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Exostoma laticaudata, a new glyptosternine catfish (Teleostei: Sisoridae) from Manipur, Northeastern India

Arunkumar L

Department of Zoology, Mayai Lambi College,
Yumnam Huidrom- 795009, Manipur, India
E-mail: arunkumar.laifrakpam@gmail.com

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ABSTRACT

Exostoma laticaudata is distinguished from its congeners in having a combination of the following characters: preanal length 73.4-75.2%SL; pectoral fin length 19.8-23.7%SL, dorsal to adipose distance 15.4-22.9%SL; pectoral to pelvic distance 30.9-37.2%SL; head height at occiput 20.8-23.1% SL; mouth width 7.6-8.2%SL; preanus 67.2-69.2%SL; distance between pelvic to anal fins origin 23.0-28.8%SL; dorsal fin height 18.4-19.1%SL; maxillary barbel length 90.8-96.5%HL; inner mandibular barbel length 9.8-14.6%HL; outer mandibular barbel length 22.0-32.7%HL; mouth width 31.8-33.8%HL and 34.6-39.5%HW; depth of caudal peduncle 81.9-83.1% of its length; branched ventral fin rays 5, the posterior end of the adipose-fin adnate with the dorsal procurrent caudal fin rays and emarginate caudal fin. A dichotomous key genus *Exostoma* is provided.

Key words: *Exostoma laticaudata* sp. nov., Glyptosterninae, Manipur.

1. INTRODUCTION

The glyptosternine catfish genus *Exostoma* Blyth is a member of the family Sisoridae in the order Siluriformes, and is distributed throughout central, southern and eastern Asia (Lalramliana *et al*, 2015). Their range of distribution extends from the upper reaches of the Amu Darya River drainage in Turkmenistan southwards and eastwards to Indochina and the Yangtze River (Changjiang) drainage of Central China, and the Mekong and Salween drainages in the northern and western Thailand (Ng & Vidthayanon, 2014). They are distributed in the Brahmaputra drainage, northeast India; east and south to the Salween drainage, Myanmar [Kottelat (1989), Talwar & Jhingran (1991) Jayaram (1999) and Tamang *et al* (2015)]. So, the glyptosternine catfish, *Exostoma* is native to Asia. Ferraris (2007) listed only two valid species viz., *Exostoma berdmorei* and *E. labiatum*; and three species viz., *Glyptosternum Chaudhurii, E. stuarti* and *E. vinciguerrae* in species inquirendae.

Currently, 17 species of the genus *Exostoma* are known viz., *E. barakensis* [now, *E. barakense*] Vishwanath & Joyshree, 2007; *E. berdmorei* Blyth, 1860; *E. chaudurii* Hora, 1923; *E. dulongense* Luo & Chen, 2020; *E. effernum* Ng & Vidthayanon, 2014; *E. ericinum* Ng. 2018; *E. gaoligongense* Chen *et al,* 2017; *E. kottelati* Darshan *et al,* 2019; *E. labiatum* (McClelland, 1842); *E. mangdechhuense* Thoni & Gurung, 2018; *E. peregrinater* Ng & Vidhayanon, 2014; *E. sawmteai* Lalramliana *et al,* 2015; *E. sectile* Ng Kottelat, 2018; *E. stauarti* (Hora, 1923); *E. tenuicaudata* Tamang *et al,* 2018; *E. tibetana* Gong *et al,* 2018 and *E. vinciguerrae* Regan, 1905 respectively. Of the 17 species, 5 (*E. kottelati, E. labiatum, E. mangdechhuense, E. tenuicaudata* and *E. tibetana*) were originally described from the Brahmaputra drainage in the northeast India (Darshan *et al,* 2019; McClelland, 1842; Thoni & Gurung, 2018; Tamang *et al,* 2015; and Gong *et al,* 2018), 2 (*E. barkaense* and *E. sawmteai*) from the Barak –Surma- Meghana in the north east India (Vishwananth & Joyshree, 2007 and Lalramliana *et al,* 2015), 2(*E. effernum* and *E. peregrinator*) from the Chao-Phraya in Thailand (Ng & Vidthayanon, 2014), 6 (*E. chaudhurii, E. dulongense, E. ericinum, N. sectile, E. stuarti* and *E. vincigurrae*) from the Irrawaddy and 2 (*E. berdmorei* and *E. gaoligongense*) from the Salween drainage.

Exostoma vinciguerrae and *E. stuarti* were firstly reported from Manipur as a new records in India by Sharma & Singh (1988) and Selim & Vishwanath (1998) respectively. Vishwanath (2007) listed three species of *Exostoma* viz., *E. barakense, E. stuarti* and *E. vinciguerrae* in his checklist of fishes of Manipur. But, he synonymized all the species of *E. stuarti* and *E. vincigurrae* recorded from Manipur under *E. barakense* (dx.doiorg*/I*jottZPJ. 15462531-4). Specimens of *Exostoma* collected from the Namthilok stream, a head-water stream of Leimatak river i.e., a tributary of the Barak river drainage, Churachandpur district, Manipur, northeastern India has been found to be different from its congeners and is described here as *Exostoma laticaudata* sp. nov.

Key to the species of the genus *Exostoma* Blyth

1.	Interdorsal space absent	*E. labiatum*
	Interdorsal space present	.....2.
2.	Adipose dorsal fin confluent with caudal fin	.....3.
	Adipose dorsal fin separated from caudal -fin	.....12.
3.	Anterolateral surface of lip with striae	.....4.
4.	Parallel striae on the anterolateral surface of lips	.....5.
	Parallel and rounded striae on the lateral surface of lips	.....7.
	Rounded striae on the anterolateral surface of lips	.....11.
5.	Tip of pelvic-fin reaching anus. Nasal barbel not reaching or just reaching middle of orbit.	*E. chaudhurii*
	Tip of pelvic-fin not reaching anus.	.....6.
6.	Dorsal-fin base length with 6.4-10.6%SL; Weakly forked caudal –fin. Vertebrae 40-43.	*E. dulongense*
	Dorsal-fin base length with 12.4-13.5%SL, Lunate type of caudal –fin. Vertebrae 38-39	*E. sawmteai*
7.	Weakly forked caudal-fin	.....8.
	Emarginate caudal-fin	.....9.
	Lunate caudal fin	10
8.	Predorsal length 42.6-44.4%SL; preanal length 73.5-74.2%SL; depth of caudal peduncle 9.2-9.7%SL	*E. berdmorei*

	Predorsal length 36.7-40.5%SL; preanal length 67.7-70.5%SL; depth of caudal peduncle length 5.7-7.9%SL.	*E. ericinum*
9.	Snout length 39.7-53.3%HL	*E. gaoligongense*
10.	Snout length56.1-61.2%HL	*E. peregrinator*
11.	Tip of outer mandibular barbell not reaching first pectoral-fin base. Caudal peduncle depth 7.6-9.3%SL; adipose-fin base length 33.8-41.6%SL. Lunate or shallow emarginated caudal-fin. Vertebrae 39-42	*E. vinciguerra*
12.	Anterolateral surface of lips with striae	13
13.	Parallel striae on the anterolateral surface lips	14
	Parallel and rounded striae on the anterolateral surfaces of lips	17
	Rounded striae on the anterolateral surface of lips	21
14.	Emarginate type of caudal-fin	15
	Weakly fork type of caudal-fin	16
15.	Nasal barbel length 27.2-32.0%HL; depth of caudal peduncle 44.1-56.7% its length and vertebrae 38	*E. barakense*
	Nasal barbel length 35.4-46.8%HL; depth of caudal peduncle 81.9-83.1% its length and vertebrae 34-35	*E. laticaudata* sp.nov.
16.	Nasal barbel length, 19.9-26.3HL; depth of caudal peduncle 13.8-17.2% its length and vertebrae 38	*E. tenuicaudata.*
17.	Lunate type of caudal-fin	.....18.
	Weakly fork type of caudal-fin	.....19.
	Semi lunate fork type of caudal-fin	.....20.
18.	Body depth at anus 12.5-13.5%SL; pectoral –pelvic distance 21.4-24.8%SL	*E. kottelati*
	Body depth at anus 16.3%SL; pectoral –pelvic distance 28.4-31.1%SL	*E. stuarti*
19.	Body depth at anus 10.5-12.4%SL; pectoral –pelvic distance 29.5-32.5%SL	*E. effernum*
20.	Head length 22.6-24.9%SL; head width 79.7-88.2%HL mouth width 33.2-39.4%HL; caudal peduncle depth 7.7-8.7%SL.Preanal length 73.1-77.5%SL.	*E. mangdechhuense*
21.	Fork type of caudal-fin.	.....22.
	Lunate type of caudal-fin.	.....23.
22.	Eye diameter 10-13%HL, short nasal barbel 19-31%HL	*E. sectile*
23.	Nasal barbell just reaching to anterior orbital margin. Eye diameter 8-10%HL, long nasal barbel 31-40%HL	*E. tibetana*

2. MATERIAL AND METHODS

Measurements were made point to point with dial caliper and data recorded to tenths of a millimeter. Mouth width presented as proportion of head width (%HW) and caudal peduncle depth (CPD) in its length (%CPL) are also measured. The specimens are deposited in the Manipur University Central Museum (MUCM) with accession no. 45/NH/MUM.

3. RESULTS

***Exostoma laticaudata* sp. nov. (Fig.1A & 1B)**

Holotype: 45/NH/MUM, 72.5mm SL; 86.6mm TL; India: Manipur: Henglep Kendra, 8.5 km from Moirang Bazar, Churachandpur district, Namthilok stream of Leimatak River, Barak River basin, $24^0$81′55″N latitude, $93^0$39′48″E longitude. 13 October 2008, collected by M. Sharatkumar Singh.

Paratypes: Seventeen specimens, 53.2 -54.6mm SL; 64.3-64.6mm TL; data as for holotype.

Fig. 1A. *Exostoma laticaudata* sp. nov.; a. Dorsal view; b. Lateral view; c. Ventral view.

Diagnosis

Exostoma laticaudata, a new species of glyptosternine catfish is distinguished from *E. barakense* in having greater depth of caudal peduncle (81.9-83.1%CPL vs. 44.1-56.7), from *E. berdmorei* in having longer dorsal to adipose distance (15.4-22.9%SL vs. 9.2-11.7), from *E. chaudhurii* in showing deeper caudal-peduncle 81.9-83.1% of its length vs. 23-32 and shorter adipose-fin base (27.0-31.0%SL vs. 36.1-41-4), from *E. dulongense* in having longer dorsal-fin base (11.0-12.8%SL vs. 6.4-10.6) and longer pectoral to pelvic distance (30.9-37.2%SL vs. 19.6-25.5), from *E. effernum* in having longer pre-anal (73.4-75.2%SL vs. 70.2-71.6), from *E. ericinum* in having shorter caudal peduncle 13.1-18.9%SL vs. 23.2-26.2) and deeper head 11.6-12.8%SL vs. 9.4-10.9), from *E. gaoligongense* in having shorter adipose-fin base (270-31.0% SL vs. 31.7-45.2), shorter caudal peduncle (13.1-18.9SL vs. 18.8-22.3) and longer nasal barbel which reaching posterior margin of eye vs. reaching or surpassing anterior edges of eye, from *E. kottelati* in having longer dorsal to adipose (15.4-22.9%SL vs. 5.5-8.9), longer pectoral to pelvic (30.9-37.2%SL vs. 24.1-24.8) and wider interorbital (29.8-32.9%HL vs. 19.1-28.8), from *E. labiatum* in having longer snout (53.2-57.7% HL vs. 45.0-48.0), from *E. mangdechhuense* in having shorter caudal peduncle (13.1-18.9%SL vs. 19.0-21.3) and longer preanal (73.4-75.2%SL vs. 65.4-68.0), from *E. peregrinator* in having emarginate vs. lunate type of caudal-fin, from *E. sawmteai* in having lesser number of vertebrae (34-35 vs. 38-39), from *E. sectile* in having emarginate vs. fork caudal fin, shorter caudal-fin (18.3-21.5% SL vs. 22.6-25.5) and shorter snout (53.2-55.7%HL vs. 58-62), from *E.*

stuarti in having deeper caudal peduncle (81.9-83.1%CPL vs. 42.8), from *E. tenuicaudata* in having deeper caudal peduncle (7.8-14.5%SL vs. 3.6-4.7), from *E. tibetana* in having longer head (23.0-24.7%SL vs. 19.0-22.5), deeper caudal peduncle (81.9-83.1% of its length vs. 33-43) and emarginate vs. lunate caudal-fin and from *E. vincigurrae* in having shorter snout (53.2-55.7%HL vs. 58.8-60.0),

Description

Morphometric data as in Table 1. Body elongate, sub-cylindrical, strongly depressed anteriorly to dorsal fin origin, compressed posteriorly; dorsal profile arising from tip of snout to occiput, slowly increasing form occiput upto origin of branched dorsal fin, sloping gently to end of caudal peduncle. Anal opening closer to anal fin base than posterior base of pelvic fin. Head region strongly depressed, snout broadly rounded. Gill openings moderate, extending moderate ventrally form origin of lateral line to base of pectoral fin. Eyes small, subcutaneous, located dorsally on head. Mouth inferior and transverse, broad, lips thin, fleshy, papillate, post labial continuous. Lower lip with prominent labial fold entire posterior margin, notched at insertions of inner mandibular barbels. Anterolateral surface of lips and lower surface of maxillary barbel with parallel striae. Post-labial groove on lower jaw present and un-interrupted. Barbel four pairs. Maxillary barbel long, extending operculum, base wide with thin flap of skin tapering towards pointed tip, ventral surface with numerous striae. Nasal barbel reaching posterior margin of eye, base wide with flapy skin. Outer mandibular barbel extending anterior base margin of pectoral fin. Inner mandibular barbel extending to midway between its base and that of pectoral fin. Minute sensory pores scattered all over dorsal and lateral sides of head.

Fig. 1B. *Exostoma laticaudata* sp. nov.; a. Tubercles on Pectoral-fin; b. Oral & mouth view; c. Striae on pectoral-fin; d.Posterior end of adipose-fin.

Dorsal fin with i, 5, i, its origin anterior to pelvic fin origin, no strong spine and serrations, fin margin slightly concave. Adipose fin long and deep, posterior end adnate with upper procurrent caudal fin rays. Pectoral fin large, with i, 12 rays, margin broadly rounded, first unbranched ray broad with regular striae on ventral surface, poorly scattered conical tubercles on fleshy portion of the pectoral fin base and rays. Ventral fin enlarge with i, 5 rays, slightly rounded margin, its origin posterior to dorsal fin origin, ventral surface of first unbranched ray with striae, not reaching anus. Anal fin reaching mid of caudal peduncle and with i, 5 rays. Caudal fin emarginate, with 17 rays and lower lobe slightly longer than upper lobe. Skin smooth. Lateral line complete and mid-lateral in position. Vertebrae 34-35.

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

Characters	**Holotype 45/NH/MUM**	**Paratypes 45/NH/MUM No.=17. Ranges**	**Mean ± SD**
(1)	(2)	(3)	(4)
Total length in mm	86.6	64.3-64.6	
Standard length (SL) in mm	72.5	53.2-54.6	
In% of SL (Standard length)			
Head length	23.9	23.0-24.7	23.9±1.6
Body depth at anus	14.9	12.1-15.2	14.1±1.2
Body depth at dorsal fin origin	17.4	13.6-15.6	15.5±2.0
Body width at anal fin origin	11.7	6.9-9.8	9.5±1.5
Head height at occiput	20.8	23.0-23.1	22.3±1.6
Head width	21.9	19.8-20.9	20.9±1.5
Mouth width (Inner or Rictus)	7.6	7.8-8.2	7.9±0.9
Caudal peduncle length	17.4	13.1-18.9	16.5±1.3
Caudal peduncle depth	10.9	7.8-14.5	11.1±1.1
Predorsal length	43.2	40.9-41.6	41.9±2.1
Pre-dorsal length at adipose fin origin	72.6	60.1-63.2	65.3±2.7
Prepectoral length	20.0	13.6-15.6	15.4±1.3
Prepelvic length	48.0	46.5-50.8	48.4±2.3
Preanal length	74.3	73.4-75.2	74±2.9
Peranus length	69.1	67.2-69.2	68.5±2.7
Dorsal to adipose distance	22.9	15.4-16.8	18.4±1.4
Length of dorsal fin base	11.0	11.0-12.8	11.6±1.1
Height of dorsal fin	19.1	18.4-19.0	18.9±1.4
Height of adipose fin	5.5	4.8-6.0	5.4±0.8
Head depth	12.1	11.6-12.8	12.2±1.2
Mouth width (with outer fold)	16.5	15.4-16.9	16.3±1.3
Length of adipose fin base	31.0	27.0-28.0	28.7±1.8

Pectoral fin length	23.7	19.8-21.0	21.5±1.5
Pelvic fin length	18.2	16.6-18.3	17.7±1.4
Length of anal fin base	6.9	5.1-8.1	6.7±0.8
Length of anal fin	14.8	13.6-15.0	14.5±1.3
Caudal fin length	19.5	18.3-21.5	19.6±1.5
Distance between pelvic and anal fin origin	27.7	23.0-28.8	26.5±1.7
Pelvic –anus distance	21.1	18.4-20.7	20.1±2.2
Vent-anal-fin origin distance	5.1	6.0-6.1	5.8±1.2
Adipose dorsal fin height	31.0	21.7-28.0	21.4±1.5
Distance between anal to caudal fin origin	25.2	26.0-30.7	27.3±1.7
Distance between tip of snout to anterior nostril	6.5	5.5-6.4	6.1±0.8
Distance between tip of snout to posterior nostril	9.5	7.0-8.0	8.1±0.9
Distance between pectoral to pelvic fin origin	31.1	30.9-37.2	33.1±1.9
In % of HL (Head Length)			
Head width	91.9	84.2-86.2	87.4±3.1
Snout length	53.4	53.2-55.7	54.1±2.4
Eye diameter	7.7	8.3-14.7	10.3±1.0
Inter orbital width	32.9	29.8-32.6	31.7±1.9
Mouth width (Inner or Rictus)	31.8	31.8-33.8	32.9±1.9
Mouth width (with outer fold)	69.4	71.5-73.6	71.5±2.8
Head depth	50.9	46.7-55.8	51.1±2.4
Maxillary barbel length	96.5	90.8-95.7	94.3±3.2
Nasal barbel length	22.0	35.4-46.8	34.7±2.0
Inner mandibular barbel length	14.6	9.8-11.2	12.2±1.2
Outer mandibular barbel length	22.0	22.0-32.7	26.1±1.7
In % of CPL (Caudal Peduncle length)			
Caudal peduncle depth	83.1	81.9-82.8	83.0±3.0
Mouth width (inner-Rictus)	43.5	43.7-49.1	48.8±3.5
In % of HW (Head Width)			
Mouth width (Inner or Rictus)	34.6	39.3-39.5	37.8±2.0
Mouth width (with outer labial fold)	75.5	85.5-88.0	82.8±3.0

Colouration

Dorso-lateral surfaces with pale brown or light creamish brown. Ventral surface light cream. Dorsal, pectoral, pelvic and anal fins hyaline with light brown. Adipose dorsal fin light cream. Barbels brown dorsally and light cream ventrally.

Local name: Song Nga (Song= Stone, Nga = Fish, in Kuki tribe's language, in its type locality, Manipur).

Table 2. Distribution records of *Exostoma* species in the different drainage systems of South East Asian Countries (A) = Brahmaputra, (B) = Barak-Surma-Meghana, (C) Chaophraya, (D) = Irrawady, (E) = Salween.

Sl.No.	Name	(A)	(B)	(C)	(D)	(E)
1.	*E. barakense* Vishwanath & Joyshree, 2007		+			
2.	*E. berdmorei* Blyth, 1860					+
3.	*E. chaudhurii* Hora, 1929				+	
4.	*E. dulongense* Luo & Chen, 2020				+	
5.	*E. efferenum* Ng & Vidthayanon, 2014			+		
6.	*E. ericinum* Ng, 2018				+	
7.	*E. gaoligongense* Chen *et al*, 2017					+
8.	*E. kottelati* Darshan *et al,* 2019	+				

9.	*E. labiatum* (McClelland, 1842)	+				
10.	*E. laticaudata* sp. nov.		+			
11.	*E. mangdechhuens* Thoni & Gurung, 2018	+				
12.	*E. peregrinator* Ng & Vidthayanon, 2014			+		
13.	*E. sawmteai* Lalramliana *et al,* 2015		+			
14.	*E. sectile* Ng & Kottelat, 2018				+	
15.	*E. stuarti* (Hora, 1923)				+	
16.	*E. tenuicaudata* Tamang *et al,* 2015	+				
17.	*E. tibetana* Gong *et al,* 2018	+				
18.	*E. vinciguerrae* (Regan,1905)				+	
	Total =	**5**	**3**	**2**	**6**	**2**

Fig. 2. Type locality of *Exostoma laticaudata* sp. nov. (★) in Manipur, India.

Etymology: The specific name is derived from Latin words i.e., *latius*= broad and *caudatus* = tail, referring to short and deep caudal peduncle. An adjective.

Distribution: *Exostoma laticaudata* is known only from the type locality, Namthilok stream (a head-water tributary of Leimatak river, Barak River basin) in Manipur, northeastern India (Fig. 2) and Table 2.

Habitat: The species was collected from a small moderately flowing with having a substratum of rocks, pebbles and sand (Fig.3). It was found mainly associated with *Schistura manipurensis, Garra manipurensis, G. lissorhynchus* etc.

Fig. 3: Type locality and natural habitat of *Exostoma laticaudata* sp. nov., Namthilok stream of Leimatak River, Barak River basin, Manipur. Photograph Courtesy of L. Arunkumar.

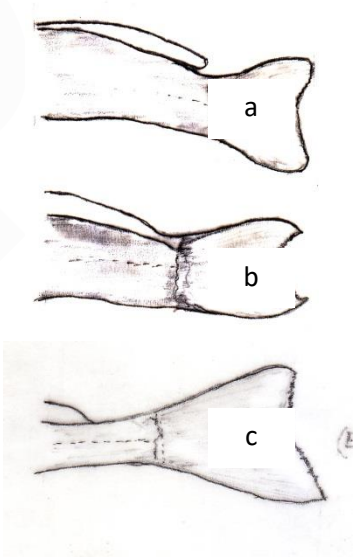

Fig. 4. Schematic illustration showing the different types of attachment of adipose dorsal fin in *Exostoma*: a-distinct notch or separate from the procurrent caudal fin ray; b-adnate to the upper procurrent caudal fin ray; c-distinctly separate or non-contiguous with the upper caudal procurrent rays.

4. DISCUSSION

Exostoma laticaudata sp.nov. can be distinguished from *E. barakense*, only the syntopic species of it in Manipur, in having shorter caudal peduncle (13.1-18.9%SL vs. 19.5-21.6), greater head height (20.8-23.1%SL vs. 10.6-13.2), narrower mouth (7.6-8.2%SL vs. 8.5-10.3), greater height of dorsal fin (18.4-19.1%SL vs. 12.2-15.8), shorter snout (53.2-55.7%HL vs. 58.1-61.5), longer maxillary barbel (90.8-96.5%HL vs. 46.1-56.5), longer inner mandibular barbel (9.8-14.6%HL vs. 4.9-7), longer outer mandibular barbel (22.0-32.7%HL vs. 14.1-20.0) nasal barbel extending to the (posterior vs. anterior) margin of eye, narrow mouth (31.8-33.8%HL vs. 39.6-43.5) and (34.6-39.5%HW vs. 43.4-49.6), less number of branched dorsal fin rays (5 vs. 6), less number of unbranched anal fin rays (i vs. ii), less number of vertebrae (34-35 vs. 38) the posterior end of the adipose-fin adnate with (vs. separated by a distinct notch) from dorsal procurrent caudal-fin rays and more branched rays of pectoral fin (12 vs. 10-11) respectively.

Exostoma laticaudata differs from *E. berdmorei* in having narrower head (84.2-91.9%HL vs. 97.9), shorter fin base (11-12.8% SL vs. 13.1-13.3), deeper body at dorsal-fin origin (13.06-14.6% SL vs. 10.9), deeper body depth at anus (12.1-15.2%SL vs. 11.0-12.7), shorter snout (53.2-55.7%HL vs. 57.0-58.4), and longer maxillary barbel (90.8-96.5% HL vs. 67.2-81.6), longer inner mandibular barbel (9.8-14.6%HL vs. 6.3-8.9), lesser branched rays of dorsal fin (5 vs. 6), more branched rays of ventral fin (7 vs. 5), more branched rays of pectoral fin (12 vs. 8-10), lesser numbers of vertebrae (34-35 vs. 36-37) and caudal fin emarginate vs. fork) respectively. Data of Ng & Vidthayanon, 2014; Vishwanath & Joyshree, 2007; Ng & Kottelat, 2018; Darshan *et al,* 2019; Luo & Chen (2020) for *E. berdmorei* were used for comparison.

Exostoma laticaudata differs from *E. chaudhurii* in having fewer vertebrae (34-35 vs. 39-41), preanal (73.4-75.2%SL vs. 66.4-73.7%SL), nasal barbel reaching posterior margin of eye or eye vs. not reaching or just reaching middle of the eye or orbit. Ng (2018) again stated that it has rounded, partially anastomosing plaques on the anterolateral surfaces of the lips and lower surfaces of maxillary barbeles and did not shown the ventral views of mouth and oral structures of *E. chaudhurii*.

E. laticaudata differs from *E. dulongense* in having fewer vertebrae (34-35 vs. 40-43), more branched pectoral-fin rays (12 vs. 11), caudal-fin emarginate vs. weakly fork, shorter caudal peduncle (13.1 -18.9%SL vs. 17.6-25.5), longer head (23.0-24.7%SL vs. 20.5-23.8), narrower mouth (31.8 -33.%HL vs. 36.4-46.1), longer maxillary barbel (90.8 -96.5%HL vs. 54.1-89.8), stouter caudal peduncle (81.9 -83.1% caudal peduncle length vs. 164.9-284.8) respectively.

Exostoma laticaudata differs from *E. effernum* in having longer preanal (73.4-75.2%SL vs. 70.2-71.6), fewer total vertebrae (34-35 vs. 36-38), shorter caudal fin (18.3-21.5%SL vs. 22.5-25.3), longer dorsal to adipose distance (15.4-22.9%SL vs. 10.3-12.3), shorter snout (53.2-55.7%HL vs. 57.3-64.6), longer maxillary barbel (90.8-96.5%HL vs. 80.0-88.5), the posterior end of adipose-fin adnate with (vs. separated by a distinct notch from) the upper procurrent caudal-fin rays, and caudal fin emarginate vs. fork respectively. Data of Ng & Vidthayanon, 2014, and Lalramliana *et al,* 2015, for *E. effernum* were used for comparison.

E. laticaudata differs from *E. ericinum* in having fewer vertebrae (34-35 vs. 42-44), emarginated vs. weakly forked caudal-fin, absence or poorly developed vs. presence of distinct and entirely covered of conical tubercles on the dorsal surfaces of head and pectoral-fin rays, longer predorsal (40.9-43.2%SL vs. 36.7-40.5), longer preanal (73.4-75.2%SL vs. 67.7-705), longer prepelvic (46.5-50.8%SL vs. 42.4-45.8), deeper caudal peduncle (7.8-14.5%SL vs. 5.7-7.9), deeper body at pelvic distance (30.9-37.2%SL vs. 26.0 -30.8), longer head (23.0-24.7%SL vs. 18.7-23.3), wider head (19.8-21.9%%SL vs. 16.3-19.5), shorter snout (53.2-55.7%HL vs. 55-60), and longer maxillary barbell (90.8-96.5%HL vs. 65-78) respectively. Data of Ng.2018, for *E. ericinum* were used for comparison.

E. laticaudata differs from *E. gaoligongense* in having longer pectoral to pelvic distance (30.9-37.2%SL vs. 26.9-31.6), longer snout (53.2-55.7HL vs. 39.7-53.3), narrower head (84.2-91.9%HL vs. 91.3-112.4), narrower mouth (31.8-33.8%HL vs. 37.9-53.9) and presence of striae vs. plicae on the ventral surfaces of 1st unbranched pectoral and pelvic-fin rays respectively. Data of Chen *et al,* 2017; for *E. gaoligongense* were used for comparison.

E. laticaudata differs from *E. kottelati* in having fewer vertebrae (34-35 vs. 39), emarginate vs. lunate caudal-fin, longer barbell, extending upto the posterior margin of eye vs. extending to anterior margin of eye, longer dorsal-fin base (11.0-12.8%SL vs. 10.3-10.7), shorter caudal-fin (18.3-21.5%SL vs. 21.9-24.5), shorter caudal peduncle (13.1-18.9%SL vs. 18.7-21.1), longer head (23.0-24.7%SL vs. 20.2-23.5), deeper head 11.6-12.8%SL vs. 8.9-10.6, narrower head (84.2-91.9%HL vs. 90.2-100.6), shorter snouts (53.2-55.7%HL vs. 56.2-61.1), and longer maxillary brabel 90.8-96.5%HL vs. 68.9-80.4) respectively. Data of Darshan *et al,* 2019; for *E. kottelati* were used for comparisons.

Exostoma laticaudata differs from *E. labiatum* in having longer adipose-fin base (27.0-31.0%SL vs. 26.2), wider interorbital (29.8-32.9%HL vs. 21.0-28.0) and deeper caudal peduncle (81.9-83.1%CPL vs. 31.2-38.7). Data of Vishwanath & Joyshree, 2007 and Lalramliana *et al*, 2015; for *E. labiatum* were used for comparison.

E. laticaudata differs from *E. mangdechhuense* in having emarginate vs. semilunate caudal-fin, longer dorsal-fin base (11.0-12.8%SL vs. 9.3-10.6), more height of dorsal-fin (18.4-19.1%SL vs. 16.2-17.9), longer anal-fin base (5.1-81Sl vs. 3.5-5.1), more height

of adipose dorsal-fin (21.7-31.0%SL vs. 2.5-4.4), narrower mouth (31.8-33.8%HL vs. 33.2-39.4 an longer inner mandibular barbell (9.8-14.6%HL vs. 4.5-9) respectively.

Exostoma laticaudata differs from *E. peregrinator* in having less number of vertebrae (34-35 vs. 36-38), deeper head (11.6-12.8%SL vs. 9.1-10.9), shorter adipose dorsal-fin base (21.0-31.0%SL vs. 31.7-34.6), shorter snout (53.2-55.7%HL vs. 56.1-61.2), more branched rays of dorsal fin (5 vs.6), more rays of caudal fin (17 vs. 15-16), and more rays of pectoral fin 12 vs. 8-10) and caudal fin (emarginate vs. lunate) respectively. Data of Ng & Vidthayanon, 2014, for *E. peregrinator* were used for comparison.

Exostoma laticaudata also differs from *E. sawmteai* in having longer dorsal to adipose distance (15.4-22.9%SL vs. 7.4-16.7), shorter caudal fin (18.3-21.0%SL vs. 19.0-25.2), length of caudal peduncle (13.1-18.9%SL vs. 18.4-20.3), wider head (19.8-21.9%SL vs.16.5-19.8), longer maxillary barbel (90.8-96.5%HL vs. 67.0-89.0), less number of branched dorsal fin rays (5 vs. 6), more caudal fin rays (17 vs. 14), and more branched rays of ventral fin (7 vs. 5) respectively. Data of Lalramliana *et al,* 2015 for *E. sawmteai* were used for comparison.

E. laticaudata differs from *E. sectile* in having fewer (34-35 vs.36-37), vs. fork caudal-fin, shorter pelvic-fin (16.6-18.3%SL vs. 18.5-22.2), longer dorsal to adipose-fin origin (15.4-22.9%SL vs. 9.1-12.8), deeper caudal peduncle (7.8-14.5%SL vs. 6.1-6.3) and deeper head (11.6-12.8%SL vs. 9.6-11.0) respectively. Data of Ng & Kottelat, 2018; for *E. sectile* were used for comparisons.

Exostoma laticaudata also differs from *E. stuarti* in having slender body depth at anus (12.1-15.2%SL vs. 16.1-18.1), narrower head (19.8-21.9%SL vs. 23.3), longer snout (53.2-55.7%HL vs. 47.6), wider interorbital (29.8-32.9%HL vs. 26.6), larger eye (7.7-14.7%HL vs. 4.7-6.5), narrower head (84.2-91.9%HL vs. 95.2), deeper head (46.7-55.8%HL vs. 45.7), more rays of branched pectoral fin (12 vs. 10) the posterior end of the adipose-fin adnate with (vs. separated by a distinct notch from) the upper procurrents caudal-fin rays and caudal fin (emarginate vs. lunate) respectively. Jayaram (1979) and Chen *et al* (2017) reported that *E. stuarti* beared 5 and 3 anal-fin rays respectively.

Exostoma laticaudata is distinguished from *E. tenuicaudata* in having longer predorsal (40.9-43.2%SL vs. 34.3-39.0), longer preanal (73.4- 75.2%SL vs. 68.1-70.1), longer prepelvic (46.5-50.8%SL vs. 42.4-44.6), longer dorsal fin base (11.0-12.8%SL vs.7.9-10.8), shorter caudal peduncle (13.1-18.9%SL vs. 26.3-28.0), longer head (23.0-24.7%SL vs. 20.2-22.8), more head height at occiput (20.8-23.1%SL vs.9.3-10.3), deeper body at anus (12.1-15.2%SL vs. 9.6-11.3), more preanus length (67.2-69.2%SL vs. 59.9-63.3), shorter snout (53.2-55.7%HL vs. 60.2-61.8), wider interoribital (29.8-32.9%HL vs. 24.4-26.4), longer maxillary barbel (90.8-96.5%HL vs. 63.5-72.1), narrower or lesser width of mouth (inner or rictus) (31.8-33.8%HL vs. 36.3-40.1), more deeper of caudal peduncle (81.9-83.1%LCP vs.13.8-17.2), the posterior end of the adipose fin (adnate vs. not contiguous) with the upper caudal procurrent rays and lesser number of vertebrae (34-35 vs. 38) respectively. Data of Tamang *et al* 2015 for *E. tenuicaudata* were used for comparison.

E. laticaudata differs from *E. tibetana* in having nasal barbel reaching posterior orbital region vs. reaching anterior orbital region, anterolateral surface of oral portions with parallel striae vs. anastomosing rounded plaques, deeper body at anus (12.1-15.2%SL vs. 10.4-12.3), longer dorsal-fin base (11.0-12.8%SL vs. 8.8-10.8), shorter adipose-fin base (27.0-31.0%SL vs. 31.9-37.8), longer anal-fin base (5.1-8.1%SL vs. 4.9-5.7), longer predorsal (40.9-43.2%SL vs. 36.0-39.3), deeper caudal peduncle (7.8-14.5% SL vs. 6.7-8.6), and longer maxillary barbell (90.8-96.5%HL vs. 69-88) respectively. Data of Gong *et al*, 2018; for *E. tibetana* were used for comparisons.

Exostoma laticaudata also differs from *E. vinciguerrae* in having fewer total vertebrae (34-35 vs. 40-42), wider head (19.8-21.9%SL vs.18.1-19.6), deeper body at anus (12.1-15.2%SL vs. 10.7-11.3), shorter adipose-fin base (27.0-31.0%SL vs. 38.0-39), smaller eye (7.7-14.7%HL vs. 16.0-16.4), narrower head (84.2-91.9%HL vs. 105.0-108.0), slender depth of head (46.7-55.8%HL vs. 52.0-62.5), deeper caudal peduncle (81.9-83.1%CPL vs.58.0-58.3) and more branched rays of pectoral fin (12 vs.10) respectively. Recently, Ng & Kottelat (2018) reported that *E. vincigurrae* have 39-41 vertebrae.

Distribution Records of *Exostoma* species in the Southeast Asian Region:

E. barakense: India. Manipur, northeastern state, Tamenglong district, Iyei river, a tributary of the Barak river, Brahmaputra drainage, Brahmaputra basin.

E. berdmorei: Myanmar. Tenasserim, eastern Myanmar, Sittang River drainage. Thailand. Mae Hong Son Province, Mae Sariang district, Huay Po Tak Province, Tha Song Yang district, Mae Jawang, Salween River drainage.

E. chaudhurii: Burma (now, Myanmar). Kachin State, Putao plains, China: Yunnan Province, Small tributary to the Dulongjiang near Bapo; Tengchang Country: the upper Irrawaddy River drainage.

E. dulongense China. Yunnan Province, Lushui Country, Painma Township; Xiaoijiang River main stream at Gulangba village. Duolongjiang River, Wuzhong river a tributary of Xiaaojiang River. Irrawaddy basin.

E. efferenum: Thailand. Ping Noi stream, Doi Inthanon National Park, Chiang Mai Province, The Ping River (a tributary of the Chao Phraya River) drainage in northwestern Thailand.

E. ericinum: China. Yunnan Province, Tengchaong country, Guyong township, Binglangjiang at Houqiao village. Dayingjiang (= Taping River) drainage in Southwestern China. Left bank tributary of the Irrawaddy River.
E. gaoligongense: China. Southwestern Yunnan Province, Manggang River, a tributary of Nujiang (=Salween River), Gaoligoing Mountain, Baihualing village, Mangkuang Township, Baoshan city, Yunnan Province, Salween River drainage.
E. kottelati: India. Arunachal Pradesh, Lowers Subansiri district, a stream flowing into Ranga river at Yazzali village, Brahmaputra basin.
E. labiatum: India. Meghalaya, Mishmee Hills, Teesta river and its tributaries. North Bengal Assam, Sakhai, Lizho river, Naga Hills, Brahmaputra drainage.
E. mangdechhuense Bhutan. Zhemang, Kiragang stream at Mamung.
E. peregrinator: Thailand. Mae Hong Son Province, Mae La Noi district, Ban Tung. The Ping River and the Chao Phraya River drainages in northwestern Thailand.
E. sawmteai: India. Mizoram, northeastern state, Champhai district, Pharish River, a tributary of Tuivai River in the vicinity of Kawlbem, Barak River drainage, Brahmaputra basin.
E. sectile: Myanmar, Kachin State, Putao, Par Tate Chaung stream about 3 km. upstream of Upper Sankhaung village. Upper Irrawaddy River drainage in northern Myanmar.
E. stuarti: Myanmar. Northern Myanmar at Tanjor or Tanja, Langtao, Putao plains, Irrawady drainage.
E. tenuicaudata: India. Aurnachal Pradesh, northeastern state, upper Siang district, Bomdo village, Tuting, upper Brahmaputra drainage, Brahmaputra basin.
E. tibetana: China. Tibet Autonomous Region, Motuo Country, Beibeng Town, Didong village, a mountain stream flowing into the Yarlungs Tsangpo River.
E. vinciguerrae: Myanmar. Upper Myanmar, Kakhyen Hills, northern Shan State, Putao plains, Catchin or Kachin, Razi, Monehoe, Hsipi state. Tibetian frontier. Irrawaddy drainage.

COMPARATIVE MATERIALS

E. barakense* (originally *E. barakensis*):** MUMF 8098, 8096, 8097, 8099, 8100-8102. Data from Vishwanath & Joyshree (2007). ***E. berdmorei: Vishwanath & Joyshree (2007), Ng & Kottelat (2018), Darshan *et al* (2019) and Luo & Chen (2020), Ng. & Vidthayanon (2014). ***E. chaudhuri***: data from Ng (2018), Ng & Kottelat (2018), Gong *et al* (2018), Darshan *et al* (2019) and Luo & Chen (2020). ***E. dulongense***: Data from Lu & Chen (2020).). ***E. effernum***: Data from Ng. & Vidthayanon (2014). ***E. ericinum***: Data from Ng (2018). ***E. gaoligongense (originally E. gaoligongense)***: data from Chen *et al* (2017). ***E. kottelati***: Data from Darshan *et al* (2019). ***E. labiatum***: Data from Vishwanath & Joyshree (2007). ***E. mangdechhuensis*** (Originally, *E. mangdechhuensis*: Data from Thoni & Gurung (2018). ***E. peregrinator***: Data from Ng. & Vidthayanon (2014). ***E. sawmteai***: Data from Lalramliana *et al.* (2015). ***E. sectile***: Data from Ng & Kottelat (2018). ***E. stuarti***: Data from Ng. & Vidthayanon (2014) and Vishwanath & Joyshree (2007). ***E. tenuicaudata***: Data from Tamang *et al*, (2015). ***E. tibetana***: Data from Gonz *et al* (2018). ***E. vinciguerrae***: Data from Lalramliana *et al*, (2015), Ng. & Vidthayanon (2014) and Vishwanath & Joyshree (2007).

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