

Under an assumed name: the identity of *Nanobagrus fuscus* (Popta, 1904) clarified (Actinopterygii: Siluriformes)

HEOK HEE NG

c/o Lee Kong Chian Natural History Museum, National University of Singapore, 2 Conservatory Drive, Singapore 117377; heokhee.ng@gmail.com

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Abstract

Nanobagrus fuscus is redescribed on the basis of fresh material collected from the Mentaya River drainage, Borneo. The identity of material from central Sumatra, the Malay Peninsula and western Borneo previously identified as this species is reidentified here as *N. torquatus*.

Key words

Bagridae, freshwater fish, Sundaic Southeast Asia, Teleostei.

Introduction

The diminutive bagrid catfish genus *Nanobagrus* is found in river drainages in the Malay Peninsula, Sumatra and Borneo. Comprising of seven species (*N. armatus*, *N. fuscus*, *N. immaculatus*, *N. lemniscatus*, *N. nebulosus*, *N. stellatus* and *N. torquatus*), members of the genus are typically found in swift-flowing forested streams (Ng, 2010). *Nanobagrus* is distinguished from other bagrid genera by their miniature adult size (maximum size under approx. 45 mm SL), reduced supraoccipital process, reduced anterior nuchal-plate element, and large and prominent posterior cranial fontanel.

Nanobagrus fuscus (reported from Sumatra, the Malay Peninsula and Borneo) and *N. torquatus* (reported from southern Sumatra) are two very similar-looking species that are distinguished from each other only by their color pattern (Thomson et al., 2008). While identifying fish specimens collected from the Mentaya River drainage in southern central Borneo, significant differences were observed between them and material identified as *N. fuscus* from Sumatra, the Malay Peninsula and western Borneo. This prompted a reassessment of the identity of material identified as *N. fuscus* from throughout Sundaic Southeast Asia. The results of this reassess-

ment are reported in this study, as is a redescription of *Nanobagrus fuscus* from the holotype and fresh material from the Mentaya River drainage.

Materials and methods

Measurements were made point to point with digital calipers and data recorded to tenths of a millimeter. Counts and measurements were made on the left side of specimens whenever possible, following Ng & Kottelat (2013). 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). Unpaired fin-ray and vertebral counts were made from radiographs, with the latter counted following the method of Roberts (1994), i.e. with the first rib-bearing vertebra considered the fifth and the counts presented as abdominal (with hemal spines anterior to first anal-fin pterygiophore) + caudal (with hemal spines posterior to first anal-fin pterygiophore) = total vertebrae. Asterisks after a meristic value indicates the condition for the holotype. Institutional codes follow Sabaj (2016).

Nanobagrus fuscus (Popta, 1904)

Fig. 1

Leiocassis fuscus Popta, 1904: 186 (type locality: upper Mahakam River, Borneo); 1906: 52, Pl. III Fig. 10.

Material examined. RMNH 7555, holotype, 38.3 mm SL; Borneo: Kalimantan Timur, upper Mahakam River. CMK 20486 (1), 20.0 mm SL; Borneo: Kalimantan Tengah, Mentaya River drainage, Pundu-Plantarang area, stream at km 142 on Palangkaraya–Sampit road, 2°1'40"S 112°59'48"E. ZRC 51980 (1), 28.8 mm SL; Borneo: Kalimantan Tengah, Mentaya River drainage, Pundu-Plantarang area, Sungai Kora, km 148 on Palangkaraya–Sampit road, 2°3'59"S 112°56'59"E.

Diagnosis. *Nanobagrus fuscus* is distinguished from congeners in having a combination of following characters: head strongly depressed (depth 11.7–12.5% SL), dark brown body with three cream bands on body: one immediately behind head, second immediately posterior to dorsal fin and third below posterior insertion of adipose fin, length of adipose-fin base 99–103% length of anal-fin base (14.9–16.5% SL), and dorsal-to-adipose distance 15.3–18.5% SL,

Description. Biometric data in Table 1. Head strongly depressed; dorsal profile slightly convex, ventral profile almost straight; snout gently rounded when viewed dorsally. Bony elements of dorsal surface of head covered with thick skin, not readily visible. Midline of cranium with fontanelle extending from behind snout to just beyond level of posterior orbit margin. Supraoccipital process reduced, not reaching nuchal plate. Eye ovoid, horizontal axis longest, subcutaneous, located entirely in dorsal half of head. Gill openings wide, extending from posttemporal to beyond isthmus. Branchiostegal rays 8 (1).

Mouth subterminal. Oral teeth small, 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; band width equal to premaxillary band at midline, narrowing slightly laterally, then tapering to a sharp point posterolaterally.

Barbels in four pairs. Maxillary barbel slender, extending to base of pectoral spine. Nasal barbel slender, extending to one third of distance between posterior orbital margin and base of pectoral spine. Inner mandibular barbel origin close to midline; barbel thicker and longer than nasal barbel, extending to one third of distance between posterior orbital margin and base of pectoral spine. Outer mandibular barbel originating posterolateral of inner mandibular barbel, extending to midway between posterior orbital margin and base of pectoral spine.

Body subterete, slightly compressed, becoming more so toward caudal peduncle. Dorsal profile rising evenly, not steeply, from tip of snout to origin of dorsal fin, sloping gently ventrad 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, midlateral in position. Vertebrae 17+18=35 (1).

Dorsal fin with spinelet, spine, and 7 rays. Origin of dorsal fin at 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, slender, posterior edge without serrations. Nuchal plate reduced to narrow triangle, with pointed tip anteriorly.

Pectoral fin with stout spine, sharply pointed at tip, and I,6 (3) rays. Anterior margin of spine smooth; posterior margin of spine with 10–12 large serrae along entire length. Pectoral-fin margin straight anteriorly, convex posteriorly. Cleithral process slender, extending for half of pectoral-spine length.

Pelvic-fin origin at vertical through posterior end of dorsal-fin base, with i,5 (3) rays, its distal margin slightly convex; tip of adpressed fin not reaching anal-fin origin. Anus and urogenital openings located at vertical through middle of adpressed pelvic fin. Males with an elongate conical genital papilla.

Adipose fin with convex margin for entire length, with deeply-incised posterior portion; adipose-fin base moderate, spanning one third of postdorsal distance. Anal-fin origin posterior to vertical through anterior origin of adipose fin; anal fin with iv,8 (2) or iv,9 (1) rays and convex distal margin.

Caudal peduncle moderately deep. Caudal fin deeply forked, with i,7,7,i (3) principal rays; both lobes acutely rounded, upper lobe longer than lower. Procurrent rays extend anterior to median fin base.

Coloration. In 70% ethanol: Dorsal and lateral surfaces of head dark brown, fading to cream ventrally. Interorbital region with an irregular cream band. Body dark brown on dorsal and lateral surfaces; ventral surfaces cream. Three cream bands encircling body: first band at nape, second immediately posterior to dorsal fin and third below posterior insertion of adipose fin. Adipose fin hyaline along dorsal margin and posterior half; dark brown on anterior half. Dorsal and anal fins with dark brown bases and dark brown crescentic mark on middle third of fins. Pectoral and pelvic fins hyaline. Base of caudal fin dark brown, with three hyaline spots: one on dorsal procurrent caudal-fin rays, second at posterior extremity of lateral line and third on ventral procurrent caudal-fin rays. Caudal fin with dark brown crescentic mark on middle third of each fin lobe; rest of fin hyaline. Barbels cream.

Distribution. Known from the upper Mahakam River drainage in eastern Borneo and the Mentaya River drainage in southern central Borneo (Fig. 2). Given the disjunct nature of this distribution, it is likely that the species is also found in the river drainages between these two (i.e. the Katingan, Sebangau, Kahayan and Barito river drainages).



Fig. 1. *Nanobagrus fuscus*, ZRC 51890, 28.8 mm SL; Borneo: Mentaya River drainage. Dorsal, lateral and ventral views.

Discussion

Nanobagrus fuscus and *N. torquatus* are easily distinguishable from all other congeners by their strongly depressed (vs. moderately depressed) heads (depth 10.0–12.5% SL vs. 14.0–17.3) and a color pattern consisting of at least one yellow or cream band encircling the body (vs. uniformly brown coloration or with series of cream or yellow spots or patches on body). These two species are distinguished from each other only by their color pattern: *N. torquatus* has a single band immediately behind the head, while *N. fuscus* has three bands: one behind the head, another behind the dorsal fin, and the third on the caudal peduncle (Thomson et al., 2008).

A comparison between material identified as *N. fuscus* collected from the Mahakam and Mentaya river drainages (including the holotype from the Mahakam River drainage) and from the remainder of its known distribution (i.e. river drainages in central Sumatra, the Malay Peninsula and western Borneo) reveals differences in morphometry. The specimens from the Mahakam and Mentaya river drainages have a longer adipose-fin base (99–103% length of anal-fin base vs. 69–97) and a shorter dorsal-to-adipose distance (15.3–18.5% SL vs. 18.8–25.5), suggesting that material identified as *N. fuscus* from central Sumatra, the Malay Peninsula and western Borneo are not conspecific.

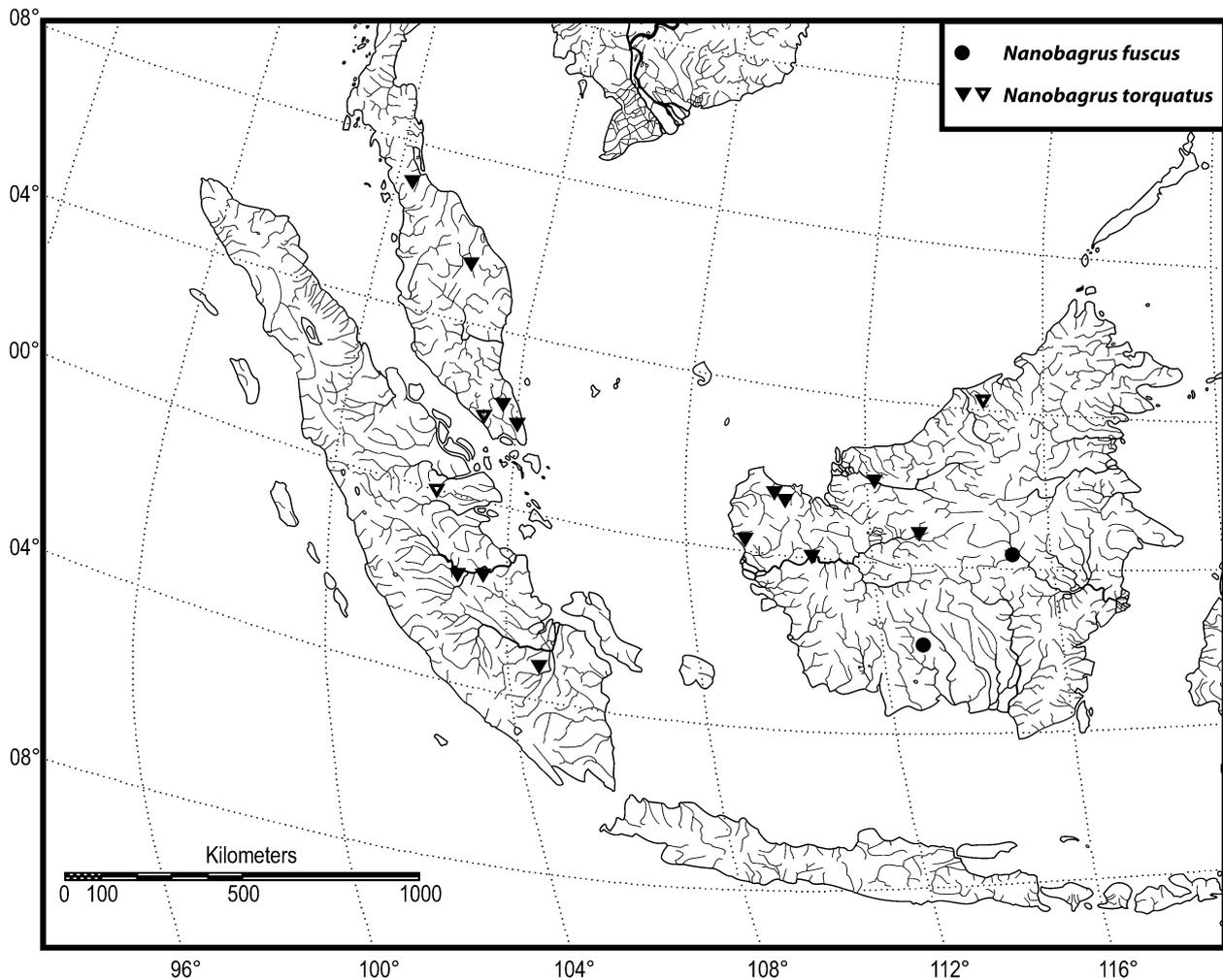


Fig. 2. Map showing distributions of *Nanobagrus fuscus* and *N. torquatus*. Closed symbols indicate records from specimens examined in this study and open symbols indicate records from the literature (Parenti & Meisner, 1995; Rachmatika et al., 2006; Thomson et al., 2008). Locality in upper Mahakam River drainage for *N. fuscus* approximate. Each symbol may represent more than a single locality.

Aside from differences in the color pattern, no other morphometric differences were found between two paratypes of *N. torquatus* (ANSP 187394) and specimens from central Sumatra, the Malay Peninsula and western Borneo identified as *N. fuscus* (see comparative material listed). Furthermore, material identified as *N. fuscus* from central Sumatra, the Malay Peninsula and western Borneo displays intraspecific variation in color pattern that includes the one described for *N. torquatus*. These color patterns range from the presence of three light yellow or cream bands on the body (Fig. 3a), to the complete or partial absence of one or more of the light yellow or cream bands (Figs. 3b–d) to the almost complete absence of light yellow or cream bands on the body (Fig. 3e); furthermore, I have encountered instances where individuals with the different color patterns have been found within the same population (e.g. of the eight specimens in ZRC 28418–28424, three possessed three pale bands, one had the middle pale band almost missing, and four had a single pale band behind the head).

Thomson et al. (2008) identified specimens collected from the southern Malay Peninsula with a single band

encircling the body behind the head (CAS-SU 39339) as a possibly unnamed species, citing differences in barbel development and possibly fin coloration between this material and *N. torquatus*. Examination of fresh material collected from the southern Malay Peninsula (ZRC 28418–28242 and ZRC 40263) show no differences in barbel development and fin coloration between specimens with a single pale band and those with three.

Taken together, the available evidence indicates that: (1) the species from the Mahakam and Mentaya river drainages (*N. fuscus* s. str.) is distinct from the one found in central Sumatra, the Malay Peninsula and western Borneo; and (2) the species from central Sumatra, southern Malay Peninsula and western Borneo is indistinguishable from, and conspecific with *N. torquatus*. Therefore, *N. torquatus* is hereby rediagnosed as a species of *Nanobagrus* with one to three light yellow or cream bands encircling the body (very rarely without any such bands), length of adipose-fin base 69–97% length of anal-fin base and dorsal-to-adipose distance 18.8–25.5% SL. The length of the adipose-fin base as expressed as a ratio of SL distinguishes *N. fuscus* (14.9–16.5% SL) from



Fig. 3. Variation in color pattern of *Nanobagrus torquatus*: a. With three cream bands around body (ZRC 46144, 39.6 mm SL; Borneo: Sungai Serayan Besar drainage); b. With middle cream band around body almost missing (ZRC 46146, 30.0 mm SL; Borneo: Kapuas River drainage); c. With one cream band around nape and other two posterior cream bands around body very faint (ZRC 23358, 34.8 mm SL; Malaysia: Sungai Terengganu drainage); d. With one cream band around nape (ZRC 28424, 37.6 mm SL; Malaysia: Sungai Sedili Besar drainage); e. Without any cream bands on body (ZRC 46153, 36.7 mm SL; Malaysia: Johor River drainage).

Table 1. Morphometric data for *Nanobagrus fuscus* (n=3).

	Range	Mean±SD
Standard length (mm)	20.0–38.3	
%SL		
Predorsal length	37.9–42.0	39.7±2.10
Preanal length	65.3–69.5	67.1±2.15
Prepelvic length	47.5–50.1	48.9±1.31
Prepectoral length	22.2–26.5	24.5±2.16
Length of dorsal-fin base	12.2–13.5	13.0±0.70
Length of dorsal spine	4.7–10.1	8.1±2.96
Length of anal-fin base	15.1–16.0	15.6±0.45
Pelvic-fin length	12.0–13.5	13.0±0.87
Pectoral-fin length	13.0–18.4	16.1±2.80
Pectoral spine length	12.0–14.6	13.4±1.31
Caudal-fin length	28.7–33.5	31.3±2.42
Length of adipose-fin base	14.9–16.5	15.7±0.80
Dorsal to adipose distance	15.3–18.5	17.4±1.79
Post-adipose distance	14.9–16.7	15.5±1.01
Length of caudal peduncle	15.0–17.8	16.5±1.41
Depth of caudal peduncle	8.9–10.1	9.5±0.60
Body depth at anus	10.4–12.5	11.6±1.10
Head length	27.4–30.5	28.6±1.66
Head width	19.6–21.0	20.4±0.71
Head depth	11.7–12.5	12.1±0.40
%HL		
Snout length	29–33	30±2.3
Interorbital distance	25–32	29±3.6
Eye diameter	8–10	9±1.2
Nasal barbel length	24–56	45±17.9
Maxillary barbel length	86–89	88±1.7
Inner mandibular barbel length	28–39	34±5.7
Outer mandibular barbel length	71–83	76±6.1

N. torquatus (10.2–14.5% SL) amongst the material examined in this study. However, Thomson et al. (2008) report the length of the adipose-fin base of *N. torquatus* as 9.8–18.5% SL (although my measurements from the photographs of the type series indicate 10.2–15.1% SL), which entirely spans the range of values observed for both species. Because of the possible unreliability of this ratio in diagnosing the two species, I have instead used the length of the adipose-fin base expressed as a ratio of the anal-fin base length (i.e. a relative measure of the sizes of the adipose and anal fins) to distinguish between *N. fuscus* and *N. torquatus*; this character is useful for diagnosing the two species, as confirmed by measurement from the photographs of the type series of *N. torquatus*. The distribution range of *N. torquatus* is now expanded to comprise river drainages in central and southern Sumatra (Kampar River drainage southwards to the Musi River drainage), Malay Peninsula (from the Songkhla Lake drainage southwards) and western Borneo (Kapas River drainage northwards to the Belait River drainage; Fig. 2).

Comparative material

Nanobagrus torquatus: ZRC 44164 (2), 30.7–39.1 mm SL; ZRC 46246 (2), 31.8–34.2 mm SL; Sumatra: Jambi, Sungai Alai, 1°28'S 102°20'E. ZRC 41969 (4), 20.6–28.8 mm SL; Sumatra: Jambi,

Batang Hari drainage, Pijoan area, 1°35'S 103°28'E. ZRC 46247 (34 alc., 1 cs), 15.5–25.0 mm SL, Sumatra: Jambi, Batang Hari drainage, Jambi. MZB 15315 (holotype), 34.1 mm SL (photograph examined); ANSP 187394 (2 paratypes), 29.5–35.6 mm SL; CAS 226003 (2 paratypes), 31.9–33.0 mm SL (photographs examined); UF 167007 (5 paratypes), 29.7–36.0 mm SL (photographs examined); Sumatra: Sumatera Selatan, Air Musi drainage, Air Rambang, about 80 km SW of Palembang, 3°33'2"S 104°15'50"E. CMK 2919 (1), 31.7 mm SL; Thailand: Songkhla Province, Boripat, 30 km SW of Rattaphum on road to Satun. CMK 4149 (1), 24.9 mm SL; Thailand: Songkhla Province, Boripat. ZRC 23358 (1), 34.8 mm SL; Malaysia: Terengganu, Sungai Berang, just outside Sekayu Nature Park, 4°57'57"N 102°57'48"E. ZRC 46148 (2), 28.6–37.1 mm SL; Malaysia: Johor, Sungai Endau drainage, Sungai Kahang and tributary ca. 44.4 km from Mersing turnoff to Kluang just before side road to Endau Rompin Taman Negara, km 96 from Mersing to Batu Pahat, 2°3'56"N 103°31'35"E. ZRC 40263 (2), 21.6–29.8 mm SL; Malaysia: Johor, tributary of Sungai Batang Pinang, km 272 to Kluang. ZRC 46153 (3), 27.9–36.7 mm SL; Malaysia: Johor, Gunung Panti foothills, approximately 40 min by logging road between km 266 and km 267 on Kota Tinggi–Kuantan road, 1°52'11"N 103°52'44"E. ZRC 28418–28424 (8), 30.0–37.6 mm SL; ZRC 39955 (1), 29.5 mm SL; Malaysia: Johor, Sungai Sedili Besar drainage, Sungai Tementang, 1°52'1"N 103°55'49"E. ZRC 37860 (3), 15.4–32.1 mm SL; Borneo: Sarawak, Sungai Nibong, about 1 km N of Durin ferry point on Sri Aman–Sibu road. ZRC 46145 (1), 34.5 mm SL; Borneo: Sarawak, stream approximately 4.9 km before end of road to Kampung Pueh, near base of Gunung Pueh, 1°48'9"N 109°43'41"E. ZRC 39447 (2), 28.9–32.0 mm SL; Borneo: Sarawak, stream at km 22 to Sematan on Sematan–Lundu road, 1°46'35"N 108°44'44"E. ZRC 43644 (10), 27.3–34.9 mm SL; Borneo: Sarawak, Lundu, Sungai Sebiris, 8.7 km towards Sematan on Lundu–Sematan road after junction from Batang Kayan ferry point, 1°41'46"N 109°47'4"E. ZRC 46144 (16 alc., 2 cs), 34.0–42.6 mm SL; Borneo: Sarawak, Sungai Sebiris, on Sematan to Lundu road, 1°41'32"N 109°47'0"E. ZRC 39495 (2), 32.5–33.4 mm SL; Borneo: Sarawak, Sungai Stok Muda before Lundu, 1°28'51"N 109°58'18"E. ZRC 39495 (2), 32.5–33.4 mm SL; ZRC 26054 (1), 33.7 mm SL; Borneo: Sarawak, 42 km before Lundu from Kuching, after Sungai Stinggang. ZRC 46146 (2), 30.0–31.8 mm SL; Borneo: Kalimantan Barat, Kabupaten Pontianak, Sungai Kepayan, blackwater brook at km 58 from Pontianak on Pontianak–Anjungan road, approximately 7 km before Kampung Anjungan, 0°18'50"N 109°8'5"E. CMK 6901 (3), 41.3–42.0 mm SL; Borneo: Kalimantan Barat, Sungai Sibau where it splits into two branches, about 2 km upstream of Putussibau. CMK 6734 (2), 41.6–42.7 mm SL; Borneo: Kalimantan Barat, Insiluk, 16 km west northwest from Sanggau on road to Pontianak. Additional data from Thomson et al. (2008).

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