

## *Barbucca heokhui*, a new species of loach from central Borneo (Teleostei: Barbuccidae)

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**Abstract.** *Barbucca heokhui*, new species, is described from the Kahayan drainage in central Borneo. It is distinguished from the other species of the genus by its miniature size (the largest known specimen is 21.5 mm SL), a truncate to rounded caudal fin, an incomplete lateral line, and a distinctive colour pattern made, among others, of five pairs of irregular bars on the flank, narrower than interspaces, many of which may be dissociated into several small blotches. It occurs in syntopy with *B. diabolica*. Sexual dimorphism is reported for the first time for a member of the family; in males, the 2nd to 4th branched pectoral rays are thicker than the others and with a patch of small tubercles along their posterior edge.

**Key words.** Cobitoidei, loach, miniature fish, sexual dimorphism, black water, peat swamp forest

### INTRODUCTION

The loach family Barbuccidae includes a single genus, *Barbucca* (Roberts, 1989; Kottelat, 2012). *Barbucca diabolica* was first discovered in the Kapuas drainage in Borneo by Roberts in 1976, who described it in 1989. This sole species of *Barbucca* was later reported from other areas on Borneo (in Kahayan and Mahakam drainages in Indonesia, and in Sarawak), on Sumatra (Batang Hari and Musi drainages), and the Malay Peninsula in Malaysia and Thailand (Narathiwat) (Kottelat et al., 1993; Ng, 1993; Kottelat, 1995, 2012 and pers. obs.; Kottelat & Widjanarti, 2005; Tan & Kottelat, 2009; Tan H. H., pers. comm.). Populations of *Barbucca* have since been observed in southeastern Thailand, Cambodia, and Vietnam (Bui, 2011; Panitvong, 2022; pers. obs.). Because of their small size, patchy distribution, low density, and uncommon presence in collections, their actual diversity has not yet been addressed. Specimens from Phu Quoc Island (Vietnam) have been described as *B. elongata* (Vasil'eva & Vasil'ev, 2013).

*Barbucca* was originally placed in the family Cobitidae by Roberts (1989) but its relationships were not clear. Later authors have placed it in Cobitidae (Nemacheilinae) (Bănărescu & Nalbant, 1995), Balitoridae (Nemacheilinae) (Kottelat, 1990: 19, Kottelat et al., 1993: 51; Kottelat & Lim, 1996: 235; Kottelat & Widjanarti, 2005: 156; Šlechtová et

al., 2007; Vasil'eva & Vasil'ev, 2013) or Nemacheilidae (Rainboth et al., 2012: 68), but all with reservation. Faced with the impossibility to assign it to any of these families, Kottelat (2012, 2013) placed it in its own family, which is also compatible with the molecular phylogeny of Šlechtová et al. (2007).

The most important external characters distinguishing Barbuccidae from the other families of loaches (Cobitoidea) are in the structure of the mouth (Fig. 1). The upper lip is fleshy, smooth, with or without a median notch. The lower lip is continuous with the upper lip, fleshy, interrupted medially, with a thick, fleshy barbel-like projection along its posterior edge, near the lateral corner. The skin of the chin between the median extremities of the lower lip forming a fleshy, triangular lobe, with a soft, thin, compressed projection orientated perpendicular to the body. Two pairs of rostral barbels, and one pair of maxillary barbels are present. All barbels have rings of densely set small projections (taste buds?). The tip of the lower jaw is exposed. To these characters can now be added the sexually dimorphic modification of the branched pectoral-fin rays 2 to 4 (thicker, bent and with patches of small tubercles in males; see below).

The gasbladder and its bony capsule are also distinctive, although not easily used for identification because observation requires dissection. In Barbuccidae, the 'manubrium' is missing, the two capsules are posteriorly separate and the duct is exposed.

Barbuccidae are further distinguished by having a short, compact, body with a barred colour pattern. The head is small, with a blunt snout and large, oval eyes that are orientated dorso-laterally. The anterior nostril is at the tip of a short tube; the posterior nostril is in contact with the base of the tube and adjacent to the orbit of the eye. The

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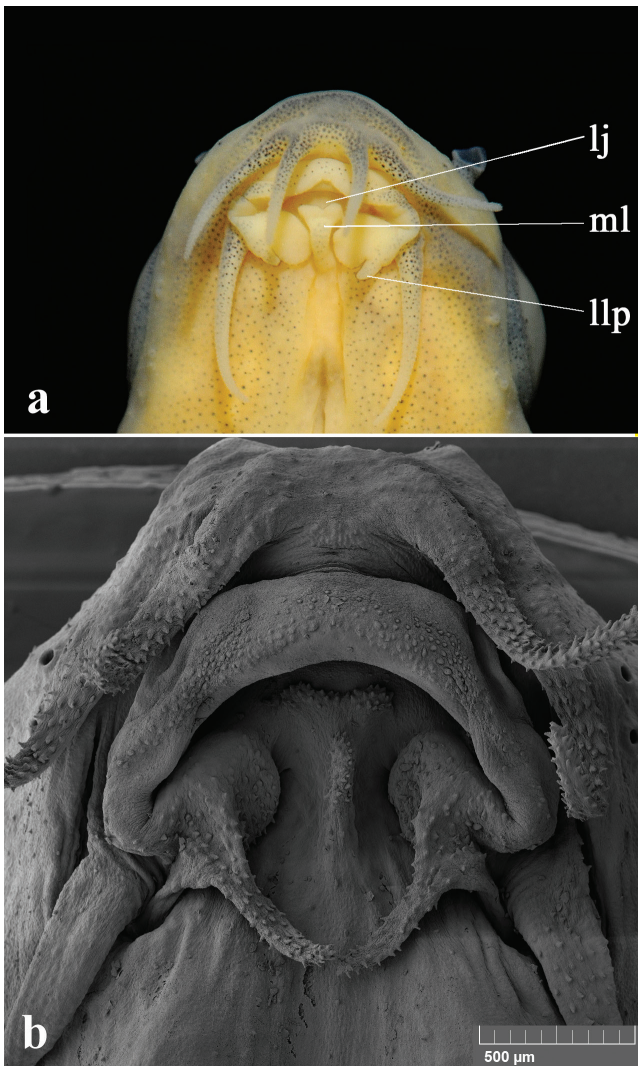


Fig. 1. *Barbuca diabolica*; mouth. a, ZRC 47747, 29.0 mm SL; b, TCWC 20886.01, approx. 28 mm SL. lj, lower jaw; llp, barbel-like projection of lower lip; ml, median lobe. (Photographs by Tan H. H. [a, retouched by author], and K. W. Conway [b]).

caudal fin is emarginate to rounded. The origin of the dorsal fin is slightly in advance of the origin of the pelvic fin. The pectoral and pelvic fins are directed laterally, each with a single unbranched ray. In *B. diabolica*, large tubercles are arranged irregularly on the posterior lower half of the flank, especially above the anal fin and caudal peduncle.

This article aims to describe an additional, conspicuously different and miniature species of *Barbuca* from the Kahayan drainage, Borneo.

## MATERIAL AND METHODS

Measurements and counts follow Kottelat (1990) and Kottelat & Freyhof (2007). Head length is the lateral head length of Kottelat (1990). The last dorsal and anal-fin ray articulating on the same pterygiophore as the preceding ray is noted as “½”. Vertebrae counts follow Roberts (1989: 22). The small size of the specimens and poor fixation

renders the collection of morphometric data difficult and would damage the limited number of specimens available; for most features, measurement could be obtained with reasonable accuracy only from 2 specimens. Frequency of meristic values are indicated in parentheses, if more than one value is observed; asterisks indicate the condition for the holotype. Discussion of *B. diabolica* is mainly based on the population from Central Kalimantan that occur in syntopy with the new species. Abbreviations used: CMK, collection of the author; LKCNHM and ZRC, Lee Kong Chian Natural History Museum, Singapore; MZB, Museum Zoologicum Bogoriense, Cibinong, Indonesia; and TCWC, Collection of Fishes, Biodiversity Research and Teaching Collections, Texas A&M University, College Station, USA.

### *Barbuca heokhuii*, new species

(Figs. 2–5)

**Holotype.** MZB 17246, 21.5 mm SL; Indonesia: Kalimantan Tengah: aquarium fish trade, reportedly from Danau Tahai, Sungai Rungan system, Kahayan drainage; 2°01'45"S 113°46'49"E; M. Kottelat & Tan H. H., 4 March 2008.

**Paratypes.** MZB 17247, 2; ZRC 66766, 2; 16.2–17.8 mm SL; Indonesia: Borneo: Kalimantan Tengah: Kota Palangka Raya: Tahai, junction of Sungai Tahai with Danau Tahai, 2°01.465'S 113°46.624'E, 18 m asl; Tan H. H., R. Hadiaty & D. Wowor, 21 August 2009. — CMK 29183, 1, 14.4 mm SL; Indonesia: Kalimantan Tengah: Kahayan drainage: Sungai Rungan system: Sungai Planta, stream draining to Sungai Rungan; 2°02'01"S 113°47'06"E; M. Kottelat & Tan H. H., 5 March 2008. — ZRC 65913, 3, 15.9–18.1 mm SL; Indonesia: Kalimantan Tengah: Kahayan drainage: Sungai Rungan; H. Tommy, 24 June 2017.

**Diagnosis.** *Barbuca heokhuii* is distinguished from the other named species of *Barbuca* by having: a smaller adult size (the largest known specimen is 21.5 mm SL, vs. 37.2 in *B. diabolica* and 34.3 in *B. elongata*), a deeper body (depth at dorsal-fin origin 17–21 % SL, vs. 14–18 in *B. diabolica* and *B. elongata*); a truncate to rounded caudal fin (vs. emarginated); the lateral line incomplete, reaching to below posterior half of dorsal fin (vs. complete); absence of large tubercles on head and body (vs. presence on posterior part of flank, between above the tip of the pelvic fins and the base of the caudal fin); anus about halfway between pelvic-fin base and anal-fin origin (vs. about ½ to ⅔ of distance between them); and a colour pattern made of five pairs of irregular bars on the flank, narrower than interspaces, of which the anterior one or two pairs may be dissociated into several small blotches; the posterior 3 pairs meet their contralaterals on the back; the anterior two pairs end dorsally into two conspicuous blotches not meeting their contralaterals (vs. 6 broad dark brown bars much wider than interspaces, or 5–6 pairs of broad bars wider than interspaces, and continuous with their contralaterals on the back in *B. diabolica* and *B. elongata*); the dorsal fin with two blackish longitudinal stripes (vs. one or none); the caudal fin hyaline (vs. with one or two vertical rows of blackish spots).

Table 1. Morphometric data of holotype and five paratypes of *Barbus heokhui*. Ranges and means include holotype data.

	MZB 17246	ZRC 66767 (1), 65913 (3), CMK 29183 (1)	
	holotype	paratypes	
		range	mean
Standard length (mm)	21.5	14.4–21.5	
Total length (mm)	28.1	18.4–28.1	
<b>In percent of standard length</b>			
Total length	131	128–133	
Head length	27	27–29	
Predorsal length	48	46–51	
Prepelvic length	50	50–53	
Pre-anus length	66	64–71	
Pre-anal length	74	74–85	
Head depth	16	14–18	
Body depth at dorsal-fin origin	18	17–21	
Depth of caudal peduncle	13	13–15	
Length of caudal peduncle	13	12–14	
Head width	18	17–19	
Body width at dorsal-fin origin	13	11–14	
Snout length	10	10–13	
Eye diameter	8	8–10	
Interorbital width	8	8–10	
Length of dorsal fin	26	26–30	
Length of caudal fin	29	23–32	
Length of anal fin	20	17–20	
Length of pelvic fin	23	22–25	
Length of pectoral fin	20	20–25	
<b>In percent of head length</b>			
Snout length	37	36–45	
Eye diameter	30	28–35	
Interorbital width	29	26–36	

**Description.** See Figs. 2–5 for general appearance and Table 1 for morphometric data of holotype and 5 paratypes. A moderately deep-bodied loach with body depth increasing up to slightly in front of dorsal-fin origin, gradually decreasing along base of dorsal fin. Behind dorsal fin, body depth almost uniform until caudal-fin base. Ventral profile straight. Head as deep as wide; body rounded to slightly compressed anteriorly, gradually more compressed backwards until caudal-fin base. Interorbital area convex. In lateral view, eye slightly below or flush with dorsal profile of head. Snout steeply rounded, blunt, about triangular in dorsal view. Depth of caudal peduncle 0.8–1.0 times in its length, uniform. Largest recorded size 21.5 mm SL.

Dorsal fin with 4 unbranched and 7½ (2) or 8 (7\*) branched rays; distal margin almost straight or slightly concave anteriorly. First or second branched ray longest. Pectoral fin with 1 unbranched and 8 (2) or 9 (7\*) branched rays, rounded, almost reaching pelvic-fin base. No axillary pectoral lobe. Pelvic fin with 1 unbranched and 6 (9) branched rays; rounded; reaching anus, reaching at least ¾ of distance between pelvic-fin base and anal-fin origin; origin below base of branched dorsal-fin rays 2 to 3; no axillary lobe.

Anus between pelvic fins, about one eye diameter in front of anal-fin origin. Anal fin with 3 unbranched and 4½ (7) branched rays; distal margin slightly convex. Caudal fin with 8+7 (1) or 8+8 (6\*) branched rays (dorsal and ventral procurent rays cannot be counted); rounded. Vertebrae in holotype: predorsal 8, precaudal 19, caudal 10, total 29; pelvic-fin origin under 13th vertebra (under 3rd branched dorsal-fin ray).

Body entirely covered by scales. Scales embedded (impossible to count with accuracy in posterior half of body), about 45 on midlateral row. Lateral line incomplete, reaching below dorsal-fin base, with about 19–24 pores (difficult to count with accuracy). No tubercles on head and body.

Anterior nare at tip of a short tube, with a pointed tip at posterior margin. Posterior nare adjacent to anterior one, and adjacent to anterior edge of orbit. Mouth arched, gape about 3 times wider than long. Lips smooth. Upper lip thick, with median notch. Processus dentiformis present. Lower lip interrupted medially, with a broad barbel-like projection along its posterior edge, near lateral corner. Skin of chin between median extremities of lower lip forming a narrow lobe, with



Fig. 2. *Barbucca heokhuii*; Borneo, Kalimantan Tengah: Kahayan drainage; a, MZB 17246, holotype, 21.5 mm SL; b, CMK 29183, paratype, 14.4 mm SL. (Photographs by Tan H. H.).

a soft, thin, compressed projection orientated perpendicular to body. Tip of lower jaw not exposed, anterior part of lower lip covered by upper lip. Inner rostral barbel reaching about corner of mouth; outer one reaching about below anterior of eye. Maxillary barbel reaching beyond middle of eye. All barbels covered by densely set distinct small projections (as in *B. diabolica*, Fig. 1b).

**Sexual dimorphism.** The 14.4 and 16.2 mm SL paratype (the two smallest) have pectoral-fin branched rays 2 and 3 thicker and darker than the other rays, with small patches of tiny tubercles, which is assumed to be a male character (see Discussion below). In females, all rays have a similar width.

**Colouration.** After 2 weeks in formalin. Head and body background colour pale reddish grey; throat, belly and lower part of head paler. Except otherwise noted, all marks on body are dark brown. Most of exposed part of each scale with a dark spot; on caudal peduncle, scales between last two bars without or with only few pigments.

F flank pattern highly variable, but with some or all of the following elements. A dark bar at posterior extremity of caudal peduncle, anterior edge dark brown, posterior edge blackish. On flank, five pairs of irregular shaped bars, anterior one immediately behind head, usually incomplete, dissociated into variously shaped spots (see Fig. 2b for specimen with most complete pattern); 2nd pair in front of dorsal-fin origin; 3rd pair below anterior half of dorsal-fin base; 4th pair between posterior extremity of dorsal-fin base and anus; 5th pair above anal-fin base. These 5 pairs of bars maybe complete or not, separated on whole depth of flank, or only in part. Two posterior pairs most commonly merged on the back and continuous with their contralaterals. Second and 3rd pairs commonly fused above lateral line, but separate and narrower below, and thinner or missing at level of lateral line. Fused upper extremity of pair under dorsal fin continuous over the back with their contralateral. Fused upper extremity of 2 anterior pairs not continuous with their contralaterals over the back. One small spot slightly above lateral line between pairs of bars. A blackish spot below anterior extremity of lateral line. Space between 5th bar and bar at caudal-fin base without conspicuously paler background because of absence of dots on scales.



Fig. 3. *Barbucca heokhuii*, ZRC 66766, 16.2 mm SL; Borneo, Kalimantan Tengah: Kahayan drainage. (Photographs by Tan H. H.).

Head with a brown band between eyes and a brown blotch dorsally behind each eye. In dorsal view, blotches behind eyes and blotches at upper extremity of the two anterior pairs of bars, appearing as two parallel rows of three blotches each. A short blackish bar on opercles, two blackish bands across cheek below eye, and one between eye and tip of snout.

Dorsal fin with a black longitudinal band close to base, continuous with anterior bar of 4th pair; a blackish spot

at base of branched rays 2–4, continuous with 3rd pair of bars; a row of black spots made of pigments on branched rays at branching point. Anal fin with a black longitudinal band close to base, continuous with posterior bar of 5th pair. Pectoral fin with blackish spot at base and black pigments on proximal extremity of dorsal surface of branched rays 2–5. Pelvic fin with blackish spot at anterior extremity of base and a row of black dots at branching point of branched rays. Caudal fin hyaline.



Fig. 4. *Barbucca heokhuii*, ZRC 66766, 17.8 mm SL; Borneo, Kalimantan Tengah: Kahayan drainage. (Photographs by Tan H. H.).

In life: as in preserved specimens, but overall colouration reddish brown.

**Distribution and habitat.** *Barbucca heokhuii* is currently known only from the Rungan watershed, near its confluence with Kahayan, in Kalimantan Tengah, Borneo. It was collected in peat substrate at the bottom of a slow flowing blackwater stream. *Barbucca heokhuii* was collected together with *B. diabolica*; though both were from different microhabitats. In the low water season (August 2009), *B. heokhuii* was collected only from the base of a tree on the riverbank, against a submerged thick rootmat wall. *Barbucca diabolica*,

which was more abundant, was collected mainly from submerged tree trunks and from fallen trees.

**Etymology.** Named for Tan Heok Hui (LKCNHM) in appreciation for his work on Southeast Asian fishes, and especially fishes of peat swamp forests and loaches of Borneo, and for the long lasting friendship, collaboration and companionship in the field.

**Sexual dimorphism and presence of tubercles in *Barbucca*.** Sexual dimorphism has not been reported before in *Barbucca*. It is described here for *B. diabolica*. Males have the

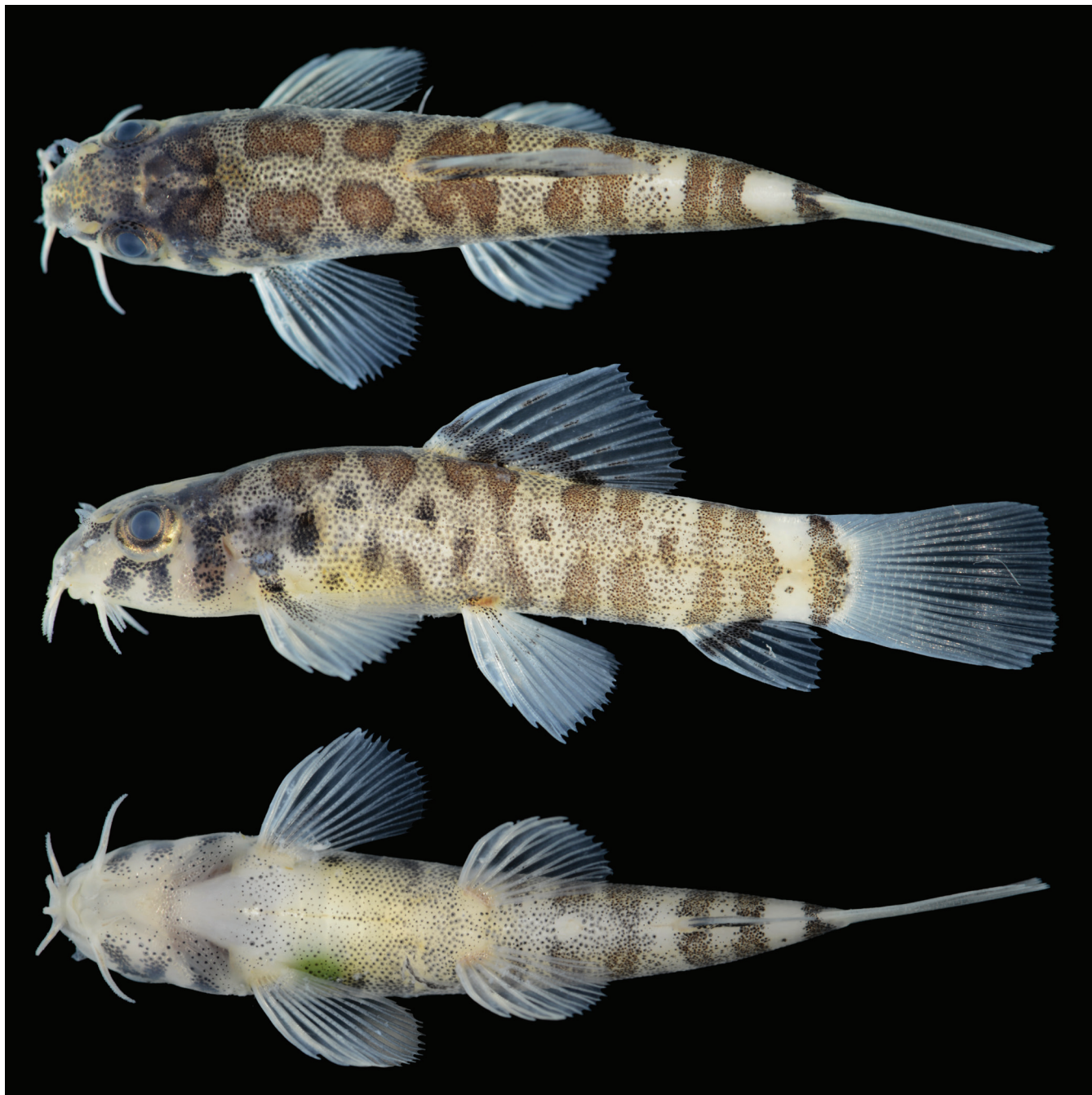


Fig. 5. *Barbucca heokhuii*, ZRC 65913, 18.1 mm SL; Borneo, Kalimantan Tengah: Kahayan drainage. (Photographs by Tan H. H.).

branched pectoral-fin rays 2–4 thicker than the preceding and succeeding ones, and each has an elongated patch of tiny tubercles on its posterior edge (Fig. 6b). With increasing SL, the patches become larger and darker and also begin to develop on branched rays 1, and 3–5. These tubercles are missing in females. Further, in most males, the branches of branched rays 2 and 3 are shorter and very close, with narrow or no membranes between them (Fig. 6b). The rays have a downward bend at the branching point (Fig. 6c), resulting in an arched fin (convex side directed upwards). In some specimens, apparently larger females, the 2nd branched ray has a row of about 3 to 6 distinct pointed tubercles along the dorsal midline. These tubercles are conspicuously larger than those in the patches in males, about same size as those on the gill cover in both sexes.

There is variation in the length of the branches and in the extent of the patches of tubercles between populations, but not enough mature males were available for a meaningful comparison. In *B. heokhuii*, the 14.4 and 16.2 mm SL paratypes have thicker pectoral rays 2 and 3, and small patches of tiny tubercles, smaller than those of *B. diabolica*. The enlarged rays suggest that the specimens are adult or nearly so.

Both sexes of *B. diabolica* have tubercles on the head and body. On the head, there is a row of 3–5 tubercles along the posterior edge of the operculum, and smaller ones on the rest of the head sparsely set (Fig. 7a). They are only present in the largest individuals. There are a few very large white tubercles in the lower half of the posterior part of the

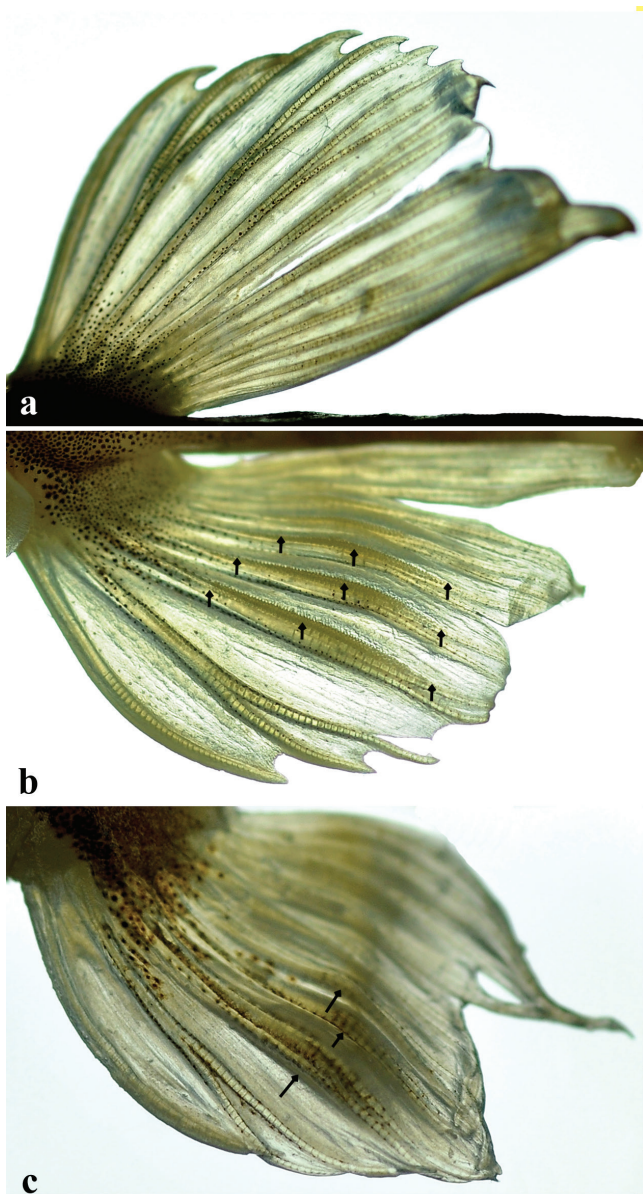


Fig. 6. *Barbuca diabolica*, CMK 20365; a, 36.4 mm SL, female, right pectoral fin, dorsal view; b, CMK 20365, 32.3 mm SL, male, left pectoral fin, dorsal view; (c) CMK 20342, 24.8 mm SL, male, left pectoral fin, anterodorsal view. Arrows show extent of patches of tubercles in (b) and position of downward bend at branching point in (c).

body, from above the anus to until above the anal fin. These tubercles are about the size of a scale, and are present in both sexes from the size of about 15 mm SL. In one specimen (CMK 20365, 33.3 mm SL) there are no large tubercles, but numerous small pointed tubercles, which are missing in the other specimens from same lot. There are no tubercles in the available specimens of *B. heokhuii*.

## DISCUSSION

Several species may be confused under the name *Barbuca diabolica* (see below). This remains to be investigated and is beyond the scope of the present paper. Meanwhile, for the sake of the present discussion, the comparison refers to

the population of the Rungan River, where it is syntopic with *B. heokhuii*.

The largest known specimen of *B. heokhuii* is 21.5 mm SL and a specimen of 14.4 mm SL, considered to be a male, has already developed sexual dimorphisms. This suggests that the species does not grow much larger and, using the criteria of Weitzman & Vari (1988), it qualifies as a miniature species and is added to the list of miniature freshwater fishes from South and Southeast Asia compiled by Kottelat & Vidthayanon (1993) over 30 years ago now, and certainly in need of an update. Numerous additional miniature species have been described from this region in the course of the last three decades (e.g., Britz & Kottelat, 2002, 2008, 2010; Kullander & Britz, 2002; Britz, 2003, 2009; Kottelat et al., 2006; Roberts, 2007; Britz et al., 2009, 2012, 2021, 2022; Conway & Kottelat, 2011, 2023; Conway et al., 2011; Ou et al., 2011; Anoop et al., 2019; Parenti et al., 2023). A great number of the miniature fishes on Sundaland have stenotopic requirements and are found only or mainly in peat swamp forests and blackwaters, have very small distribution ranges, and are threatened by deforestation, plantations and extensive agriculture. Besides *B. heokhuii*, these include (list not exhaustive): *Paedocypris* (3 named and several unnamed species; Kottelat et al., 2006; Britz & Kottelat, 2008; Britz & Conway, 2009); *Fangfangia spinicleithralis* (Britz et al., 2012); *Sundadanio* (8 named species; Conway et al., 2011); *Boraras* (3 of the named species; Kottelat, 1991a; Conway & Kottelat, 2011); *Kottelatlimia* (1 of the named species and several unnamed species are miniature; Kottelat & Lim, 1992); *Neohomaloptera johorensis* (Roberts, 1989); *Phenacostethus* (apparently several unnamed species; pers. obs.); *Bihunichthys* (1 named and several unnamed species; Kottelat & Lim, 1994; Britz & Kottelat, 2003); and *Parosphromenus* (about 5 of the named species are miniature; Kottelat, 1991b; Kottelat & Ng, 2005).

Superficially, the modified male pectoral fin of *Barbuca* species has analogous similarities with what is observed in members of several genera of Nemacheilidae (*Physoschistura*, *Mustura*, *Pteronemacheilus*) with thickened rays and elongated patches of small tubercles (Kottelat, 2018; Conway & Kottelat, 2023). In these genera, however, the modified rays are branched rays 1–3 (vs. 2–3 in *Barbuca*). *Pteronemacheilus* has branched ray 1 thickened and branched rays 3–4 closely connected and with a bend at branching points (Kottelat, 2018: fig. 4).

Considering the wide distribution of *B. diabolica* throughout Sundaland and south and southeastern Thailand, some variability is expected. Indeed, there is variability of colour pattern in the examined material (Figs. 7–9). In a molecular analysis of loach phylogeny at family level, Šlechtová et al. (2007) included *B. diabolica* from Jambi (Sumatra) and Bintulu (Sarawak, Borneo) and found genetic differences. It is beyond the scope of the present article to research the diversity within *B. diabolica*, especially because for most populations there are not enough specimens, especially adult males.



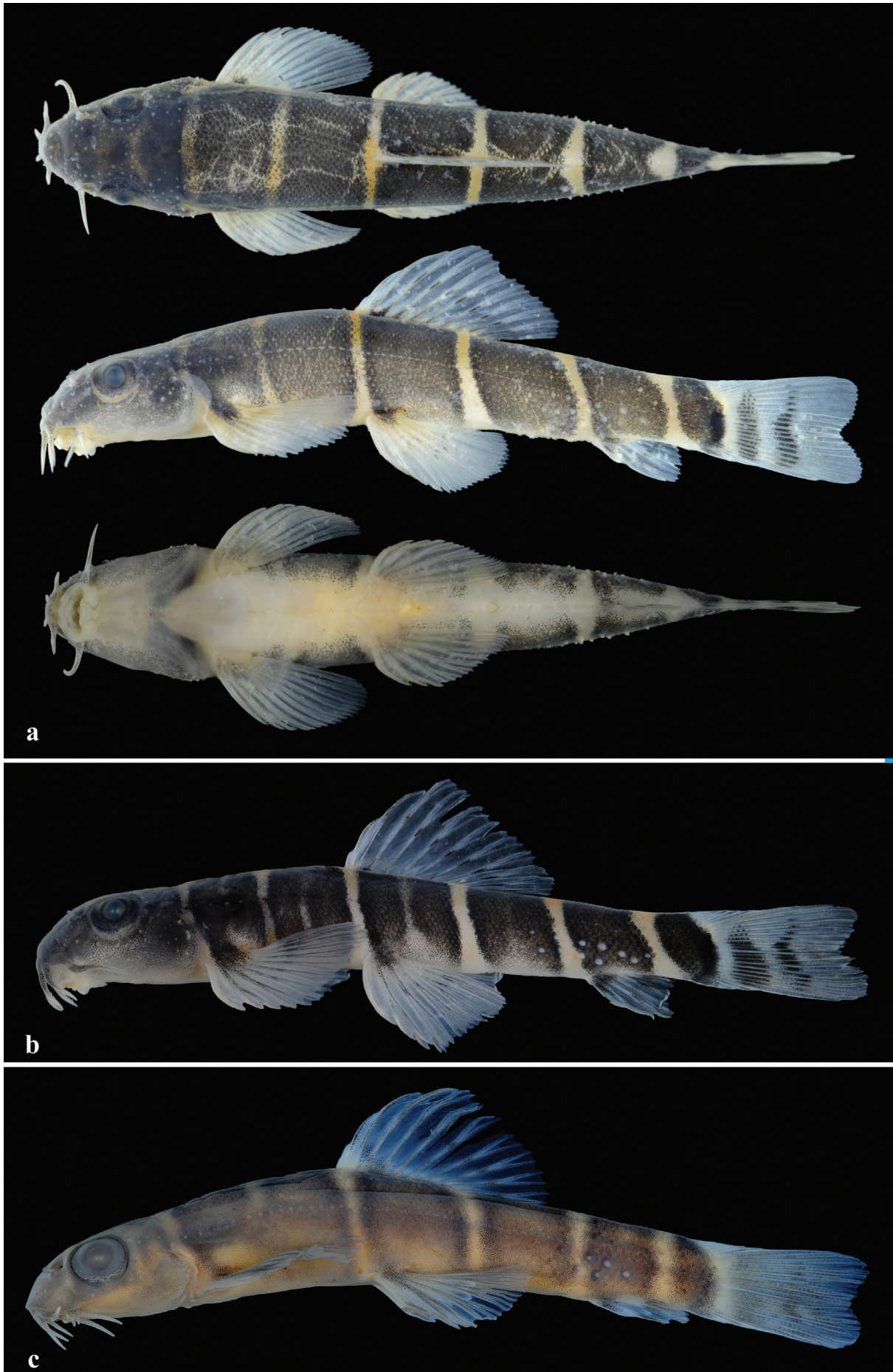


Fig. 7. *Barbucca diabolica*; a, ZRC 56409, 37.4 mm SL; Borneo: Kahayan drainage; b, ZRC 66771, 36.5 mm SL; Borneo: Kahayan drainage; c, ZRC 47747, 29.0 mm; Sumatra: Batang Hari. (Photographs by Tan H. H.).



Fig. 8. *Barbucca diabolica* (or *B. elongata*), ZRC 51197; Thailand: Chantaburi; a, 26.5 mm SL; b, 33.1 mm SL. (Photographs by Tan H. H.).



Fig. 9. a, *Barbucca diabolica*, ZRC 66772, 32.8 mm SL; Borneo: Kahayan drainage; b, *Barbucca diabolica* (or *B. elongata*), ZRC 51197, 26.5 mm SL; Thailand: Chantaburi, probably same specimen as Fig. 8a. (Photographs by Tan H. H.).

Vasil'eva & Vasil'ev (2013) described *B. elongata* from Phu Quoc island, off southern Vietnam. They had no access to material of *B. diabolica* and their comparison with this species is based on information provided by Roberts (1989) in the original description. They distinguished the 2 species as follow (p. 322 of the English version): “*B. elongata* differ[s] from *B. diabolica* s. stricto in the following characters. In the new species, the body is less deep, and minimum body depth is not substantially different from maximum body depth (the anterior part of the body is very deep in *B. diabolica*). In addition, the predorsal distance and caudal peduncle length are larger [...]. As a result of these differences, the specimens of the new species seem more slim and elongated. These specimens differ from *B. diabolica* in not overlapped paired fins, conical and not deep snout, smaller scales, and total number of scales in the lateral series (more than 55 vs. 45–50 in *B. diabolica* (Roberts, 1989)). In addition, the specimens with 11 or 12 dark stripes not completely fused into six large blocs (as is usual for *B. diabolica*) are found in Phu Quoc Island”.

Without access to material from the area of the type locality of *B. elongata*, it is difficult to comment on these vaguely formulated differences in shape. Regarding the colour pattern, the 11 or 12 ‘stripes’ mentioned by Vasil'eva & Vasil'ev correspond to the 6 broad dark brown bars figured by Roberts (1989) and observed in most material examined. But in

most individuals (including the one figured by Roberts), the edges of the bars are darker than the central area, and in the populations from Rungan (central Borneo), Sarawak (western Borneo), Jambi (Sumatra), Terengganu and Narathiwat (Malay Peninsula) there are individuals in which some or all the bars are devoid of pigments in the middle and appear with vertically ‘split’ bars as the bars in specimens from Phu Quoc. Some specimens from Chantaburi (Thailand, the material examined closest to the type locality of *B. elongata*) have the pattern of ‘split’ bars, but others have the normal pattern of 6 bars (Figs. 8, 9b). The two specimens from Phu Quoc figured by Bui (2011: 35, pl. 3) show one specimen with ‘split’ bars and one with entire bars.

With the scant information and in the absence of topotypic material, and with the likelihood that several species are confused under the name *B. diabolica*, I give *B. elongata* the benefit of the doubt and tentatively treat it as valid, pending a more detailed investigation.

**Material examined.** *B. diabolica*: Borneo: Kalimantan Barat: Kapuas River drainage: CMK 6950, 4, 15.5–19.8 mm SL; Danau Temuan, a shallow blackwater lake near Nanga Embaluh; 0°49'58"N 112°36'15"E; M. Kottelat et al., 28 April 1990. — CMK 11517, 1, 33.8 mm SL; Sungei Tawang at Tekenang, Danau Sentarum Wildlife Reserve; E. Widjanarti, 1993. — ZRC 66770, 1, 20.0 mm SL; Kapuas, Batang Kalis

and side streams, 2–5 km stretch after Nanga Kalis upstream of Nanga Mandai (0°47'01.9"N 112°48'21.6"E), 6 May 1998. Borneo: Kalimantan Tengah: Kahayan drainage: CMK 20320, 4, ZRC 66772, 4; 26.8–37.2 mm SL; aquarium fish trade, reportedly from Danau Tahai, Sungei Rungan system; 2°01'45"S 113°46'49"E; M. Kottelat & Tan H. H., 4 March 2008. — CMK 20342, 2, ZRC 66773, 3; 18.0–26.5 mm SL; Sungei Rungan system: Sungei Planta, stream draining to Sungei Rungan; 2°02'01"S 113°47'06"E; M. Kottelat & Tan H. H., 5 March 2008. — CMK 20365, 11, ZRC 66774, 11; 22.5–36.7 mm SL; Sungei Rungan system: Nyaru Menteng; 2°01'46"S 113°46'46"E; M. Kottelat & Tan H. H., 5 March 2008. — ZRC 66771, 63, 17.0–35.3 mm SL; Kota Palangka Raya: Tahai, junction of Sungai Tahai with Danau Tahai, 2°01.465'S 113°46.624'E, 18 masl; Tan H. H., R. Hadiaty & D. Wowor, 21 August 2009. — ZRC 56409, 37, 16.8–42.2 mm SL; Sungai Rungan; H. Tommy, 24 June 2017. Borneo: Kalimantan Timur: CMK 7763, 3, 13.3–17.1 mm SL; Mahakam River basin: unnamed left side blackwater tributary of Mahakam River, about 2 km upriver of Mujub; 0°01'S 115°43'E; M. Kottelat, 3 April 1991. Sumatra: CMK 11114, 2, 21.9–27.1 mm SL; Jambi, Sungei Alai, 28 km from Muara Bungo on road to Muara Tebo, between ½ h downriver to 1 h upriver of bridge, and Danau Gresik; 1°28'45"S 102°18'23"E; M. Kottelat & Tan H. H., 30 May 1994. — CMK 17520, 10, 22.6–27.2 mm SL; Jambi: from aquarium fish collectors; Tan H. H., 8 July 2002. — CMK 20654, 2, ZRC 66775, 3; 14.2–29.1 mm SL; Sumatera Selatan: southern tributary of ox-bow lake along Musi River, upstream of Danau Calak; 2°57'27"S 103°58'26"E; M. Kottelat & Ng H. H., 16 May 2008. — ZRC 47747, 22, 24.2–29.0 mm SL; Jambi; P. Yap, 14 January 2003. Malay Peninsula: CMK 8211, 1, 16.1 mm SL; Malaysia: Terengganu: stream at about km 6 on road from Kuala Brang to Kuala Terengganu; 5°04'25"N 103°03'20"E; M. Kottelat et al., 19 March 1992. — CMK 8530, 6, ZRC 23218, 6; 11.3–24.4 mm SL; Malaysia: Johor: Sungei Muar drainage: Sungei Labis, 15 km from Labis on road to Muar; 2°23'20"N 102°54'57"E; M. Kottelat et al., 26 July 1992. — CMK 21078, 5, 24.5–32.4 mm SL; Thailand: Narathiwat Prov.: Amphoen [District] Waeng: tributary of Sungai Golok, near Buketa village, cross road Nr 4057 and 4062; K. Kubota, May 2009. *B. elongata*?: CMK 20252, 1, 21.3 mm SL; Thailand: Trat Prov.: Khlong Huai Raeng, km 18 on road 3271 from Trat to Bo Rai; 12°23'47"N 102°39'15"E; M. Kottelat & K. Kubota, 21 December 2007. — ZRC 51197, 41, 25.7–34.3 mm SL; Thailand: Chantaburi; aquarium fish trade; P. Yap, 5 June 2007. *Barbucca* sp.: TCWC 20886.01, 7 (1 SEM). 24.0–32 mm SL; aquarium trade, 2017.

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