

***Bagrichthys majusculus*, a new catfish from Indochina (Teleostei, Bagridae)**

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A b s t r a c t. *Bagrichthys majusculus*, a new species of bagrid catfish from Indochina, is very similar to *B. macracanthus* and *B. vaillantii*, and has been previously identified as the former species. It differs from congeners in having a unique combination of the following characters: relatively large and broad mouth, well-developed oral dentition with homodont teeth, 10–13 gill rakers, moderately-long dorsal spine with 15–27 serrations, 9 pectoral-fin rays, inner and outer mandibular barbels with straight margins, pectoral-spine length 15.8–20.7 % SL (standard length), dorsal-spine length 24.4–32.5 % SL, length of adipose-fin base 46.0–50.7 % SL, adipose maximum height 9.9–10.5 % SL, depth of caudal peduncle 7.1–7.5 % SL, and head depth 14.0–16.1 % SL.

Key words: new species, *B. macracanthus*, *B. vaillantii*, Southeast Asia

Introduction

The genus *Bagrichthys* consists of highly-specialised bagrid catfishes found in large rivers throughout Southeast Asia. They are characterised by their elongate and laterally compressed caudal peduncle, dorsally-directed serrations on the posterior edge of the dorsal-fin spine, gill membranes united at the isthmus, and a long adipose fin without a free posterior margin. The taxonomy of *Bagrichthys* has been the subject of recent work (R o b e r t s 1989, N g 1999, 2000), and six species are currently recognised, viz. *B. hypselopterus* (Bleeker, 1852), *B. macropterus* (Bleeker, 1853), *B. macracanthus* (Bleeker, 1854), *B. vaillantii* (Popta, 1906), *B. micranodus* Roberts, 1989, and *B. obscurus* Ng, 1999.

Whilst comparing specimens identified as *B. macracanthus* from Indochina with those from Sumatra and Borneo, several significant differences in morphology were observed between the two populations. The population from Indochina is thus described in this study as belonging to a new species, *B. majusculus*.

Material and Methods

Measurements were made point to point with dial callipers and data recorded to 0.1 mm. 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 and counts were made following N g (2000).

Fin rays were counted under a binocular dissecting microscope using transmitted light. Vertebral counts were taken from radiographs following the method of R o b e r t s (1994). Numbers in parentheses following a particular fin-ray, branchiostegal-ray, gill-raker or vertebral count indicate the number of specimens with that count. Institutional codes follow E s c h m e y e r (1998).

Bagrichthys majusculus, new species (Fig. 1)

Pseudobagrichthys macracanthus (non Bleeker, 1854) – Bleeker 1865a: 34, 1865b: 175.

Bagroides macracanthus (non Bleeker, 1854) – Sauvage 1883: 161, Durand 1940: 30, Smith 1945: 378, Suvatti 1936: 77, 1950: 292, Kuronuma 1961: 6, Taki 1968: 20, 1974: 50, Fig. 51, Orsi 1974: 161, Desoutter 1975: 458, Kottelat 1985: 270, Mai & Nguyen 1988: 49, Malet al. 1992: 185.

Bagrichthys hypselopterus (non Bleeker, 1852) – Chevey 1932: 17, Chaux & Fang 1949: 342, Kuronuma 1961: 6.

Bagroides hypselopterus (non Bleeker, 1852) – Kottelat 1989: 13.

Bagrichthys macracanthus (non Bleeker, 1854) – Jayaram 1968: 378 (in part), Roberts 1993: 33, Rainboth 1996: 139.

Holotype: UMMZ 214916, male, 121.4 mm SL; Thailand: Ubon Ratchathani province, Khong Chiam district, Mun River at Ban Dan, 3 km upstream from Mekong River confluence; W. J. Rainboth, R. E. Arden & Y. Dhammigbavorn, 12 June 1975.

Paratypes: CAS 92487, 1 male, 121.0 mm SL; 1 female, 131.0 mm L; Laos: Mekong at Ban Hang Khone, just below Khone Falls; T. R. Roberts, June–July 1993. MCZ 51318, 1 male, 157.9 mm SL, 1 female, 176.6 mm SL; Thailand: Nong Khai market; T. R. Roberts, 13 May 1970. UMMZ 224380, 1 female, 96.8 mm SL; Vietnam: Phung Ding province, S side of Can Tho island, 3 km SE of Can Tho; E. D. Buskirk, 1974. UMMZ 224578, 1 female, 124.8 mm SL; Thailand: Khon Kaen province, Nam Pong Reservoir, 50 m from E shore, 3 km S of fish landing; W. J. Rainboth et al., September 1974. UMMZ 232306, 1 male, 138.4 mm SL; 1 female, 166.6 mm SL; Cambodia: Stung Treng morning market; W. J. Rainboth, N. van Zalinga & C. Rotha; 26 January 1995. UMMZ 232545, 1 female, 123.6 mm SL; Cambodia: Kandal province, Tonle Sap; W. J. Rainboth & C. Rotha, 13 February 1995. UMMZ 239654, 1 male, 129.6 mm SL; Laos: Mekong River at Ban Hang Khone, just below Khone Falls; I. Baird, date unknown. USNM 297278, 1 female, 105.7 mm SL; Thailand: Roi Et province, Lam Chi, 1.5 km below highway 23 bridge, 4 km W of Selaphum; WBD-Mekong expedition, 31 January 1971. USNM 315902, 1 female, 124.6 mm SL; Thailand: Ubon Ratchathani province, market in Ubon at edge of Mun River; WBD-Mekong expedition, 14 September 1971.

Diagnosis: *Bagrichthys majusculus* differs from other congeners in having a unique combination of the following characters: relatively large and broad mouth, well-developed oral dentition with homodont teeth, 10–13 gill rakers, moderately long dorsal spine with



Fig. 1. *Bagrichthys majusculus*, paratype male, MCZ 51318, 157.9 mm SL; Thailand: Nong Khai.

15–27 serrations, 8–9 pectoral-fin rays, inner and outer mandibular barbels with straight margins, pectoral-spine length 15.8–20.7 % SL, dorsal-spine length 24.4–32.5 % SL, length of adipose-fin base 46.0–50.7 % SL, adipose maximum height 9.9–10.5 % SL, caudal peduncle depth 7.1–7.5 % SL, and head depth 14.0–16.1 % SL.

D e s c r i p t i o n : Body long and compressed. Dorsal profile rising evenly and steeply from tip of snout to origin of dorsal fin, then sloping ventrally from there to end of caudal peduncle. Ventral profile flat to anal-fin base, then sloping dorsally from there to end of caudal peduncle. Anus and urogenital openings located at vertical through middle of adpressed pelvic fin. Skin smooth. Lateral line complete and midlateral, with long tubular epidermal extensions of the sensory pores.

Head somewhat compressed and narrow, anterior part produced into a prominent protruding snout with somewhat truncate margin when viewed laterally. Mouth inferior and relatively small, with papillate lips. Gill openings wide, extending from exposed surface of posttemporal to beyond isthmus. Gill membranes free from, and not attached across, isthmus. Eye ovoid, horizontal axis longest; located entirely in dorsal half of head. Orbit with free margin.

Barbels in four pairs. Maxillary barbel moderately long, extending to opercular flap. Nasal barbel slender and short, extending to posterior margin of orbit (females) or to midway between posterior margin of orbit and base of supraoccipital (males). Inner mandibular-barbel origin close to midline; barbel thicker and longer than nasal barbel and extending to level of anterior margin of orbit. Outer mandibular barbel originates posterolateral of inner mandibular barbel, extending to level of centre of orbit.

Oral teeth small and in irregular rows on all tooth-bearing surfaces. Premaxillary tooth band rounded, of equal width throughout. Dentary tooth band broader than premaxillary tooth band, widening laterally and then tapering to a sharp point posterolaterally. Vomerine tooth band unpaired, continuous across midline; strongly arched along anterior margin; band width broader than premaxillary band.

Dorsal fin located at middle of body; origin nearer tip of snout than caudal flexure. Dorsal-fin margin convex, usually with anterior branch of fin rays longer than other branches. Last dorsal-fin ray without posterior membranous connection to body. Dorsal-fin spine short, straight and robust, with 15–29 serrations on posterior margin. Adipose fin with margin convex for entire length; posterior end deeply incised. Caudal fin deeply forked; upper and lower lobes pointed, with outermost principal fin-rays produced into filaments. Procurrent rays symmetrical and extending only slightly anterior to fin base. Anal-fin base ventral to posterior half of adipose fin. Fin margin curved or straight. Last anal-fin ray without posterior membranous connection to body. Pelvic-fin origin at vertical through posterior end of dorsal-fin base. Pelvic-fin margin slightly convex, tip of adpressed fin not reaching anal-fin origin. Pectoral fin with stout spine, sharply pointed at tip. Anterior spine margin smooth; posterior spine margin with 12–21 serrations along entire length. Pectoral-fin margin straight anteriorly, convex posteriorly. In % SL: head length 19.2–20.6, head width 11.3–13.7, head depth 14.0–16.1, predorsal distance 35.4–38.6, preanal length 58.7–62.9, prepelvic length 40.2–45.4, prepectoral length 18.0–20.3, body depth at anus 17.5–21.1, length of caudal peduncle 27.2–31.4, caudal peduncle depth 7.1–7.5, pectoral-spine length 15.8–20.7, pectoral-fin length 17.2–19.4, dorsal-spine length 24.4–32.5, length of dorsal-fin base 11.3–12.8, pelvic-fin length 14.6–16.6, length of anal-fin base 11.0–12.6, caudal-fin length 25.5–35.2, length of adipose-fin base 46.0–50.7, adipose maximum height 9.9–10.5, post-adipose distance 8.8–12.0; in % HL: snout length 30.6–36.3, interorbital distance 26.4–33.6, eye diameter 14.1–17.2, nasal barbel length 25.3–35.5 (females) or

47.0–66.6 (males), maxillary barbel length 54.0–66.1 (females) or 66.1–89.9 (male), inner mandibular barbel length 12.8–14.1 (females) or 14.3–15.3 (males), outer mandibular barbel length 16.9–25.0 (females) or 25.0–27.6 (males). Branchiostegal rays 5 (7) or 6 (1). Gill rakers 3+7 (2), 3+9 (2), 4+8 (1) or 3+10 (1). Vertebrae 17+25=42 (1), 18+24=42 (1), 18+25=43 (3), 18+26=44 (2), 19+25=44 (4) or 19+26=45 (1).

Fin ray counts: dorsal II,7 (8); pectoral I,8 (1) or I,9 (7); pelvic i,5 (8); anal iii,10 (1), iv,9 (1), iv,10 (2), iii,11 (1), iv,11 (2) or v,10 (1); caudal 8/9 (8).

Colour in alcohol: dorsal surface of head and body uniform brown or dark brown, with a cream-coloured midlateral streak running along entire length of body. Large regularly spaced cream-coloured patches occasionally present on nape and sides of body below anterior third of adipose fin and immediately above posteriormost anal-fin ray; patches sometimes coalescing to form bands. Ventral surfaces of head and body cream; adipose fin and fin rays of all fins brown; inter-radial membranes of all fins with scattered melanophores.

D i s t r i b u t i o n : Known from the Mekong and Chao Phraya River drainages in Indochina.
E c o l o g y : *Bagrichthys majusculus* feeds on crustaceans and other small benthic animals (T a k i 1978). It spawns at the beginning of the rainy season in flooded riparian forests, with juveniles beginning to appear in August (R a i n b o t h 1996).

E t y m o l o g y : From the Latin *majusculus*, meaning somewhat greater, in reference to the relatively larger adipose fin base, pectoral and dorsal spines of this species when compared to *B. macracanthus*, its closest congener.

R e m a r k s : *Bagrichthys majusculus* differs from *B. hypselopterus* in having fewer gill rakers on the first gill arch (10–13 vs. 14–15), serrations on the posterior margin of the pectoral spine (15–27 vs. 60 or more) and pectoral-fin rays (8–9 vs. 10–11), the nape and dorsal-fin base slightly (vs. very strongly) elevated, inner and outer mandibular barbels with straight margins (vs. convoluted anterior margins), and jaw teeth homodont, i.e. of one kind (vs. markedly heterodont, i.e. of different kinds). It differs from *B. macropterus*, *B. micranodus*, and *B. obscurus* in having a relatively large and broad (vs. small and narrow) mouth with well-developed, i.e. with exposed teeth forming well defined tooth bands (vs. extremely reduced, i.e. with few scattered teeth deeply buried in soft tissue) oral dentition, and a longer pectoral spine (24.4–32.5 % SL vs. 15.3–21.0).

Bagrichthys majusculus most closely resembles *B. macracanthus* and *B. vaillantii*, but can be differentiated from both species in having a longer pectoral spine (pectoral-spine length 15.8–20.7 % SL vs. 11.5–16.2), the former in having a larger adipose fin (length of adipose-fin base 46.0–50.7 % SL vs. 38.8–45.8), deeper caudal peduncle (depth of caudal peduncle 7.1–7.5 % SL vs. 5.6–7.0), and the latter in having a longer dorsal spine (dorsal-spine length 24.4–32.5 % SL vs. 18.2–21.9), more slender head (head depth 14.0–16.1 % SL vs. 16.2–19.0) and a deeper adipose fin (adipose maximum height 9.9–10.5 % SL vs. 8.2–9.5).

From the results of this study and a previous one by N g (1999), it is clear that there are two species of *Bagrichthys* in Indochina that are closely related to morphologically similar Sundaic species. Although R a i n b o t h (1996) postulated that there may be more than one species of *Bagrichthys* with long dorsal spines in the Mekong River, the results here indicate that *B. majusculus* is the only such species present in the Mekong.

The historical biogeography of Indochinese *Bagrichthys* is probably similar to that for *Hemisilurus* proposed by B o r n b u s c h & L u n d b e r g (1989), i.e. an ancestral *Bagrichthys* in the North Sunda River system splitting into the *B. hypselopterus* + *B. macracanthus* + *B. majusculus* (diagnosed as having long dorsal spines with 18 or more serrations in adults, and exposed jaw and palatal teeth forming well defined tooth bands)

and *B. macropterus* + *B. micranodus* + *B. obscurus* lineages (diagnosed as having short dorsal spines with 15 or less serrations in adults, and scattered jaw and palatal teeth deeply buried in soft tissue) not later than the Pleistocene, with subsequent divergence by the post-Pleistocene isolation of the Indochinese and Sundaic populations.

Comparative material: *Bagrichthys hypselopterus*: CAS 49366, 2 ex., 228.4–242.7 mm SL; Borneo: Kalimantan Barat, fish market at Sintang. CAS 49367, 1 ex., 179.2 mm SL; Borneo: Kalimantan Barat, Sungai Tawang near Pengembung. ZRC 40472, 1 ex., 242.0 mm SL; ZRC 41532, 15 ex., 166.1–279.5 mm SL; ZRC 41898, 1 ex., 208.8 mm SL; Sumatra: Jambi, Pasar Angso Duo (fish market).

Bagrichthys macracanthus: CMK 11278, 2 ex., Sumatra: Jambi, Danau Arang Arang. ZMA 101.457, 3 ex., 107.1–195.4 mm SL; Sumatra: Jambi, Batang Hari. ZRC 14251, 1 ex., 115.5 mm SL; Peninsular Malaysia: Selangor, North Selangor peat swamp forest, pools at Sungai Bernam headworks. ZRC 38547, 2 ex., 36.2–67.3 mm SL; Sumatra: Jambi, Sungai Kumpeh in Arang Arang. ZRC 38633, 1 ex., 108.4 mm SL; Sumatra: Jambi, Danau Arang Arang. ZRC 39034, 1 ex., 101.9 mm SL; Sumatra: Riau, Sungai Bengkwan, tributary of Indragiri River, 4 hours downstream from Rengat. ZRC 41533, 1 ex., 145.2 mm SL; ZRC 41897, 1 ex., 169.2 mm SL; ZRC 44118, 12 ex., 109.7–160.6 mm SL; Sumatra: Jambi, Pasar Angso Duo (fish market). ZRC 42601, 1 ex., 52.8 mm SL; Sumatra: Jambi. ZRC 44161, 4 ex., 89.5–113.2 mm SL; Sumatra: Jambi, Sungai Alai. ZRC 46030, 2 ex., 101.0–134.8 mm SL; Borneo: Sarawak, Kapit market.

Bagrichthys macropterus: USNM 230275, 4 ex., 99.3–148.5 mm SL; Borneo: Kalimantan Barat, Kapuas mainstream 58 km NE of Sintang and 1 km downstream from Sebruang. ZRC 38997, 1 ex., 224.8 mm SL; ZRC 41534, 5 ex., 199.7–296.9 mm SL; Sumatra: Jambi: Pasar Angso Duo (fish market).

Bagrichthys micranodus: CAS 49369, 2 paratypes, 71.3–94.7 mm SL; USNM 230267, 3 paratypes, 58.1–75.2 mm SL; Borneo: Kalimantan Barat, Kapuas River 58 km NE of Sintang and 1 km downstream from Sebruang. CMK 7015, 1 ex., 180.0 mm SL; Borneo: Kalimantan Barat, Kapuas River at Nanga Embaloh.

Bagrichthys obscurus: USNM 317511, holotype, 153.2 mm SL; Thailand: Roi Et province, Lam Chi, 1.5 km below highway 23 bridge, 4 km W of Selaphum. CAS 92567, 1 paratype, 249.1 mm SL; Laos: Mekong below Khone Falls. CAS 92580, 2 paratypes, 166.6–216.1 mm SL; Laos: Mekong at Ban Hang Khone, just below Khone Falls. UMMZ 214485, 1 paratype, 113.7 mm SL; UMMZ 214486, 1 paratype, 128.3 mm SL; Thailand: Ubon Ratchathani province, Khong Chiam district, Mun River at Ban Dan, 3 km upstream from confluence with Mekong River. UMMZ 232307, 2 paratypes, 192.5–203.3 mm SL; Cambodia: Stung Treng morning market. USNM 297111, CAS 61918, 22 ex., 64.2–188.0 mm SL; Thailand: fish market at Ubon Ratchathani.

Bagrichthys vaillantii: RMNH 7839, 1 ex., 90.6 mm SL; Borneo: Tepoe. CAS 93398, 1 ex., 102.1 mm SL; eastern Borneo. CAS 93403, 1 ex., 172.3 mm SL; Borneo: Kalimantan Timur, Sungai Belayan from mouth of Sungai Sentekan southwards for about 6 km. CMK 7635, 5 ex., 107.8–152.8 mm SL; Borneo: Kalimantan Timur, stream connecting Mahakam River to Danau Semajang.

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