THE RAFFLES BULLETIN OF ZOOLOGY 2005 **53**(2): 251-255
Date of Publication: 31 Dec.2005

GLYPTOTHORAX EXODON, A NEW SPECIES OF RHEOPHILIC CATFISH FROM BORNEO (TELEOSTEI: SISORIDAE)

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***ABSTRACT.* –** *Glyptothorax exodon*, a new species of rheophilic catfish from Borneo is described here. It can be distinguished from Sundaic congeners except *G. platypogonides* and *G. siamensis* in having a slender body (13.8–15.8% SL vs. 17.3–20.9). It differs from *G. platypogonides* in having a deeper caudal peduncle (6.8–7.3% SL vs. 5.7–6.7) and more exposed premaxillary teeth when the mouth is closed and from *G. siamensis* in having a larger eye (10.4–13.2% HL vs. 7.5–9.1) and a mottled color pattern lacking distinct pale stripes (vs. a uniform dark brown with distinct pale midlateral and mid-dorsal stripes).

***KEY WORDS.* –** Rheophilic catfish, Kalimantan Barat, *Glyptothorax*, Kapuas River.

INTRODUCTION

Glyptothorax is the most diverse and the most widely distributed sisorid catfish group, with 86 nominal species found in Asia Minor (in the Tigris and Euphrates River drainages) westwards to East Asia (to the Yangtze River drainage) and southwards to Southeast Asia. They typically inhabit fast flowing hillstreams or faster-flowing stretches of larger rivers, and are distinguished by their distinctive thoracic adhesive apparatus, comprising an elliptical field of folded longitudinal pleats of skin. They are additionally diagnosed by a detached distal portion of the premaxilla and long and thin lateral arms of the vomer that extend underneath the entire length of the articular process of the lateral ethmoid (de Pinna, 1996). Despite recent phylogenetic studies (de Pinna, 1996), the monophyly of the group has yet to be rigorously tested.

During ichthyological surveys in the Kapuas River drainage in western Borneo (Roberts, 1989; Ng & Rachmatika, 1999), specimens identified as *G. platypogonides* (Bleeker, 1855) were collected. Comparison of this material with Sumatran material of *G. platypogonides* (also collected during recent surveys; Tan & Ng, 2000) revealed that the Bornean material represented a distinct undescribed species, which is described below as *Glyptothorax exodon*, new species.

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 Ng & Dodson (1999), and institutional abbreviations Eschmeyer (1998).

TAXONOMY

Glyptothorax exodon, new species
(Fig. 1)

Bagarius bagarius (non Hamilton) Vaillant, 1902: 72.
Glyptothorax platypogonoides (non Bleeker) Roberts, 1989: 136, Fig. 104.
Glyptothorax aff. *platypogonoides* Ng & Rachmatika, 1999: 182, Fig. 8B.

Material examined. – Holotype - MZB 9940, 57.5 mm SL, Borneo: Kalimantan Barat, Sungai Tekelan, coll. I. Rachmatika, 5 Sep.1997.

Paratypes – BMNH 19823.29.190 (1), 63.2 mm SL; CAS 49419 (1), 59.0 mm SL, RMNH 28907 (1), 57.2 mm SL, Borneo: Kalimantan Barat, mainstream of Sungai Pinoh, 20–60 km upstream from Nangapinoh, coll. T. R. Roberts & S. Wirjoatmodjo, 22–26 Jul.1976; RMNH 7845 (1), 60.2 mm SL, Borneo: Kalimantan Barat, Nanga Raun, coll. J. Büttikofer, 1897; MZB 9412 (2), 55.1–60.0 mm SL, Borneo: Kalimantan Barat, Embaloh, Sungai Jaket, coll. I. Rachmatika et al., 19 Sep.1997.

***Diagnosis.* –** *Glyptothorax exodon* be distinguished from Sundaic congeners except *G. platypogonides* and *G. siamensis* in having a slender body (13.8–15.8% SL vs. 17.3–20.9). It differs from *G. platypogonides* in having a deeper caudal peduncle (6.8–7.3% SL vs. 5.7–6.7) and more exposed premaxillary teeth when the mouth is closed (Fig. 2) and from *G. siamensis* in having a larger eye (10.4–13.2% HL vs. 7.5–9.1) and a mottled color pattern lacking distinct pale stripes (vs. a uniform dark brown with distinct pale midlateral and mid-dorsal stripes).

***Description.* –** Morphometric data in Table 1. Head depressed, body moderately compressed. Dorsal profile rising evenly from tip of snout to origin of dorsal fin, then sloping gently ventrally from there to end of caudal peduncle. Ventral profile flat to anal-fin base, then sloping gently dorsally from there to end of caudal peduncle. Anus and urogenital openings located at vertical through middle of adpressed pelvic fin. Skin prominently tuberculate, with ovoid tubercles particularly visible on sides of body. Lateral line complete and midlateral. Vertebrae 17+18=35 (1), 17+19=36 (2), 18+18=36 (2) or 18+19=37 (2).

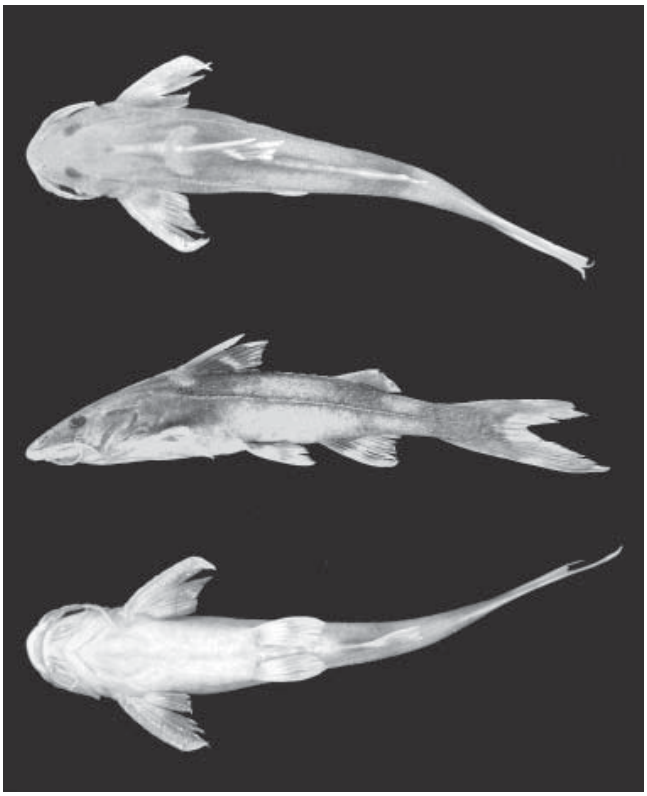

Fig. 1. *Glyptothorax exodon*, paratype, RMNH 28907, 57.2 mm SL; Borneo: Sungai Pinoh. Dorsal, lateral and ventral views.

Head depressed and narrow, triangular when viewed laterally and with acute snout margin when viewed from above. Snout prominent. Anterior and posterior nares large and separated only by base of nasal barbel. Gill openings broad, extending from immediately ventral to posttemporal to isthmus. Bony elements of dorsal surface of head covered with thick, tuberculate skin. Eye ovoid, horizontal axis longest; located entirely in dorsal half of head. Orbit with free margin.

Barbels in four pairs. Maxillary barbel long and slender, extending to middle of pectoral-fin base. Nasal barbel slender, extending to midway between its base and anterior orbital margin. Inner mandibular-barbel origin close to midline, extending to two thirds of distance between its base and that of pectoral spine. Outer mandibular barbel originating posterolateral of inner mandibular barbel, extending to base of pectoral spine.

Mouth inferior, premaxillary tooth band almost wholly exposed when mouth is closed. Oral teeth small and villiform, in irregular rows on all tooth-bearing surfaces. Premaxillary teeth in single broad semilunate band. Dentary teeth in two narrow crescentic bands separated at midline.

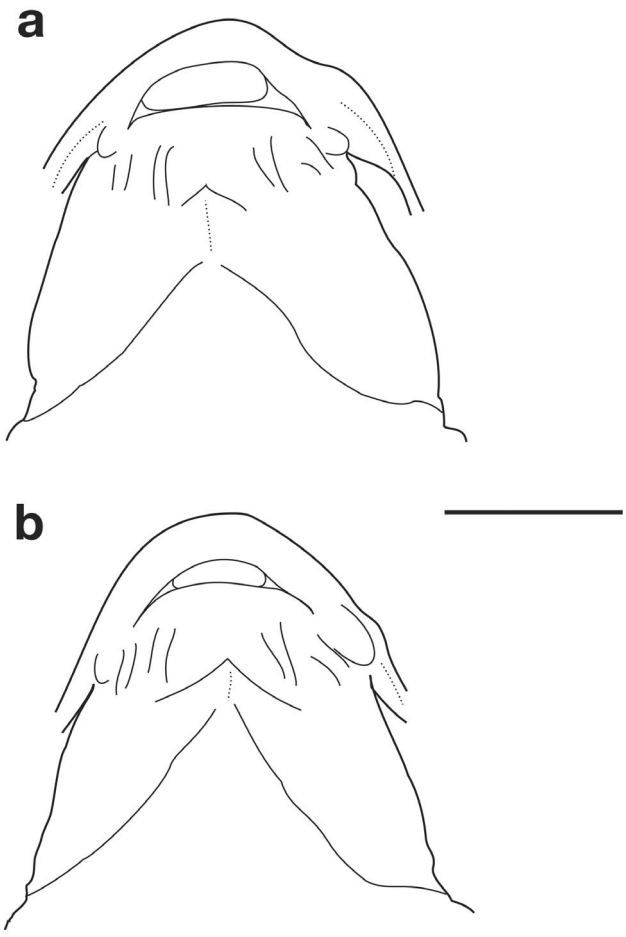

Fig. 2. Ventral views of heads of: a. *Glyptothorax exodon*, RMNH 28907, paratype, 57.2 mm SL; b. *G. platypogonides*, ZRC 41588, 56.0 mm SL. Scale bar represents 5 mm.

Dorsal fin located above anterior third of body, with I,6 (7) rays; fin margin convex; spine short and gently curved. Adipose fin with anterior margin concave and posterior margin angular. Caudal fin strongly forked, with equal upper and lower lobes and i,7,8,i (7) principal rays. Procurrent rays symmetrical and extending only slightly anterior to fin base. Anal-fin base ventral to adipose-fin origin. Anal fin with straight anterior margin and straight or slightly concave posterior margin ; with iv,8 (2) or iv,9 (5) rays. Pelvic-fin origin immediately posterior to vertical through posterior end of dorsal-fin base. Pelvic fin with slightly convex margin and i,5 (7) rays; tip of adpressed fin not reaching anal-fin origin. Pectoral fin with I,8 (7) rays; posterior fin margin slightly concave; anterior spine margin smooth, posterior margin with 10–12 serrations. Thoracic adhesive apparatus present, located on belly and consisting of logitudinal pleats of skin in narrow elliptical field. Adhesive apparatus with median depression on posterior half and extending from just behind gill opening to level of base of posteriormost pectoral-fin ray.

***Coloration.* –** In 70% ethanol: Dorsal and lateral surfaces of head, and body brown to brownish gray, fading to beige on ventral surfaces. A dark, diffuse midlateral stripe running along lateral line; lateral line without such pigmentation in some individuals, causing it to show up as paler stripe within darker stripe. Body with several long, elliptical pale spots: first above lateral line and spanning region between dorsal and adipose fins, second on anterior half of caudal peduncle above lateral line and third on anterior half of caudal peduncle below lateral line. Dorsal fin with brown base and broad subdistal triangular brown mark. Pectoral fins hyaline, with brown melanophores forming a diffuse broad, transverse band subdistally. Pelvic fin hyaline, with faint transverse brown band in middle. Anal fin with brown base and brown melanophores forming V-shaped subdistal mark on anterior half of fin; rest of fin hyaline. Adipose fin brown to brownish gray, with hyaline distal margin. Caudal fin brown to brownish gray , tips and posterior margins of lobes hyaline. Maxillary barbels brown to brownish gray dorsally, beige ventrally.

***Distribution.* –** Known from the Kapuas River drainage in western Borneo (Fig. 3).

***Etymology.* –** From the Greek *exo-* (out) and *odontos* (tooth), in reference to the exposed premaxillary teeth.

***Habitat.* –** *Glyptothorax exodon* is found in swift, clear streams with a substrate consisting of gravel, cobbles or large rocks (Roberts, 1989). Other fish found in this habitat include *Barbonymus collingwoodi*, *Crossocheilus* spp., *Cyclocheilichthys repasson*, *Epalzeorhynchos kalopterus*, *Garra borneensis*, *Paracrossocheilus* spp., *Puntius* spp., *Rasbora* spp., *Schismatorhynchos heterorhynchus*, *Tor tambroides*, *Gastromyzon contractus*, *Nemacheilus kapuasensis*, *Glyptothorax major*, *Hemibagrus* cf. *nemurus*, *Doryichthys martensii*, *Mastacembelus* spp. and *Auriglobus amabilis*.

DISCUSSION

Given the wide distribution of *Glyptothorax* species and the large number (87) of nominal species, it would not be realistic to compare *G. exodon* with all congeners without making it difficult for the reader to follow. However, Southeast Asian *Glyptothorax* species have restricted distributions (HHN, unpub. data), which means that species found in a particular region are not likely to occur outside of it; it is therefore more meaningful to restrict our comparisons of *G. exodon* to only those species that occur in Sundaic Southeast Asia.

The identity of the Sundaic Southeast Asian species of *Glyptothorax* remains confused (Roberts, 1989; Kottelat &

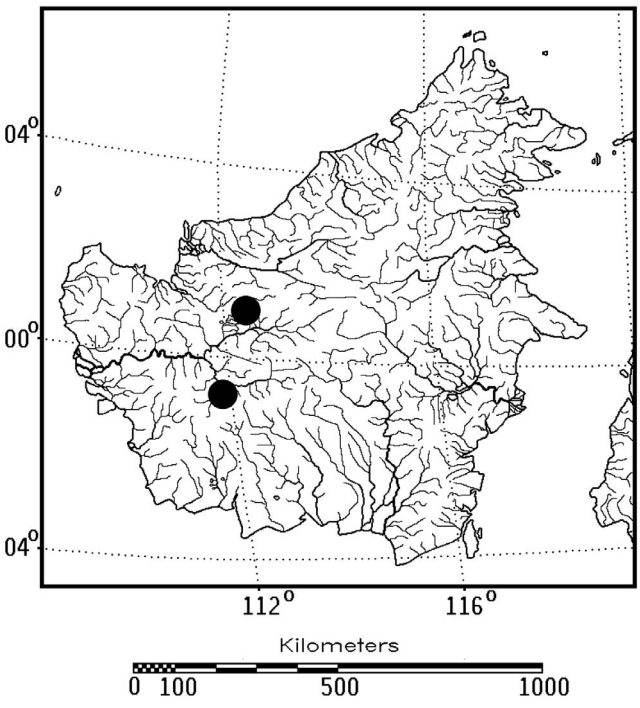

Fig. 3. Distribution map of *G. exodon*.

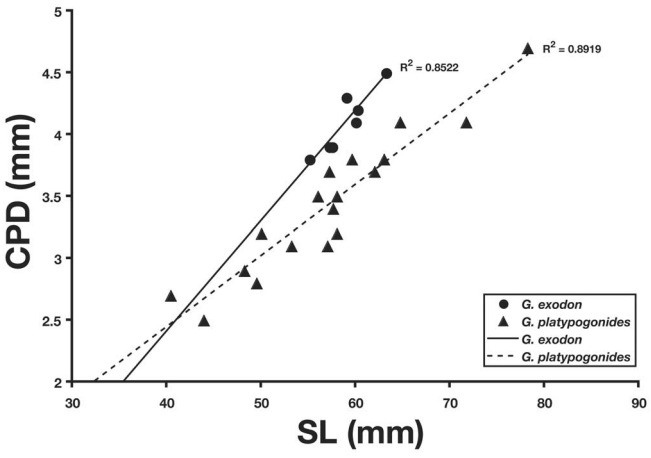

Fig. 4. Scatterplot of depth of caudal peduncle (CPD) plotted against standard length for *G. exodon* and *G. platypogonides*.

Table 1. Biometric data for *Glyptothorax exodon* (n=7)

	Holotype	Range	Mean±SD
%SL			
Head length	26.8	25.7–29.2	26.8±1.28
Head width	16.0	16.0–18.1	17.0±0.85
Head depth	14.8	13.8–15.1	14.3±0.56
Predorsal length	37.9	36.7–39.2	37.9±0.96
Preanal length	64.1	64.1–67.8	66.4±1.40
Prepelvic length	49.7	48.6–53.0	49.7±1.69
Prepectoral length	21.0	20.6–25.4	22.7±2.16
Body depth at anus	15.5	13.8–15.8	14.5±0.88
Length of caudal peduncle	18.1	18.0–20.6	19.3±1.07
Depth of caudal peduncle	6.8	6.8–7.3	7.0±0.21
Pectoral-spine length	20.2	16.2–20.3	18.7±1.51
Pectoral-fin length	25.0	22.1–25.0	23.7±1.06
Dorsal-spine length	17.9	15.0–20.0	16.7±1.95
Length of dorsal-fin base	13.0	10.6–14.9	12.8±1.43
Pelvic-fin length	16.5	15.2–16.5	15.7±0.46
Length of anal-fin base	14.8	14.2–15.3	14.9±0.46
Caudal-fin length	29.0	28.0–31.0	29.2±1.02
Length of adipose-fin base	13.7	11.0–14.0	13.0±1.13
%HL			
Snout length	45.5	44.1–47.0	45.7±0.97
Interorbital distance	26.0	23.6–26.6	25.3±1.21
Eye diameter	11.0	10.4–13.2	11.6±0.97
Nasal barbel length	19.5	14.9–19.9	17.6±2.07
Maxillary barbel length	111.0	91.8–111.0	98.7±9.31
Inner mandibular barbel length	37.0	29.8–39.1	34.3±4.46
Outer mandibular barbel length	63.0	47.8–66.9	54.8±8.11

Lim, 1995). Current literature lists only three species: *G. major* (Boulenger, 1894), *G. platypogon* (Valenciennes, 1840) and *G. platypogonides* as valid. The group is more diverse than the literature implies and furthermore, many of the names have been misapplied (Kottelat & Lim, 1995). Since the group is currently being revised elsewhere (Ng & Kottelat, in prep.), it would not be appropriate to discuss the identities of all of the Sundaic Southeast Asian species. Therefore, we follow the current literature in recognizing only the three species as valid for now, but we note that the Southeast Asian members of the group as a whole can be divided into those with deep bodies (17.3–20.9% SL) and those with slender bodies (12.0–15.8% SL). Both *G. exodon* and *G. platypogonides* belong to the latter group; this means that an in depth discussion of the identities of all other deep bodied Sundaic Southeast Asian species can be deferred for now.

Additionally, we consider *G. siamensis* Hora, 1923 to be valid member of this group of slender bodied species. *Glyptothorax siamensis* has often been misidentified in the literature (e.g. Zakaria-Ismail & Lim, 1995) as *G. platypogonides*, but can be distinguished from it in having a fairly uniform color pattern with distinct pale mid-dorsal and midlateral stripes (vs. highly mottled coloration without distinct pale stripes). Chu & Mo (1999) consider *G. siamensis* (a species described from Peninsular Thailand) a junior synonym of *G. dorsalis* Vinciguerra, 1890, a species otherwise known only from the Irrawaddy and Salween River drainages. The first author has examined material of *G. dorsalis* from the Salween River drainage and we conclude that they are not conspecific: *G. dorsalis* always possesses darker spots randomly distributed on the head and body and a pale colored nuchal shield (vs. dark spots and pale colored nuchal shield always absent in *G. siamensis*).

The differences in biometrics between *G. exodon* and *G. platypogonides* are not solely due to ontogeny. A biplot of caudal peduncle depth (Fig. 4) against SL shows that the regression lines are significantly different (ANCOVA; $P<0.00000005$).

***Comparative material.* –** *Glyptothorax major*: BMNH 1892.9.2.59, 1 syntype, 107.6 mm SL; BMNH 1892.10.7.26, 1 syntype, 74.2 mm SL; BMNH 1893.3.6.173–178, 5 syntypes, 31.0–84.8 mm SL; Borneo: Sarawak, Senah, Tagora and Baram Rivers. CAS 49418, 1 ex., 89.7 mm SL; Borneo: Kalimantan Barat, Sungai Tamang, small forested stream flowing into Sungai Pinoh, opposite mouth of Sungai Kelawi. FMNH 68922, 1 ex., 96.1 mm SL; Borneo: Sarawak, Kapit district, Mengiong River drainage, Sungai Tekalit and Nanga Tekalit camp.

Glyptothorax platypogon: RMNH 2998, 3 syntypes, 61.0–67.0 mm SL: Java. MZB 8516 35 ex., 24.5–65.0 mm SL; Java: Bogor, Cisarua, Desa Tugu Jembatan Utara, Ciliwung. UMMZ 155696, 1 ex., 59.0 mm SL; Java: Cisokan.

Glyptothorax platypogonides: ANSP 27285, 1 ex., 77.5 mm SL; Sumatra: Sumatera Barat, Tamah Datar, Batusangkar. RMNH 6912, 4 ex., 53.63–67.1 mm SL; RMNH 15289, 3 ex., 65.6–73.5 mm SL; Sumatra: Sumatera Selatan, Lahat. UMMZ 243339, 3 ex., 40.4–71.7 mm SL; ZRC 41588 15 ex., 43.9–78.2 mm SL; Sumatra: Sumatera Barat, Pulaupunjung market at Sungaidareh. UMMZ 243329, 1 ex., 59.6 mm SL; Sumatra: Sumatera Barat, market at Kiliranjao.

Glyptothorax siamensis: CAS 132671 (1), 92.8 mm SL; Malaysia: Selangor, hills west of Ginting Sempak, 29km E of Kuala Lumpur. USNM 109609 (1), 61.5 mm SL; Thailand: Nakhon Si Thammarat. ZRC 2412 (2), 83.0–89.2 mm SL; Malaysia: Selangor, 18 km from Kuala Lumpur along Bentong Road.

ACKNOWLEDGMENTS

The authors thank the following for permission to examine material under their care: Dominique Didier (ANSP), Darrell Siebert (BMNH), David Catania (CAS), Mary Anne Rogers (FMNH), Martien van Oijen (RMNH), Lynne Parenti (USNM), and Kelvin Lim (ZRC). Funding from the Raffles Museum of Biodiversity Research, National University of Singapore and the All Catfish Species Inventory (NSF DEB-0315963) is gratefully acknowledged.

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