	49.7	49.8 (44.1-56.7)	±3.8

moderately broad when viewed from above, depressed, body becoming compressed towards caudal peduncle, an adhesive apparatus on ventral surface of body indistinctly developed. Caudal fin emarginate, lateral line complete and midlateral in position. Skin smooth. Eyes small, rounded, subcutaneous and located dorsally in the posterior half of head. Mouth transverse, inferior, lips fleshy, thick and papillated, forming a continuous labial fold around the mouth, upper and lower jaw equal. The teeth are rather large, movable, and oar-shaped, distally flattened and directed backwards and are arranged in two patches which are separated by a narrow gap on both jaws. Palate edentulous.

Barbels four pairs: maxillary barbel with thin flap of skin fringing posterior margin and pointed tip, extending to the base of first pectoral fin; nasal barbel with small flap of thin skin fringing posterior margin and extending to the anterior margin of eye. Nostrils close together, midway between snout tip and anterior margin of eye, separated from each other by a flap bearing nasal barbel. Inner mandibular barbel origin close to midline, extending to midway between lower lip margins. Outer mandibular barbel originates postero-lateral to the inner mandibular barbel.

Tubercles are scattered on the head region, entire portion of maxillary barbels, around the posterior nasal opening, on the opercles and above the base of the pectoral fin. Gill openings, extending opposite to the base of the outer most pectinated ray of pectoral fin base.

Pectoral fin horizontal broadly rounded, not reaching pelvic fin with the outer ray thick, flattened and pectinated ventrally. Dorsal fin rays shorter than the length of head, without a strong spine; origin nearer to adipose dorsal origin than to snout end and nearer to pelvic origin than to pectoral base; adipose fin long, uniformly deep all along its length and continues to caudal fin base with a depression anterior to caudal base; adipose about thrice the length of dorsal base; pelvic ½ times of head; anal fin 2.5 times of head. Anal origin vertically through anterior $^{1}/_{3}{}^{rd}$ length of adipose and midway between pelvic and caudal base.

Counts

Dorsal fin rays i, 6 (7), pectoral fin rays i, 10 (4) or i, 11 (3), pelvic fin rays i, 5 (7) branched rays, anal fin rays ii, 4 ½ (4) or 5 (3) and caudal fin rays 2 principal and 15 (7) branched rays. Gill rakers with 3 + 11 = 14 (1) and 23 precaudal + 15 caudal = 38 vertebrae. Branchiostegal rays 8. Numbers of ribs 14.

Colour

Body yellowish-brown dorsolaterally and pale ventrally,

all fins except caudal fin pale. Proximally 1/3 length of outer rays and ½ length of median rays are dark greyish and distally 1/3 length of lower lobe and 1/5 length of upper lobe rays are also dark greyish. The intermediate region of the fin yellow in colour.

Discussion

Hora and Silas (1952) classified glyptosternoid fishes based on the nature of teeth and form of teeth bands in the jaws. de Pinna (1996), considered *Exostoma* Blyth as belonging to glyptosternine based on the following characters: interopercle narrow and elongate, mandibular laterosensory canal absent, external arm of basipterygium abruptly expanded distally, proximal pectoral radials 2 and 3 flared at distal tip parapophysis of fifth vertebra strongly flattened and expanded, etc. The new species has all the characteristic features of the genus.

Chaudhuri (1919) and Norman (1925) regarded *E. stuarti* a synonym of *E. vinciguerrae.* Annandale (1918) reported *E. vinciguerrae* and *E. labiatum* to be conspecific. However, Hora (1923) observed differences in the lengths of dorsal fins of *E. stuarti* and *E. vinciguerrae.* Hora & Silas (1952) distinguished *E. vinciguerrae* from *E. stuarti* in having adipose fin confluent with the caudal vs. free. Wu & Wu (1992); Chen (1998) and Chu *et al.* (1999) put *Exostoma vinciguerrae* and *E. stuarti* as junior synonyms of *E. labiatum* without proper justification. Jayaram (2006) also followed suit.

Examination of ZSI specimens clearly shows that *E. labiatum* differs from both *E. vinciguerrae* and *E. stuarti* in having more numbers of pectoral fin rays, 12-13 vs 10; interdorsal space absent vs. present. *E. labiatum* is distinguished from *E. vinciguerrae* in having shallower head, its depth 48.0-50.0 vs. 57.1 (52.0-62.5)% HL; narrower head, its width 90.0-96.0 vs. 105.1 (100.0-108.0)% HL; shorter snout, its length 45.0-48.0 vs. 57.4 (50.8-60.0)% HL; narrower inter orbital, its width 21.0-28.0 vs. 30.2 (29.1-32.0)% HL; stouter caudal peduncle, its depth 31.2- 38.7 vs. 58.1 (58.0-58.3)% caudal peduncle length. It also differs from *E. stuarti* in having deeper body, its depth 18.1 vs. 13.7-16.2% SL; shallower head, its depth 48.0-50.0 vs. 45.7% HL; larger eye, its diameter 9.6-10.0 vs. 4.7% HL; stouter caudal peduncle, its depth 31.2-38.7 vs. 42.8% caudal peduncle length.

E. labiatum is a species distributed in the Brahmaputra drainage while *E. stuarti* and *E. vinciguerrae*, in the Chindwin drainage. In view of the differences in morphology and distribution, *E. stuarti* and *E. vinciguerrae* are treated valid here and have been resurrected from synonymy with *E. labiatum.* Thus, five species of *Exostoma* are known, they are: *E. vinciguerrae*, *E. stuarti*, *E. labiatum*, *E. berdmorei* and *E. barakensis* sp. nov.

Exostoma barakensis sp. nov. differs from *E. berdmorei* in having deeper body, its depth 15.6 (14.0-16.5) vs. 10.9% SL; deeper caudal peduncle, its height 49.8 (44.1-56.7) vs. 36.3% caudal peduncle length; less numbers of anal fin rays ii, 4½-5 vs. i, 6; broadly rounded vs. pointed snout; emarginated vs. deeply forked caudal fin.

It differs from *E. labiatum* in having longer snout, its length 59.5 (58.1-61.5) vs. 45.0-48.0% HL; deeper caudal peduncle, its height 49.8 (44.1-56.7) vs. 31.2-38.7% caudal peduncle length; Interdorsal space present vs. absent; caudal emarginated vs. forked and less number of pectoral fin rays i, 10-11 vs. i, 12-13.

It differs from *E. vinciguerrae* in having wider head, its width 88.9 (85.2-91.6) vs.105.1 (105-108.0)% HL; smaller eye, its diameter 9.6 (7.3-11.6) vs.16.2 (16.0-16.4)% HL; shallower caudal peduncle, its height 49.8 (44.1-56.7) vs. 58.1 (58.0-58.3)% caudal peduncle length; caudal emarginated vs. lunate.

It also differs from *E. stuarti* in having shallower body, its depth 15.8 (14.2-16.9) vs. 18.1% SL; narrower head, its width 88.9 (85.2-91.6) vs. 95.2% HL; longer snout, its length 59.5 (58.1-61.5) vs. 47.6% HL; larger eye, its diameter 9.6 (7.3-11.6) vs. 4.7% HL; wider inter orbital, its width 29.5 (26.9-33.1) vs. 26.6% HL; deeper caudal peduncle, its height 49.8 (44.1-56.7) vs. 42.8% caudal peduncle length; caudal emarginated vs. lunate.

Day (1871) mentioned *Exostoma* as having tubercles on the lips, reflected around the whole or most of its circumference. In the present species, tubercles are scattered on the head region, entire portion of maxillary barbels, around the posterior nasal opening, on the opercles and above the base of the pectoral fin. Tubercles were not seen in *E. vinciguerrae*, *E. stuarti*, *E. labiatum* and *E. berdmorei* in ZSI, which might have been lost due to long preservation.

Table 2. Comparison of* Exostoma barakensis *sp. nov. with its congeners

Characters	*E. barakensis* sp. nov. Holotype & paratypes	*E. vinciguerrae* F-10259/1, 6667/1,6671/1	*E. labiatum* F-11819/1,11817	*E. stuarti* F-8742/1	*E. berdmorei* 795
N	7	3	2	1	1
SL	65.7-98.	34.0-36.0	40.0-58.0	44.0	64.0
In %SL					
Body depth	14.0-16.5	14.2-16.0	13.7-16.2	18.1	10.9
In %HL					
Head width	85.2-91.6	105-108.0	90.0-96.0	95.2	–
Snout length	58.1-61.5	58.8-60.0	45.0-48.0	47.6	–
Eye diameter	7.3-11.6	16.0-16.4	9.6-10.0	4.7	–
Interorbital width	26.9-33.1	29.4-30.6	21.0-28.0	26.6	–
In % CPL					
CPH	44.1-56.7	580-58.3	31.2-38.7	42.8	–
Pectoral fin rays	i, 10-11	i, 10	i, 12-13	i, 10	i, 10
Caudal fin	Emarginated	Lunate	Slightly forked	Lunate	Deeply forked

Key to valid species of genus *Exostoma*

1. Gill openings greatly restricted, extending above the base of first pectinated ray of pectoral 2
1A. Gill opening extending below the base of first pectinated ray of pectoral 3

2. Interdorsal absent; pectoral with 12-13 branched ..... *Exostoma labiatum*
2A. Interdorsal present; pectoral with 10-11 branched 4

3. Caudal deeply forked; snout pointed ..... *Exostoma berdmorei*
3A. Caudal lunate, snout broadly triangular ..... *Exostoma stuarti*

4. Eye diameter 7.3-11.6 % HL; width of head 85.2-91.6 % Hl ..... ***Exostoma barakensis* sp. nov.**
4A. Eye diameter 16.0-16.4 % HL; width of head 105.0-108.0 % HL ..... *Exostoma vinciguerrae*

Comparative materials

E. berdmorei, ASB cat 597 in ZSI, type, 64.0 mm SL., Tenasserim, Myanmar, coll. Maj. Berdmore;
E. labiatum, ZSI F 11817/1, 1 ex., 40.0 mm SL, Sakhai, Lizho river, Naga hills, Dr. B. Prashad and B.N. Chopra; ZSI F 11819/1, 1 ex., 58.0 mm SL, same collection data.
E. labiatum, F-11819/1, 11817/1, 2 ex., 40.0, 58.0 mm SL, Mishmee hills, Assam.
E. stuarti, F-8742/1, 1 ex., 44.0 mm SL, Nam-yak river at Tanjor in the N- frontier of Burma.
E. vinciguerrae, F-10259/1, 6667/1, 6671/1, 3 ex., 34.0-63.0 mm SL, Kakhyen hills, Northern Shan, States, Catein, Putao N- frontier of Burma.

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Acknowledgements

The authors are grateful to the Director, Zoological Survey of India, Kolkata, for granting permission to examine specimens of *Exostoma* and to Dr. A.K. Karmakar for his valuable help.