

GLYPTOTHORAX RUGIMENTUM, A NEW SPECIES OF CATFISH FROM MYANMAR AND WESTERN THAILAND (TELEOSTEI: SISORIDAE)

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ABSTRACT. – *Glyptothorax rugimentum*, a new species of sisorid catfish from the Ataran, Salween and Sittang River drainages in Myanmar and western Thailand is described here. It can be distinguished from all congeners in having a unique combination of the following characters: unculiferous ridges of thoracic adhesive apparatus extending anteriorly onto gular region, thoracic adhesive apparatus in rhomboidal, somewhat U-shaped field, head width 19.1–22.6% SL, eye diameter 8.4–11.6% HL, nasal barbels not reaching anterior orbital margin (length 24.5–37.1% HL), pelvic-fin origin at vertical through base of last dorsal-fin ray, steeply-sloping posterior margin of adipose fin, and presence of light and dark vertical bands on the caudal peduncle. *Glyptothorax burmanicus* is revalidated from synonymy with *G. cavia* and the use of thoracic adhesive apparatus morphology as a diagnostic character for species of *Glyptothorax* is briefly discussed.

KEY WORDS. – *Glyptothorax rugimentum*, new species, Myanmar, western Thailand.

INTRODUCTION

Glyptothorax is the most diverse and the most widely distributed sisorid catfish genus, with 89 nominal species found in Asia Minor (in the Tigris and Euphrates River drainages) eastwards 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 radiating folded oblique pleats of skin. They are additionally diagnosed by a detached distal portion of the premaxilla, with 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). A species of *Glyptothorax* with unculiferous ridges of the thoracic adhesive apparatus extending anteriorly onto the isthmus at the junction of the branchiostegal membranes was recently obtained from the Ataran, Salween and Sittang river drainages in western Thailand and Myanmar. Our examination indicates that it belongs to an un-named species, which is described below as *Glyptothorax rugimentum*, new species.

MATERIALS AND METHODS

Measurements were made point to point with dial callipers and data recorded to tenths of a millimetre. Counts and measurements were made on the left side of specimens whenever possible. Subunits of the head are presented as percentage of head length (% HL). Head length and measurements of body parts are given as percentage of standard length (% SL). Measurements follow Ng & Kottelat (1998), and collection abbreviations follow Eschmeyer (1998).

TAXONOMY

Glyptothorax rugimentum, new species

(Fig. 1)

Material examined. – Holotype – ZRC 50572, 78.6 mm SL, Myanmar: Kayin State, Ataran River drainage, stream “Chon Son” between Kyondaw and Phadaw, about 20 km NW of Payathouzu (at border with Thailand), 15°25'N 98°15'E; coll. K. Kubota, Dec.2002.

Paratypes – CMK 17784, 5 ex., 64.5–75.6 mm SL, data as for holotype. CMK 17950, 1 ex., 70.0 mm SL, same data as holotype, Mar.2003. UMMZ 247301, 12 ex., 43.0–53.7 mm SL, Myanmar: Ataran River drainage; K. Udomritthiruj, 2006. CMK 16243, 3 ex., 55.5–58.5 mm SL, Thailand: Mae Hong Son, Salween River drainage, Nam Mae Sariang at dam SW of Amphoe Mae Sariang; M. Kottelat et al., 8 Apr.2000. UMMZ 246033, 1 alc., 1 c&s, 60.5–68.9 mm SL, Thailand: Salween River drainage; K. Udomritthiruj, 2005. ZRC 50843, 2 ex., 65.6–70.5 mm SL, Thailand: Tak, Salween River drainage, Mae Lamao; Y. Y. Goh & Y.-X. Cai, 9 Jun.1998. UMMZ 245971, 2 ex., 44.5–49.7 mm SL, Myanmar: Bago, Sittang River drainage, Pyu township, Pyu stream ca. 229 km from Yangon, 18°29'N 96°26'E; Than Kyaw Toe, Sep.2005.

Diagnosis. – *Glyptothorax rugimentum*, new species, can be distinguished from all congeners except *G. indicus* in having the unculiferous ridges of the thoracic adhesive apparatus extending anteriorly onto the gular region (vs. gular region without unculiferous ridges). It can be distinguished from *G. indicus* in having a wider head (19.1–22.6% SL vs. 16.3–18.9), larger eye (8.4–11.6% HL vs. 6.2–8.1), shorter nasal barbels (not reaching anterior orbital margin vs. reaching to middle of orbit; 24.5–37.1% HL vs. 37.8–52.5), a narrower thoracic adhesive apparatus (in a rhomboidal, somewhat U-shaped field vs. a more laterally divergent chevron-shaped field), pelvic-fin origin at (vs. posterior to) vertical through base of last dorsal-fin ray, a more steeply-sloping posterior margin of the adipose fin, and the presence (vs. absence) of light and dark vertical bands on the caudal peduncle.

Description. – Biometric data in Table 1. Head depressed, body subcylindrical. Dorsal profile rising evenly from tip of

snout to origin of dorsal fin, then sloping gently ventrally from origin of dorsal fin to end of caudal peduncle. Ventral profile flat to anal-fin base, then sloping gently dorsally from anal-fin base to end of caudal peduncle. Anus and urogenital openings located at vertical through middle of adpressed pelvic fin. Skin tuberculate, with small tubercles on sides of body. Lateral line complete and midlateral. Vertebrae 15+20=35 (2), 16+19=35 (5), 17+18=35 (1), 16+20=36 (8), 17+19=36 (3), 16+21=37 (1), 17+20=37 (5) or 17+21=38 (1).

Head depressed and broad, triangular when viewed laterally. Snout prominent. Anterior and posterior nares large and separated only by base of nasal barbel. Gill openings broad, extending from immediately ventral to post-temporal 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.

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

Mouth inferior, premaxillary tooth band partially 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.

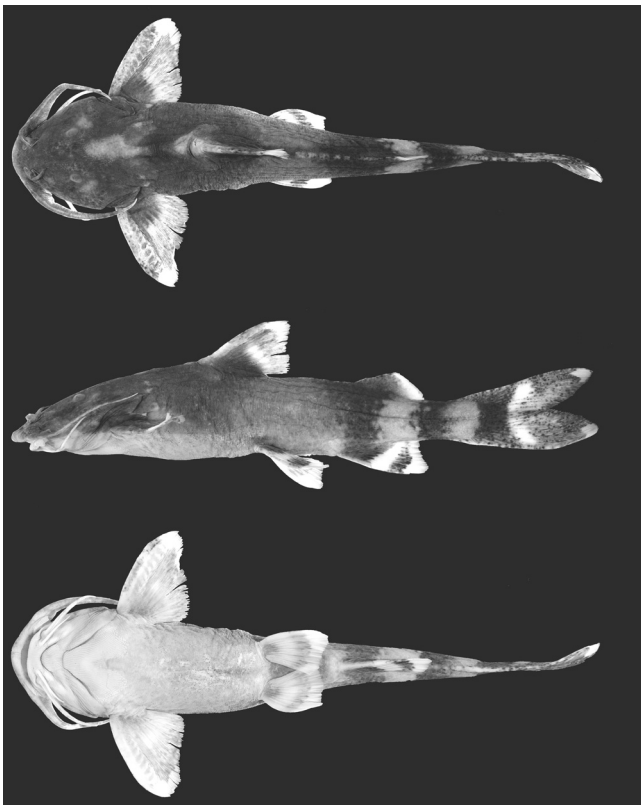


Fig. 1. *Glyptothorax rugimentum*, new species, holotype, ZRC 50572, 78.6 mm SL; Myanmar: Ataran River. Dorsal, lateral and ventral views.

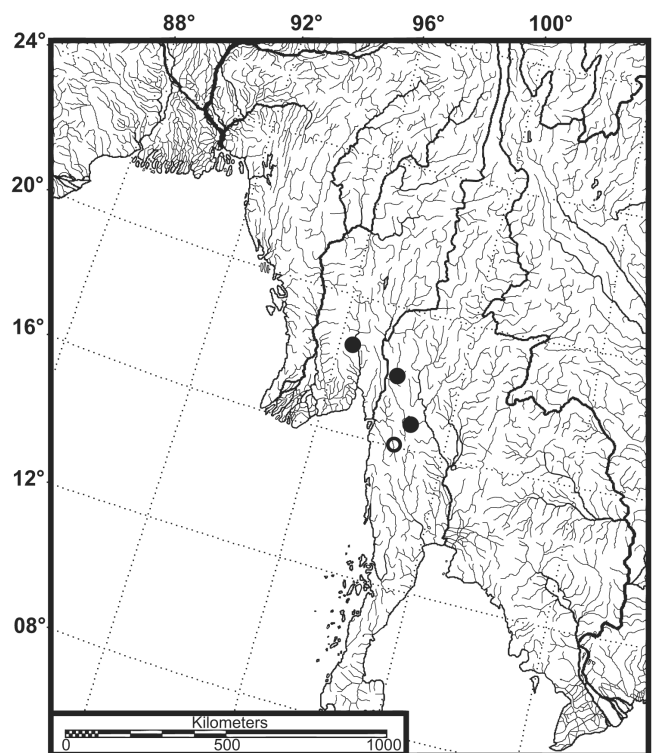


Fig. 2. Map showing collecting localities of *Glyptothorax rugimentum*, new species. Open circle denotes type locality.

Table 1. Biometric data for *Glyptothorax rugimentum* (n = 26).

	Holotype	Range	Mean±SD
Standard length	78.6	43.0–78.6	
%SL			
Predorsal length	42.7	39.9–42.7	40.9±0.82
Preanal length	70.0	66.2–71.4	69.1±1.55
Prepelvic length	52.7	48.7–53.4	51.7±1.73
Prepectoral length	24.4	21.6–27.5	24.2±1.71
Length of dorsal-fin base	15.8	13.7–15.8	14.7±0.71
Dorsal-spine length	16.9	15.2–18.6	17.1±1.05
Length of anal-fin base	13.6	11.1–15.1	13.5±1.14
Pelvic-fin length	15.9	13.9–17.1	15.4±0.96
Pectoral-fin length	21.6	20.2–22.6	21.8±0.84
Pectoral-spine length	16.5	15.6–18.5	16.9±0.78
Caudal-fin length	26.7	23.3–30.2	26.6±1.99
Length of adipose-fin base	13.1	9.4–13.5	12.0±1.07
Dorsal to adipose distance	19.3	17.2–22.2	19.9±1.65
Post-adipose distance	14.8	14.4–17.6	16.1±1.07
Length of caudal peduncle	17.9	17.7–21.7	19.3±1.43
Depth of caudal peduncle	7.3	6.1–7.6	7.0±0.41
Body depth at anus	15.3	12.8–15.3	13.9±0.86
Head length	30.7	28.4–31.2	29.6±1.01
Head width	22.1	19.1–22.6	21.2±1.05
Head depth	16.5	13.6–16.5	15.0±1.01
%HL			
Snout length	51.5	47.5–54.4	50.5±2.21
Interorbital distance	26.1	22.8–29.3	25.2±1.98
Eye diameter	9.5	8.4–11.6	9.9±0.97
Nasal barbel length	25.3	24.5–37.1	29.8±4.35
Maxillary barbel length	93.4	89.8–107.4	98.1±5.37
Inner mandibular barbel length	32.8	26.4–43.5	34.4±5.02
Outer mandibular barbel length	53.5	47.0–65.4	55.8±5.78

Dorsal fin located above anterior third of body, with I,6 (26) rays; fin margin convex; spine short and gently curved. Adipose fin with anterior margin straight or very slightly concave and posterior margin angular. Caudal fin strongly forked, with lower lobe very slightly longer than upper lobe and i,7,7,i (26) 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 iii,7 (22) or iv,7 (4) rays. Pelvic-fin origin at vertical through posterior end of dorsal-fin base. Pelvic fin with slightly convex margin and i,5 (26) rays; tip of adpressed fin not reaching anal-fin origin. Pectoral fin with I,8 (22) or I,8,i (4) rays; posterior fin margin slightly concave; anterior spine margin smooth, posterior margin with 10–12 serrations.

Thoracic adhesive apparatus present, consisting of ridges of skin in rhomboidal field and forming a somewhat U-shaped

appearance with depressed area. A median depression present on posterior half and extending from isthmus to level of middle of pectoral fin. Median ridges orientated longitudinally, lateral ones radiating from median depression. Ridges uninterrupted except for posteriormost lateral ridge, which are dissociated into irregular small, unculiferous patches. Median longitudinal ridges extending anteriorly along ventral midline of body to cover gular region.

Colouration. – In 70% ethanol: Dorsal and lateral surfaces of head, and body brown to brownish grey, fading to beige on ventral surfaces. A diffuse, dark brown saddle-shaped blotch on dorsal and lateral surfaces of body immediately behind head. A series of vertical bars on body and caudal peduncle (bars are diffuse and indistinct in some individuals): a dark bar running through anterior bases of adipose and anal fins and on body in between; a pale bar running through posterior bases of adipose and anal fins; a dark bar running

through middle third of caudal peduncle; a pale bar running through posterior third of caudal peduncle; a dark bar running through caudal fin base. Dorsal fin with brown base and diffuse subdistal brown band, rest of fin yellowish to pale brown in fresh material. Pectoral fin with brown melanophores on fin rays and a hyaline band along posterior margin. Pelvic fin hyaline (yellowish to pale brown in fresh material), with an irregular brown spot at base and a faint transverse brown band in middle. Anal fin with brown base and brown melanophores forming a transverse subdistal band; rest of fin hyaline (yellowish to pale brown in fresh material). Adipose fin brown, with hyaline distal margin, rest of fin yellowish to pale brown in fresh material. Caudal fin with scattered brown melanophores, a hyaline spot at base of each lobe and tips of lobes hyaline (yellowish in fresh material, with prominent dark outline). Maxillary and nasal barbels brown dorsally, beige ventrally.

Distribution. – Known from the Ataran, Salween and Sittang River drainages in Myanmar and western Thailand (Fig. 2).

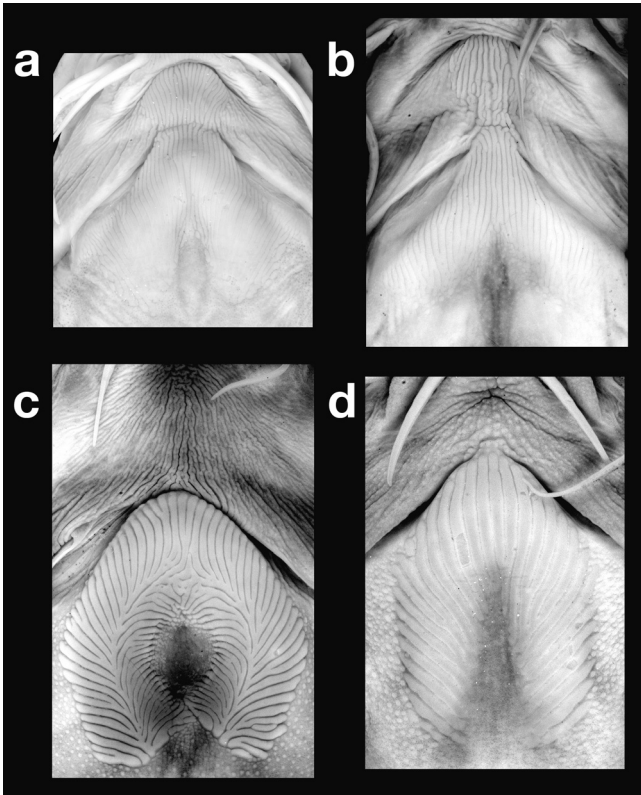


Fig. 3. Thoracic adhesive apparatus of: a, *Glyptothorax rugimentum*, CMK 17784, 64.5 mm SL; b, *G. indicus*, KU 29100, 72.8 mm SL; c, *G. burmanicus*, ZRC 50595, 93.4 mm SL; d, most other congeners (*G. dorsalis*, CMK 17785, 65.5 mm SL illustrated). Illustrations not to scale.

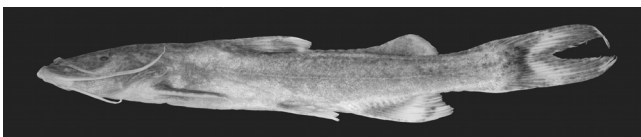


Fig. 4. *Glyptothorax indicus*, KU 29100, 72.8 mm SL; Nepal: Koshi River.

Etymology. – From the Latin *ruga*, meaning crease, and *mentum*, meaning chin. The name is a noun in apposition and refers to the presence of unculiferous skin ridges on the gular region.

DISCUSSION

The anterior extension of the unculiferous ridges of the thoracic adhesive apparatus onto the gular region is unique to *G. rugimentum*, new species, and *G. indicus*. All other congeners lack the ridges in this region, with the gular region highly folded (but not noticeably ridge-like), and bearing only taste buds in this region (Fig. 3; HHN unpub. data). In some species, the gular region appears to be folded regularly (Fig. 3c), but these regular folds of the branchiostegal membrane do not resemble those of the adhesive apparatus in gross morphology in that they do not have a slightly flattened ventral surface like the ridges of the adhesive apparatus; these folds are also not unculiferous, and bear only taste buds. Besides the differences in morphometrics (mentioned in the diagnosis) and colouration (*G. indicus* lacks the light and dark bands on the caudal peduncle present in *G. rugimentum*, new species; compare Figs. 1 and 4) between *G. rugimentum*, new species, and *G. indicus*, the shapes of the thoracic adhesive apparatus of the two species are also different. The adhesive apparatus of *G. rugimentum*, new species, is arranged in a rhomboidal, somewhat U-shaped field while that of *G. indicus*

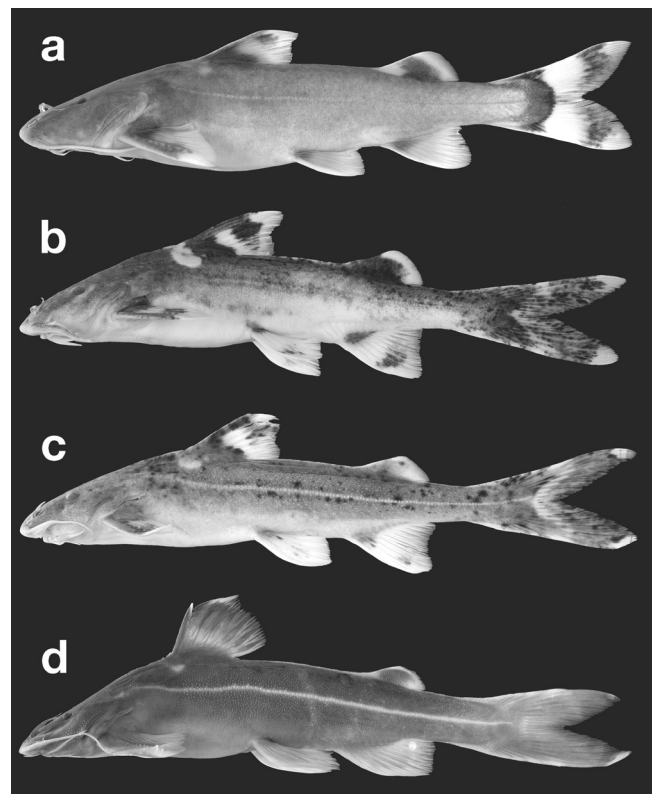


Fig. 5. Lateral views of other *Glyptothorax* species found syntopically or sympatrically with *G. rugimentum*, new species: a, *G. burmanicus*, ZRC 50595, 93.4 mm SL; b, *G. dorsalis*, CMK 17785, 65.5 mm SL; c, *G. aff. minimaculatus*, CMK 18798, 70.6 mm SL; d, *G. trilineatus*, CAS 210296, 78.3 mm SL. Illustrations not to scale.

is arranged in a more laterally divergent, chevron-shaped field (Fig. 3). Although a comparison of Figs. 1 and 4 appear to indicate that *G. rugimentum* has a deeper body than *G. indicus*, this is not borne out by the morphometric data, which are broadly overlapping (body depth at anus 12.8–15.3% SL for *G. rugimentum*, new species, vs. 12.3–16.3 for *G. indicus*).

Three other species of *Glyptothorax* are known to occur syntopically with *G. rugimentum*, new species, in southern Myanmar and western Thailand: *G. dorsalis*, *G. aff. minimaculatus* and *G. trilineatus*. All these species lack unculiferous ridges on the isthmus and also lack vertical bands on the caudal peduncle (Fig. 5). In addition, only one morphometric difference could be discerned between *G. rugimentum*, new species, and these three species, viz. the longer head (28.4–31.2% SL vs. 22.4–28.9) in *G. rugimentum*. The three species can also be distinguished from *G. rugimentum* by the colour pattern. Although colour pattern may show much variability in many species of *Glyptothorax*, some elements are quite constant. *Glyptothorax trilineatus* is distinguished from *G. rugimentum*, new species, by its dark (from plain bluish-brown to plain black body) usually with a conspicuous yellow stripe midlaterally and another stripe along the dorsal midline. *Glyptothorax dorsalis* and *G. aff. minimaculatus* have a conspicuous yellowish blotch at the dorsal-fin origin corresponding to the nuchal plate elements; both have small black spots irregularly distributed on the belly and caudal fin (all absent in *G. rugimentum*, new species). *Glyptothorax dorsalis* has a pale body, especially the lower half, from yellowish brown to yellow in life (*G. rugimentum*, new species, is brown in life). *Glyptothorax aff. minimaculatus* has a brown body with a narrow faint midlateral stripe (stripe absent in *G. rugimentum*, new species).

A fourth species, *G. burmanicus*, is known to occur sympatrically (but not syntopically) with *G. rugimentum*, new species. *Glyptothorax burmanicus* is often considered to be a junior synonym of *G. cavia* (e.g. Chu & Mo, 1999), but the two species can be distinguished by colouration (brown or greyish brown without distinctly pale nuchal plate elements in *G. cavia* and medium to dark grey with distinctly pale nuchal plate elements in *G. burmanicus*), depth of caudal peduncle (6.5–8.0% SL in *G. burmanicus* vs. 4.8–6.4 in *G. cavia*). In addition to the presence (vs. absence) of unculiferous ridges on the gular region, *G. rugimentum*, new species, further differs from *G. burmanicus* in having a longer dorsal (15.2–18.6% SL vs. 11.9–13.8) and pectoral (15.6–18.5% SL vs. 13.3–15.2) spines, and in having the depressed area in the thoracic adhesive apparatus not wholly enclosed by ridges (vs. ridges of the thoracic adhesive apparatus enclosing an ovoid depressed region in the centre; Fig. 3). Furthermore, the ridges on the adhesive apparatus are organized in different orientations in the two species. In *G. rugimentum*, new species, the ridges are linear, radiating from the median depression (Fig. 3a), while in *G. burmanicus*, they are organized into a double row, with the inner row converging towards and the outer row radiating away from the median depression, imparting a frond-like pattern to the adhesive apparatus (Fig. 3c). *Glyptothorax rugimentum*, new

species, also differs from *G. burmanicus* in colouration: *G. burmanicus* has a pale to dark grey (vs. brown) body with small, ovoid yellow patches in the nuchal region and the anterior quarter of the adipose fin (vs. patches absent in *G. rugimentum*).

The shape of the thoracic adhesive apparatus has been used as a diagnostic character in distinguishing species of *Glyptothorax* (e.g. Hora, 1923), but we highlight its importance in such a role, particularly when few or no accompanying morphometric characters are available. Although ultrastructural studies of the structure of the thoracic adhesive apparatus have been conducted (e.g. Sinha et al., 1990), little or no such studies on the gross morphology of the adhesive apparatus have been published. The effect of ontogeny on the gross structure of the adhesive apparatus (an important consideration for the use of the adhesive apparatus as a diagnostic character for species) has also not been documented. From our observations of large ontogenetic series of *Glyptothorax* species used in this study as well as other congeners (most notably *G. major* and *G. prashadi*), we note that the shape of the field in which the ridges of the thoracic adhesive apparatus are arranged is constant throughout the growth of the fish (although the number of ridges within the field increases with ontogeny up to a certain point). Given the consistency of the shape of the thoracic adhesive apparatus, this makes it a very useful character for diagnosing *Glyptothorax* species. Similarly, the branching pattern, shape and organisation of the ridges can be useful secondary characters to distinguish among the species.

Comparative material. – *Glyptothorax burmanicus*: BMNH 1987.9.17.4, 1 ex., 157.4 mm SL, China: Yunnan province, Irrawaddy River drainage, Tengchong county, Tuantian. NRM 39941, 2 ex., 60.8–72.8 mm SL, Myanmar: Kachin state, Irrawaddy River drainage, Myitkyina market. ZRC 46126, 1 ex., 247.3 mm SL, China: Yunnan province, Baoshan county, Salween River drainage, Nujiang at old road from Baoshan to Tengchong (purchased in Tengchong). ZRC 50595, 12 ex., 93.4–115.5 mm SL, China: Yunnan province, Linchang county, Salween River drainage, Nanding River at Xingfu village, 47 km on road from Linchang to Yunxian, 24°10'27.0"N 100°3'18.6"E. UMMZ 246860, 6 alc., 1 c&s, 40.4–83.9 mm SL, Thailand: Mae Hong Son province, Salween River drainage, Huai Mae Saloh, tributary of Salween River N of Mae Sam Laep.

Glyptothorax cavia: KU 28888, 3 ex., 43.3–63.2 mm SL, Nepal: Nawalparasi, Tribeni, Ganges River drainage, Narayani River, downstream from Tribeni Barrage at Pier No. 6, 27°26'6"N 83°53'18"E. KU 29582, 2 ex., 77.6–86.5 mm SL, Nepal: Saptari/Sunsari, Ganges River drainage, Koshi River at Koshi Barrage, 26°31'30"N 86°56'00"E. OSUS 16337, 5 ex., 73.5–130.7 mm SL, Nepal: Chitawan, Ganges River drainage, Narayani River at Narayangarh, upstream from irrigation office.

Glyptothorax dorsalis: CMK 17785, 9 ex., 40.0–65.5 mm SL, Myanmar: Kayin state, Ataran River drainage, stream "Chon Son" between Kyondaw and Phadaw, about 20 km NW of Payathouzou (at border with Thailand).

Glyptothorax indicus: KU 29432, 1 ex., 110.0 mm SL,

Bardiya/Kailali, Ganges River drainage, Chisapani, at Chisapani, 28°38'30"N 81°16'54"E. KU 28816, 1 ex., 54.5 mm SL, Nepal: Banke, Ganges River drainage, Bhurigaon, at Madhuwaa/Kanchanpur, 28°04'12"N 81°50'48"E. KU 29514, 2 ex., 64.8–77.7 mm SL, Nepal: Nawalparasi, Ganges River drainage, Tribeni River at Tribeni barrage, 27°27'N 83°55'E. OSUS 16538, 12 ex., 58.5–133.7 mm SL, Nepal: Nawalparasi, Ganges River drainage, Narayani River at Tribeni Ghat. KU 28638, 1 ex., 54.0 mm SL, Nepal: Rautahat/Sarlahi, Ganges River drainage, Bagmati River at Raj–Marg highway, 27°6'N 85°29'E. KU 29100, 3 ex., 53.5–72.8 mm SL, Nepal: Saptari/Sunsari, Ganges River drainage, Koshi River at Koshi barrage, 26°32'N 86°56'E.

Glyptothorax aff. *minimaculatus*: NRM 40698, 7 ex., 105.3–135.8 mm SL, Myanmar: Kachin state, Irrawaddy River drainage, Myitkyina market. NRM 32651, 2 ex., 88.1–91.2 mm SL, China: Yunnan province, Zhenkang county, Salween River drainage, Nantang River, tributary to Nanding River, about 5 km from Mengdui on the road to Zhenkang. CMK 12173, 1 ex., 60.0 mm SL, CMK 12174, 2 ex., 45.1–49.5 mm SL, Thailand: Tak province, Salween River drainage, stream at km 57 on road from Mae Sot to Wa Rei (5 km before Wa Rei). CMK 18798, 3 ex., 70.6–95.1 mm SL, Myanmar: Kayin state, Ataran River drainage, stream “Chon Son” between Kyondaw and Phadaw, about 20 km NW of Payathouzou (at border with Thailand).

Glyptothorax trilineatus: CAS 210296, 1 ex., 78.3 mm SL, Myanmar: Sagaing state, Irrawaddy River drainage, Alaungdaw Kathapa National Park, Paya Chaung, 22°18'49.6"N 94°28'52.3"E. CAS 223041, 4 ex., 35.8–44.7 mm SL, China: Yunnan province, Baoshan county, Longling, Salween River drainage, Menzhai River from roughly 100 m downstream of bridge to a point approximately 800 m upstream from bridge.

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