



***Pseudomystus heokhuii*, a new species of bagrid catfish from Sumatra (Teleostei: Bagridae)**

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Abstract

Pseudomystus heokhuii, a new species of bagrid catfish is described from highly acidic blackwater habitats in central Sumatra. The new species can be distinguished from congeners by its unique color pattern of a pale midlateral stripe and pale oblique bands on the sides of the body. It is most similar to, and can be found sympatrically with, *P. leiacanthus*, but can be further distinguished from it in having two (vs. one) dark narrow irregular bars on the caudal fin, longer pectoral spine (19.3–22.4% SL vs. 15.2–18.6), longer caudal fin (33.5–40.0% SL vs. 25.7–31.9) with pointed (vs. rounded) lobes, longer nasal and maxillary barbels (63.1–81.1% HL vs. 31.3–51.5 and 86.2–125.3% HL vs. 70.9–91.3 respectively; nasal barbel reaching to dorsal insertion of opercular flap vs. to just beyond posterior orbital margin and maxillary barbel reaching just beyond base of last pectoral-fin ray vs. to base of pectoral spine), a straight (vs. crescentic) premaxillary tooth patch, a more sharply tapering snout when viewed dorsally, and an even (vs. slightly convex) predorsal profile.

Key words: Siluriformes, Batang Hari, Indragiri, peat swamps

Introduction

Members of the bagrid genus *Pseudomystus* Jayaram, 1968 are small- to mid-sized freshwater catfishes endemic to Southeast Asia. There are currently 18 valid species of *Pseudomystus* (Kottelat *et al.*, 1993; Kottelat, 2000; Ng & Rachmatika, 1999; Ng & Freyhof, 2005; Ng & Lim, 2005; Ng & Siebert, 2005); many of them have a color pattern of contrasting vertical bars or blotches, which makes them attractive fishes for the aquarium trade (where they are known as bumblebee catfishes). As part of a larger revisionary study of the genus by K. Lim, material from Sumatra previously identified as *Pseudomystus leiacanthus* (Weber & de Beaufort, 1912) was examined and it was found that this material represented a distinct, undescribed species. The description of this material as *Pseudomystus heokhuii* sp. nov. forms the basis of this study.

Material and methods

Measurements were made point to point with dial calipers and data recorded to tenths of a millimeter. 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 and measurements of body parts are given as proportions of standard length (SL). Measurements follow those of Ng & Kottelat (1998). Asterisks after meristic counts indicate values for holotype. Institutional abbreviations follow Eschmeyer (1998).

Pseudomystus heokhuii sp. nov.

Fig. 1

Pseudomystus leiacanthus (in part)—Tan & Ng, 2000: 280.

Holotype. MZB 10717, 50.7 mm SL; Sumatra: Jambi, Batang Hari drainage at Rantau Panjang; H. H. Tan *et al.*, Nov. 1996.

Paratypes. ZRC 41951 (6), 38.0–51.6, data as for holotype. ZRC 38523 (25), 34.7–53.2 mm SL; CMK 11080 (6), 39.0–50.1; Sumatra: Jambi, Batang Hari drainage, Sungai Bakung (a tributary of Sungai Kembang), stream joining Danau Arang Arang and Sungai Kumpeh Hulu in Arang Arang, flooded peat swamp-forest; M. Kottelat & H. H. Tan, 29 May 1994. ZRC 38601 (4), 35.9–43.7 mm SL; CMK 11147 (5), 33.9–43.3 mm SL; Sumatra: Jambi, Batang Hari drainage, Danau Rasau, a blackwater lake draining to the Batang Hari, opposite Kampung Rantau Panjang; M. Kottelat & H. H. Tan, 1–2 June 1994. ZRC 39069 (17), 31.5–46.6 mm SL; Sumatra: Riau, Indragiri drainage, peat swamp draining into Sungai Bengkwan, tributary of Indragiri River; P. K. L. Ng *et al.*, 15 June 1995. ZRC 43154 (13), 40.7–63.6 mm SL; Sumatra: Jambi, Batang Hari drainage; T. Sim, Jun 1995. ZRC 41819 (14), 31.5–59.3 mm SL; Sumatra: Jambi, Batang Hari drainage at Rantau Rasau (from aquarium fish collectors); T. Sim, 4 June 1996. ZRC 41664 (1), 34.1 mm SL; Sumatra: Jambi, Batang Hari drainage (from aquarium fish collectors); T. Sim, 14 June 1996. ZRC 46150 (20), 21.3–46.3 mm SL; Sumatra: Jambi, Batang Hari drainage, Sungai Bakung, tributary of Danau Arang Arang, swamp-forest, 1°37'31.0"S 103°47'20.6"E; H. H. Tan *et al.*, 25 July 1997. ZRC 46151 (12), 37.4–54.0 mm SL; Sumatra: Sumatera Selatan, Batang Hari drainage, Sungai Sentang, 12 km from Jambi to Bayung Lencir (216 km to Palembang) near Desa Sukajaya; H. H. Tan *et al.*, 27 July 1997. UMMZ 243385 (1), 44.8 mm SL; Sumatra: Sumatera Selatan, Sungai Merdak in the vicinity of Sukajaya; H. H. Ng *et al.*, 11 December 2003.

Diagnosis. *Pseudomystus heokhuii* can be distinguished from congeners in having a color pattern consisting of a pale midlateral stripe and two pale oblique bands on the sides of the body; no other congener possesses a distinct pale midlateral stripe. It is further distinguished from all congeners except *P. breviceps*, *P. bomboides*, *P. flavipinnis*, *P. myersi*, *P. siamensis*, *P. robustus*, *P. sobrinus* and *P. stenomus* in having a deeper body (17.8–21.0% SL vs. 9.0–17.0). *Pseudomystus heokhuii* appears most similar to, and occurs sympatrically with, *P. leiacanthus*, but can be further distinguished from it in having two (vs. one) dark narrow irregular bars on the caudal fin, longer pectoral spine (19.3–22.4% SL vs. 15.2–18.6), longer caudal fin (33.5–40.0% SL vs. 25.7–31.9) with pointed (vs. rounded) lobes, longer nasal and maxillary barbels (63.1–81.1% HL vs. 31.3–51.5 and 86.2–125.3% HL vs. 70.9–91.3 respectively; nasal barbel reaching to dorsal insertion of opercular flap vs. to just beyond posterior orbital margin and maxillary barbel reaching just beyond base of last pectoral-fin ray vs. to base of pectoral spine), a straight (vs. crescentic) premaxillary tooth patch (Fig. 2), a more sharply tapering snout when viewed dorsally (Fig. 3) and an even (vs. slightly convex) predorsal profile (Fig. 4). Additional characters for distinguishing *P. heokhuii* from congeners are mentioned in the Discussion.

Description. Biometric data as in Table 1. Head depressed; dorsal profile evenly sloping and ventral profile almost straight; snout rounded or truncate when viewed dorsally. Bony elements of dorsal surface of head covered with thin skin; bones visible, especially on posterior half of neurocranium, and ornamented with numerous fine, radial grooves. Midline of cranium with fontanelle extending from behind snout to just beyond level of posterior orbital margin. Supraoccipital process moderately broad, with gently converging sides and blunt tip; extending to nuchal plate. Supratemporal with short posterior process, about half as long as postcleithral process. Eye ovoid, horizontal axis longest, subcutaneous; located entirely in dorsal half of head. Gill openings wide, extending from posttemporal to beyond isthmus. Gill membranes free from isthmus, with 7 (1) or 8* (23) branchiostegal rays.

TABLE 1. Biometric data for *Pseudomystus heokhuii* (n=24).

	Holotype	Range	MeanSD
%SL			
Predorsal length	41.2	39.4–41.8	40.30.79
Preanal length	66.1	66.1–71.2	67.61.51
Prepelvic length	51.5	51.5–57.0	53.71.68
Prepectoral length	25.2	22.9–26.6	24.91.29
Length of dorsal-fin base	15.4	11.6–16.4	14.01.49
Dorsal-spine length	24.7	16.7–24.7	19.92.32
Anal-fin length	17.2	15.3–17.3	16.40.75
Pelvic-fin length	17	14.1–17.0	15.10.99
Pectoral-fin length	25.6	22.6–25.6	24.01.10
Pectoral-spine length	21.3	19.3–22.4	20.91.19
Caudal-fin length	39.4	33.5–40.0	37.72.23
Length of adipose-fin base	22.5	18.2–22.8	20.01.77
Dorsal to adipose distance	10.8	10.8–17.2	13.62.05
Post-adipose distance	18.5	14.9–18.5	16.81.20
Caudal peduncle length	17.9	16.1–19.4	17.91.08
Caudal peduncle depth	9.3	8.8–10.5	9.50.59
Body depth at anus	19.5	17.8–21.0	19.61.05
Head length	29.2	28.6–30.4	29.40.54
Head width	23.3	21.7–23.8	22.60.79
Head depth	18.1	18.1–19.6	18.60.48
%HL			
Snout length	29.7	29.7–37.3	34.22.33
Interorbital distance	31.1	30.6–34.3	32.21.44
Eye diameter	9.5	8.5–10.7	9.70.70
Nasal barbel length	81.1	63.1–84.5	77.16.74
Maxillary barbel length	105.4	86.2–125.3	109.813.14
Inner mandibular barbel length	45.9	34.6–50.0	46.04.93
Outer mandibular barbel length	68.9	68.9–91.0	79.88.12

Mouth subterminal. Oral teeth small and viliform, 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. Vomerine tooth band unpaired, continuous across midline; smoothly arched along anterior margin, tapering laterally to point extending posteriorly past level of premaxillary band; band width narrower than premaxillary band at midline, widening laterally and then tapering to a sharp point posterolaterally.

Barbels in four pairs. Maxillary barbel slender, extending just beyond pectoral-fin base. Nasal barbel slender, extending to dorsal insertion of opercle. Inner mandibular-barbel origin close to midline; barbel thicker and longer than nasal barbel and extending for three quarters of head length. Outer mandibular barbel originating posterolateral of inner mandibular barbel, extending to base of pectoral spine.

Body slightly compressed, becoming more so toward caudal peduncle. Dorsal profile rising evenly but not steeply from tip of snout to origin of dorsal fin and sloping gently ventrally from origin of dorsal fin to end

of caudal peduncle. Ventral profile slightly convex to anal-fin base, then sloping slightly dorsally to end of caudal peduncle. Skin smooth; lateral line complete and midlateral in position. Vertebrae 15+20=35* (1), 16+19=35 (2), 16+20=36 (2) or 17+19=36 (2).



FIGURE 1. *Pseudomystus heokhuii*, MZB 10717, holotype, 50.7 mm SL; Sumatra: Jambi, Rantau Panjang.

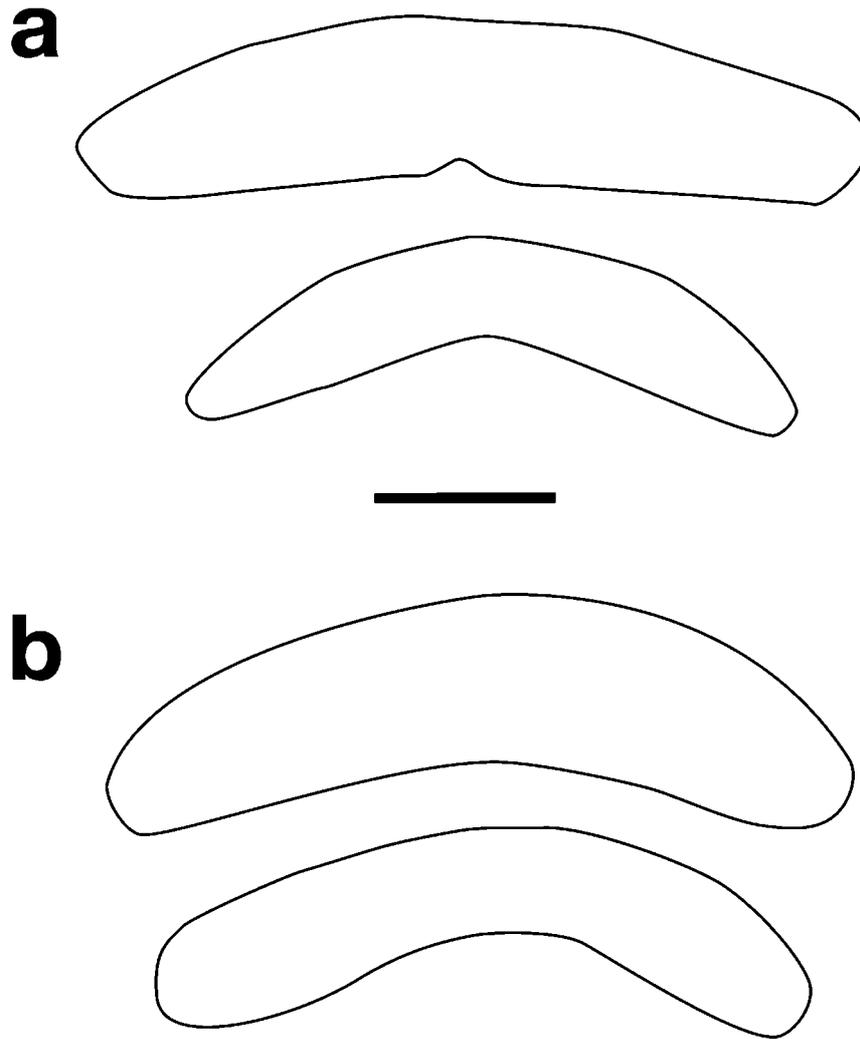


FIGURE 2. Premaxillary and vomerine tooth patches of: a. *Pseudomystus heokhuii*, ZRC 41819, paratype, 57.9 mm SL; b. *P. leiacanthus*, ZMA 112.671, syntype, 43.2 mm SL. Scale bar represents 1 mm.

Dorsal fin with spinelet, spine, and 7 (24) rays. Origin of dorsal fin anterior to mid-body, about two-fifths of body. Dorsal fin margin convex, usually with anterior branch of fin rays longer than other branches. Dorsal fin spine short, straight and slender, posterior edge without serrations. Nuchal shield moderately broad, with rounded tip anteriorly.

Pectoral fin with stout spine, sharply pointed at tip, and 6,i (1) or 7* (23) rays. Anterior spine margin smooth; posterior spine margin with 9–15 large serrations along entire length (serrations fewer in smaller specimens). Pectoral fin margin straight anteriorly, convex posteriorly. Postcleithral process of moderately broad, with slightly convex dorsal margin and extending for half of pectoral-spine length.

Pelvic fin origin posterior to vertical through posterior end of dorsal-fin base, with i.5 (24) rays and slightly convex margin; tip of adpressed fin reaching base of second or third anal-fin ray. Anus and urogenital openings located at vertical through middle of adpressed pelvic fin. Males with a conical genital papilla reaching to base of first anal-fin ray.

Adipose fin with convex margin for entire length, with deeply-incised posterior portion and origin at or immediately anterior to vertical through base of first anal-fin ray; fin-base moderate, spanning about one-third of postdorsal distance. Anal fin base at or just posterior to vertical through origin of adipose fin, with iii,9* (5); iv,9 (4); iii,10 (14) or iv,10 (1) rays and curved posterior margin.

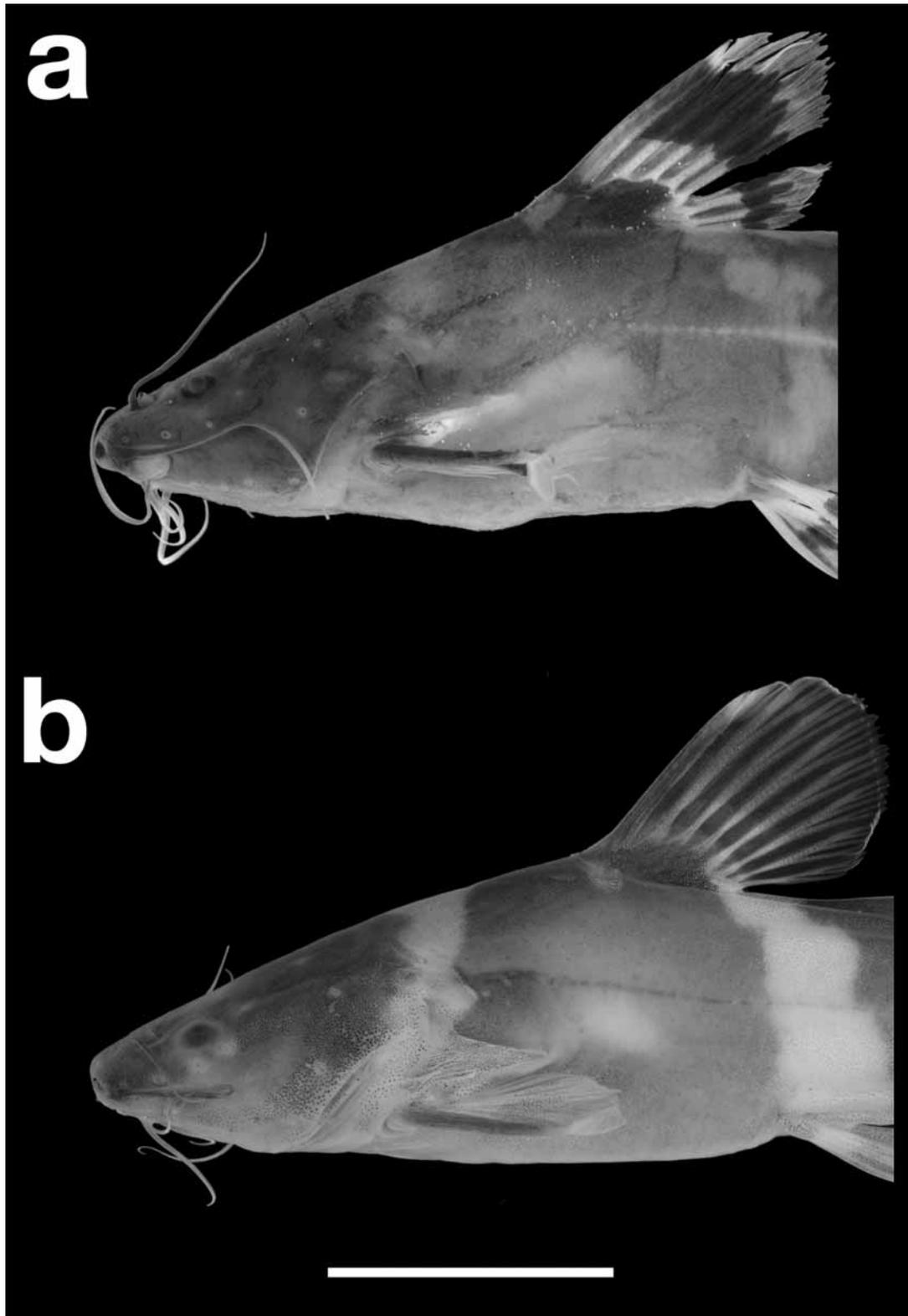


FIGURE 3. Predorsal profiles of: a. *Pseudomystus heokhui*, ZRC 39069, paratype, 42.6 mm SL; b. *P. leiacanthus*, ZRC 46143, 45.6 mm SL. Scale bar represents 10 mm.

Caudal peduncle moderately deep. Caudal fin deeply forked, with i,6,7,i (1) or i,7,8,i* (23) principal rays; upper and lower lobes slender and lanceolate. Procurrent rays extend anterior to fin base.

Coloration. In 70% ethanol: Body dark greyish-brown above, dusky below. Sides with pale stripe over

the lateral line from middle of body below dorsal fin origin to base of caudal peduncle. Ventral surfaces of head and body dark yellow. Caudal fin hyaline with dark brown submarginal bar on each caudal lobe, and two separate spots in middle of upper and lower caudal lobes; spots faintly coalescent to form irregular bar in some individuals. Three irregular yellowish bars: first (indistinct in some individuals) over nape, second from immediately posterior to dorsal fin base to immediately posterior to pelvic origin, third on anterior part of caudal peduncle from immediately posterior to adipose fin base to immediately posterior to anal-fin base. Small yellowish blotches also present on anterior part of upper and lower procurent caudal rays, adipose fin origin, and along anal fin base. Dorsal, anal and pelvic fins hyaline with dark basal and submarginal bars. Posterior edge of adipose fin hyaline.

Live color similar, with more pronounced yellow coloration.

Distribution. Known only from the Batang Hari and Indragiri River drainages in central Sumatra (Fig. 5) where it is collected from floodplain channels and peat swamps with very acidic (pH 3.5-4.5), tannin-stained water.

Etymology. The species is named after Heok Hui Tan, who brought the fish to our attention.

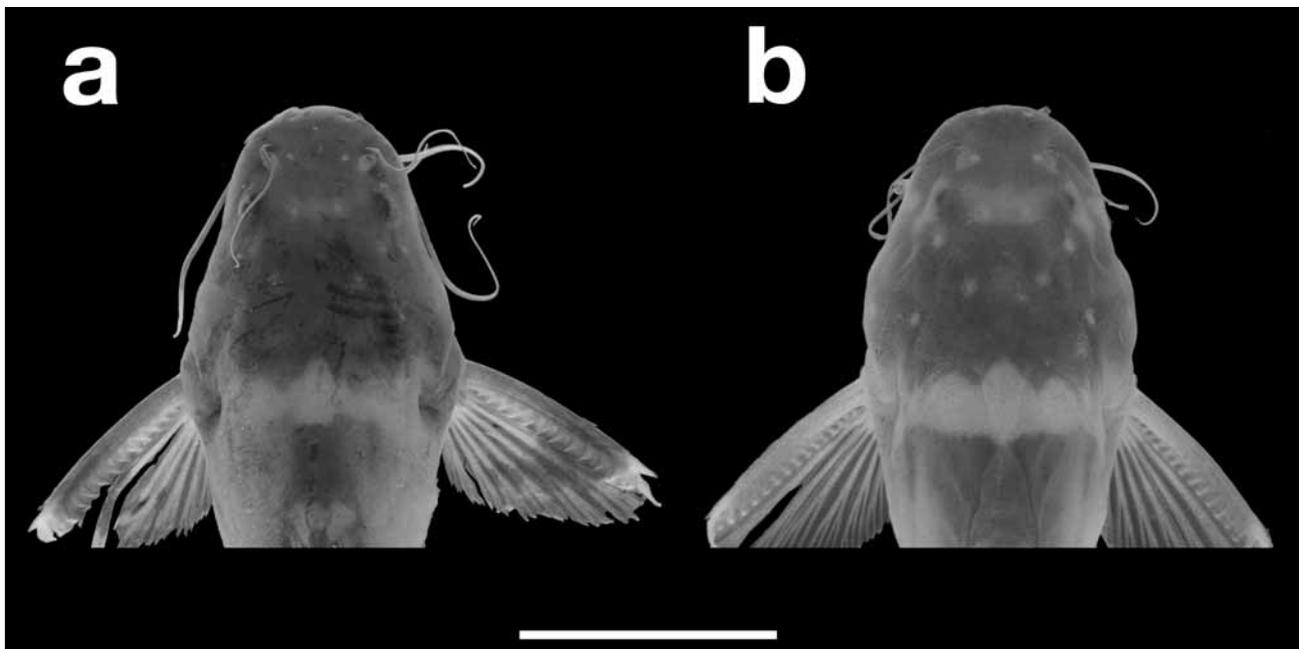


FIGURE 4. Dorsal views of heads of: a. *Pseudomystus heokhuii*, ZRC 39069, paratype, 42.6 mm SL; b. *P. leiacanthus*, ZRC 46143, 45.6 mm SL. Scale bar represents 10 mm.

Discussion

Pseudomystus heokhuii is unusual, compared with its congeners, in that it exclusively inhabits floodplain peat swamps, in tannin-stained, very acidic (pH below 5) water. It has been obtained from among submerged roots and branches where it seems to occur in large congregations. Other fish species found syntopically in such habitats include: *Osteochilus spilurus* (Cyprinidae), *Parachela oxygastroides* (Cyprinidae), *Systomus gemellus* (Cyprinidae), *Kottelatlimia pristis* (Cobitidae), *Mystus bimaculatus* (Bagridae), *Kryptopterus macrocephalus* (Siluridae), *Silurichthys indragiriensis* (Siluridae), *Hemirhamphodon pogonognathus* (Hemiramphidae), *Nandus nebulosus* (Nandidae), *Betta raja* (Osphronemidae), *Luciocephalus pulcher* (Osphronemidae), *Sphaerichthys osphromenoides* (Osphronemidae), and *Macrognathus circumcinctus* (Mastacembelidae), *Pseudomystus leiacanthus* is occasionally found in habitats associated with peat swamps, but it seems to prefer clear, slightly less acidic water, and these two species are not known to be syntopic.

Although the specimens of *P. leiacanthus* we examined possess what appears to be a faint pale midlateral stripe (Fig. 6), closer examination reveals that the “stripe” is merely formed by the aggregation of the pale margins of the laterosensory pores along the lateral line. In *P. heokhuii*, the stripe consists not only of the margins of the laterosensory pores, but also a pale region on the body wall that surrounds the dorsal and ventral margins of the lateral line.

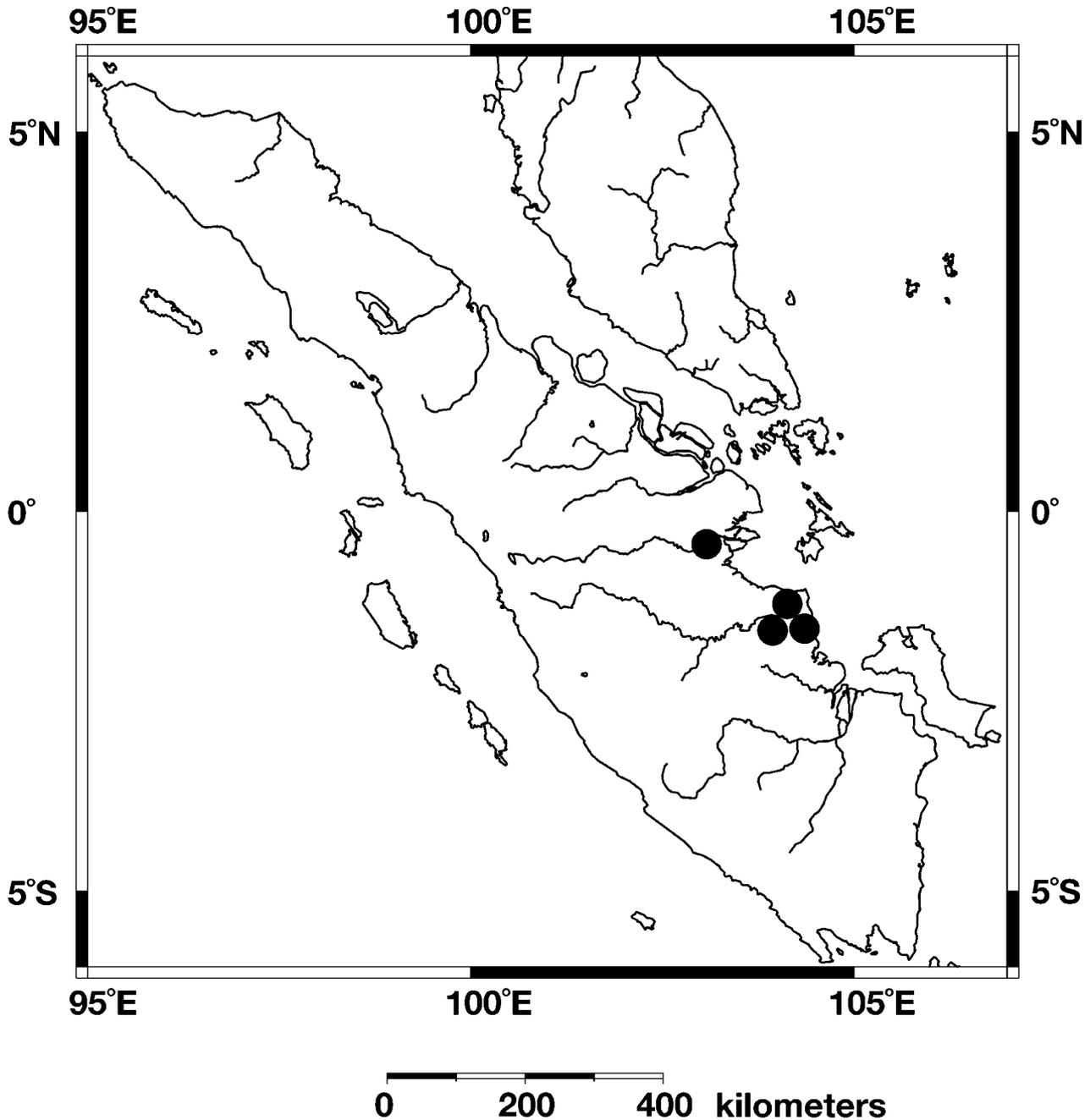


FIGURE 5. Map showing collection localities of *Pseudomystus heokhuii*.

In addition to the characters described in the diagnosis, *P. heokhuii* further differs from *P. breviceps*, *P. bomboides*, *P. flavipinnis*, *P. siamensis*, *P. sobrinus* and *P. stenomus* in having a smaller eye (8.5–10.7 %HL vs. more than 13.0), and from *P. carnosus*, *P. fumosus* and *P. moeschii* in having the posttemporal with a posterior process that is only two-thirds as long as (vs. as long as) the postcleithral process. *Pseudomystus heokhuii* can be further distinguished from *P. inornatus*, *P. mahakamensis*, *P. rugosus* and *P. stenogrammus* in

having a deeper caudal peduncle (8.8–10.5% SL vs. 5.4–7.6) and wider head (21.7–23.8% SL vs. 15.1–18.4), and from *P. myersi* in having the posterior end of the adipose fin not in contact (vs. confluent) with the upper procurent caudal rays. It further differs from *P. robustus* in having a moderately (vs. very) broad postcleithral process and the pelvic fin reaching (vs. not reaching) the anal-fin base, and from *P. vaillanti* in having the pelvic fin reaching (vs. not reaching) the anal-fin base.



FIGURE 6. *Pseudomystus leiacanthus*, ZRC 46135, 48.1 mm SL; Riau Archipelago: Pulau Kundur, Tg. Batu.

Comparative material

Pseudomystus bomboides: ZRC 45426 (holotype), 41.2 mm SL; ZRC 45493 (2 paratypes), 23.7–31.7 mm SL; Laos: Vientiane, confluence of Nam Leuk and Nam Ngong, 18°22'4"N 103°5'27"E.

P. breviceps: BMNH 1889.11.12.64–65 (2 syntypes), 66.8–80.6 mm SL; Sumatra: Deli (Medan).

P. carnosus: RMNH 15859 (holotype), 78.1 mm SL; RMNH 35223 (1 paratype), 65.7 mm SL; Sumatra: Sukadana. RMNH 15860 (2 paratypes), 62.4–82.8 mm SL; Sumatra Lampung.

P. flavipinnis: MZB 6593 (holotype), 47.0 mm SL; Borneo: Kalimantan Barat, Sungai Embaloh at Benua Marinus.

P. fumosus: ZRC 3229 (holotype), 73.6 mm SL; Malaysia: Pahang, Taman Negara, Kuala Tahan. BIR-CUM 4428 (1 paratype), 66.0 mm SL; Malaysia: Pahang, Sungai Lompat, a tributary of Sungai Krau, 3°41'40"N 102°12'40"E.

P. fuscus: RMNH 7555 (holotype), 39.6 mm SL; Borneo: upper Mahakam. ZRC 46144 (18), 34.0–42.6 mm SL; Borneo: Sarawak, Sungai Sebiris, 13.8 km after Kg. Pueh turnoff towards Lundu on Sematan-Lundu road, 1°41'32.0"N 109°47'0.8"E.

P. inornatus: BMNH 1893.3.6.179, holotype, 119.2 mm SL; Borneo: Sarawak, Senah.

P. leiacanthus: ZMA 112.671 (1 syntype), 43.2 mm SL; Sumatra: Riau, Indragiri (Kwantan) River at Taluk. ZMA 112.672 (1 syntype), 59.8 mm SL; Sumatra: Riau, Indragiri (Kwantan) River at Rengat. CMK 11067 (1), 18.1 mm SL; Sumatra: Jambi, Sungai Keruh, about 2 km S of Jambi–Muara Tembesi road. ZRC 46138 (11), 28.7–38.6 mm SL; Riau Archipelago: Pulau Bintan, 49 km to Tg. Pinang, 1°6'25.5"N 104°28'32.4"E. ZRC 46135 (1), 48.1 mm SL; Riau Archipelago: Pulau Kundur, Tg. Batu. ZRC 40183 (3), 34.8–42.1 mm SL; Malaysia: Pahang, Sungai Belat, 26 km from Kuantan. ZRC 46143 (1), 45.6 mm SL; Malaysia: Terengganu, Kemaman, peat swamp forest.

P. mahakamensis: RMNH 7838 (2 syntypes), 83.8–84.6 mm SL; Borneo: Mahakam River at Tepoe. CMK 7785 (1), 93.9 mm SL; Borneo: Kalimantan Timur, Mahakam River among boulders upstream of Melak, 0°12'S 115°47'E.

P. moeschii: BMNH 1889.11.12.66 (holotype), female, 71.0 mm SL; Sumatra: Deli. UMMZ 243700 (1), 66.9 mm SL; Sumatra: Sumatera Selatan, Sungai Merdak in the vicinity of Sukajaya, 1°55'54.1"N 103°44'23.7"E.

P. myersi: CAS 49375, 3 paratypes, 42.9–86.1 mm SL; USNM 230280, 3 paratypes, 39.0–73.6 mm SL; Borneo: Kalimantan Barat, small stream into Kapuas River, northeast of Gg. Setunggul, 53 km northwest of Sintang, 10 km northwest of Silat (0°24'N 111°51'E).

P. robustus: FMNH 68001, holotype, 215.5 mm SL; Borneo: Sabah, Kinabatangan River at Deramakot. FMNH 68002 (1 paratype), 203.4 mm SL; FMNH 68040 (1 paratype), 253.3 mm SL; Borneo: Sabah, Kinabatangan River at Deramakot. ZRC 45497 (2), 108.3–122.0 mm SL; Borneo: Sabah, Kinabatangan River at Pekan Bukit Garam (Pangkalan).

P. rugosus: BMNH 1893.3.6.172 (holotype), 103.1 mm SL; Borneo: Sarawak, Poeh.

P. siamensis: BMNH 1897.10.8.126 (holotype), 76.5 mm SL; Thailand: Chao Phraya basin, Bangpakong River. ANSP 59284 (1), 42.4 mm SL [holotype of *Leiocassis bicolor*]; ANSP 59285–59289 (5), 37.6–45.6 mm SL [paratypes of *Leiocassis bicolor*]; Thailand: Chiang Mai. ANSP 60178 (1), 85.6 mm SL [holotype of *Leiocassis albicollaris*]; Thailand: Bangkok. CAS 94782 (64), 30.4–107.0 mm SL; Cambodia: Ratanakiri, O Champha, 4–8 km upstream from its mouth into Tonle San near Te Veng.

P. sobrinus: ZFMK 27167. holotype, 62.3 mm SL; ZFMK 27168–27183 (17 paratypes), 30.6–79.8 mm SL; Vietnam: Phu Yen, stream about 15 km south of Tuy Hoa, 12°53'05"N, 109°23'70"E. ZFMK 24068–24073 (6 paratypes), 38.3–59.0 mm SL; Vietnam: Dac Lac, Crong Hang (stream) at M'Drac village about 60 km west of Ninh Hoa, a tributary of Song Ba, 12°46'10"N, 108°42'76"E. ZFMK 27166 (1 paratype), 86.3 mm SL; Vietnam: Gia Lai, market in Azun Pa. UMMZ 245016 (3 paratypes), 46.3–47.8 mm SL; ZRC 49127 (2 paratypes) 42.6–52.5 mm SL; ZFMK 27184–27185 (2 paratypes), 38.0–42.5 mm SL; Vietnam: Phu Yen, stream about 30 km west of Tuy Hoa, 13°03'08"N, 109°05'00"E.

P. stenogrammus: MZB 6103, holotype, 133.3 mm SL; BMNH 1998.10.1.4 (1 paratype), 89.0 mm SL; ZRC 46152 (1 paratype), 80.1 mm SL; Borneo: Kalimantan Tengah, Sungai Laung at Dessa Maruwei. BMNH 1998.10.1.1 (1 paratype), 67.0 mm SL; BMNH 1998.10.1.2 (1 paratype), 98.9 mm SL; BMNH 1998.10.1.6 (1 paratype), 80.2 mm SL; Borneo: Kalimantan Tengah, Barito River at Muara Laung.

P. stenomus: RMNH 2986 (holotype), 69.1 mm SL; Java. ZRC 42587 (5), 67.3–79.8 mm SL; Java: Bogor, purchased from roadside vendor at Pasar Anya.

P. vaillantii: RMNH 7840 (holotype), 105.5 mm SL; Borneo: Nanga Raoen, mouth of Raoen River. ZRC 46133 (16), 30.1–106.5 mm SL; Borneo: Kalimantan Barat, Pontianak.

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