

## The identity of *Batasio tengana* (Hamilton, 1822), with the description of two new species of *Batasio* from north-eastern India (Teleostei: Bagridae)

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*Batasio tengana* is redescribed on the basis of fresh material and a neotype designated. Two new species are described: *Batasio fasciolatus* n. sp. is described from material previously identified as *B. tengana* from the Brahmaputra River drainage and can be distinguished from congeners in having a combination of five to six vertical dark brown bars on a light brown body, dorsal-spine length 13.6–16.8% standard length ( $L_S$ ), pectoral-spine length 12.7–14.3%  $L_S$ , and eye diameter 16.5–18.8% head length ( $L_H$ ). *Batasio spilurus* n. sp. is described from the Brahmaputra River drainage in Assam and can be distinguished from congeners in having a short adipose-fin base (12.6–12.8 v. 14.5–33.3%  $L_S$ ) and more slender caudal peduncle (5.7–6.2 v. 6.7–11.8%  $L_S$ ). © 2006 The Fisheries Society of the British Isles

Key words: Brahmaputra; freshwater catfish; Ganges; India; Nepal.

### INTRODUCTION

Species of *Batasio* Blyth, 1860, are small bagrid catfishes inhabiting the fresh waters of south and south-east Asia. They typically have laterally compressed heads and bodies, at least 35 vertebrae, and lack both an oar-like adipose fin and a prominent anterolateral process of the pelvic girdle. *Batasio* species are found only in hill-streams and upper reaches of large rivers. Twelve species of *Batasio* are considered valid (Ng & Edds, 2004): *B. batasio* (Hamilton, 1822), *B. tengana* (Hamilton, 1822), *B. affinis* Blyth, 1860, *B. dayi* (Vinciguerra, 1890), *B. merianiensis*, (Chaudhuri, 1913), *B. havmolleri* (Smith, 1931), *B. travancoria* (Hora & Law, 1941), *B. pakistanicus* (Mirza & Jan, 1989), *B. tigrinus* (Ng & Kottelat, 2001), *B. elongatus* (Ng, 2004), *B. sharavatiensis* (Bhatt & Jayaram, 2004) and *B. macronotus* (Ng & Edds, 2004).

During a recent ichthyological survey of north-east India, specimens of two *Batasio* species were obtained. A study of this material revealed that one of the species matched the original description and illustration of *B. tengana*, but was unlike specimens previously reported as *B. tengana*. Comparison with material previously identified as *B. tengana* and other material collected from north-east

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India and Nepal showed that these specimens reported as *B. tengana* in previous studies are misidentifications. The purpose of this study was to redescribe *B. tengana* and designate a neotype, and to describe two new species from north-east India.

## MATERIALS AND METHODS

Measurements were made point-to-point with dial callipers and recorded to 0.1 mm. Ng & Kottelat (2001) was followed for all measurements and counts. Numbers in parentheses after measurements or meristic counts refer to the number of specimens observed with the stated measurement or count. Asterisks following a particular meristic count indicates the values for the neotype (for *B. tengana*) or the holotypes (for *B. fasciolatus* n. sp. and *B. spilurus* n. sp.). Institutional codes follow Eschmeyer (1998).

## RESULTS

### *BATASIO TENGANA* (HAMILTON, 1822) (FIG. 1)

*Pimelodus tengana* Hamilton, 1822: 176, Pl. 39 Fig. 58 (type locality: Goalpara)

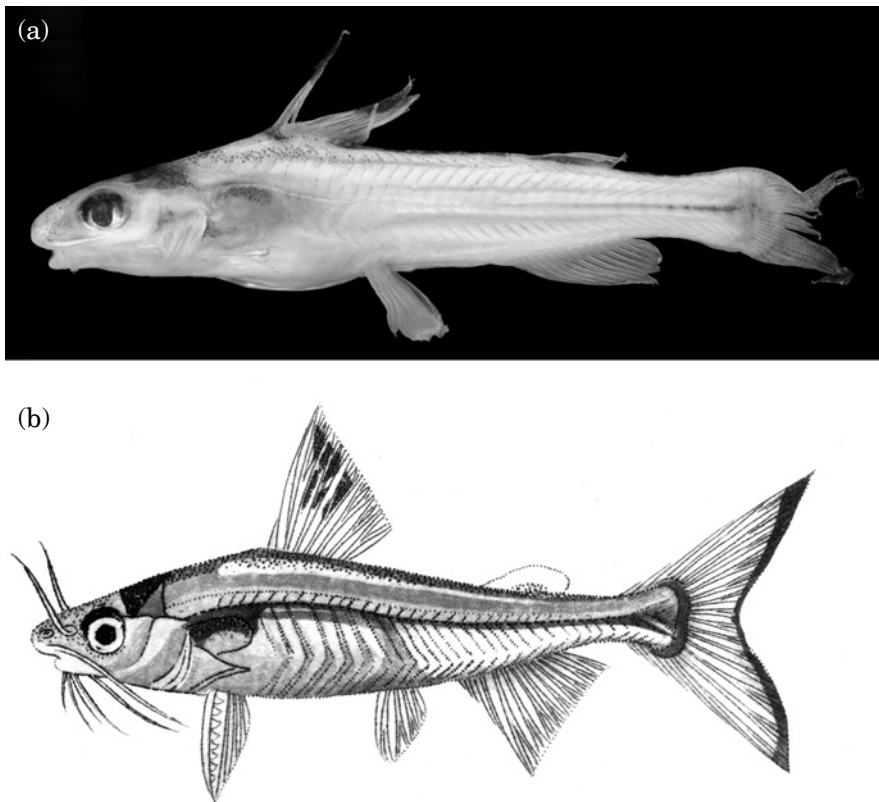


FIG. 1. *Batasio tengana*: (a) Neotype, UMMZ 244796, 43.4 mm  $L_S$ ; India: West Bengal, Tista River and (b) illustration from Hamilton (1822: Pl. 39 Fig. 58).

*Bagrus tengana* Cuvier & Valenciennes, 1840: 433.

*Batasio tengana* Blyth, 1860: 150.

*Macrones tengana* Günther, 1864: 84.

*Gagata tengana* Day, 1877: 493; Day, 1889: 210.

#### Material examined

UMMZ 244796, neotype, designated here 43.4 mm standard length ( $L_S$ )  
India: West Bengal: Tista River at Tista barrage; 26°45'10" N; 88°34'11" E.  
KU 28534 (1), 31.5 mm  $L_S$ ; KU 35240 (5), 30.4–39.4 mm  $L_S$ ; KU 35256,  
53.5 mm  $L_S$ ; Nepal: Saptari/Sunsari, purchased at Kosi barrage, 26°31'30" N;  
86°56'00" E. KU 28685 (1), 36.0 mm  $L_S$ ; Nepal: Kanchanpur, Chandhar River,  
confluence of three rivers (Chaudhar, Bahuri, Gobraiya) at Royal Shuklaa  
Phantaa Wildlife Reserve, 28°43'00" N; 80°12'00" E. OSUS 17365 (2), 35.8–  
36.6 mm  $L_S$ ; Nepal: Nawalparasi, Narayani River at Toadi Ghat. OSUS 15812  
(2), 43.8–45.9 mm  $L_S$ ; Nepal: Nawalparasi, borrow ditch west of Tribeni.

#### Diagnosis

*Batasio tengana* can be distinguished from all congeners except *B. pakistanicus* and *B. spilurus* n. sp. in having a shorter adipose-fin base (14.5–17.5 v. 22.1–35.1%  $L_S$ ) and the presence (v. absence) of a dark mid-dorsal stripe. *Batasio tengana* appears to reach a smaller size than other congeners (maximum size to c. 55 v. to 101 mm  $L_S$ ), except for *B. pakistanicus* and *B. spilurus* n. sp., which are known to reach 35 and 45 mm  $L_S$  respectively. *Batasio tengana* differs from *B. pakistanicus* in the pectoral fin rays not reaching (v. reaching) the pelvic-fin origin, and from *B. spilurus* n. sp. in having a longer adipose-fin base (14.5–17.5 v. 12.6–12.8%  $L_S$ ), a deeper caudal peduncle (6.7–8.2 v. 5.7–6.2%  $L_S$ ) a narrower head (12.5–14.5 v. 16.4–16.5%  $L_S$ ), and a more rounded, bulbous snout when viewed laterally [Fig. 2(a)].

#### Description

Morphometric data are given in Table I. Body moderately compressed laterally, slender in individuals <50 mm  $L_S$  and moderately deep in the individual >50 mm  $L_S$ . Dorsal profile rising evenly and gently from tip of snout to origin of dorsal fin, then sloping gently ventrally from dorsal fin to end of caudal peduncle. Ventral profile flat to anal-fin base, then sloping gently dorsally from anal-fin base to end of caudal peduncle. Anus and urogenital openings located at vertical through middle of appressed pelvic fin. Skin smooth. Lateral line complete and midlateral. Vertebrae 19 + 18 (2), 19 + 19 (9) or 19 + 20\* (2).

Head slightly depressed and narrow. Bony elements of dorsal surface of head covered with thin skin. Anterior nostril tubular, separated from posterior nostril by distance in excess of width of nasal-barbel base. Sensory pores on head enlarged and prominent. Eye ovoid, horizontal axis longest; located entirely in dorsal half of head. Gill openings wide, extending from posttemporal to beyond isthmus. Gill membranes free from isthmus.

Mouth inferior, premaxillary tooth band not exposed when mouth closed. Oral teeth small and villiform, in irregular rows on all tooth-bearing surfaces. Premaxillary tooth band rounded, of equal width throughout. Dentary tooth

TABLE I. Biometric data for *Batasio tengana* ( $n = 13$ )

	Neotype	Range	Mean $\pm$ s.d.
In % standard length ( $L_S$ )			
Predorsal length	35.7	35.7–40.0	37.1 $\pm$ 1.28
Preanal length	66.6	65.5–69.7	67.2 $\pm$ 1.49
Prepelvic length	47.5	45.7–51.4	49.1 $\pm$ 1.86
Prepectoral length	24.9	22.9–25.8	24.6 $\pm$ 1.08
Length of dorsal-fin base	13.8	10.5–16.4	14.4 $\pm$ 1.61
Length of dorsal spine	10.4	10.4–16.1	14.5 $\pm$ 1.75
Length of anal-fin base	18.0	15.3–20.4	18.3 $\pm$ 1.79
Length of pelvic fin	15.2	13.7–17.8	16.0 $\pm$ 1.16
Length of pectoral fin	15.4	15.4–19.7	18.6 $\pm$ 1.37
Length of pectoral spine	14.3	13.9–17.1	15.5 $\pm$ 0.95
Length of caudal fin	22.4	21.9–29.7	26.3 $\pm$ 2.76
Length of adipose-fin base	16.4	14.5–17.5	15.5 $\pm$ 0.96
Dorsal to adipose distance	21.7	15.1–23.3	19.5 $\pm$ 2.21
Post-adipose distance	18.4	15.4–20.2	17.4 $\pm$ 1.36
Length of caudal peduncle	15.4	14.0–20.0	16.4 $\pm$ 1.52
Depth of caudal peduncle	7.6	6.7–8.2	7.3 $\pm$ 0.52
Body depth at anus	13.8	8.6–18.1	13.2 $\pm$ 2.21
Head length ( $L_H$ )	25.6	23.8–28.8	25.8 $\pm$ 1.37
Head width	14.1	12.5–14.5	13.6 $\pm$ 0.54
Head depth	14.7	13.2–16.4	14.7 $\pm$ 1.01
In % $L_H$			
Snout length	30.6	30.6–40.0	35.1 $\pm$ 2.76
Interorbital distance	21.6	21.6–29.9	25.8 $\pm$ 2.50
Eye diameter	25.2	21.9–32.1	26.8 $\pm$ 2.93
Length of nasal barbel	32.4	12.8–56.1	41.3 $\pm$ 13.68
Length of maxillary barbel	65.8	65.8–94.7	83.9 $\pm$ 9.94
Length of inner mandibular barbel	27.0	12.8–41.1	21.2 $\pm$ 8.75
Length of outer mandibular barbel	37.8	31.6–53.1	40.7 $\pm$ 6.92

band much narrower than premaxillary tooth band at symphysis, tapering laterally.

Barbels in four pairs. Maxillary barbel long and slender, extending to base of pectoral spine. Nasal barbel slender, extending to midway between posterior orbital margin and gill opening. Inner mandibular-barbel origin close to midline, extending to one-quarter of distance between its base and base of pectoral spine. Outer mandibular barbel originating posterolateral of inner mandibular barbel, extending to midway between its base and base of pectoral spine.

Dorsal fin with spinelet, spine, and 7 (13) rays. Origin of dorsal fin at point through anterior two-fifths of body. Dorsal-fin margin convex. Dorsal-fin spine moderately long, straight, and slender, with smooth anterior and posterior edges.

Pectoral fin with stout spine, sharply pointed at tip, and 6 (4), 7 (2) or 8\* (7) rays.

Anterior spine margin smooth; posterior spine margin with nine to 12 small serrations along entire length. Pectoral-fin margin straight anteriorly, convex posteriorly.

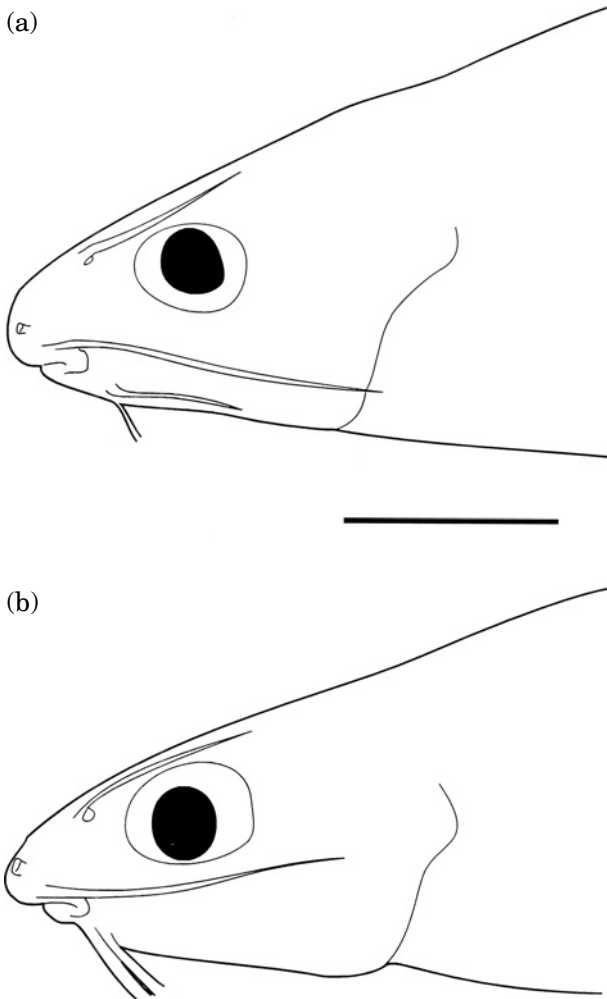


FIG. 2. Lateral views of heads of: (a) *Batasio tengana*, OSUS 15812, 43.8 mm  $L_S$  and (b) *B. spilurus* n. sp., holotype, ZRC 49133, 42.0 mm  $L_S$ . Scale bar = 5 mm.

Pelvic-fin origin at vertical through posterior end of dorsal-fin base, with i,5 (13) rays and slightly convex margin; tip of appressed fin not reaching anal-fin origin. Anus and urogenital openings located at vertical through middle of appressed pelvic fin. Males with a long, slender genital papilla extending to base of second anal-fin ray.

Adipose fin shorter than anal-fin base, with convex margin for entire length; anterior end at vertical through anterior third of anal-fin base. Anal fin with iv,9 (6), v,9 (2), iv,10 (2), v,10 (1) or iv,11\* (2) rays and convex distal margin.

Caudal peduncle slender in individuals <50 mm  $L_S$ ; moderately deep in specimens >50 mm  $L_S$ . Caudal fin deeply forked, with i,7,7,i (1) or i.7.8.i\* (12) principal rays; upper and lower lobes pointed. Procurrent rays extend only slightly anterior to fin base.

### Colouration

In 70% ethanol: dorsal, lateral and ventral surfaces of head dark yellow. Dorsal surface of occipital region with numerous dense melanophores, imparting brown colour on head. Melanophores on head becoming more scattered and extending into single faint brown band on either side of body just below dorsal midline; band extending from occipital region to adipose-fin origin. Nuchal shield with dark brown patch. Dorsal midline of body with distinct dark brown band, extending from base of last dorsal-fin ray to origin of dorsal procurrent caudal rays; band interrupted at anterior and posterior insertions of adipose-fin base, but running along either side of body at middle third of adipose-fin base. Humeral region with scattered melanophores forming faint semilunate mark on dorsal third of tympanum. Lateral surfaces of caudal peduncle with very faint line on lateral myoseptum, becoming more diffuse to form diffuse dark area on middle of caudal peduncle base in some individuals. Paired fins hyaline. Anal fin hyaline, base with few scattered melanophores in some individuals. Dorsal fin hyaline, with subdistal, horizontally oriented, dark brown elliptical mark on anterior half. Caudal fin with faint stripes consisting of melanophores on fin rays running through each lobe in some individuals, hyaline in others. Live colouration similar, except more greyish and body more translucent.

### Distribution

Known from the Ganges and the Brahmaputra River drainages (Fig. 3). *Batasio tengana* is apparently restricted to upper reaches of larger rivers.

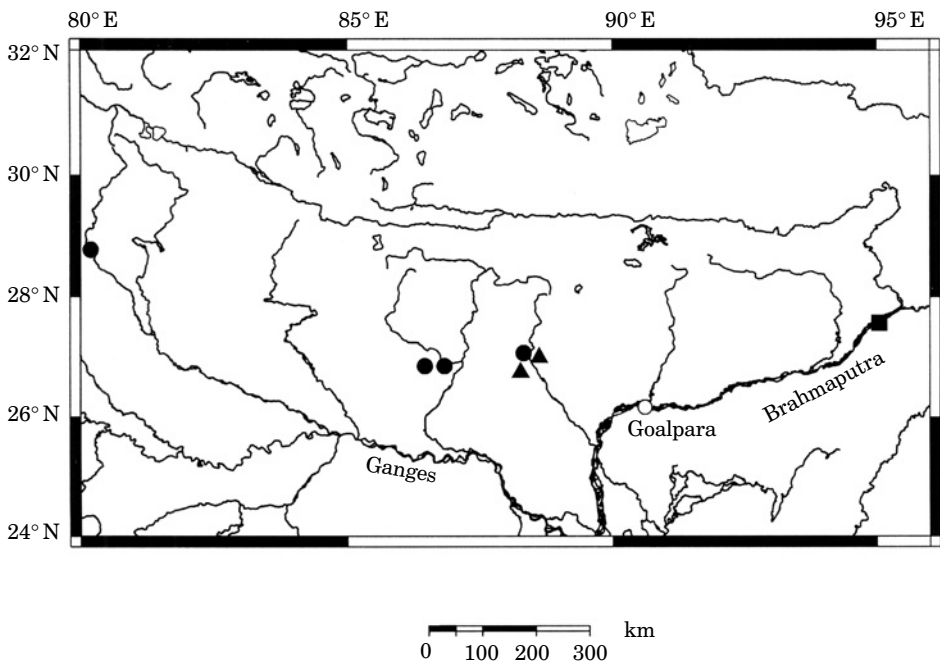


FIG. 3. Map showing distributions of *Batasio tengana* (●), *Batasio fasciolatus* n. sp. (▲) and *Batasio spilurus* n. sp. (■). The original type locality of *B. tengana* (Goalpara, ○), noted by Hamilton (1822) as indicated.

*BATASIO FASCIOLATUS* SP. NOV. (FIG. 4)

*Batasio tengana* (non Hamilton) Hora & Law, 1941: 36, Pl. 2 Figs 1–3 (in part); Jayaram, 1977: 17.

*Holotype*

UMMZ 244798, 67.0 mm  $L_S$ ; India: West Bengal, market at Malbazar; 26°32'30" N; 88°44'17" E; H. H. Ng, J. Dignall, A. Rao & A. Vuorela, 15 April 2004.

*Paratypes*

BMNH 1988.4.11.14 (1), 50.1 mm  $L_S$ ; India: West Bengal, Balason River at Digana, near Panighata, 20 km from Siliguri; K. C. Jayaram, 21 February 1970. UMMZ 244799 (1), 70.6 mm  $L_S$ ; data as for holotype. UMMZ 244797 (1), 57.5 mm  $L_S$ ; India: West Bengal: Tista River at Tista barrage; 26°45'10" N; 88°34'11" E; H. H. Ng, J. Dignall, A. Rao & A. Vuorela, 15 April 2004.

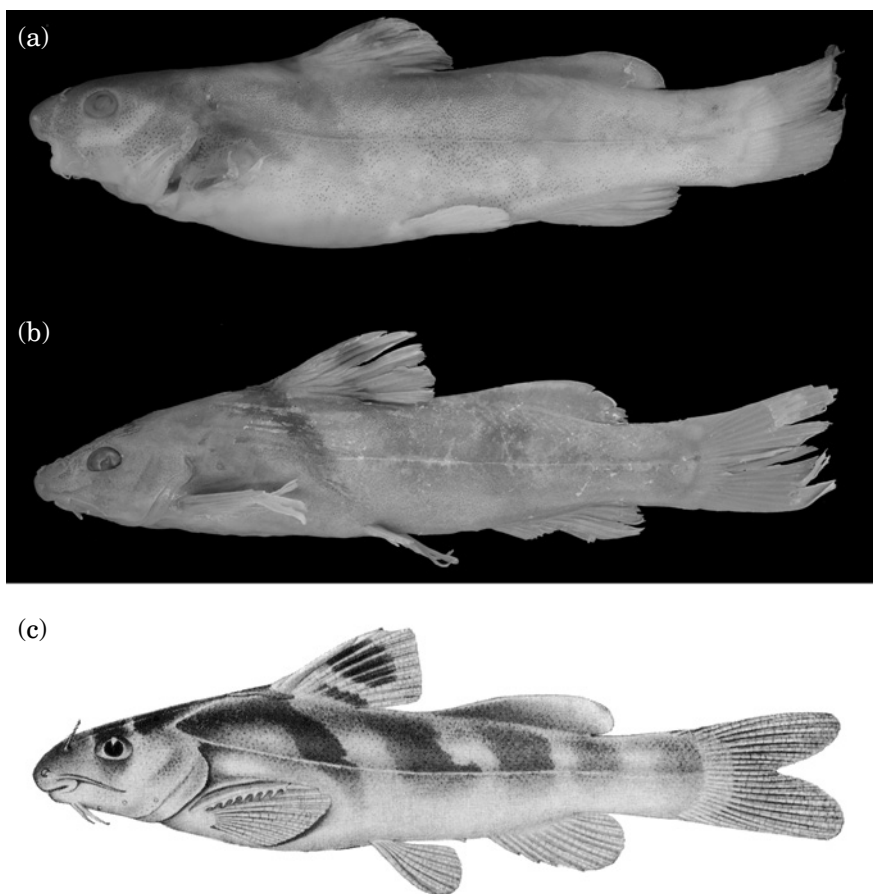


FIG. 4. *Batasio fasciolatus* n. sp.: (a) holotype, UMMZ 244798, 67.0 mm  $L_S$ , showing adult colouration (b) paratype, BMNH 1988.4.11.14, 50.1 mm  $L_S$ , showing juvenile colouration and (c) illustration from Hora & Law (1941: Pl. 2 Fig. 1).

### Diagnosis

*Batasio fasciolatus* n. sp. can be distinguished from all congeners except *B. tigrinus* by the adult colouration of five to six vertical dark brown bars on a light brown body (v. two or less vertical bars, uniform colouration or only horizontal marks). It differs from *B. tigrinus* in having longer dorsal spines (13.6–16.8 v. 9.4–12.5%  $L_S$ ) and pectoral spines (12.7–14.3 v. 10.3–12.9%  $L_S$ ) and smaller eye [16.5–18.8 v. 20.3–24.8% head length ( $L_H$ )].

Specimens of *Batasio fasciolatus* n. sp. were previously identified as *B. tengana*, but can be further distinguished from it in having a longer adipose-fin base (24.5–25.3 v. 14.5–17.5%  $L_S$ ), deeper caudal peduncle (10.1–11.8 v. 6.7–8.2%  $L_S$ ) and smaller eye (16.5–18.8 v. 21.9–32.1%  $L_H$ ). The only other species of *Batasio* with at least one vertical bar on the body found in the Brahmaputra River drainage is *B. merianiensis*, but *B. fasciolatus* differs from it in having smaller pectoral spine (12.7–14.3 v. 16.3%  $L_S$ ) and eye (16.5–18.8 v. 25.9%  $L_H$ ).

### Description

Morphometric data are given in Table II. Body moderately compressed laterally. Dorsal profile rising evenly and moderately steeply from tip of snout to origin of dorsal fin, then sloping gently ventrally from dorsal fin to end of caudal peduncle. Ventral profile flat to anal-fin base, then sloping gently dorsally from anal-fin base to end of caudal peduncle. Anus and urogenital openings located at vertical through middle of appressed pelvic fin. Skin smooth. Lateral line complete and midlateral. Vertebrae 20 + 18 (2), 20 + 19\* (1) or 21 + 18 (1).

Head slightly depressed and narrow. Bony elements of dorsal surface of head covered with thin skin. Anterior nostril tubular, separated from posterior nostril by distance in excess of width of nasal-barbel base. Sensory pores on head enlarged and prominent. Eye ovoid, horizontal axis longest; located entirely in dorsal half of head. Gill openings wide, extending from posttemporal to beyond isthmus. Gill membranes free from isthmus.

Mouth inferior, premaxillary tooth band not exposed when mouth closed. Oral teeth small and villiform, in irregular rows on all tooth-bearing surfaces. Premaxillary tooth band rounded, of equal width throughout. Dentary tooth band much narrower than premaxillary tooth band at symphysis, tapering laterally.

Barbels in four pairs. Maxillary barbel short and slender, extending to midway between its base and base of pectoral spine. Nasal barbel slender, extending to middle of orbit. Inner mandibular-barbel origin close to midline, extending to one-quarter of distance between its base and base of pectoral spine. Outer mandibular barbel originating posterolateral of inner mandibular barbel, extending to one-third of distance between its base and base of pectoral spine.

Dorsal fin with spinelet, spine, and 7 (4) rays. Origin of dorsal fin at point through anterior two-fifths of body. Dorsal-fin margin convex. Dorsal-fin spine short, straight, and slender, with smooth anterior and posterior edges.

Pectoral fin with stout spine, sharply pointed at tip, and 8 (4) rays. Anterior spine margin smooth; posterior spine margin with six to nine small serrations along entire length. Pectoral-fin margin straight anteriorly, convex posteriorly.



TABLE II. Biometric data for *Batasio fasciolatus* n. sp. ( $n=4$ )

	Holotype	Range	Mean $\pm$ s.d.
In % standard length ( $L_S$ )			
Predorsal length	36.4	35.6–38.9	37.0 $\pm$ 1.41
Preanal length	73.6	68.9–73.6	70.8 $\pm$ 2.00
Prepelvic length	52.7	49.9–52.7	51.5 $\pm$ 1.17
Prepectoral length	27.9	24.2–27.9	26.1 $\pm$ 1.82
Length of dorsal-fin base	15.7	13.4–17.4	15.5 $\pm$ 1.63
Length of dorsal spine	13.9	13.6–16.8	14.7 $\pm$ 1.46
Length of anal-fin base	13.4	13.3–16.0	14.3 $\pm$ 1.26
Length of pelvic fin	15.1	14.2–15.7	14.9 $\pm$ 0.69
Length of pectoral fin	19.6	18.6–19.6	19.1 $\pm$ 0.50
Length of pectoral spine	12.7	12.7–14.3	13.7 $\pm$ 0.90
Length of caudal fin	20.1	20.1–24.4	21.9 $\pm$ 1.81
Length of adipose-fin base	24.8	24.5–25.3	24.9 $\pm$ 0.34
Dorsal to adipose distance	9.7	9.7–12.0	10.9 $\pm$ 1.27
Post-adipose distance	14.6	13.0–14.6	13.9 $\pm$ 0.73
Length of caudal peduncle	17.8	14.2–19.3	16.7 $\pm$ 2.30
Depth of caudal peduncle	11.8	10.1–11.8	10.9 $\pm$ 0.70
Body depth at anus	20.3	18.1–20.3	19.1 $\pm$ 1.10
Head length ( $L_H$ )	26.1	25.0–26.9	26.0 $\pm$ 0.79
Head width	14.3	13.6–15.6	14.5 $\pm$ 0.83
Head depth	18.8	15.2–18.8	17.4 $\pm$ 1.54
In % $L_H$			
Snout length	37.1	35.7–37.1	36.7 $\pm$ 0.65
Interorbital distance	30.3	26.4–30.3	28.3 $\pm$ 1.74
Eye diameter	18.3	16.5–18.8	17.9 $\pm$ 0.99
Length of nasal barbel	18.3	18.3–28.5	22.0 $\pm$ 5.65
Length of maxillary barbel	56.0	50.0–63.2	56.4 $\pm$ 6.61
Length of inner mandibular barbel	11.4	11.1–15.3	12.9 $\pm$ 1.99
Length of outer mandibular barbel	24	18.1–29.6	24.9 $\pm$ 5.08

Pelvic-fin origin at vertical through posterior end of dorsal-fin base, with i,5 (4) rays and slightly convex margin; tip of appressed fin not reaching anal-fin origin. Anus and urogenital openings located at vertical through middle of appressed pelvic fin. Males with a long, slender genital papilla extending to base of first anal-fin ray.

Adipose fin with convex margin for entire length; anterior end at vertical through middle of pelvic fin. Origin of anal-fin base at vertical through anterior quarter of adipose fin, with iv,9 (1), v,8 (1) or v,9\* (2) rays and convex distal margin.

Caudal peduncle moderately deep. Caudal fin deeply forked, with i,7,8,i (4) principal rays; upper and lower lobes rounded. Procurrent rays extend only slightly anterior to fin base.

#### Colouration

In 70% ethanol: body and head greyish brown, with six vertical dark brown bars: one on head passing through eye, second running obliquely anterior to dorsal fin, third between dorsal- and adipose-fin bases, fourth below anterior

half of adipose-fin base, fifth below posterior quarter of adipose-fin base and last at base of caudal peduncle. Vertical bars less distinct in adult fish, becoming more coalescent along lateral myoseptum [Fig. 4(a)]; bars strongly distinct in juvenile fish [Fig. 4(b)]. Dorsal fin hyaline, with subdistal, horizontally oriented, dark brown ovoid mark on anterior half. Caudal fin with scattered melanophores on fin rays and hyaline membrane. Other fins hyaline.

#### *Distribution*

Known from the Tista River drainage, itself a tributary of the Brahmaputra River (Fig. 3).

#### *Etymology*

From the Latin fasciolatus, the diminutive form of fascia, meaning belt, in reference to the banded pattern of this species.

### *BATASIO SPILURUS* N. SP. (FIG. 5)

#### *Holotype*

ZRC 49133 (1), 42.0 mm  $L_S$ ; India: Assam, Dibrugarh district, 27°29' N; 94°54' E (co-ordinates approximate); A. A. Rao, July 2001.

#### *Paratype*

ZRC 50201 (1), 40.5 mm  $L_S$ ; data as for holotype.

#### *Diagnosis*

*Batasio spilurus* n. sp. can be distinguished from all congeners in having a short adipose-fin base (12.6–12.8 v. 14.5–33.3%  $L_S$ ) and more slender caudal peduncle (5.7–6.2 v. 6.7–11.8%  $L_S$ ). It further differs from all congeners except *B. pakistanicus* and *B. tengana* in having a slender body (12.6–13.6 v. 15.8–23.9%  $L_S$ ). It can be further distinguished from *B. pakistanicus* in the pectoral fin rays not reaching (v. reaching) the pelvic-fin origin, and from *B. tengana* in having a wider head (16.4–16.5 v. 12.5–14.5%  $L_H$ ), the presence of a distinct black triangular spot at the base of the caudal peduncle (v. spot very diffuse or absent), and a sharper snout when viewed laterally [Fig. 2(b)].



FIG. 5. *Batasio spilurus* n. sp., holotype, ZRC 49133, 42.0 mm  $L_S$ ; India: Assam, Dibrugarh district.

*Description*

Morphometric data are given in Table III. Body moderately compressed. Dorsal profile rising evenly and moderately steeply from tip of snout to origin of dorsal fin, then sloping gently ventrally from dorsal fin to end of caudal peduncle. Ventral profile flat to anal-fin base, then sloping gently dorsally from anal-fin base to end of caudal peduncle. Anus and urogenital openings located at vertical through middle of appressed pelvic fin. Skin smooth. Lateral line complete and midlateral. Vertebrae 19 + 19 (1) or 20 + 19\* (1). Head slightly depressed and narrow. Bony elements of dorsal surface of head covered with thin skin. Anterior nostril tubular, separated from posterior nostril by distance in excess of width of nasal-barbel base. Sensory pores on head enlarged and prominent. Eye ovoid, horizontal axis longest; located entirely in dorsal half of head. Gill openings wide, extending from posttemporal to beyond isthmus. Gill membranes free from isthmus.

Mouth inferior, premaxillary tooth band not exposed when mouth closed. Oral teeth small and villiform, in irregular rows on all tooth-bearing surfaces.

TABLE III. Biometric data for *Batasio spilurus* n. sp.

	Holotype ZRC 49133	Paratype ZRC 50201
In % standard length ( $L_S$ )		
Predorsal length	38.8	39.5
Preanal length	66.7	67.7
Prepelvic length	49.5	51.1
Prepectoral length	26.7	26.4
Length of dorsal-fin base	15.5	15.8
Length of dorsal spine	15.5	14.3
Length of anal-fin base	17.4	17.0
Length of pelvic fin	14.5	17.0
Length of pectoral fin	20.0	18.8
Length of pectoral spine	16.9	16.3
Length of caudal fin	26.2	26.4
Length of adipose-fin base	12.6	12.8
Dorsal to adipose distance	20.2	19.5
Post-adipose distance	18.3	19.0
Length of caudal peduncle	16.4	17.8
Depth of caudal peduncle	6.2	5.7
Body depth at anus	12.6	13.6
Head length ( $L_H$ )	26.9	28.6
Head width	16.4	16.5
Head depth	15.7	17
In % $L_H$		
Snout length	35.4	33.6
Interorbital distance	27.4	24.1
Eye diameter	25.7	24.1
Length of nasal barbel	48.7	42.2
Length of maxillary barbel	69.0	75.0
Length of inner mandibular barbel	22.1	25.9
Length of outer mandibular barbel	48.7	51.7

Premaxillary tooth band rounded, of equal width throughout. Dentary tooth band much narrower than premaxillary tooth band at symphysis, tapering laterally.

Barbels in four pairs. Maxillary barbel long and slender, extending to four-fifths of distance between its base and base of pectoral spine. Nasal barbel slender, extending to posterior orbital margin. Inner mandibular-barbel origin close to midline, extending to one-quarter of distance between its base and base of pectoral spine. Outer mandibular barbel originating posterolateral of inner mandibular barbel, extending to two thirds of distance between its base and base of pectoral spine.

Dorsal fin with spinelet, spine, and 7 (2) rays. Origin of dorsal fin at point through anterior two-fifths of body. Dorsal-fin margin convex. Dorsal-fin spine moderately long, straight, and slender, with smooth anterior and posterior edges.

Pectoral fin with stout spine, sharply pointed at tip, and 8 (2) rays. Anterior spine margin smooth; posterior spine margin with 10–12 small serrations along entire length. Pectoral-fin margin straight anteriorly, convex posteriorly.

Pelvic-fin origin at vertical through posterior end of dorsal-fin base, with i,5 (2) rays and slightly convex margin; tip of appressed fin not reaching anal-fin origin. Anus and urogenital openings located at vertical through middle of appressed pelvic fin.

Adipose fin shorter than anal-fin base, with convex margin for entire length; anterior end at vertical through anterior third of anal-fin base. Anal fin with v,8,i (1) or v,10,i (1) rays and convex distal margin.

Caudal peduncle slender. Caudal fin deeply forked, with i,7,8,i (2) principal rays; upper and lower lobes pointed. Procurrent rays extend only slightly anterior to fin base.

### *Colouration*

In 70% ethanol: dorsal, lateral and ventral surfaces of head dark yellow. Dorsal surface of occipital region with numerous dense melanophores, imparting brown colour on head. Nuchal shield with dark brown patch. Dorsal midline of body with distinct dark brown band, extending from base of last dorsal-fin ray to origin of dorsal procurrent caudal rays; band interrupted at anterior and posterior insertions of adipose-fin base, but running along either side of body at middle third of adipose-fin base. Humeral region with melanophores forming semilunate mark on dorsal half of tympanum. Lateral myoseptum with faint line extending from tympanum to base of caudal peduncle, expanding to form triangular dark spot on middle of caudal peduncle base; series of faint chevron-shaped marks interspersed at regular intervals along line. Paired fins hyaline. Anal fin hyaline, base with few scattered melanophores in some individuals. Dorsal fin hyaline, with subdistal, horizontally oriented, dark brown ovoid mark on anterior half. Caudal fin with faint stripes consisting of melanophores on fin rays running through each lobe.

### *Distribution*

Known from the Brahmaputra River drainage in the vicinity of Dibrugarh (Fig. 3).

### Etymology

From the Greek *spilos*, meaning spot, and *ouros*, meaning tail, in reference to the distinct spot at the base of the caudal peduncle.

## DISCUSSION

There has been much confusion over the identity of *B. tengana*. Hamilton (1822) described *Pimelodus tengana* from Goalpara, Assam (it is often given as the Brahmaputra River following the original description, but Hora, 1949 and Ng & Kottelat, 2001 give the correct type locality, Goalpara), and described the colour as ‘... diaphanous, with a silver coloured membrane investing the viscera and spine, and with a gloss of gold at the sides. On the back are many black dots, which are collected into a spot above each pectoral fin and also on the crown of the head...’. No mention is made of the presence of any dark vertical marks, and the figure in the original description [Hamilton, 1822, Pl. 39 Fig. 58, reproduced here as Fig. 1(b)] also does not show this.

Subsequent workers (see synonymy of *B. tengana*) apparently did not examine any material identifiable as the *P. tengana* of Hamilton, merely copying their accounts from the original description. Hora & Law (1941) were the first after Hamilton to make any attempt to identify this species based on actual specimens. In their study, Hora & Law (1941) considered specimens from the Tista River drainage in northern Bengal to be conspecific with Hamilton’s (1822) *P. tengana*. Their specimens had dark vertical bars, but Hora & Law (1941) cited ontogenetic differences to explain the lack of dark vertical marks as described by Hamilton (1822). Since then, other workers (Jayaram, 1977) have followed Hora & Law (1941) in their identification of *B. tengana*. Ng & Kottelat (2001), however, showed that the material identified as *B. tengana* by Hora & Law (1941) actually consisted of four different species and restricted the name *B. tengana* for the species from the Brahmaputra River drainage. Nevertheless, Ng & Kottelat (2001) mistakenly identified a specimen of *B. batasio* from the Meghna River (a tributary of the Brahmaputra River) drainage as *B. tengana*. A comparison of the illustrations in Hora & Law [1941: Pl. 2 Fig. 1, reproduced here as Fig. 4(c)] and Hamilton (1822) show that the two species are distinctly different. Hamilton’s (1822) illustration shows a fish with a very short adipose-fin base (less than the length of the anal-fin base), while the species illustrated in Hora & Law (1941) shows a fish with a long adipose-fin base (about 1.5 times the anal-fin base). The caudal peduncle of the fish in Hamilton’s (1822) illustration is also more slender (7.5 v. 11.7%  $L_S$ ).

Material obtained during recent ichthyological surveys of north-eastern India and Nepal revealed the existence of two distinct species of *Batasio* in the Ganges-Brahmaputra drainage referable to the *B. tengana* of Hamilton (1822) and Hora & Law (1941) respectively. Since no name exists for the material that Hora & Law (1941) misidentified as *B. tengana*, it is described here as *B. fasciolatus* n. sp. Furthermore, a third species very similar to *B. tengana* was identified from the middle Brahmaputra River drainage in the vicinity of Dibrugarh; this species is also without a name and is described herein as *B. spilurus* n. sp.

Because no type material exists for species described by Hamilton (1822) (Gudger, 1924: 123; Roberts, 1998: 272) and given the confusion surrounding the

exact identity of *B. tengana*, the most prudent course of action would be to designate a neotype for this species. This is further supported by the existence of a second morphologically similar species in the Brahmaputra River drainage (*B. spilurus* n. sp.) and the fact that the distributions of both *B. tengana* and *B. spilurus* n. sp. are poorly known: Hamilton's (1822) type locality for *B. tengana* (Goalpara) lies between the known distributions of *B. tengana* and *B. spilurus* n. sp. There is lack of adequate information at present as to whether or not the two species are sympatric, and it is not possible to definitively conclude which of the two species (*B. tengana* or *B. spilurus* n. sp.) Hamilton (1822) was referring to from his description and illustration. Therefore, in accordance with the qualifying conditions in Article 75.3 of the International Code for Zoological Nomenclature, a neotype is designated for *Pimelodus tengana* Hamilton, 1822. The neotype (UMMZ 244796, 43.4 mm  $L_S$ ) was collected from the Tista River at Tista barrage (26°45'10" N; 88°34'11" E) by H. H. Ng, J. Dignall, A. Rao & A. Vuorela on 15 April 2004. This represents the closest locality to Goalpara [Hamilton's (1822) original locality of *B. tengana*] for the material examined in this study.

The differences in eye diameter between *B. fasciolatus* n. sp. and *B. tigrinus* and *B. fasciolatus* n. sp. and *B. tengana* are not solely due to ontogeny. Plots of eye diameter and  $L_S$  show that the regression lines are significantly different between *B. fasciolatus* n. sp. and *B. tengana* [ANCOVA,  $P < 0.001$ ; Fig. 6(a)] and *B. fasciolatus* n. sp. and *B. tigrinus* [ANCOVA,  $P < 0.001$ ; Fig. 6(b)]. Since only one specimen of *B. merianensis* was examined, it was not possible to plot the regression line for this species. *Batasio tengana*, *B. pakistanicus* and *B. spilurus* n. sp. differ considerably in external morphology from other congeners in having much shorter adipose fins (less than the length of the anal-fin base v. at least 1.5 times the length of the anal-fin base); this difference has given reason to suspect that they are not congeneric with other *Batasio* species (Ng & Kottelat, 2001). A very short adipose-fin base is also seen in *Rama chandramara* (Hamilton, 1822), which Mo (1991) considers to be congeneric with *Batasio*. The adipose fin in *Rama*, however, is much smaller than in any species of *Batasio* and oar-like (a character independently shared with *Neotropius* and schilbeids), and the genus is further diagnosed by the presence of a prominent anterolateral process of the pelvic girdle (absent in all *Batasio* species), and fewer vertebrae (32–34 v. at least 35). *Batasio tengana*, *B. fasciolatus* n. sp. and *B. spilurus* n. sp. share with all other *Batasio* species the elevated vertebral number (37–39), and the lack of both an oar-like adipose fin and a prominent anterolateral process of the pelvic girdle and are therefore considered congeneric. In addition, *B. tengana*, *B. spilurus* n. sp. and *B. fasciolatus* n. sp. share with *Rama* and other *Batasio* the presence of a broad lamina on the ventral edge of the dentary, enlarged sensory pores on the head, and a transversely elongate entopterygoid. No material of *B. pakistanicus* was available for examination, but the enlarged sensory pores of the head and the overall morphology as illustrated in Mirza & Jan (1989) strongly suggest its inclusion in *Batasio*. The problem of the generic identities of the species discussed above cannot be adequately resolved without more material (particularly of *B. pakistanicus* and *B. spilurus*), and is beyond the scope of this study (as previously mentioned, *B. tengana*, *B. fasciolatus*, *B. pakistanicus* and *B. spilurus* are tentatively considered congeneric with other *Batasio* species).

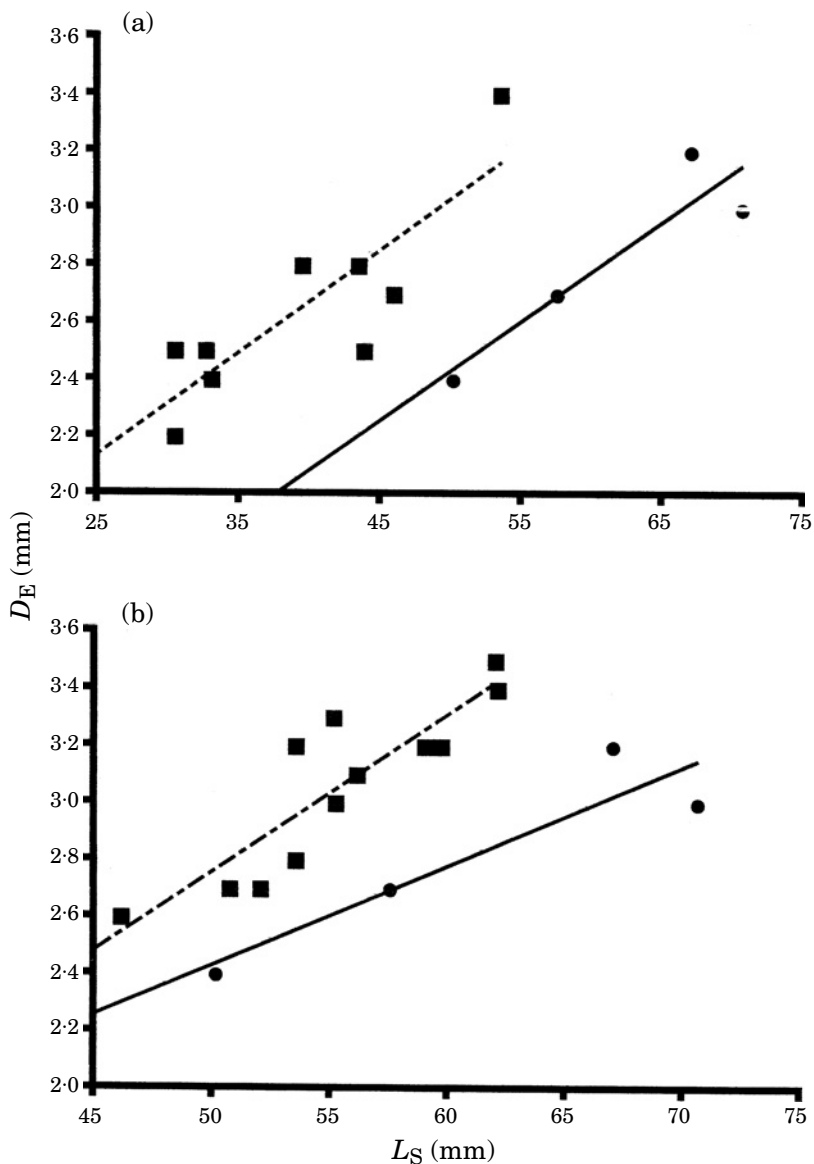


FIG. 6. Scatterplot of eye diameter ( $D_E$ ) and standard length for (a) *Batasio fasciolatus* n. sp. (—●—) and *Batasio tengana* (---■---) and (b) *Batasio fasciolatus* n. sp. (—●—) and *Batasio tigrinus* (---■---). The curves were fitted by:  $y = 0.0348x + 0.6937$  ( $r^2 = 0.8515$ ) (*B. fasciolatus* n.),  $y = 0.0359x + 1.239$  ( $r^2 = 0.718$ ) (*B. tengana*) and  $y = 0.0552x + 0.0003$  ( $r^2 = 0.7788$ ) (*B. tigrinus*).

#### Comparative material

*Batasio affinis*: ZSI F7880/1, holotype, 67.3 mm  $L_S$ ; Myanmar: Sittang River. CMK 17782 (4), 53.8–70.7 mm  $L_S$ ; Myanmar: Kayin state, stream 'Chon Son' between Kyondaw and Phadaw, c. 20 km NW of Payathouzu, 15°25' N; 98°15' E.

*Batasio batasio*: CAS-SU 34847 (3), 58.2–69.0 mm  $L_S$ ; India: West Bengal, Mahananda River at Siliguri. UMMZ 209009 (1), 54.8 mm  $L_S$ ; Bangladesh: Chittagong, Koilla Khal (creek), 9.7 km E of Feni-Chittagong highway on road to Ramgarh, 22°55' N; 91°36' E. ZRC 40570 (10), 53.4–67.8 mm  $L_S$ ; India: Assam, Dibrugarh.

*Batasio dayi*: BMNH 1893.1.16.8 (1 syntype), 56.2 mm  $L_S$ ; Myanmar: Mitan Chaung, a rivulet flowing S from the summit of Mulayet Taung (16°11' N; 98°32' E). NRM 39942 (2), 68.6–70.7 mm  $L_S$ ; NRM 39981 (2), 55.1–67.0 mm  $L_S$ ; NRM 40711 (2), 56.3–56.7 mm  $L_S$ ; Myanmar: Kachin State, Myitkyina market. ZRC 46108 (3), 70.3–82.7 mm  $L_S$ ; Myanmar: Kachin State, Myitkyina market.

*Batasio havmolleri*: USNM 90304, holotype, 38.0 mm  $L_S$ ; Thailand: Klong Thalern near Ban Rong Phibun. USNM 90305 (two paratypes), 37.5–40.7 mm  $L_S$ ; Thailand: Klong Thalerng. ANSP 59338 (holotype of *Mystus stigmaturus*), 59.0 mm  $L_S$ ; ANSP 59339–59341 (three paratypes of *M. stigmaturus*), 53.0–57.1 mm  $L_S$ ; Thailand: Nakhon Sritammarat. ZRC 41973 (1), 70.5 mm  $L_S$ ; Thailand: Ranong province, King Amphoe Suk Sam Lan, Ton Koi waterfall. ZRC 43757 (4), 25.8–64.7 mm  $L_S$ ; Thailand: Narathiwat province, Tuk Khao Budo-Sungai Padee National Park. ZRC 392 (5), 46.5–71.1 mm  $L_S$ ; Malaysia: Terengganu, Sungai Tok Dor, 18.5 km S of Jerteh. ZRC 2401 (3), 51.6–64.5 mm  $L_S$ ; Malaysia: Perak: Chenderoh Lake.

*Batasio elongatus*: NRM 40748, holotype, 75.6 mm  $L_S$ ; Myanmar: Rakhine state, Baw Di Chaung drainage, Baw Di Chaung at Baw Di bridge, 32 km from Gwa on road to Ngathaingchaung, 17°34'15" N; 94°43'47" E. NRM 40832 (15 paratypes), 45.0–67.6 mm  $L_S$ ; Myanmar: Rakhine state, Kananmae Chaung, near Leldee village, by foot 45 min from Gwechaung village, at km 18 on Thandwe-Taungkok road, 18° 35' 39" N; 94°22'45" E.

*Batasio macronotus*: KU 34546, holotype, 85.6 mm  $L_S$ ; KU 29104 (2 paratypes), 86.4–89.0 mm  $L_S$ ; Nepal: Saptari/Sunsari, Kosi River drainage, purchased at Kosi barrage, 26°31'30" N; 86°56'00" E. OSUS 15968 (two paratypes), 59.5–60.8 mm  $L_S$ ; Nepal: Saptari/Sunsari, Kosi River drainage, purchased in market at Itanari.

*Batasio merianiensis*: ZSI F7781/1, holotype, 65.7 mm  $L_S$ ; India: Assam, pond at Meriani junction.

*Batasio pakistanicus*: Not directly observed in this study; data from Mirza & Jan (1989).

*Batasio sharavatiensis*: Not directly observed in this study; data from Bhatt & Jayaram (2004).

*Batasio tigrinus*: ZRC 40624, holotype, 62.1 mm  $L_S$ ; CMK 14431 (two paratypes), 49.5–52.8 mm  $L_S$ ; ZRC 40623 (one paratype), 62.0 mm  $L_S$ ; CAS 213312 (one paratype), 59.0 mm  $L_S$ ; Thailand: Kanchanaburi province, Mae Nam Kwae Noi drainage, Huai Lia, km 49 on road from Thon Pha Phun to Sangkhla Buri, 15°4'25" N; 98°33'51" E. CMK 14533 (nine paratypes), 42.9–59.7 mm  $L_S$ ; Thailand: Kanchanaburi province, Mae Nam Kwae Noi drainage, Huai Khayeng at Ban Huai Khayeng, 14°35'14" N; 98°34'56" E. CMK 14541 (one paratype), 56.1 mm  $L_S$ ; Thailand: Kanchanaburi province, Mae Nam Kwae Noi drainage, Nam Khung upstream of Ban Huai Pak Khung, 14°38'44" N; 98°31'23" E.



*Batasio travancoria*: ZSI 13449/1, holotype, 73.6 mm  $L_S$ ; India: Kerala, from the foot of the largest falls of Perutenaruri, a tributary of the Pamba River at Edakadathy. ZSI 13452/1 (one paratype), India: Tamil Nadu, Palode, Chittar River. CMK 10028 (5), 85.1–101.0 mm  $L_S$ ; India: Kerala, Panamkulam, c. 26 km from Chalakudy on Chalakudy–Valparai road.

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