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A new species of *Pseudobagrus* (Teleostei: Siluriformes: Bagridae) from southern China

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Abstract

A new species of bagrid catfish, *Pseudobagrus gracilis*, is described from specimens collected from the Zhujiang (Pearl River) basin, southern China. It closely resembles *P. adiposalis* Oshima and *P. ussuriensis* (Dybowski), but differs in having a large elliptical eye (19.8–24.4% HL), a short maxillary barbel not reaching the posterior margin of the eye, a lightly serrated posterior edge on the second dorsal spine, a caudal fin slightly emarginated with upper lobe slighter longer than lower lobe, frontal concave with a smooth surface, and supraoccipital process short (far from the first basal bone of the dorsal spine).

Key words: Siluriformes, Bagridae, *Pseudobagrus*, new species, southern China

Introduction

All species of the bagrid catfish genus *Pseudobagrus* Bleeker, 1859 share the following features: an inferior mouth; narial openings widely separated; four pairs of barbels; top of head covered by skin, except the posterior process of supraoccipital in some species; two dorsal spines; pelvic fin small; caudal fin emarginate, truncate or round. Currently 15 nominal species of *Pseudobagrus* are recognised in China (Zheng and Dai, 1999), accounting for about half of the worlds species in the genus (see Ng, 2003). However, relatively little work has been done on bagrid catfishes (Ng, 2003), members of *Pseudobagrus* are morphologically similar, and diagnostic characters are usually subtle. A need to further study the systematics of this genus prompted this study.

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Material and Methods

Fish sampling was conducted in October and November 2004 in the Zhujiang (Pearl River) basin, southern China. Upon close examination, specimens of the *Pseudobagrus* species obtained show morphometric and osteological differences to known species, suggesting a new species. Measurements were made with dial calipers and data recorded to 0.01 mm. Counts and measurements were made on the left side of the 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). Drawings of the specimens were made with a Nikon Wild M-5 microscope. Institutional acronyms follow Eschmeyer (1998) with the exception of South China Normal University (SCNU).

Pseudobagrus gracilis sp. nov. (Fig. 1)

Measurements were taken on 16 specimens (62.80–203.76mm TL, 54.98–173.07mm SL) collected from Wushui drainage, Shaoguan City, Guangdong Province and Lijiang drainage, Guilin City, Guangxi Province; tributaries of the Beijiang and Xijiang rivers, respectively. Both rivers are tributaries of the Zhujiang, the largest catchment basin in southern China draining into the South China Sea. Collecting localities are shown in Fig. 2.

FIGURE 1. Lateral and ventral views of *Pseudobagrus gracilis* sp. nov. SCNU 0410007 (paratype), 101.91mm TL, 86.85mm SL; China: Guangxi Province, Guilin City, Zhujiang basin, Lijiang drainage.

FIGURE 2. Collecting localities of *Pseudobagrus gracilis* sp. nov. Only the collecting sites and the three major tributaries of the Zhujiang basin are illustrated. Collecting localities are shown as asterisks.

Holotype: SCNU 0410002, 203.76mm TL, 173.07mm SL; China: Guangxi Province, Guilin City, Zhujiang basin, Lijiang drainage; 29° 55' 23 N118° 28' 12 E; Li Jie, 26 October 2004.

Paratypes: SCNU 0410007–0410009 (3), 101.91–125.41mm TL, 86.85–110.31 mm SL; collection locality and collector as holotype. SCNU 0411008, UF 149607 (115.22mm TL, 97.22mm SL) and SCNU 0411010 (3), 78.92–131.23mm TL, 67.46–92.55 mm SL; China: Guangdong Province, Shaoguan City, Zhujiang basin, Wushui drainage; 24°48' N113° 35' E; Li Jie, 7 November 2004.

Diagnosis Among southern Chinese congeners, *Pseudobagrus gracilis* most closely resembles *P. adiposalis* and *P. ussuriensis*, but differs from topotypes of *P. adiposalis* and *P. ussuriensis* in possessing a larger elliptical eye (19.8–24.4% HL vs. 11.5–12.7% HL in *P. adiposalis* and 12.4–13.9% HL in *P. ussuriensis*), lower body depth (11.2–16.4% SL vs. 14.2–16.1% SL in *P. adiposalis* and 14.8–18.4% SL in *P. ussuriensis*), lower caudal peduncle depth (5.2–8.0% SL vs. 6.9–7.9% SL in *P. adiposalis* and 6.6–8.7% SL in *P. ussuriensis*), fewer serrae on the posterior edge of the pectoral fin spine (10–11 vs. 14 in *P. adiposalis* and 12–14 in *P. ussuriensis*), and fewer vertebrae (5+42–43 vs. 5+46–47 in *P. adiposalis* and 5+44 in *P. ussuriensis*).

Additionally, the new species shows the following differences from *P. adiposalis*: posterior margin of second dorsal spine lightly serrated (vs. smooth) and subequal caudal lobes, with upper lobe slighter longer (vs. symmetrical lobes of equal length). It also differs from *P. ussuriensis* in having more gill rakers (11–13 vs. 10–11) and a caudal fin without black margin (vs. with prominent black margin). The new species also has a wider distance between the supraoccipital process and the first dorsal spine than does *P. adiposalis and P. ussuriensis*. Major diagnostic features of *Pseudobagrus gracilis* in comparison with *P. adiposalis* and *P. ussuriensis* are summarized in Table 1.

TABLE 1. Diagnostic features distinguishing *Pseudobagrus gracilis* sp. nov. from *P. adiposalis* and *P. ussuriensis*.

	P. gracilis (n=10)	*P. adiposalis* (n=3)	*P. ussuriensis* (n=5)
Caudal fin shape	Slightly emarginated with upper lobe slighter longer	Slightly emarginated with symmetrical lobes	emarginate
Posterior margin of second dorsal spine	lightly serrated	smooth	serrated
Meristic			
Number of serrae on posterior edge of pectoral fin spine	10–11	14	12–14
Number of gill rakers	11–13	12	10–11
Number of vertebra	5+42–43	5+46–47	5+44
Morphometric			
%SL			
Body Depth	11.2–16.4	14.2–16.1	14.8–18.4
Caudal peduncle depth	5.2–8.0	6.9–7.9	6.6–8.7
%HL			
Snout length	30.6–35.1	30.5–34.3	27.5–33.6
Eye diameter	19.8–24.4	11.5–12.7	12.4–13.9
Distance between supraoccipital process and the first basal bone of dorsal spine	wide	close	connected

Pseudobagrus gracilis can be readily distinguished from other species of *Pseudobagrus* of southeastern China as follows: from *P. ondon* Shaw in having the anterior edge of the pectoral spine smooth (vs. serrated); from *P. pratti* (Gunther) in having a slightly emarginate caudal fin (vs. moderately forked); from *P. tenuis* (Gunther) in having an emarginate caudal fin (vs. round fin with prominent white margin); from *P. truncatus* (Regan) in having more vertebrae (5+42–43 vs. 5+39–40), posterior edge of second dorsal spine slightly serrated (vs. smooth), more gill rakers (11–13 vs. 8–10), and gonopore slightly closer to origin of anal fin than to distal origin of pelvic fin (vs. slightly closer to distal origin of pelvic fin than to origin of anal fin). Figure 3 depicts the different caudal fin shapes of various Chinese *Pseudobagrus* species.

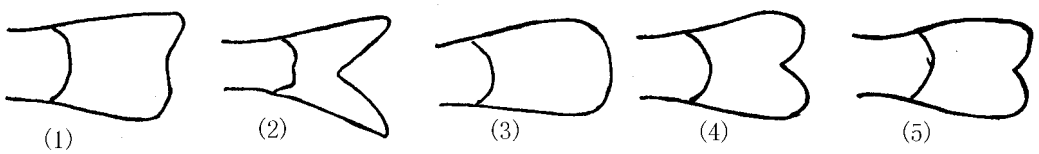

FIGURE 3. The caudal fin shape of five Chinese *Pseudobagrus* species: (1) *P. gracilis*, (2) *P. pratti*, (3) *P. tenuis*, (4) *P. ussuriensis*, (5) *P. adiposalis*.

In comparison with the morphologically most similar *P. adiposalis*, the new species has the following distinctive osteological characters (Fig. 4): the neck of the mesethmoid is elongated (vs. short and stout in *P. adiposalis*); frontal edge smooth (vs. rough); both the anterior and posterior fontanelle well developed (vs. not well developed, with a longer anterior fontanelle and a fused posterior fontanelle); supraoccipital process short, distally not forked, and far from the first dorsal spine (vs. supraoccipital process long, distally forked and close to the first dorsal spine).

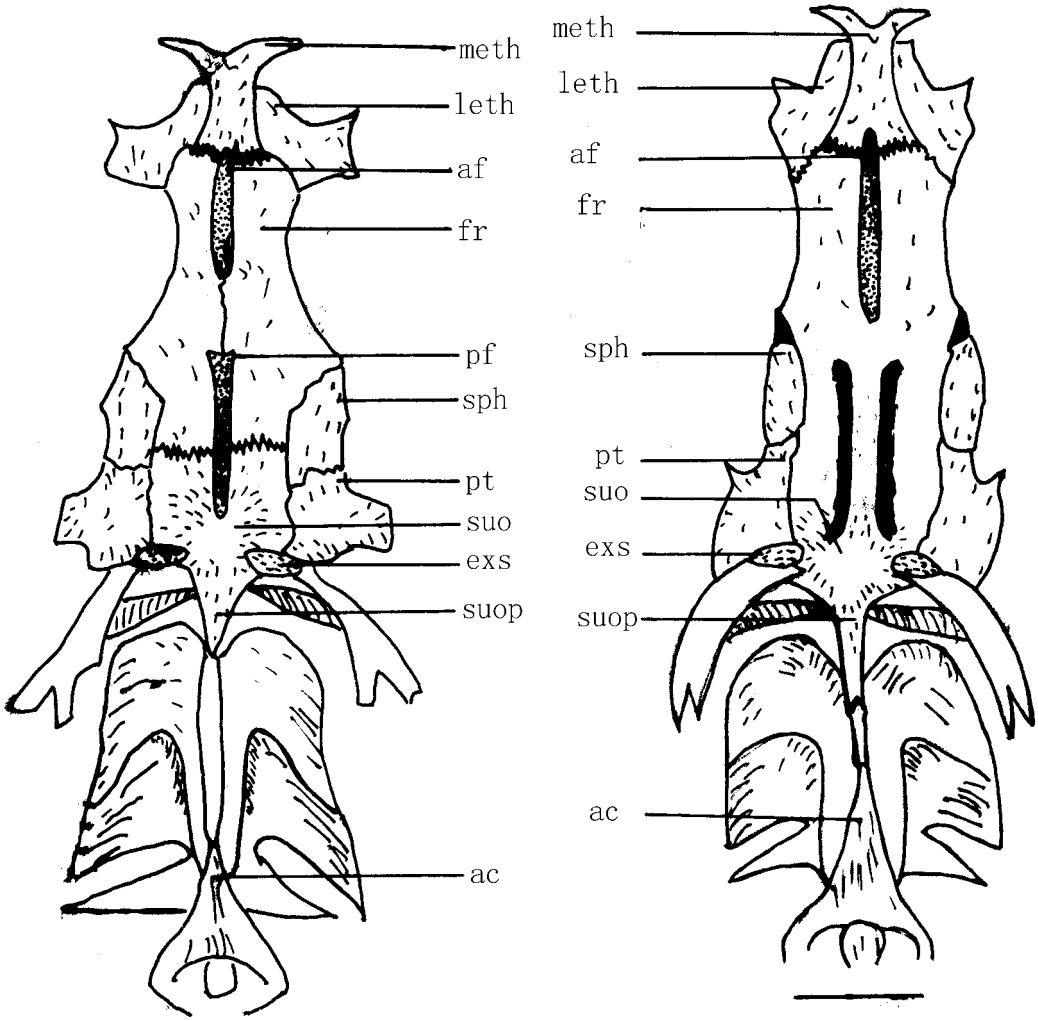

FIGURE 4. Cranium (dorsal view) of *Pseudobagrus gracilis* sp. nov. (left) and *Pseudobagrus adiposalis* (right): ac = actinost (the basal bone of dorsal spine), af = anterior fontanelle, exs = extrascapular, fr = frontal, leth = lateral ethmoid, meth = mesethmoid, pf = posterior fontanelle, pt = pterotic, sph = sphenotic, suo = supraoccipital, suop = posterior process of supraoccipital. Bar = 5.2mm

Description. Body elongated and cylindrical, laterally compressed posterior to the pelvic fin. Head broad and wide, dorsally flattened, covered by smooth skin. Snout rounded. Upper jaw protruded, mouth subterminal; large, fleshy lips present, joined at corner of mouth. Upper jaw teeth villiform, forming dentary patches. Eyes large, elliptical, located on anterior half of head; visible dorsally, but not ventrally. Nostrils widely separated, tubular anterior pair located anterolaterally on snout tip; fleshy posterior pair located dorsally immediately before eye. Four pairs of barbels relatively short and white; nasal barbels nearly reaching to anterior edge of eye; maxillary barbels reaching to posterior edge of eye, but not the branchiostegal membrane; outer mandibular barbels reaching to center of eye; inner mandibular barbels approximately half the length of the outer mandibular barbel. Gill opening wide, gill membranes fused, not connected with gular fold.

Body naked, lateral line complete and straight. Dorsal fin short, origin of dorsal fin between pectoral and pelvic fins, closer to tip of snout than to origin of adipose fin. First dorsal spine tiny and subcutaneous, second dorsal spine long, almost equal to body height, anterior edge smooth, posterior edge slightly serrated. Adipose fin moderately long with a rounded distal margin separated from body. Pectoral fin spine slightly shorter than second dorsal spine, anterior edge smooth but with serrations on posterior edge. Pelvic fin much closer to anal fin than to pectoral fin, but distal margin not reaching anal fin. Origin of anal fin behind origin of adipose fin, the length of the anal fin shorter than the length of the adipose fin. Caudal fin slightly emarginated, both lobes of juveniles having equal length, but the upper lobe is slightly longer in the adult. Some individuals have white on the tips of the lobes. Gonopore slightly closer to anal fin than to pelvic fin; urogenital papillae not reaching anal fin.

Proportional measurements. Morphometric data of *Pseudobagrus gracilis* are listed in Table 2.

Counts (n = 10). Branchiostegal rays: 8–12. Gill rakers: 11–13. Fin ray counts: dorsal II–7; pectoral I–7; pelvic i–5; anal 17–21 (average 19). Vertebral counts: 5+42–43. Swimbladder with one chamber.

Coloration The dorsum is dark grey, and the underside is whitish in live specimens. Alcohol-preserved specimens are greyish-brown dorsally, and flanks have a lighter tinge.

Distribution. *Pseudobagrus gracilis* has been collected from the Wushui drainage of the Beijiang drainage in Guangdong Province and the Lijiang drainge of the Xijiang drainage in Guangxi Province; there are also literature records (misidentified as *P. adiposalis*) from the Dongjiang drainage in Guangdong Province (Ye, 1991). These drainages are all part of the Zhujiang catchment basin in southern China, which discharges into the South China Sea. *Pseudobagrus gracilis* appears to be a Zhujiang endemic.

Ecology. *Pseudobagrus gracilis* is found in medium to large rivers in lowland areas. These waterways have a rocky substrate with moderate or fast current, and water clarity is generally good. Sampling data suggests that *P. gracilis* may be nocturnal as are many other catfishes, but its ecology and biology are otherwise unknown.

TABLE 2. Morphometric data for *Pseudobagrus gracilis* (n=10).

	Holotype	Range	Mean ±SD
% SL			
Total length	115.3	113.7–118.5	115.8±1.70
Body depth	11.2	11.2–16.4	14.0±1.69
Head length	18.8	18.8–24.6	21.2±1.61
Predorsal length	27.4	27.4–34.4	31.6±2.63
Preanal length	56.1	56.1–65.6	59.6±2.71
Prepelvic length	43.6	43.6–49.7	46.5±2.37
Prepectoral length	16.4	16.3–21.7	18.5±1.79
Length of dorsal fin base	8.9	8.3–10.4	9.5±0.82
Anal fin length	26.7	18.3–26.7	23.6±2.39
Pelvic fin length	10.2	10.1–12.7	11.6±0.98
Pectoral fin length	13.5	13.5–18.4	15.9±1.57
Caudal fin length	15.3	13.7–17.8	15.9±1.29
Length of adipose fin base	24.2	24.2–29.5	27.3±1.47
Caudal peduncle length	17.3	15.9–18.0	17.1±0.66
Caudal peduncle depth	5.2	5.2–8.0	6.7±0.92
% HL			
Head width	68.1	63.9–75.9	69.9±4.19
Mouth width	43.2	34.8–44.5	39.2±3.36
Snout length	34.4	30.6–35.1	33.6±2.16
Interorbital distance	28.9	28.8–36.2	31.2±2.01
Eye diameter	20.7	19.8–24.4	21.7±1.44
Nasal barbel length	24.7	17.4–28.0	23.6±4.04
Maxillary barbel length	45.5	41.8–56.8	49.8±4.99
Inner mandibular barbel length	20.9	17.1–27.0	22.7±3.19
Outer mandibular barbel length	31.9	28.4–41.6	35.9±4.05

Etymology *Gracilis* is Latin for slender. The species is named for its elongated and thin body form (see Fig. 1).

Discussion

The new species has been confused or misidentified with two other *Pseudobagrus* species since records have been made for freshwater fishes in South China. Yue (1981) recognised *Pseudobagrus (Leiocassis) pratti* in Guangxi Province, but from the description and line drawing the species seems to be *P. gracilis*. Pan (1984) collected an elongated bagrid from the Beijiang drainage of the Zhujiang basin and also called it *Leiocassis pratti*, but did not provide descriptions or figures. Cheng and Zheng (1987) and Zhu (1995) listed *P. adiposalis* as native to southeastern China, from Danshui River of Taiwan, Lingjiang and

Oujiang of Zhejiang Province, Xianjiang of Hunan Province, and the Zhujiang basin. Ye (1991) also reported *P. adiposalis* from the Dongjiang drainage of the Zhujiang basin. Gao (1991) and Zheng and Dai (1999) likewise failed to recognise these cryptic species. It is likely that the authors failed to distinguish these species within this large geographic area.

We examined the literature cited above and examined specimens of *P. pratti* Pan (1984) collected in the Beijiang and topotypes of *P. adiposalis* Oshima, collected in Taiwan. Evidence presented here suggests that most information in the literature referring to *P. pratti* and *P. adiposalis* from South China likely pertains to *P. gracilis*, which apparently is endemic to the Zhujiang basin. *P. gracilis* and *P. pratti* are two distinct species, easily separable by caudal fin shape (emarginate in *P. gracilis* vs. deeply forked in *P. pratti*, see Fig. 3) and distribution (Zhujiang vs. upper Yangtze), and distinct from *P. adiposalis* by meristic counts, morphometrics, osteology (see *Diagnosis and Description*), and distribution (vs. Danshui River, Taiwan Island).

Systematic position

The development of fontanelle may well be indicative of an evoluntionary trend in the genus *Pseudobagrus*, from two well-developed fontanelle to the disappearance of the posterior fontanelle. *P. gracilis* has well-developed fontanelle indicating that it is probably a primitive member of the genus whereas *P. adiposalis* has a reduced posterior fontanelle indicating evolutionary advancement. Another putative evoluntionary trend is the increase in the length of the basal bone of the dorsal spine.

Osteological examination of various *Pseudobagrus* species suggests that the new species has many primitive characters most comparable to those of *P. albomarginatus* (Rendahl), including the possession of well-developed fontanelle and moderately developed supraoccipital bone. *P. adiposalis*, on the other hand, has a diminutive posterior fontanelle and a well-developed supraoccipital bone, with a pronounced process along the median line. More work is needed to ascertain whether the insular *P. adiposalis* evolved from *P. gracilis* on the mainland.

Comparative material

Holotype: *P. truncatus* BMNH 1891.6.13.24; *P. pratti*: BMNH 1891,6.13:25.

Topotype: *P. adisposalis* (3): SCNU 2002.07001. SCNU 2001.04.002. SCNU 2001.05.003; *P. truncatus* (3): SCNU 1992.08002–004; *P. ondon* (5) SCNU.2001.08.001–005. *P. ussuriensis* (5) SCNU 0409001–0409005;

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