

**HEMIBAGRUS GRACILIS, A NEW SPECIES OF LARGE
RIVERINE CATFISH (TELEOSTEI: BAGRIDAE)
FROM PENINSULAR MALAYSIA**

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ABSTRACT. - A new species of large riverine bagrid catfish, *Hemibagrus gracilis*, is described from the eastern part of Peninsular Malaysia. *Hemibagrus gracilis* seems to be most closely allied to *H. planiceps*, but differs in having a proportionately more elongate body, longer snout, lower and more slender caudal peduncle, as well as more vertebrae. The complicated taxonomy of the related species, *H. nemurus* is also discussed.

INTRODUCTION

Four species of the riverine catfish genus *Hemibagrus* Bleeker, 1862 (Bagridae) are known at present from Peninsular Malaysia, viz. *H. nemurus* (Valenciennes, 1840), *H. planiceps* (Valenciennes, 1840), *H. hoevenii* (Bleeker, 1846) and *H. wyckii* (Bleeker, 1858) (Zakaria-Ismail, 1987; Lim et al., 1993; Kottelat & Lim, 1995). The more widely used genus, *Mystus* Scopoli, 1777, was redefined by Mo (1991), and as a result, most of the larger Malaysian species previously assigned to *Mystus* have been transferred to *Hemibagrus*. The genus *Hemibagrus* (type species *Bagrus nemurus* Valenciennes, 1840) is known from Southeast Asia, Indo-China and southern China (Mo, 1991).

Lim et al. (1990a, b) recorded a relatively large and elongate *H. nemurus*-like fish (referred to as a *Mystus*) from the Endau-Rompin State Park, in southeastern Peninsular Malaysia, which they noted might be related to *H. planiceps*. Because both *H. nemurus* and *H. planiceps* were very briefly described and without any figures, the precise definition of these two species have been poorly known. Roberts (1989) provided data on several species synonymised under or allied to *H. nemurus* and discussed their affinities. Roberts (1993) subsequently clarified the identities of *H. nemurus* and *H. planiceps*, providing data and figures for the types of Javanese species described by Valenciennes (1840) from Java.

Comparisons of the Endau-Rompin specimens with *H. nemurus* and *H. planiceps* (both fide Roberts, 1993), as well as analysis of their mitochondrial DNA (Dodson et al., 1995) show that they belong to a new species, herein described.

The following abbreviations are used: ZRC = Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore; mt DNA = mitochondrial DNA; SL = standard length; TL = total length; HL = head length. Measurements used follow Figure 1.

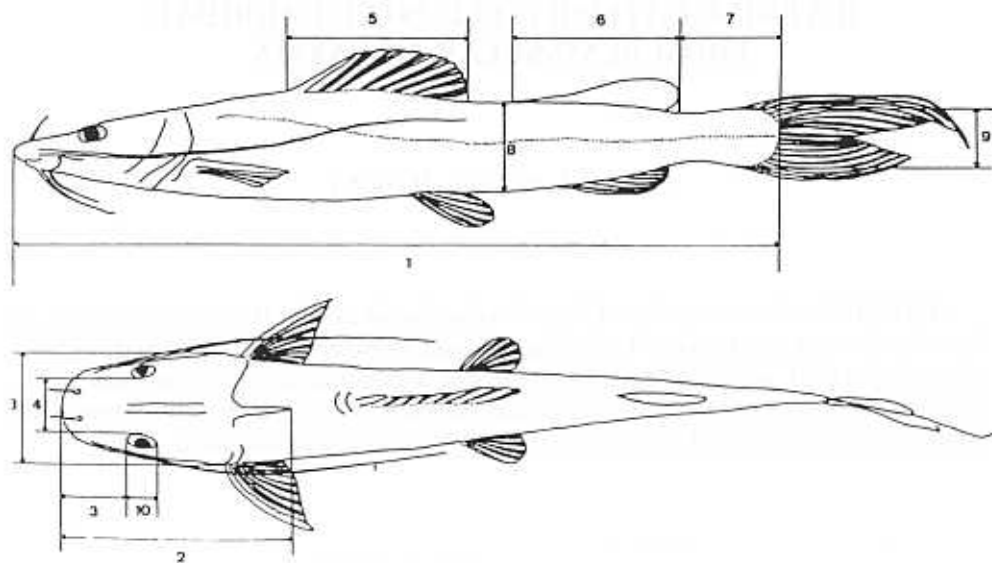


Fig. 1. Schematic figures of *Hemibagrus gracilis*, new species, showing how measurements have been made. Codes are as follow: 1. standard length; 2. head length; 3. head width; 4. interorbital distance; 5. dorsal fin length; 6. adipose fin length; 7. post-adipose distance; 8. body depth at anus; 9. caudal peduncle depth; 10. eye diameter.

TAXONOMY

Notes on *Hemibagrus nemurus* and related species

Weber & de Beaufort (1913) synonymised without explanation, *Bagrus sieboldii* Bleeker, 1846, *Bagrus hoevenii* Bleeker, 1846, *Macrones bongan* Popta, 1904, *Macrones kajan* Popta, 1904, *Macrones bo* Popta, 1904, *Macrones howong* Popta, 1904, *Macrones fortis* Popta, 1904, *Macrones fortis* var. *capitulum* Popta, 1906, and *Macrones bleekeri* Volz, 1903, with *Hemibagrus nemurus* (referred to as a *Macrones*). In the same manner, they also synonymised *Bagrus anisurus* Valenciennes, 1840, with *Mystus planiceps* (Valenciennes, 1840). The only other *M. nemurus*-like fish they recognised from Southeast Asia was *Mystus baramensis* (Regan, 1906). The extensive synonymy of *M. nemurus* and its related species is almost certainly an oversimplification, and at least some of the species are valid.

Roberts (1989) questioned Weber & de Beaufort's (1913) extensive synonymy of *H. nemurus*, and other than *Bagrus sieboldii* and *Bagrus hoevenii*, he "... tentatively recognised only *M. bongan* as a synonym of *M. nemurus* ..." and commented that "... *M. howong*, *M. bo* and *M. kajan*, all from the Mahakam basin, may be synonyms of *M. baramensis* ..." (Roberts, 1989: 124). With regards to *M. pahangensis* Herre, 1940, and *M. johorensis* Herre, 1940, he notes that "... both have an obvious midaxial streak and agree with all respects with *M. nemurus*" (Roberts, 1989: 122). Kottelat & Lim (1995) resurrected *H. hoevenii* from the synonymy of *H. nemurus* (see also Kottelat et al., 1994), an action which has been supported

by studies on its mt DNA (Dodson et al., 1995). The mt DNA data of Dodson et al. (1995) also suggest that what is now recognised as *H. nemurus* is almost certainly a mixture of species.

We have examined a large series of specimens housed in the ZRC and originating from Thailand, Peninsular Malaysia, Sumatra, Borneo and Java which had been identified as *H. nemurus* and *H. planiceps* (neither practical or necessary to list all of them here), and our preliminary observations indicate that there at least four different "groups" can be tentatively recognised. The "groups" recognised here in our present synopsis are quite tentative, and almost certainly artificial and not phylogenetic. We believe however, that will be useful to help resolve the complicated taxonomy of the various species, especially in aiding preliminary comparisons and discussions.

One "group" conforms with what Roberts (1989) redescribes as *H. nemurus* s. str., and in which the longest dorsal fin ray, when apposed against the body, just reaches the beginning of the adipose fin; the body has a dark midaxial streak and the number of vertebrae ranges from 43 to 45. In this "group" we include *Bagrus nemurus* Valenciennes, 1840 s. str., *Bagrus sieboldii* Bleeker, 1846, *Bagrus hoevenii* Bleeker, 1846, *Macrones kajan* Popta, 1904 (Mahakam), *Macrones bo* Popta, 1904 (Mahakam) and *Mystus pahangensis* Herre, 1940 (Pahang) (cf. Popta, 1906: pl. 2 figs. 6, 7; Herre, 1940: pl. 9; Roberts, 1993: pl. 63; Kottelat & Lim, 1995: Fig. 1). Of these, only *H. nemurus* and *H. hoevenii* are currently regarded as valid species (Roberts, 1989, 1993; Kottelat & Lim, 1995).

A second "group" has 43-46 vertebrae; the body may or may not have a dark midaxial streak, and the longest dorsal fin ray, when apposed against the body, reaches or covers at least one-third of the adipose fin. This "group" includes *Macrones bleekeri* Volz, 1903 (Sumatra), *Macrones howong* Popta, 1904 (Mahakam), *Macrones fortis* Popta, 1904 (Mahakam), *Macrones fortis* var. *capitulum* Popta, 1906 (Mahakam), *Macrones baramensis* Regan, 1906 (Sarawak), and *Mystus johorensis* Herre, 1940 (Johor). With regard to their body depths and snout proportions, all are proportionately shorter fish than *H. nemurus* s. str. (cf. Volz, 1903b: Pl. 25 fig. 3; Popta, 1906: pl. 1 fig. 4, pl. 2 figs. 8a, b, pl. 3 fig. 9; Herre, 1940: pl. 7). Of these, only *H. baramensis* is now regarded as a valid species (see Roberts, 1989), although it is not the oldest name. It is important to note that the oldest name for all the species in this group, *Macrones bleekeri* Volz, 1903, is preoccupied by an earlier name, *Macrones bleekeri* Day, 1877. *Macrones bleekeri* Day, 1877, an Indian species, is however, a very different fish (see Day, 1877: 451, pl. 101 fig. 1), and is now placed in the genus *Mystus* s. str. (see Roberts, 1994: 246). As such, if *Macrones bleekeri* Volz, 1903, proves to a distinct species of *Hemibagrus*, a replacement name will be needed. The next available names for this group are *Macrones howong* Popta, 1904, and *Macrones fortis* Popta, 1904.

A third "group", represented in the ZRC by specimens from southern and eastern Kalimantan, has a marmorated body and a dark midaxial streak, and has long dorsal fin rays which, when apposed against the body, overlap at least the anterior one-third of the adipose fin. The number of vertebrae in this group is not known. Apparently, no previously described species belongs to this "group".

The fourth "group" contains species which have an elongate body with a high vertebral count (47-50), a body with no midaxial streak and having the longest dorsal fin ray not, or just reaching the beginning of the adipose fin. This "group" includes *Bagrus planiceps* Valenciennes, 1840, *Bagrus anisurus* Valenciennes, 1840, *Bagrus flavus* Bleeker, 1846, *Macrones bongan* Popta, 1904, and *H. gracilis*, new species (cf. Popta, 1906: pl. 2 fig. 5;

Roberts, 1993: pls. 65, 66). *Bagrus anisurus* Valenciennes, 1840, was synonymised with *Hemibagrus planiceps* by Weber & de Beaufort (1913), and Roberts (1993) confirmed this after examining the types of both species. *Bagrus flavus* Bleeker, 1846, was synonymised with *B. planiceps* by Bleeker (1858, 1862). We have also examined radiographs of syntypes of *Macrones anisurus* from Java in the RMNH (nos. 2939, 2941, 2950, 2957, 2959, 2962) and for the moment, concur with Weber & de Beaufort's and Roberts' synonymy of these two species. Specimens referred to *M. nemurus* by Robert's (1989: 123, Table 7) from the Kapuas seem to belong to two species, one with 43-44 vertebrae and another with 48 vertebrae. We have examined radiographs of two specimens from the Kapuas collected by J. Büttikofer, one from Sibau (RMNH 7829, 89.6 mm SL) and one from Raoen (RMNH 7828, 145.0 mm SL); the former with 48, the latter with 49 vertebrae. These specimens had been identified to *H. planiceps* by Vaillant (1902: 54) but Roberts (1989: 122) reidentified them as *H. nemurus*. Both RMNH specimens are slender (body depth 11.4% and 12.7% SL respectively; caudal peduncle depth 7.5% and 6.9% SL respectively) and agree well with what Popta (1904, 1906) described and figured as *Macrones bongan* from the Kapuas (body depth 12.5% SL, caudal peduncle depth 8.5% SL) (cf. Popta, 1906: pl. 2 fig. 5). The snout length and post-adipose distance of *Macrones bongan* are 28.1% HL and 9.6% SL respectively (cf. Popta, 1906: pl. 2 fig. 5) - these data not being discernible from the radiographs of RMNH 7828 and 7829. Roberts (1989: 122, 123) also reported specimens which he identified as *Mystus cf. planiceps* from Rejang river in Sarawak which had a relatively high vertebral count (47-49) but reportedly differed in other characters (not specified). These Rejang specimens had been reported by Inger & Chin (1962: 141) as *M. planiceps*. Their figure of one of these specimens is rather schematic (Inger & Chin, 1962: Fig. 71), but it does show an elongate fish: body depth 12.7-15.5% SL, caudal peduncle height 7.6% SL, snout length 29.2% HL, post-adipose distance 13.6% SL, and 47-49 vertebrae (body depth from their data, other ratios from Inger & Chin, 1962: Fig. 71; vertebral counts from Roberts, 1989: Table 7). The proportions of these fish from the Rejang are clearly not those of *H. planiceps* s. str., and instead, approach those of *H. gracilis*, and they might well be conspecific. The elongate specimens from Kapuas (Roberts' (1989) specimens with vertebral counts of 48, and Vaillant's (1902) specimens which had been originally identified as *H. planiceps*) are probably conspecific with *M. bongan*, which seems to be a valid species. *Hemibagrus bongan* is certainly not conspecific with *H. nemurus* as suggested by Roberts (1989), differing not only in vertebral counts but also in body proportions. From this group, three species are here recognised - *H. planiceps*, *H. bongan* and *H. gracilis*.

During this study, we have also examined the holotype of *Bagrus elongatus* Günther, 1864 (type locality Singapore) in the Natural History Museum, London. *Bagrus elongatus* is also a species of *Hemibagrus* (fide Mo, 1991), but it is most likely a Chinese taxon, and the given type locality is almost certainly wrong (see Alfred, 1966). A redescription of *Hemibagrus elongatus* is being done by the first author and M. Kottelat, and the species will be treated separately in another paper later on.

Hemibagrus gracilis, new species

(Figs. 1-3, 4A)

Mystus planiceps - Zakaria-Ismail, 1987: 480 (not *Bagrus planiceps* Valenciennes, 1840).

Mystus aff. *nemurus* - Lim et al., 1990a: 316; Lim et al., 1990b: 44.

Mystus cf. *planiceps* - Ng & Lim, 1994: 62.

Mystus aff. *planiceps* - Zakaria-Ismail, 1993: 208, pl. 5f.

Material examined. - Holotype - 1 ex., 247 mm SL (ZRC 21484); Peninsular Malaysia: Johor, Ulu Endau, Sungei Jasin; coll. J. Dodson, 4-5 Apr.1992.

Paratypes - 4 ex., 162-214 mm SL (ZRC 21482, 21485-21487); data as for holotype. — 2 ex., 236-266 mm SL (ZRC 8294-8295); Peninsular Malaysia: Pahang, Rompin, Sungei Kinchin (at base camp); coll. P. K. L. Ng et al., 18 Jun.1989. — 1 ex., 200 mm SL (ZRC 8296), Peninsular Malaysia: Pahang, Rompin, Sungei Kinchin at confluence of Sungei Selindang, coll. P. K. L. Ng et al., 15 Jun.1989. — 1 ex., 27.9 mm SL (ZRC 8293), Peninsular Malaysia: Pahang, Rompin, Sungei Kinchin at confluence of Sungei Selindang, coll. P. K. L. Ng et al., 13 Jun.1989. — 3 ex., 182-264 mm SL (ZRC 8726-8728); Peninsular Malaysia: Pahang, Rompin, Sungei Kernam (tributary of Sungei Kinchin); coll. Y. H. Koo et al., 20 Jul.1989. — 2 ex., 295-405 mm SL (ZRC 8752-8753); Peninsular Malaysia: Johor-Pahang border, Sungei Taku (tributary of Sungei Endau); coll. Y. H. Koo et al., 18 Jul.1989 — 1 ex., 277 mm SL (ZRC 8757); Peninsular Malaysia: Pahang, Rompin, Sungei Kinchin (at base camp); coll. Y. H. Koo et al., 18 Jul.1989. — 2 ex., 230-245 mm SL (ZRC 8758-8759); Peninsular Malaysia: Pahang, Rompin, Sungei Kinchin (at base camp); coll. Y. H. Koo et al., 19 Jul.1989.

Others - 1 ex., 69.2 mm SL (ZRC 3233), Peninsular Malaysia: Pahang, 0.5 mile up Sungei Tahan, King George V (= present Taman Negara) National Park, coll. E. R. Alfred, 22 Mar.1956. — 1 ex., 113.7 mm SL (ZRC 2442), Peninsular Malaysia: Pahang, Ulu Jelai, coll. A. D. Machado, 1900.

Diagnosis. - An elongate *Hemibagrus* with a flat head; long snout (29.1-37.0% HL), moderately large eyes (13.2-24.5% HL), long barbels, very slender body (body depth 8.4-14.1% SL); long adipose fin (17.3-22.1% SL); long post-adipose distance (11.5-17.0% SL); caudal peduncle very slender (depth 6.2-7.8% SL); 10 branchiostegal rays, gill rakers on first epibranchial arch 3-6+7-14=10-19; vertebrae 23-24+25-26=49-50. Fins without markings or pigmentation. Colour in life: uniformly grey dorsally with a faint humeral spot, no dark midaxial streak, dirty white ventrally.

Description (based on all the types). - Head length 23.6-28.1% SL; head width 16.5-19.8% SL; eyes moderately large, horizontal diameter 13.2-24.5% HL; interorbital distance wide (27.6-36.7% HL); dorsal surface of cranium slightly rugose; cranial fontanel extending to base of supraoccipital crest; snout long, 29.1-37.0% HL; body very slender, body depth 8.4-14.1% SL; occipital process short, separated from predorsal plate by slightly more than twice eye diameter; predorsal plate reduced; distance between occipital process and dorsal-fin origin 7.4-15.5% SL. Gill rakers elongate, 3-6+7-14=10-19 on first gill arch, all well-developed. Barbels long; maxillary barbel extending posteriorly to posterior dorsal base; nasal barbel, thinner than other barbels, extending posteriorly to posterior orbital edge; outer mandibular barbel, slightly longer than inner, extending posteriorly to midway through dorsal fin. Dorsal spine strong, serrated on inner margin with 8 serrae; dorsal fin with 7 rays, length 23.9-28.9% SL, second ray longest, not reaching adipose fin; pectoral spine short, with 18 moderately large serrae on inner margin; pectoral fin with 8-9 rays; humeral spine short; pelvic fin with 6 rays (1 simple+5 branched); adipose fin long, 17.3-22.1% SL, with its dorso-posterior margin distinctly rounded and its base incised posteriorly; anal fin with 12-13 rays (8-9 simple+3-4 branched); post-adipose distance long, 11.5-17.0% SL; caudal peduncle very slender (height 6.2-7.8% SL); caudal fin with upper lobe elongate and lanceolate, lower lobe rounded and much shorter, with 17 rays. Anus separated from genital papillae by a distance of 5.4-7.6% SL. Vertebrae 23-24+25-26=49-50.

Colour. - Dorsal surface of head and body uniform light grey to grey, with a faint humeral spot on both sides of the body, lateral line cream to yellow, no dark midaxial streak; ventral surfaces of head and body dirty white; adipose fin and fin rays of all fins grey; inter-radial membranes of all fins dirty yellow. A colour photograph of the species can be found in Ng & Lim (1994: 62).

Size. - The largest specimen preserved is 405 mm SL (ZRC 8753), but the species grows larger than this. One specimen caught by fishermen (not preserved) was estimated at some 500 mm SL.

Remarks. - *Hemibagrus gracilis*, new species, belongs to the *H. planiceps* "group" (see above) and seems to be closest to *H. planiceps*. Compared to *H. gracilis* however, *H. planiceps* has a proportionately shorter body (body depth 11.2-15.8% SL vs. 8.4-14.1% SL), usually shorter snout length (25.8-34% HL vs. 29.1-37.0% HL), deeper caudal peduncle (10.8% SL vs. 6.2-9.7% SL) and fewer vertebrae (47-48 vs. 49-50) (after radiographs examined; Bleeker, 1862: pl. 71; Roberts, 1989: 122, 123; 1993: 30, figs. 65, 66). The holotype of *H. planiceps* figured by Roberts (1993) is rather unusual in that the occipital process seems to be very short but this is not the case on the type. The first author briefly examined the holotype of *H. planiceps* (102 mm SL) while in the Muséum national d'Histoire naturelle, Paris, and the structure of its occipital process agrees well with that on specimens of *H. gracilis* and *H. nemurus* examined, being more produced than in the figure in Roberts (1993).

Studies on the mt DNA of various species of *Hemibagrus* from Thailand, Sumatra, Java, Borneo and Peninsular Malaysia (Dodson et al., 1995) strongly support the specific distinction of the Endau-Rompin specimens. The mt DNA of *H. gracilis* differs markedly from those of *M. nemurus* s. lato and *M. hoevenii* (Dodson et al., 1995). The specimens used by Dodson et al. (1995) were examined in this study and constitute part of the type series of *H. gracilis*. In fact, the mt DNA of one of the *H. nemurus* specimens (ZRC 21483) collected together with some of the paratype specimens of *H. gracilis*, differed strikingly from that of *H. gracilis* (see Dodson et al., 1995).

The previous records of *H. planiceps* or *H. aff. planiceps* from Peninsular Malaysia by Zakaria-Ismail (1984, 1987, 1993) are almost certainly *H. gracilis*. This is especially the case with Zakaria-Ismail's (1984, 1987) records which are from the east coast of Malaysia, with his latter paper referring to specimens from the Endau area in Johor. The figure provided of a *Mystus* aff. *planiceps* by Zakaria-Ismail (1993: pl. 5f) from Pahang agrees very well with what is here defined as *H. gracilis*.

Hemibagrus bongan is closely allied to *H. gracilis* but it differs in having a less elongate body, with the longest ray of the dorsal fin just reaching the beginning of the adipose fin (vs. not reaching adipose fin) and a shorter post-adipose distance (9.6% SL vs. 11.5-17.0% SL), a shorter snout (snout length 28.1% HL vs. 29.1-37.0% HL) and slightly less vertebrae (47-49 vs. 49-50).

Ecology. - *Hemibagrus gracilis* occurs in the upper stretches of Sungei Endau and Sungei Kinchin in the Endau-Rompin area at the border of the states of Johor and Pahang, Peninsular Malaysia. They prefer clear, faster flowing waters in undisturbed primary rainforest, the substrate being rocks and sand. Two specimens of *H. nemurus* (ZRC 21483, 8653) were also obtained with *H. gracilis*, but both were collected from the lower stretches of Sungei Kinchin. In the upper parts of the river, only *H. gracilis* has been obtained thus far. It would appear that *H. gracilis* prefers the upper stretches of the river while *H. nemurus* prefers the lower parts. While *H. gracilis* can also be found in the lower parts of Sungei Kinchin, it seems to be most common (on the basis of our catches) in the upper stretches. *Hemibagrus nemurus* on the other hand, has not been found, as yet, in the upper stretches of the river.

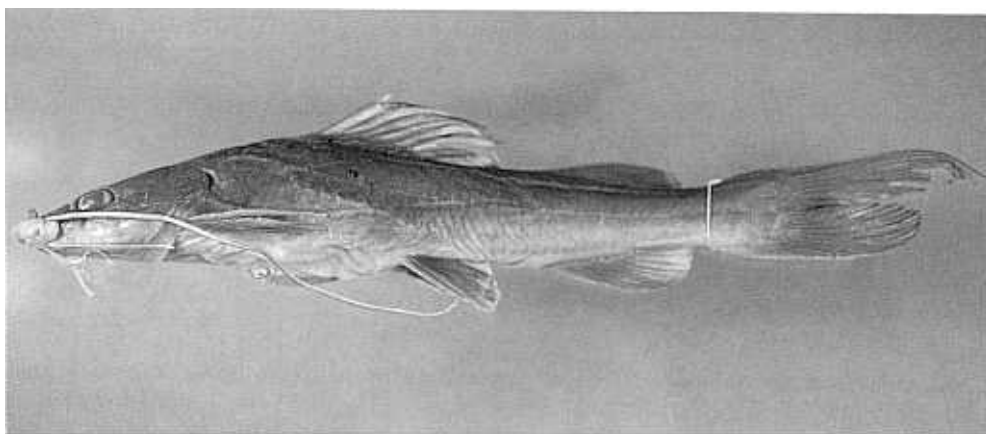


Fig. 2. *Hemibagrus gracilis*, new species. Paratype, 236 mm SL (ZRC 8294).

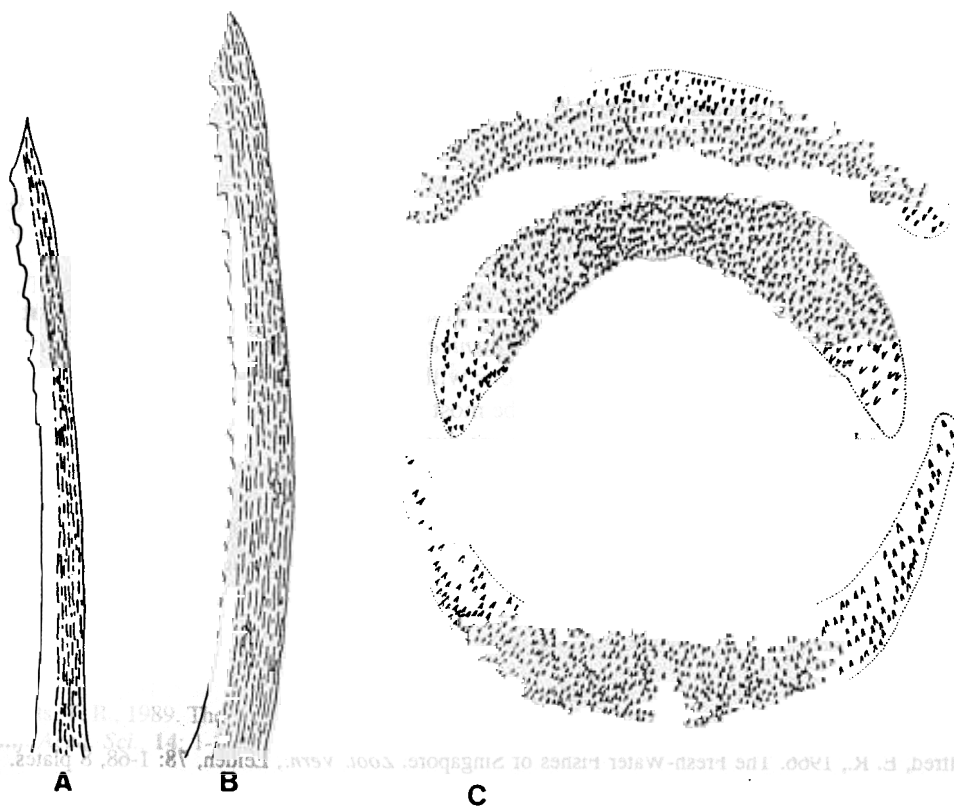


Fig. 3. *Hemibagrus gracilis*, new species. A, dorsal spine, paratype, 277 mm SL (ZRC 8757); B, left pectoral spine, paratype, 245 mm SL (ZRC 8758); C, teeth, paratype, 277 mm SL (ZRC 8757).

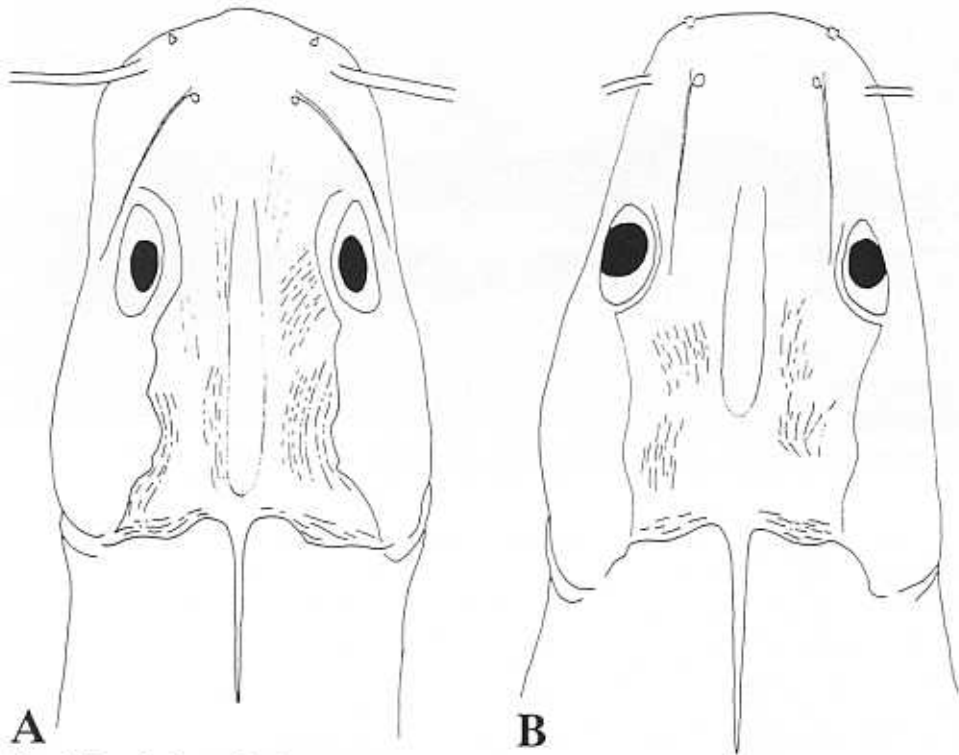


Fig. 4. Dorsal views of heads. A, *H. gracilis*, new species, paratype, 182 mm SL (ZRC 8728); B, *H. nemurus*, 167 mm SL (ZRC 21483).

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