A review of the genus Batasio (Teleostei: Bagridae) in Indochina, with the description of B. tigrinus sp. n. from Thailand

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A review of the genus Batasio (Teleostei: Bagridae) in Indochina, with the description of B. tigrinus sp. n. from Thailand. – Catfishes of the genus Batasio occurring in the Mae Khlong, Sittang and Salween basins and in the Malay Peninsula are reviewed. Four species are recognised, B. affinis, B. dayi, B. havmoller (all previously considered synonyms of B. tengana) and B. tigrinus, new species. Notes on the identity of all other nominal species of Batasio are provided.

Key-words: Batasio - Bagridae - taxonomy - Indochina.

INTRODUCTION

Species of the South and Southeast Asian catfish genus Batasio Blyth, 1860 are small to medium-sized bagrid catfishes with laterally compressed body found in moderate to fast-flowing streams. They possess the following synapomorphies: presence of large sensory pores on the head, a narrow mental region, presence of a pair of prominent posterior processes on the anterior part of the vomer, the entopterygoid transversely elongated and bar-like, the ectopterygoid absent and the metapterygoid in close contact with the quadrate but free from the hyomandibular (Mo, 1991).

To date, only four species of Batasio are regarded as valid, viz. B. batasio (Hamilton, 1822), B. tengana (Hamilton, 1822), B. travancoria Hora & Law, 1941, and B. pakistanicus Mirza & Jan, 1989. Pimelodus chandramara Hamilton, 1822 (with P. rama Hamilton, 1822 as a subjective junior synonym), previously considered to belong to a distinct genus, Rama Bleeker, 1858 (with Chandramara Jayaram, 1972 as a subjective junior synonym; Talwar & Jhingran, 1991) has been considered a species of Batasio by Mo (1991). Because of the very distinct differences that separate Rama chandramara from Batasio species, such as the short adipose-fin base (vs. moderately long adipose-fin base in Batasio; 10.2–13.5 % SL vs. 22.2–34.3) and

Manuscript accepted 02.02.2001
visible (vs. not visible) orbital margin when the head is viewed ventrally, we consider *Rama* to be a distinct genus from *Batasio* pending a more detailed study. The only taxonomic study of *Batasio* to date was conducted by Hora & Law (1941), who synonymised the following nominal species with *B. tengana*: *B. affinis* Blyth, 1860 (with *Macrones blythii* Day, 1877 as an unnecessary replacement name). *Leiocassis flaviatilis* Day, 1888, *Macrones dayi* Vinciguerra 1890, *Macrones meriantiensis* Chaudhuri, 1913, and *Mystus havmolleri* Smith, 1931. *Mystus stigmaturus* Fowler, 1934, has also been considered a synonym of *B. tengana* (see Kottelat, 1989) by recent workers. While examining specimens of *Batasio* from Indochina (definition here follows that of Kottelat, 1990), it became apparent that this material, previously identified as *B. tengana*, consists of four species. This paper reviews the taxonomy of the Indochinese species of *Batasio* and provides diagnoses for these four species, one of which is described as new. Notes on the identity of the other Indian and Burmese nominal species are also provided.

**MATERIAL AND METHODS**

Measurements were made point to point with dial callipers and data recorded to tenths of a millimetre. Counts and measurements were made on the left side of specimens whenever possible. Subunits of the head are presented as proportions of head length (HL). Head length itself and measurements of body parts are given as proportions of standard length (SL). Measurements follow those of Ng & Kottelat (1998) and numbers in parentheses following a particular count are the numbers of examined specimens with that count.

Drawings of the specimens were made with a Nikon SMZ–10 microscopic camera lucida. The specimens examined for the present study are in Academy of Natural Sciences, Philadelphia (ANSP), Natural History Museum, London (BMNH), California Academy of Sciences (CAS), the collection of the second author (CMK), Muséum d’histoire naturelle, Genève (MHNG), Museum of Zoology, University of Michigan, Ann Arbor (UMMZ), National Museum of Natural History, Smithsonian Institution, Washington (USNM), Zoological Reference Collection, National University of Singapore (ZRC) and Zoological Survey of India, Calcutta (ZSI).

**KEY TO THE INDOCHINESE SPECIES OF BATASIO**

1. Adult colour pattern consisting of four dark brown vertical bars on body: one on head passing through eye, second running obliquely anterior to dorsal fin, third at anterior third of adipose fin and last on posterior extremity of caudal peduncle .......................... *B. tigrinus* sp. n.
   - Adult colour pattern consisting of a dark brown predorsal oblique bar; dark brown spot on side of body below adipose fin and bar on head passing through eye present or absent ............................... 2

2. No dark brown spot on side of body below adipose fin; snout long (41.0–44.6 % HL); distal four–fifths of dorsal fin dark brown, with a narrow hyaline distal margin ................................. *B. dayi*
Fig. 1

Batasio affinis, after photograph of a specimen collected from Tenasserim River (drawing by Kelvin K. P. Lim).

(1860) original description of B. affinis is part of a paper reporting fishes obtained "chiefly from the Sitang River and its tributary streams, Tenasserim Provinces". The introduction further says that the paper deals with "fluviatile species, mostly collected by the late Major Berdmore in the Sitang river and its tributaries, with a few notices of new or little known species from the Gangetic streams and their outlets". We are not convinced that this statement allows to interpret that all species reported from "Tenasserim" by Blyth are ipso facto from the Sitang basin. Blyth explicitly gives the locality as Sitang for a few species (Ambassis notatus, A. lala, p. 138; Toxotes microlepis, p. 142; Mastacembelus unicolor, M. zebrinus, p. 144, etc.), therefore we feel that those not recorded as originating from the Sitang should be retained as from "Tenasserim". We are not aware of recent collections from the Sitang basin which could demonstrate that all the "Tenasserim" species described by Blyth effectively are from the Sitang. Collections by the second author and others in the Salween basin in Thailand (especially the Mae Nam Moei drainage) have yielded a number of species identified as conspecific with Blyth's species. This especially applies to many small size species known to inhabit hill streams and likely to have restricted distribution ranges (as evidenced by the distribution of their congeners in adjacent basins). If these identifications are correct, we expect that the range of some of these species may extend across the Salween to the Sitang basin, but we do not expect that this would be the case for all. Therefore, we hypothesize that part or all of Blyth's "Tenasserim" specimens are from or south of the Salween basin. Nominal species described by Blyth from Tenasserim freshwaters and (possibly) with small ranges are: Glyptothorax trilineatus, Exostoma berdmorei, Siluricthys [sic] berdmorei [Pterocryptis berdmorei], Barbus caudimarginatus [Puntius caudimarginatus], Prosteacanthus spectabilis [Acantopsis spectabilis], Cobitis cincticauda [Schistura cincticauda], Homoloptera [sic] bilineata [Homaloptera bilineata]. Batasio affinis is not recorded from the Salween basin in Thailand (pers. obs.; Ukkatawewat & Vidthayanon, 1998); the specimen from Tenasserim River basin mentioned above and the syntypes of Leiocassis fluviatilis are the only specimen we are aware of since its original description.

**DESCRIPTIONS**

*Batasio affinis* Blyth, 1860


*Macrones affinis* Günther, 1864: 83; Day, 1873: 111.


*Macrones blythii* Day 1889: 151.


**Material examined.** ZSI F7880/1, holotype, 67.3 mm SL; Myanmar: "Sitang River, Tenasserim"; Berdmore, date unknown. We have also examined a photograph (deposited in the library of ZRC) of a specimen (of unknown size) collected by T. Roberts in March 1992 in the Tenasserim River basin (the current disposition of the specimen is unknown).

**Diagnosis.** *Batasio affinis* can be differentiated from all other congeners in having a unique combination of the following characters: a colour pattern consisting of a greyish brown body with a dark brown predorsal oblique bar and a dark brown spot on the side of the body below the adipose fin, dark brown band on distal half of dorsal fin, dorsal-spine length 14.0 % SL, body depth at anus 18.0 % SL, snout length 36.0 % HL, eye diameter 24.4 % HL, interorbital distance 31.7 % HL. Fin ray counts: dorsal I,6; pectoral I,8; pelvic i,5; anal iv,8; caudal 7/8. See Key and Discussion for further comparison with *B. havmollerii*.

**Distribution.** *Batasio affinis* is known only from the Tenasserim River basin and "Tenasserim Provinces" in southern Myanmar (Fig. 2). Note that the "Tenasserim Provinces" in Blyth’s (1860) original description is much larger than today’s Tanintharyi (Tenasserim) state of Myanmar. Blyth’s "Tenasserim Provinces" also seems to have included parts of the present Myanmar states of Kayah, Kayin (Karen), Mon and part of Bago (Pegu) (Fang & Kottelat, 1999).

**Remarks.** While Blyth’s recorded the origin of the holotype of *B. affinis* simply as “Tenasserim”, Menon & Yazdani (1968: 126) record the locality of the holotype as “Sittang R., Tenasserim”. These are also the data on the label, which obviously is not the original Blyth’s label. Hora & Law (1941) mention only Tenasserim. Blyth’s
(1860) original description of B. affinis is part of a paper reporting fishes obtained "chiefly from the Sitang River and its tributary streams, Tenasserim Provinces". The introduction further says that the paper deals with "fluvial species, mostly collected by the late Major Berdmore in the Sitang river and its tributaries, with a few notices of new or little known species from the Gangetic streams and their outlets". We are not convinced that this statement allows to interpret that all species reported from "Tenasserim" by Blyth are ipso facto from the Sitang basin. Blyth explicitly gives the locality as Sitang for a few species (Ambassis notatus, A. lala, p. 138; Toxotes microlepis, p. 142; Mastacembelus unicolor, M. zebrinus, p. 144, etc.), therefore we feel that those not recorded as originating from the Sitang should be retained as from "Tenasserim". We are not aware of recent collections from the Sitang basin which could demonstrate that all the "Tenasserim" species described by Blyth effectively are from the Sitang. Collections by the second author and others in the Salween basin in Thailand (especially the Mae Nam Moei drainage) have yielded a number of species identified as conspecific with Blyth’s species. This especially applies to many small size species known to inhabit hill streams and likely to have restricted distribution ranges (as evidenced by the distribution of their congeners in adjacent basins). If these identifications are correct, we expect that the range of some of these species may extend across the Salween to the Sitang basin, but we do not expect that this would be the case for all. Therefore, we hypothesize that part or all of Blyth’s "Tenasserim" specimens are from or south of the Salween basin. Nominal species described by Blyth from Tenasserim freshwaters and (possibly) with small ranges are: Glyptothorax trilineatus, Exostoma berdmorei, Silurichthys [sic] berdmorei [Pterocryptis berdmorei], Barbus caudimarginatus [Puntius caudimarginatus], Prosteacanthus spectabilis [Acanthopsis spectabilis], Cobitis cincticauda [Schistura cincticauda], Homaloptera [sic] bilineata [Homaloptera bilineata]. Batasio affinis is not recorded from the Salween basin in Thailand (pers. obs.; Ukkatakawat & Vidthayanon, 1998); the specimen from Tenasserim River basin mentioned above and the syntypes of Leiocassis fluvialitis are the only specimen we are aware of since its original description.
Leiocassis fluviatilis Day (1888: 805) has been treated as a synonym of B. tengana by Hora & Law (1941). Its syntypes are apparently lost (Whitehead & Talwar, 1976; Eschmeyer, 1998). The original description of L. fluviatilis is brief and not very informative. The colour pattern given in the original description ("yellowish horny" and "a large black blotch on the lateral line above the anal fin, another between the pectoral and the first dorsal") could refer to B. affinis, B. havmolleri or B. merianiensis (although the tip of the caudal lobes are described as being black, a character not seen in any of the three species). We tentatively consider L. fluviatilis to be a junior synonym of B. affinis because the two nominal species are found in the same general area (Tenasserim) and as far as is known, there appears to be only a single species of Batasio in this area. The type locality is also in Tenasserim: "Anin stream, near Weywoon, Wagroo" On the maps available to us (1:250,000, Series 1501S, Sheet ND 47-2, Royal Thai Survey Department, 2516 [1973]), this locality appears as Wewun [15°41'N 97°48'E]. The Anin Chaung is a small stream entering the Andaman Sea at 15°36'N 97°44'E, with its headwaters about 20 km NW in the mountain range which constitutes the southern boundary of the Ataran, the southern-most branch of the Salween.

Batasio affinis was placed in Macrones by Day (1875: 445), who considered it as a junior secondary homonym of Bagrus affinis Jerdon (1849: 338), a species which he placed in the synonymy of M. vittatus (p. 448). Day proposed M. blythii as a replacement name. But, under art. 57.3.1 of the International Code of Zoological Nomenclature, Batasio affinis and Bagrus affinis are not secondary homonyms as they have not been brought in combination with the same generic name [the key criterion is the combination of the generic and specific names and, to our knowledge, Bagrus affinis has never been used as Macrones affinis], and therefore Macrones blythii is an unnecessary replacement name. That the two nominal species were then considered congeneric is not relevant to the argument [art. 59.1 does not apply as it explicitly concerns secondary homonyms which have already been shown homonyms under art. 57.3.1]. And even if the two names were treated as secondary homonyms, then it seems that under art. 59.3 B. affinis cannot be rejected since the substitute name [M. blythii] is not in use. The Code does not define "in use". We are only aware of a single usage of the name as a valid species-group name, as Mystus blythii, in Menon & Yazdani's (1968: 125) ZSI type catalogue.

Batasio dayi (Vinciguerra, 1890) Fig. 3

Macrones dayi Vinciguerra, 1890: 230, pi. 7 fig. 3 (type locality: Myanmar: Meetan).

Macrones (Macronoides) dayi: Hora, 1921: 179

Aoria (Macronoides) dayi: Prashad & Mukerji, 1929: 180; Mukerji, 1933: 818.


Material examined. BMNH 1893.2.16.8, 1 ex., syntype, 56.2 mm SL; Myanmar: Meetan (=Mitan Chaung, a rivulet flowing south from the summit of Mulayet Taung, 16°H'N 98°32'E). - ZRC 46108, 3 ex., 62.6-82.7 mm SL; Myanmar: Kachin State, Myitkyina market; C. J. Ferraris, Tun Shwe & Mya Than Tun, 4-8 Nov 1997.

Diagnosis. Batasio dayi can be differentiated from all other congeners in having a unique combination of the following characters: colour pattern of body

Fig. 2
Map showing distribution of Indochinese Batasio species. Open symbols indicate type localities. Type locality of B. affinis not indicated due to imprecise information (see text).
Leiocassis fluviatilis Day (1888: 805) has been treated as a synonym of B. tengana by Hora & Law (1941). Its syntypes are apparently lost (Whitehead & Talwar, 1976; Eschmeyer, 1998). The original description of L. fluviatilis is brief and not very informative. The color pattern given in the original description (“yellowish horny” and “a large black blotch on the lateral line above the anal fin, another between the pectoral and the first dorsal”) could refer to B. affinis, B. havmolleri or B. merianitensis (although the tip of the caudal lobes are described as being black, a character not seen in any of the three species). We tentatively consider L. fluviatilis to be a junior synonym of B. affinis because the two nominal species are found in the same general area (Tenasserim) and as far as is known, there appears to be only a single species of Batasio in this area. The type locality is also in Tenasserim: “Anin stream, near Weywoon, Wagroo” On the maps available to us (1:250,000, Series 1501S, Sheet ND 47-2, Royal Thai Survey Department, 2516 [1973]), this locality appears as Wewun [15°41′N 97°48′E]. The Anin Chaung is a small stream entering the Andaman Sea at 15°36′N 97°44′E, with its headwaters about 20 km NW in the mountain range which constitutes the southern boundary of the Ataran, the southernmost branch of the Salween.

Batasio affinis was placed in Macrones by Day (1875: 445), who considered it as a junior secondary homonym of Bagrus affinis Jerdon (1849: 338), a species which he placed in the synonymy of M. vitatus (p. 448). Day proposed M. blythii as a replacement name. But, under art. 57.3.1 of the International Code of Zoological Nomenclature, Batasio affinis and Bagrus affinis are not secondary homonyms as they have not been brought in combination with the same generic name [the key criterion is the combination of the generic and specific names and, to our knowledge, Bagrus affinis has never been used as Macrones affinis], and therefore Macrones blythii is an unnecessary replacement name. That the two nominal species were then considered congeneric is not relevant to the argument [art. 59.1 does not apply as it explicitly concerns secondary homonyms which have already been shown homonyms under art. 57.3.1]. And even if the two names were treated as secondary homonyms, then it seems that under art. 59.3 B. affinis cannot be rejected since the substitute name [M. blythii] is not in use. The Code does not define “in use”. We are only aware of a single usage of the name as a valid species-group name, as Mystus blythii, in Menon & Yazdani’s (1968: 125) ZSI type catalogue.

Batasio dayi (Vinciguerra, 1890) Fig. 3


Material examined. BMNH 1893.2.16.8, 1 ex., syntype, 56.2 mm SL; Myanmar: Meetan (=Mitao Chaung, a rivulet flowing south from the summit of Mulayet Taung, 16°11′N 98°32′E). - ZRC 46108, 3 ex., 62.6-82.7 mm SL; Myanmar: Kachin State, Myitkyina market; C. J. Ferraris, Tun Shwe & Mya Than Tun, 4-8 Nov 1997.

Diagnosis. Batasio dayi can be differentiated from all other congeners in having a unique combination of the following characters: colour pattern of body...
consisting only in a dark brown oblique predorsal bar, distal four-fifths of the dorsal fin dark brown with a narrow hyaline distal margin, body depth at anus 19.2–20.5 % SL, snout length 41.0–44.6 % HL, interorbital distance 22.2–25.8 % HL. Fin ray counts: dorsal I,7; pectoral I,8; pelvic i,5; anal iv,8; caudal 8/9.

**Distribution.** *Batasio dayi* is known from the Salween and Irrawaddy River drainages in Myanmar (Fig. 2).

*Batasio havmolleri* (Smith, 1931)  
Figs 4, 5  
_Mystus havmolleri* Smith, 1931: 24, fig. 12 (type locality: Thailand: Klong Thalereng near Ban Ron Phibun).  
*Mystus havmolleri* Smith, 1945: 389, fig. 86; Geisler et al., 1979: 686.  

**Material examined.** ZRC 41973, 1 ex., 70.5 mm SL; Thailand: Ranong Province, King Amphoe Suk Sam Lan, Ton Koi waterfall; D. C. J. Yeo et al., 11 August 1997. – ZRC 42188, 2 ex., 23.2–47.7 mm SL; Thailand: Ranong Province, stream N of Khuraburi, 100 km S of Ranong; M. Kottelat et al., 5 November 1995. – ZRC 42204, 3 ex., 39.1–53.1 mm SL; CMK 12153, 3 ex., 34.6–72.2 mm SL; Thailand: Ranong Province, Khlong Kho Krue at Ban Kho Krue, km 3.5 on road to Nam Tok Kho Krue, branching E 3 km S of Kraburi on road to Ranong; M. Kottelat et al., 6 November 1995. – CMK 5384, 1 ex., 43.7 mm SL; Thailand: Ranong Prov.: stream on road from Ranong to Kra Buri, km 37; M. Kottelat & A. Kottelat-Kloeitzli, 24 April 1985. – USNM 90304, 1 ex., holotype, 38.0 mm SL; Thailand: Klong Thalereng near Ban Ron Phibun, coll. unknown, January 1927. – USNM 90305, 2 ex., paratypes, 37.5–40.7 mm SL; Thailand: Klong Thalereng; H. M. Smith, January 1927. – ANSP 59338, 1 ex., 59.0 mm SL (holotype of *M. stigmatus*); ANSP 59339–59341, 3 ex., 53.0–57.1 mm SL (paratypes of *M. stigmatus*); Thailand: Nakhon Sritammarat; R. M. de Schauensee, 6 May 1933. – ANSP 59342, 4 ex., 48.3–59.0; Thailand: Nakhon Sritammarat; R. M. de Schauensee, 21 May 1933. – CMK 5177, 3 ex., 55.1–60.0 mm SL; Thailand: Surat Thani Prov.: Khlong Sok at Ban Khlong Sok, Tapi River basin; S. Lumlertdaecha et al., 4 April 1985. – MHNG 21588.49, 29 ex., 33.8–71.2 mm SL; Thailand: Phangnga Prov.: Lam Pi, north of Phuket; R. Geisler, April 1975. – ANSP 77435, 1 ex., 62.7 mm SL; Thailand: waterfall at Trang, a 40 foot-fall of the Trang River at Chong, 12 miles E of Thap Thian or Trang; R. M. de Schauensee collectors, 13 October 1936. – CMK 12116, 1 ex., 42.0 mm SL; Thailand: Satun Prov.: stream in Ban Kong Krat; 6°52′4″N 100°01′48″E; M. Kottelat et al., 4 November 1995. – ZRC 43757, 4 ex., 25.8–64.7 mm SL; Thailand: Narathiwat Province, Bacho, Bhudo Padee National Park; H. H. Tan et al., 24 October 1998. – ZRC 392, 5 ex., 46.5–71.1 mm SL; Malaysia: Terengganu, Sungai Tok Dor, 11.5 miles S of Jerteh; E. R. Alfred, 5 July 1958. – ZRC 2401, 3 ex., 51.6–64.5 mm SL; Malaysia: Perak, Chenderoh Lake; collector unknown, 1938. – ZRC 39533, 2 ex., 31.4–35.3 mm SL; Malaysia: Perak; tributary of Sungai Kulim 11 km before Gerik; H. H. Tan et al., 19 November 1995. – ZRC 41062, 2 ex., 11.5–13.0 mm SL; Malaysia: Perak, Sungai Kenderong at Gerik (5°25′28.5″N 101°7′39.0″E); H. H. Ng et al., 17 February 1997. – ZRC 41076, 12 ex., 13.2–21.7 mm SL; Malaysia: Perak, Sungai Lebey, ca. 16 km from Gerik on Gerik–Kota Bharu road (5°27′33.3″N 101°13′26.9″E); H. H. Ng et al., 17 February 1997. – ZRC 41090, 2 ex., 15.9–22.0 mm SL; Malaysia: Kedah, Caruk Bukit Sebelah, a small rocky stream ca. 2 km before Baling on Gerik–Sungai Petani road (5°40′54.8″N 100°56′33.8″E); H. H. Ng et al., 18 February 1997.

**Diagnosis.** *Batasio havmolleri* can be differentiated from all other congeners in having a unique combination of the following characters: body with a dark brown predorsal oblique bar and a dark brown spot on the side below the adipose fin, dorsal-
FIG. 3
Batasio dayi, ZRC 46108, 82.7 mm SL (photograph by Tan Heok Hui).

FIG. 4
Batasio havmoller, CMK 5177, 55.1 mm SL (photograph by M. Kottelat).
Notes on Biology. Batasio havmolleri is found in rivers and streams with moderate to swift current and a predominantly rocky bottom, less frequently in slow flowing streams with a muddy substrate. The fish hide among stones or submerged vegetation during the day and come out at night to feed.

Remarks. The colour pattern of B. havmolleri changes with age. Newly hatched fish (ca. 3 mm) are unpigmented, but at ca. 6 mm SL, they begin to develop a colour pattern consisting of two vertical dark bars: one on the head passing through the eye and another on the dorsum just below the rudimentary dorsal fin (Kottelat & Wirtz, 1983). By the time they develop into juveniles of about 10-25 mm SL, the number of dark brown bars increases to four: one on the head passing vertically through the eye, the second running obliquely anterior to the dorsal fin, the third vertically at the anterior third of the adipose fin and the last one vertically on the posterior extremity of the caudal peduncle (Fig. 5a). The first and last bars, as well as the dorsal and ventral thirds of the third bar gradually fade with age (the bars begin to fade when the specimen is ca. 40 mm SL; Fig. 5b), leaving behind a dark brown spot below the anterior third of the adipose fin (Fig. 5c).

This ontogenetic change in coloration was noted by Smith (1945) and explains the difference in coloration between the types of Mysius havmolleri and M. stigmaturus (the types of the former species are smaller than those of the latter and represent the juvenile coloration).

Batasio tigrinus sp. n. Fig. 6


Holotype. ZRC 40624, 62.1 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Lia, km 49 on road from Thon Pha Phun to Sangkhla Buri (15°4'25"N 98°33'51"E); H. H. Tan & H. H. Ng, 28 July 1999.

Paratypes. CMK 14431, 2 ex., 49.5-52.8 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Lia, km 49 on road from Thon Pha Phun to Sangkhla Buri (15°4'25"N 98°33'51"E); K. Kubota, April 1998. - CMK 14533, 9 ex., 42.9-59.7 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Khayeng (Huai Pak) at Ban Huai Khayeng (14°35' 14"N 98°34-56"E); M. Kottelat & K. Kubota, 3 April 1998. - CMK 14541, 1 ex., 56.1 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Nam Khung upstream of Ban Huai Pak Khung (14°38'44"N 98°31'23"E); M. Kottelat & K. Kubota, 3 April 1998. - ZRC 40623. 1 ex., 62.0 mm SL; CAS 213312, 1 ex., 59.0 mm SL; data as for holotype.

Diagnosis. Batasio tigrinus can be differentiated from all other congeners in having fewer vertebrae (35-37 vs. 38 — 41 ) and a unique adult colour pattern consisting of four vertical dark brown bars on a greyish brown head and body (vs. with predorsal bar and posterior spots, mottled coloration, or horizontal midlateral stripes). It can be further differentiated from its congeners in having a unique combination of the following characters: length of adipose-fin base 23.9-26.7 % SL, pectoral-spine length 10.3-12.9 % SL, dorsal-spine length 9.4-12.5 % SL, body depth at anus 18.7–21.1 % SL, snout length 38.3–41.5 % HL, eye diameter 18.2–23.5 % HL, interorbital distance 25.9–28.6 % HL. Fin ray counts: dorsal 1,7; pectoral 1,8 or 1,8,i; pelvic 1,5; anal iv,8, iv,9 or v,9; caudal 8/9. See Key and Discussion for further comparison with B. affinis and B. tigrinus.

Distribution. Batasio havmolleri is known from the Malay Peninsula, south of the isthmus of Kra. It extends to the south as far as the Perak River basin on the west coast and the Terengganu River basin on the east coast. At present, it is known to extend to the north as far as the Tapi River basin on the east coast and the area of Ranong along the west coast (Fig. 2). Its distribution range may actually be more extensive towards the north but this area has not been surveyed on the Myanmar side (western slope) and very poorly on the Thai side (eastern slope). The southern end of the Malay Peninsula has been more surveyed and the presence of the species much further south is not expected.

Fig. 5
Schematic illustration showing ontogenetic change in colour pattern of Batasio havmolleri: a. ZRC 43757, 25.8 mm SL; b. ZRC 43757, 38.5 mm SL; c. ZRC 43757, 57.4 mm SL (drawing by Kelvin K. P. Lim).
Notes on Biology. *Batasio havmollerii* is found in rivers and streams with moderate to swift current and a predominantly rocky bottom, less frequently in slow flowing streams with a muddy substrate. The fish hide among stones or submerged vegetation during the day and come out at night to feed.

**Remarks.** The colour pattern of *B. havmollerii* changes with age. Newly hatched fish (ca. 3 mm) are unpigmented, but at ca. 6 mm SL, they begin to develop a colour pattern consisting of two vertical dark bars: one on the head passing through the eye and another on the dorsum just below the rudimentary dorsal fin (Kottelat & Wirtz, 1983). By the time they develop into juveniles of about 10–25 mm SL, the number of dark brown bars increases to four: one on the head passing vertically through the eye, the second running obliquely anterior to the dorsal fin, the third vertically at the anterior third of the adipose fin and the last one vertically on the posterior extremity of the caudal peduncle (Fig. 5a). The first and last bars, as well as the dorsal and ventral thirds of the third bar gradually fade with age (the bars begin to fade when the specimen is ca. 40 mm SL; Fig. 5b), leaving behind a dark brown spot below the anterior third of the adipose fin (Fig. 5c).

This ontogenetic change in coloration was noted by Smith (1945) and explains the difference in coloration between the types of *Mystus havmollerii* and *M. stigmaturus* (the types of the former species are smaller than those of the latter and represent the juvenile coloration).

**Batasio tigrinus** sp. n.  


**Holotype.** ZRC 40624, 62.1 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Lia, km 49 on road from Thon Pha Phun to Sangkhla Buri (15°4′25″N 98°33′51″E); H. H. Tan & H. H. Ng, 28 July 1999.

**Paratypes.** CMK 14431, 2 ex., 49.5–52.8 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Lia, km 49 on road from Thon Pha Phun to Sangkhla Buri (15°4′25″N 98°33′51″E); K. Kubota, April 1998. – CMK 14533, 9 ex., 42.9–59.7 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Huai Khayeng (Huai Pak) at Ban Huai Khayeng (14°35′14″N 98°34′56″E); M. Kottelat & K. Kubota, 3 April 1998. – CMK 14541, 1 ex., 56.1 mm SL; Thailand: Kanchanaburi Province, Mae Nam Khwae Noi basin, Nam Khung upstream of Ban Huai Pak Khung (14°38′44″N 98°31′23″E); M. Kottelat & K. Kubota, 3 April 1998. – ZRC 40623, 1 ex., 62.0 mm SL; CAS 213312, 1 ex., 59.0 mm SL; data as for holotype.

**Diagnosis.** *Batasio tigrinus* can be differentiated from all other congeners in having fewer vertebrae (35–37 vs. 38–41) and a unique adult colour pattern consisting of four vertical dark brown bars on a greyish brown head and body (vs. with predorsal bar and posterior spots, mottled coloration, or horizontal midlateral stripes). It can be further differentiated from its congeners in having a unique combination of the following characters: length of adipose-fin base 23.9–26.7 % SL, pectoral–spine length 10.3–12.9 % SL, dorsal–spine length 9.4–12.5 % SL, body depth at anus 18.4–20.8 % SL, snout length 31.9–36.9 % HL, and interorbital distance 29.3–31.9 % HL. See Key and Discussion for further comparison with *B. havmollerii*.

**Description.** Head and body laterally compressed. Dorsal profile rising evenly but not steeply from tip of snout to origin of dorsal fin, then sloping gently ventrally.
from there to end of caudal peduncle. Ventral profile horizontal to origin of anal, then sloping dorsally to end of caudal peduncle. In % SL (n = 12): head length 24.2-26.7, head width 13.9-15.5, head depth 16.3-19.5, predorsal distance 36.2-38.9, preanal length 65.6-69.7, prepelvic length 47.1-50.9, prepectoral length 21.3-24.1, body depth at anus 18.4-20.8, length of caudal peduncle 16.1-19.0, depth of caudal peduncle 10.1-11.8, pectoral-fin length 16.9-19.1, pectoral-spine length 10.3-12.9, length of dorsal-fin base 14.2-16.7, dorsal-spine length 9.4-12.5, pelvic-fin length 13.2-15.3, length of anal-fin base 13.3-16.1, caudal-fin length 20.0-26.5, length of adipose-fin base 23.9-26.7, dorsal to adipose distance 7.3-9.2; in % HL: snout length 31.9-36.9, interorbital distance 29.3-31.9, eye diameter 20.3-24.8, nasal barbel length 20.0-29.8, maxillary barbel length 42.6-58.9, inner mandibular barbel length 13.3-16.7, outer mandibular barbel length 20.0-28.2. Branchiostegal rays 6(10). Gill rakers 3+5(1) or 3+6 (1). Vertebrae 18+17=35 (1), 18+18=36 (4) or 18+19=37 (9). Fin ray counts: dorsal 1,7 (10), pectoral 1,8 (8) or I,8,i (2), pelvic i,5 (10), anal iv,9 (7), or v,8 (3), caudal 8/9 (10). Dorsal origin nearer tip of snout than caudal flexure. Pectoral spine stout, with 6 (1), 7 (5), 8 (3) or 10 (1) large serrae on posterior edge. Anal origin slightly posterior to adipose origin. Depressed dorsal not reaching adipose fin. Caudal fin forked.

Colour. In 70% ethanol: body and head brownish-grey with four vertical dark brown bars: one on head passing through eye, second running obliquely anterior to dorsal fin, third at anterior third of adipose fin and last on posterior extremity of caudal peduncle. Dorsal fin hyaline, with a subdistal, horizontal dark brown elliptical mark on anterior half. Other fins with dusky rays and hyaline membranes.

In life, body and head yellowish grey to dark grey, with patterning from blackish to black. Oblique bar from dorsal origin followed by an adjacent, pale yellowish bar more or less of same width.

Distribution. Batasio tigrinus is presently known only from the Mae Nam Khwae Noi basin (part of the Mae Khlong basin) in western Thailand (Fig. 2).

Etymology. From the Latin tigrinus, meaning of tigers, in reference to the striped coloration of this species. An adjective.

DISCUSSION
In the only taxonomic study of Batasio to date, Hora & Law (1941) recognised B. tengana as the only valid species with a colour pattern of dark vertical stripes or blotches, invoking great intraspecific differences in the coloration and in the length and position of the adipose fin to explain the variation they observed among their samples. In fish taxonomy papers of that time, decisions often had to be based on a few samples and/or very few specimens, often (by present and our personal standards) poorly preserved as a result of the logistical problems and difficult technical conditions of field work at that time. Re-examination of many cases of such 'highly variable' widely distributed species previously known from a few disparate individuals has shown that, in fact, many are aggregates of distinct, often not even closely related, species (e.g. Ng, 1999a: 1999b; Kottelat & Ng, 1999). Hora & Law had access to only 18 specimens for their study; 10 from Bengal, 4 from Assam, 1

Fig. 6
Batroso tigrinus, paratype, CMK 14431, 52.8 mm SL (photograph by M. Kottelat).

Fig. 7
Batroso tengana, UMMZ 209009, 54.8 mm SL, left side, reversed (photograph by Tan Heok Hui).

Fin ray counts: dorsal I,7 (10), pectoral I,8 (8) or I,8,i (2), pelvic i,5 (10), anal iv,9 (7), or v,8 (3), caudal 8/9 (10). Dorsal origin nearer tip of snout than caudal flexure. Pectoral spine stout, with 6 (1), 7 (5), 8 (3) or 10 (1) large serrae on posterior edge. Anal origin slightly posterior to adipose origin. Depressed dorsal not reaching adipose fin. Caudal fin forked.

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Batasio affinis was described from the “Tenasserim Provinces” (see above) in southern Myanmar (Burma). The species was described as having a distinct predorsal vertical bar, and “posterior to this first band are obscure traces of three or four others, the last at the base of the tail” (Blyth, 1860). We have examined a photograph of a specimen from the Tenasserim River basin (see Material examined) and which we identify as B. affinis. The colour pattern of this specimen is very similar to that of adult B. havmolleri, except that the dark brown mark on the dorsal fin is larger in B. affinis (covering most of the distal half of the fin, except for a hyaline distal margin vs. the distal one-third [in most specimens, this mark is less extensive that on the one in Figure 4]). This photograph shows the larger eye (ca. 26% HL) and shorter snout (ca. 37% HL) which we consider characteristic of B. affinis (see below), although the colour pattern differs somewhat from that of the original description, which may possibly be explained by ontogenetic changes in the colour pattern [in some specimens of B. havmolleri and, we hypothesize in B. affinis as well, the pale bands between the darker marks on the body and caudal peduncle appear darker medially; this probably explains the “three or four” other bars mentioned by Blyth]; the holotype does not retain any colour pattern. Therefore, we do not consider B. affinis and B. havmolleri conspecific. The two species also differ in the single examined B. affinis having a longer dorsal spine (ca. 14% SL on the photograph; 14.0% SL vs. 10.7-12.4), shorter snout (36.0 % HL vs. 38.3-41.5), larger eyes (24.4 % HL vs. 18.2-23.5) set further apart (31.7 % HL vs. 25.9-28.6), and a more anterior pelvic-fin origin (in front of base of last dorsal-fin ray vs. below or slightly behind).

Batasio merianiensis (from Assam in Northeast India) also has a colour pattern similar to those of B. affinis and B. havmolleri. We have examined the holotype, but no additional material was available. We consider it to be a distinct species differentiated from both B. affinis and B. havmolleri in having a shorter adipose-fin base (22.2 % SL vs. 34.3 in B. affinis and 30.0-33.3 in B. havmolleri). It further differs from B. havmolleri in having larger eyes (25.9 % HL vs. 18.2-23.5).

Batasio tigrinus can be differentiated from B. affinis, B. dayi and B. havmolleri in having an adult colour pattern of four dark brown vertical bars (only B. havmolleri specimens of less than 40 mm SL have such a colour pattern). It can be further differentiated from B. havmolleri in having a shorter pectoral spine (10.3-12.9 % SL vs. 13.3-15.3), adipose-fin base (23.9-26.7 % SL vs. 30.0-33.3), and snout (31.9-36.9 % HL vs. 36.9-41.5), more widely-set eyes (interorbital distance 29.3-31.9 % HL vs. 23.2-26.3), and fewer vertebrae (35-37 vs. 38^10).

Both B. batasio and B. travancoria can be differentiated from all their congeners in having a combination of a slender body (body depth at anus 14.7-17.2 % SL vs. 18.0-22.5) and a colour pattern consisting of a dark brown midlateral stripe. The midlateral stripe in B. batasio is expanded to form an elliptical dark brown spot immediately below the dorsal-fin base (absent in B. travancoria) while that of B. travancoria is expanded at the posterior edge of the caudal peduncle to form a triangular dark brown mark (absent in B. batasio). Furthermore, B. batasio has a greyish brown coloured body with a mottled pattern of faint brown patches while B. travancoria has a uniformly-coloured dark brown body. Batasio batasio further
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Both B. batasio and B. travancoria can be differentiated from all their congeners in having a combination of a slender body (body depth at anus 14.7–17.2 % SL vs. 18.0–22.5) and a colour pattern consisting of a dark brown midlateral stripe. The midlateral stripe in B. batasio is expanded to form an elliptical dark brown spot immediately below the dorsal-fin base (absent in B. travancoria) while that of B. travancoria is expanded at the posterior edge of the caudal peduncle to form a triangular dark brown mark (absent in B. batasio). Furthermore, B. batasio has a greyish brown coloured body with a mottled pattern of faint brown patches while B. travancoria has a uniformly-coloured dark brown body. Batasio batasio further
differs from its congeners in having a long snout (43.9–46.2 % HL vs. 31.9–41.5) and \( B. \) \textit{travancoria} further differs from its congeners in having a flatter head (head depth 14.8–15.5 % SL vs. 16.3–21.2).

\textit{Batasio pakistaniicus} was described from the Indus River basin by Mirza & Jan (1989). The original description is rather uninformative, and we are unable to verify the accuracy of the figure provided. Based on the original description and figure, we are not able to determine if \( B. \) \textit{pakistaniicus} belongs to \textit{Batasio} or \textit{Rama}. If we consider \( B. \) \textit{pakistaniicus} to belong in the former genus, the colour pattern (a black humeral spot with a dark streak on the dorsum) clearly differentiates it from all other congeners (including the Indocheinese species discussed here).

**COMPARATIVE MATERIAL**

\textit{Batasio batasio}: ZRC 40570, 10 ex., 53.4–67.8 mm SL; India: Assam, Dibrugarh.

\textit{Batasio merianiensis}: ZSI F 7781/1, 1 ex., holotype, 65.7 mm SL; India: NE Assam, Meriani junction.

\textit{Batasio tengana}: UMMZ 209009, 1 ex., 54.8 mm SL; Bangladesh: Chittagong, Koilla Khal (creek), 6 miles E of Feni–Chittagong highway on road to Ramgarh (22°55’N 91°36’E).

\textit{Batasio travancoria}: ZSI 13449/1, 1 ex., holotype, 73.6 mm SL; India: Travancore, from the foot of the largest falls of Peruntenaru, a tributary of the Pamba River at Edakkadathy.

– ZSI 13452/1, 1 ex., 58.1 mm SL; India: Travancore, Palode, Chittar River. – CMK 10028, 5 ex., 85.1–101.0 mm SL; India: Kerala, Panamkulam, ca. 26 km from Chalakudy on Chalakudy–Valparai road.

**ACKNOWLEDGMENTS**

The authors thank the following for permission to examine material under their care: William Saul (ANSP), Darrell Siebert (BMNH), Sonia Fisch-Muller, Claude Weber (MHNG), Douglas Nelson (UMMZ), Lynne Parenti (USNM), Peter K. L. Ng (ZRC) and A. K. Karmakar (ZSI). We thank Katsuma Kubota and his staff for obtaining some of the material and for assistance in the field, Kelvin K. P. Lim for preparing figures 1 and 5 and Tan Heok Hui for figures 3 and 7. The first author is grateful to Somsak Panha (Chulalongkorn University) for facilitating field work in Thailand. This study was partially supported by the National University of Singapore research grant R-154-000-062-112.

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[https://doi.org/10.5962/bhl.part.80159](https://doi.org/10.5962/bhl.part.80159).

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