



Four new species of *Enochrus* Thomson (Coleoptera: Hydrophilidae) from southern China

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Abstract

Four new species of the water scavenger beetle genus *Enochrus* Thomson, 1859 are described from China. Among the new species, *Enochrus hani* **sp. nov.** from Yunnan and *E. tathagatus* **sp. nov.** from Xizang are very similar to *E. laoticus* Hebauer, 2005 and *E. niisatoi* Minoshima, 2017 in aedeagus and external morphology. *E. imprimeus* **sp. nov.** from Guizhou is similar to *E. liangi* Jia & Zhao, 2007 and *E. japonicus* Sharp, 1873 in general form and colour. *E. strangulatus* **sp. nov.** from Guangxi is similar to *E. laoticus* Hebauer, 2005, but elytra with five longitudinal rows of punctures and a marginal series. Species diagnoses, illustrations and a distribution map of the new species are provided.

Key words: Hydrophilidae, Enochrinae, new species, Oriental Region, China

Introduction

The world-wide distributed genus *Enochrus* Thomson is the largest genus in the subfamily Enochrinae, with more than 230 described species in the world (Jia & Wang 2010, Short & Fikáček 2011). All known species of *Enochrus* are aquatic, occurring in various kinds of freshwater environment, such as edges of lakes, ponds, rivers and streams (Watts 1998). The genus can be recognized by a combination of the following morphological characters: maxillary palpomere 2 somewhat curved outwards; palpomere 4 distinctly bent outwards, giving the palps a ‘zig-zag’ appearance; elytron with sutural stria; mesoventral process keel-shaped or conical shaped; metatarsus with 5 tarsomeres; metatarsomere 1 much shorter than metatarsomere 2 (Short & Fikáček 2013, Komarek 2003, Lee & Ahn 2016).

Enochrus is divided into six subgenera based on the morphology of maxillary palps, mesoventral process, elytral striae, and the hind margin of the fifth ventrite (Hansen 1990; Jia & Short 2013). However, the assignment of the six subgenera is clearly problematic due to the validity of some morphological features for subgenera. Some species even cannot be classified to available subgenera according to some unusual characters combination (e.g., *Enochrus algarum* Jia & Short, 2013) (Hebauer 2005; Jia & Short 2013; Minoshima 2017). The delimitation of the subgenera is indeed controversial, given the absence of any current systematic study on the genus (Short & Fikáček 2013). We therefore describe new species only as members in genus *Enochrus*, without assigned to subgenera.

A total of 24 species of *Enochrus* are known from China so far (Jia & Lin 2015). Recently, we had the opportunities to visit some nature reserves in Southern China. Four new species were collected from Xizang, Yunnan, Guizhou and Guangxi.

Material and methods

Specimens were collected by the following collecting methods: (1) net sweeping in streams and ponds. (2) searching beetles at night with a torch. The beetles were killed by fumigation with ethyl acetate and then brought back to the room in alcohol pads for specimen preparation. Representative specimens of all studied species were dissected.

After 5 minutes in 10% KOH at 80 °C, dissected male genitalia were transferred to a drop of distilled water, remaining membranes were removed under a compound microscope, and the cleaned genitalia were subsequently mounted in a drop of soluble resin on a piece of paper card attached below the respective specimen. For taking photographs, the cleaned and relaxed male genitalia were placed in a drop of glycerine. Photographs of genitalia were taken using a Zeiss AxioCam HRc camera mounted on a Zeiss AX10 microscope with the Axio Vision SE64 software. These images were then stacked in Helicon focus (v7.0.2). Habitus photographs were taken using a Nikon DS-Ri2 mounted on a Nikon SMZ25; layers were captured and stacked in the NIS-Elements software.

All type specimens are deposited in Biological Museum, Sun Yat-sen University, Guangzhou, China (SYSU). Label data of the type specimens are cited verbatim and enclosed in double quotes; a slash divides separate rows on the same label, a double slash divides separate labels. Morphological terminology used in the description follows Jia & Wang (2010) and Jia & Short (2013).

Taxonomy

Enochrus hani sp. nov.

Chinese common name: 哈尼苍白牙甲

(Figs 1, 5)

Type material. HOLOTYPE: CHINA: male (SYSU), “China: Yunnan Prov., Lüchun County, Huanglianshan Mt. (云南省绿春县黄连山), stream under forest. 1900 m, 22.8923°N, 102.3035°E, 30.VII.2022, Zu-qi Mai leg.”

PARATYPES: CHINA: 16 spec. (SYSU), same data as the holotype.

Diagnosis. Length 5.9–6.3 mm. Body oblong-oval, dorsum black with broad yellowish-brown part laterally, which is gradually blurring with the black part. Head with two connected preocular spots, each spot about $1/2\times$ as wide as base of clypeus. Elytra with 10 distinct rows of punctures, but not depressed into striae. Mesovenal process conical shaped and not compressed from the side, which is directed somewhat posteriorly (Fig. 1D). Hind margin of the fifth ventrite with a semicircular incision filled with a fringe of yellowish setae. Aedeagus (Fig. 1E, F) with a slender median lobe, slightly longer than parameres, almost the same width from basal third to near apex; median lobe slightly curved towards the ventral side at mid-length; apex of median lobe slightly dilated and bifurcated. Parameres curved outwards and not dilated apically.

Description. Form and Colour (Fig. 1A–C). Body length 5.9–6.3 mm, width 3.2–3.5mm. Oblong-oval, moderately convex. Black with metallic reflection. Head black basally, with a pair of large yellow preocular spots and a black central subtriangular spot, each preocular spot about $1/2\times$ as wide as base of clypeus; preocular spots largely connected anteromedially. Labrum black with yellow margin anteriorly; the narrow membrane between labrum and clypeus yellow. Pronotum black medially, with yellowish-brown anterior margin and wide yellowish-brown band laterally. Elytra black on disc, with apical third yellow brown that is gradually blurring with the black part, elytral yellow band wide laterally. Ventral surface black or dark brown. Mentum and labium reddish black, Maxillary palpi yellow, not darkened apically. Antennae yellow with brown clubs. Legs reddish brown, tarsi with somewhat paler.

Head. Dorsal surface with dense fine puncture and distinct systematic punctures. Labrum transverse and emarginate anteriorly, surface with dense fine punctures. Eyes not emarginate anteriorly, separated by $4.5\times$ the width of one eye. Mentum subtrapezoid, moderately depressed anteriorly; anterior margin of mentum convex; surface with dense and coarse punctures. Antennae 9-segmented, pedicel about $1/2\times$ as long as scape. Labial palpi with apical segment asymmetrical, slightly shorter than penultimate. The length of maxillary palpi is equal to the width of head; maxillary palpi with apical segment distinctly bended outwards, shorter than penultimate, the second segment hardly curved outwards.

Thorax. Pronotum widest at base, with similar fine punctures as on head but without systematic punctures; anterior, lateral and posterior margins of pronotum with fine rims. Anterior and posterior corners rounded. Scutellum triangular, almost as wide as long, with fine punctures slightly denser than pronotum. Elytra with ground punctures slightly denser than pronotum; elytra with 10 distinct rows of punctures, 1st overlaps with the sutural stria and bifurcates into two rows of punctures at the end of the sutural stria (anterior fifth of elytra). Prosternum with dense hydrofuge pubescence; anterior margin protruding anteromedially, with a transverse groove anteriorly, without

medial carina. Mesosternum narrowed anteriorly widely reaching anterior margin, raised posteriorly to form a conical shaped mesoventral process, directed somewhat posteriorly and bearing tuft of long setae; mesoventral process not compressed from the side (Fig. 1D). Metasternum elevated medially with a small glabrous area. Legs stout, femora densely pubescent except glabrous apical fifth, with tibial groove beneath; tibiae with strong spines, tarsi 5-segmented; claws not sexually dimorphic.

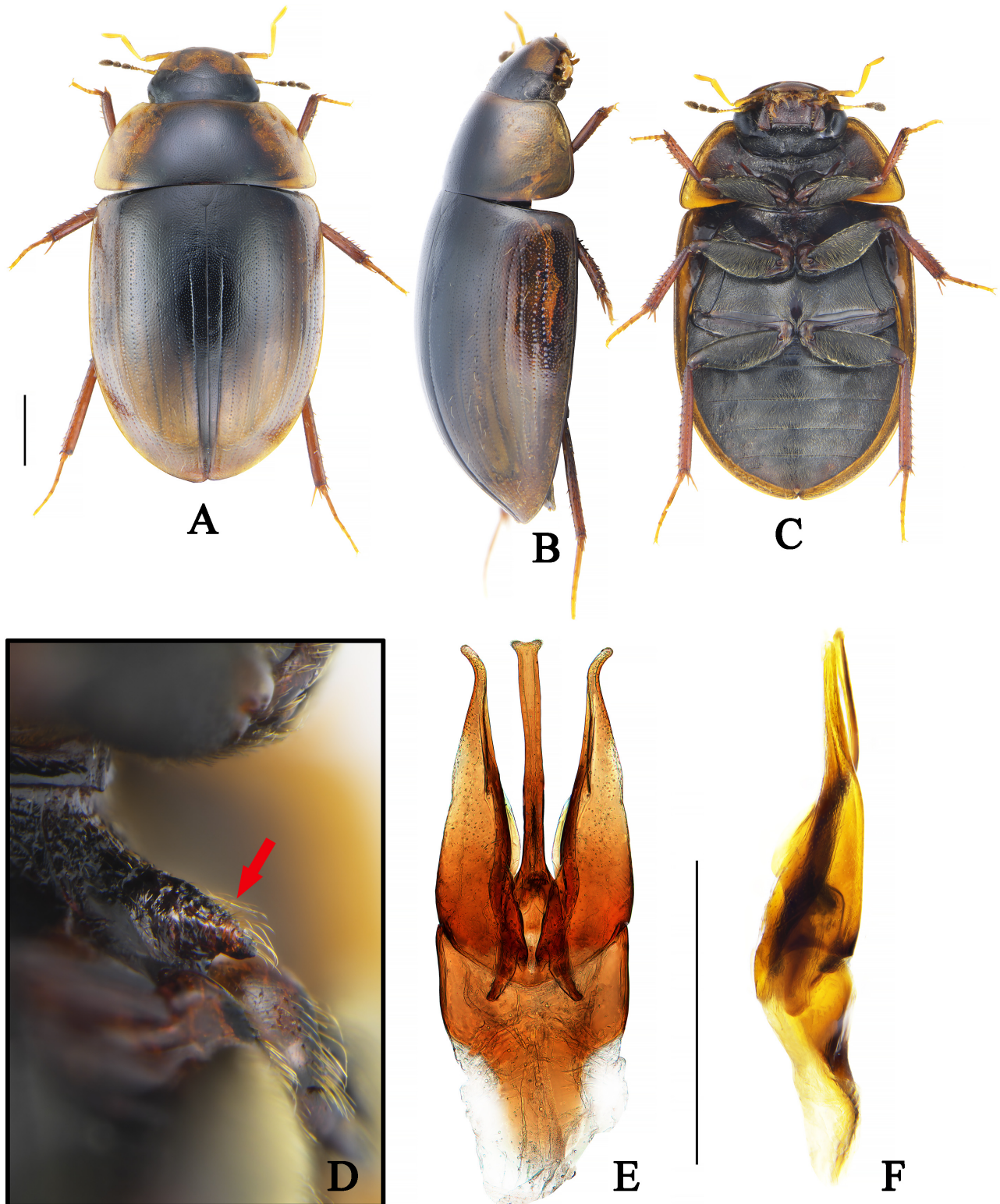


FIGURE 1. *Enochrus hani* sp. nov. A–C. Habitus. A. Dorsal view. B. Lateral view. C. Ventral view. D. Mesoventral process (indicated by arrow) E, F. Aedeagus, dorsal (E) and lateral (F). Scale bars 1 mm.

Abdomen. With 5 visible ventrites, densely pubescent. The first ventrite without carina. Hind margin of the fifth ventrite with a semicircular incision filled with a fringe of yellowish setae.

Aedeagus (Fig. 1E, F). Phallobase slightly shorter than parameres. Parameres widest at the base, gradually narrowed apicad, abruptly bent outwards subapically and not dilated apically. Median lobe slender and slightly longer than parameres, widest at the base, abruptly narrowed at basal third, then almost the same width to near the apex; median lobe slightly curved towards the ventral side at mid-length; apex of median lobe slightly dilated and bifurcated; gonopore situated at the base.

Etymology. This species was collected from Honghe Hani and Yi Autonomous Prefecture, and we have named it after the local minority, the Hani people.

Remark. Based on the morphology characters of elytra with 10 rows of punctures, this species fits the definition of the subgenus *Holcophilydrus*. Two species in this subgenus, *Enochrus laoticus* Hebauer, 2005 and *E. niisatoi* Minoshima, 2017 are very similar to this new species and are close in distribution. The new species can be distinguished from *E. laoticus* by the apices of parameres slender and pointed (apices truncated and dilated in *E. laoticus*, see Hebauer 2005: 55; Jia & Wang 2010: 381), apex of median lobe slightly dilated and bifurcated (apex truncated and hardly dilated in *E. laoticus*). It can be distinguished from *E. niisatoi* by median lobe slender and slightly dilated at apex (strongly enlarged towards apex in *E. niisatoi*)

Biology. Inhabiting shallow streams in forests. Adults hide under fallen leaves in the water during the day and are active at night, preferring to crawl upside down against the surface of the water.

Distribution. China (Yunnan) (Fig. 5).

Enochrus imprimedioides sp. nov.

Chinese common name: 中介苍白牙甲
(Figs 2, 5)

Type material. HOLOTYPE: CHINA: male (SYSU), “China: Guizhou Prov., Weng’an Town, Maolan Nature Reserve (贵州茂兰自然保护区), 814 m, 25°15’08”N, 107°53’56”E. 24.VII.2015, Renchao Lin & Yudan Tang leg.” **PARATYPES: CHINA:** 63 spec. (SYSU), same data as the holotype.

Diagnosis. Length 6.0–7.2 mm. Body oblong-oval, dorsum black or dark brown with apical third yellow brown that is gradually blurring with the black part, pronotum and elytra with yellow brown band laterally; head with two connected preocular spots, each spot about $1/3\times$ as wide as base of clypeus. Elytra with 5 irregular longitudinal rows of large punctures and a marginal series; without row of punctures before sutural stria, 1st and 2nd rows connected by one large puncture to form a short transverse row anteriorly. Mesoventral process conical shaped and not compressed from the side, which is directed somewhat posteriorly (Fig. 2D). Hind margin of the fifth ventrite with a semicircular incision filled with a fringe of yellowish setae. Aedeagus with median lobe shorter than parameres, gradually narrowed from base to apex; parameres curved outwards apically (Fig. 2E).

Description. Form and Colour (Fig. 2A–C). Body length 6.0–7.2 mm, width 3.6–3.8mm. Oblong-oval, moderately convex. Black or dark brown with metallic reflection. Head black with a pair of yellow preocular spots and a black central semicircular spot, each preocular spot about $1/3\times$ as wide as base of clypeus, preocular spots usually connected anteromedially. Labrum black with yellow margin anteriorly; the narrow membrane between labrum and clypeus yellow. Pronotum black with yellow brown anterior margin and wide yellow brown band laterally. Elytra black or dark brown, with apical third yellow brown that is gradually blurring with the black part, elytral yellow band wide laterally. Ventral surface black or dark brown. Mentum and labium black, Maxillary palpi yellow, not darkened apically. Antennae yellow with brown clubs. Legs brown, tarsi with somewhat paler.

Head. Dorsal surface with dense fine puncture and distinct systematic punctures. Labrum transverse and emarginate anteriorly, surface with dense fine punctures and a row of strong punctures. Eyes not emarginate anteriorly, separated by $4.5\times$ the width of one eye. Mentum subtrapezoid, moderately depressed anteriorly; anterior margin of mentum convex; surface with fine punctures. Antennae 9-segmented, pedicel about $1/2\times$ as long as scape. Labial palpi with apical segment asymmetrical, slightly shorter than penultimate. Maxillary palpi ca. as $1.2\times$ as width of head, with apical segment distinctly bended outwards, shorter than penultimate, the second segment curved outwards.

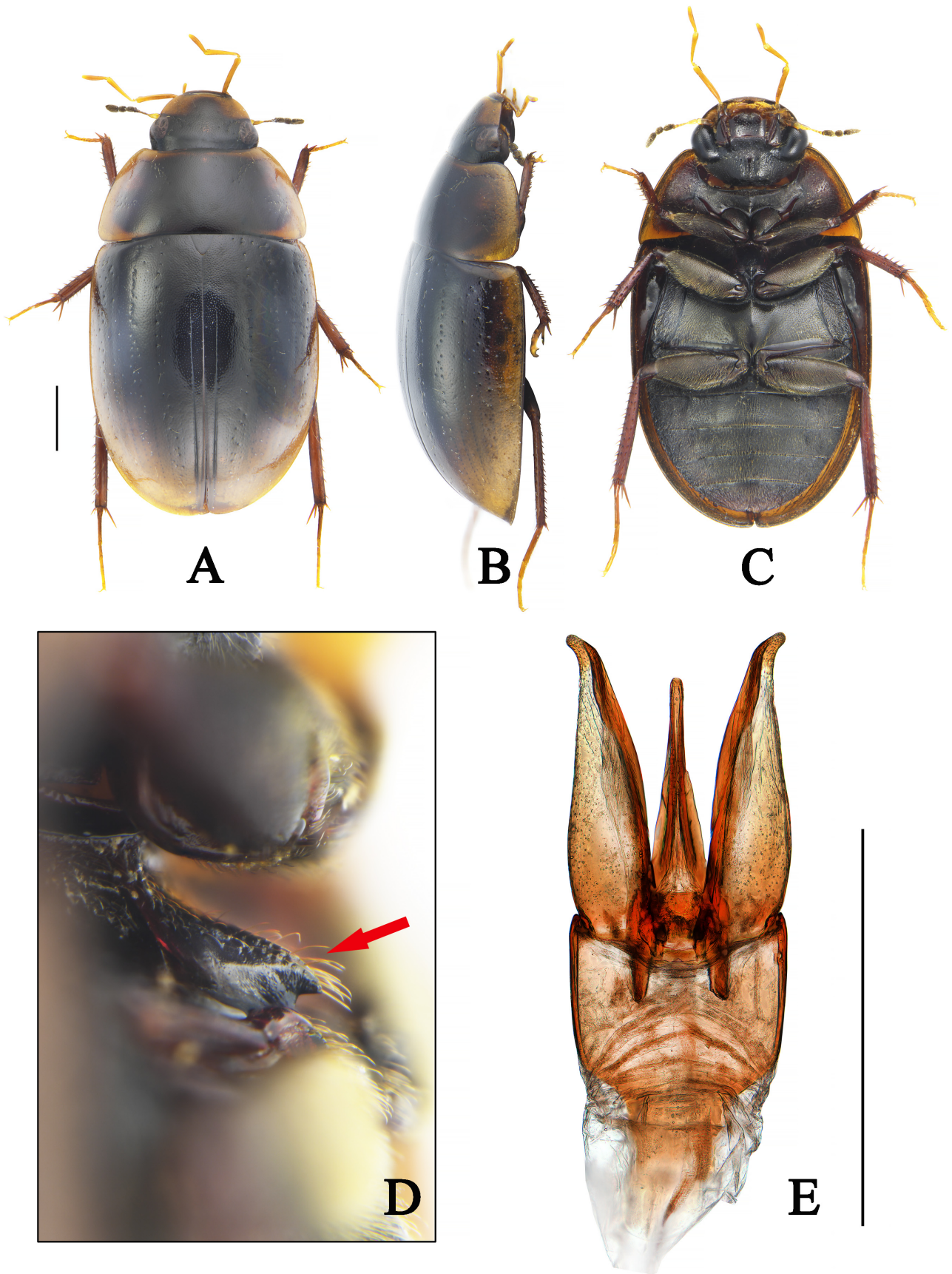


FIGURE 2. *Enochrus imprimedioides* sp. nov. A–C. Habitus. A. Dorsal view. B. Lateral view. C. Ventral view. D. Mesoventral process (indicated by arrow) E. Aedeagus, dorsal. Scale bars 1 mm.

Thorax. Pronotum widest at base, with similar fine punctures as on head and distinct systematic punctures on each side; anterior, lateral and posterior margins of pronotum with fine rims. Anterior and posterior corners rounded. Scutellum triangular, almost as wide as long, with the similar fine punctures as on pronotum. Elytra with ground punctures slightly denser than pronotum, with 5 distinct irregular longitudinal rows of punctures and a lateral series, without row of punctures before sutural stria; 1st and 2nd ones rather regular with one large puncture between them to connected basal punctures to form a short transverse row anteriorly; 3rd only with a few rather sparse punctures, the fourth and fifth close and mixed somewhere, marginal one rather irregular. Elytra without striae except for a sutural stria that reaches anterior fifth. Prosternum with dense hydrofuge pubescence; anterior margin protruding anteromedially, with a transverse groove anteriorly, without medial carina. Mesosternum narrowed anteriorly widely reaching anterior margin, raised posteriorly to form a conical shaped mesoventral process which is directed somewhat posteriorly and bearing tuft of long setae; mesoventral process not compressed from the side (Fig. 2D). Metasternum elevated medially with a small glabrous area. Legs stout, femora densely pubescent except glabrous apical fifth, with tibial groove beneath; tibiae with strong spines, tarsi 5-segmented; claws not sexually dimorphic.

Abdomen. With 5 visible ventrites, densely pubescent. The first ventrite without carina. Hind margin of the fifth ventrite with a semicircular incision filled with a fringe of yellowish setae.

Aedeagus (Fig. 2E). Phallobase slightly longer than parameres. Parameres widest at the base, gradually narrowed apically, longer than median lobe, obliquely truncated inwards and curved outwards apically. Median lobe narrower than parameres, gradually narrowed from base to apex, sharp apically, clearly not reaching the subapical angle of parameres; gonopore situated at the base.

Etymology. The species name is a combination of Latin ‘*imprimis*’, suffix meaning special, and Latin ‘*medius*’, meaning this species is special with related species: *E. liangi* Jia & Zhao and *E. japonicus* Sharp.

Remark. Based on the morphology characters of elytra and mesoventral process, this species fits the definition of the subgenus *Hydatotrephis*. It is closed to *E. liangi* Jia & Zhao. It can be distinguished from the latter by body with relatively weaker reflection, with denser and coarser ground punctures on elytra; elytra without row of punctures before sutural stria; no clear limitation between black disc and apical yellow brown patch; median lobe rather shorter, clearly not reaching the subapical angle of parameres (almost reaching the subapical angle in *E. liangi*, see Jia & Lin, 2015: 53). This species can be distinguished from *E. japonicus* Sharp by body with relatively weaker reflection, head with large preocular spots, elytra with denser and coarser ground punctures, pronotum and elytra with wide lateral yellow brown band, elytra with large yellow brown patch apically; aedeagus with parameres long and narrow apically, not so strongly bend apically.

Biology. Inhabits slow-moving areas of streams, hiding in fallen leaves in the water near the water’s edge in the day.

Distribution. China (Guizhou) (Fig. 5).

***Enochrus strangulatus* sp. nov.**

Chinese common name: 窄茎苍白牙甲
(Figs 3, 5)

Type material. HOLOTYPE: CHINA: male (SYSU), “China: Guangxi Prov., Lin’gui County, Huaping N.R. Guangfuding (广西临桂花坪广福顶), 14.VII.2011, alt. 1400–1780 m, MA, CHEN & PENG Leg.” **PARATYPES: CHINA:** 1 female (SYSU), same data as the holotype; 4 spec. (SYSU), “China: Guangxi Prov., Guilin, Xing’an County, Maoershan Mt., Huilong Temple (广西桂林兴安猫儿山回龙寺), 25°54’27”N, 110°28’3” E, 2.IX.2020, 1067 m, Zhen-ming Yang leg.”

Diagnosis. Length 5.4–5.8 mm. Body oblong-oval, dorsum dark yellowish brown with paler part laterally, which is gradually blurring with the dark part; head with two connected preocular spots, each spot about 1/2× as wide as base of clypeus. Elytra with 5 longitudinal rows of punctures and a marginal series, which are somewhat indistinct; elytra without row of punctures before sutural stria, 1st and 2nd rows connected by one large puncture to form a short transverse row anteriorly. Mesoventral process conical shaped and not compressed from the side, which is strongly directed posteriorly (Fig. 3D). Hind margin of the fifth ventrite with a semicircular incision filled with a fringe of yellowish setae. Phallobase slightly longer than parameres. Parameres broad basally, gradually narrowed

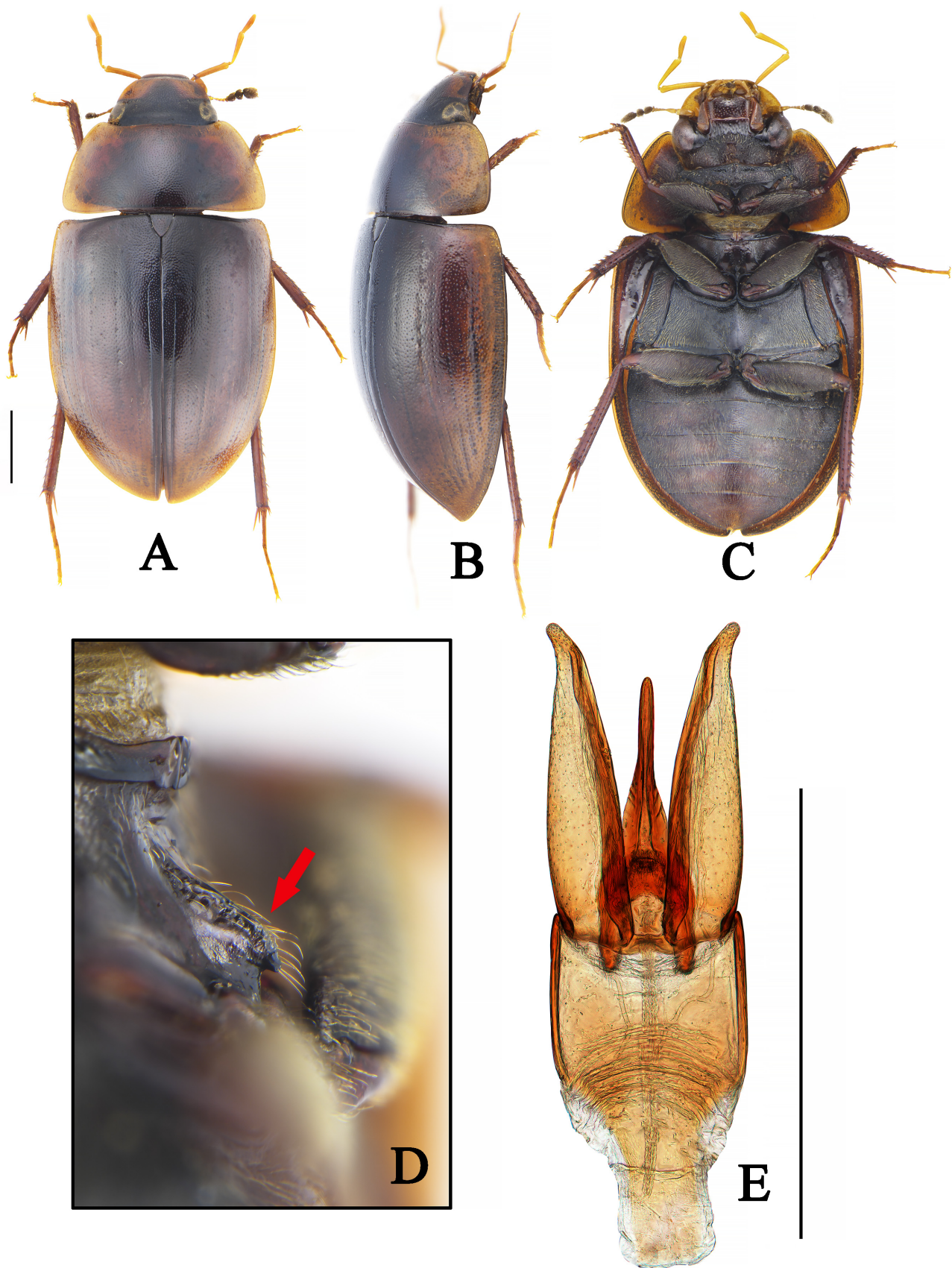


FIGURE 3. *Enochrus strangulatus* sp. nov. A–C. Habitus. A. Dorsal view. B. Lateral view. C. Ventral view. D. Mesoventral process (indicated by arrow) E. Aedeagus, dorsal. Scale bars 1 mm.

apicad, longer than median lobe, obliquely truncated inwards and strongly bent outwards apically. Aedeagus with median lobe shorter than parameres, distinct contraction in the middle, sharp apically; parameres slightly curved outwards near apices (Fig. 3E).

Description. Form and Colour (Fig. 3A–C). Body length 5.4–5.8 mm, width 3.1–3.3mm. Oblong-oval, moderately convex. Dark yellowish brown with metallic reflection. Head with a pair of yellow preocular spots and a black central subtriangular spot, each preocular spot about $1/2\times$ as wide as base of clypeus, preocular spots connected anteromedially. Labrum black with yellow margin anteriorly; the narrow membrane between labrum and clypeus yellow. Pronotum dark yellowish brown medially, with yellow band laterally. Elytra dark yellowish brown on disc with yellow band laterally, gradually blurring with the dark part. Ventral surface black or dark brown. Mentum and labium reddish black, Maxillary palpi yellow, not darkened apically. Antennae yellow with brown clubs. Legs reddish brown, tarsi with somewhat paler.

Head. Dorsal surface with dense fine puncture and distinct systematic punctures. Labrum transverse and emarginate anteriorly, surface with dense fine punctures. Eyes not emarginate anteriorly, separated by $4.5\times$ the width of one eye. Mentum subtrapezoid, moderately depressed anteriorly; anterior margin of mentum convex; surface with coarse punctures. Antennae 9-segmented, pedicel about $1/2\times$ as long as scape. Labial palpi with apical segment asymmetrical, slightly shorter than penultimate. Maxillary palpi ca. as $1.2\times$ as width of head, with apical segment distinctly bended outwards, shorter than penultimate, the second segment slightly curved outwards.

Thorax. Pronotum widest at base, with similar fine punctures as on head and fine systematic punctures; anterior, lateral and posterior margins of pronotum with fine rims. Anterior and posterior corners rounded. Scutellum triangular, almost as wide as long, with fine punctures as on pronotum. Elytra with ground punctures slightly denser than pronotum; elytra with 5 longitudinal rows of punctures and a marginal series, which are somewhat indistinct and not depressed into striae; elytra without row of punctures before sutural stria, 1st and 2nd rows connected by one large puncture to form a short transverse row anteriorly. Elytra without striae except for a sutural stria that reaches anterior fifth. Prosternum with dense hydrofuge pubescence; anterior margin protruding anteromedially, with a transverse groove anteriorly, without medial carina. Mesosternum narrowed anteriorly widely reaching anterior margin, raised posteriorly to form a conical shaped mesoventral process which is strongly directed posteriorly and bearing tuft of long setae, not compressed from the side (Fig. 3D). Metasternum elevated medially with a small glabrous area. Legs stout, femora densely pubescent except glabrous apical fifth, with tibial groove beneath; tibiae with strong spines, tarsi 5-segmented; claws not sexually dimorphic.

Abdomen. With 5 visible ventrites, densely pubescent. The first ventrite without carina. Hind margin of the fifth ventrite with a semicircular incision filled with a fringe of yellowish setae.

Aedeagus (Fig. 2E). Phallobase slightly longer than parameres. Parameres widest at the base, gradually narrowed apicad, longer than median lobe, obliquely truncated inwards and slightly curved outwards apically. Median lobe narrower than parameres, narrowed from base to apex, distinct contraction in the middle, apex pointed, clearly not reaching the subapical angle of parameres; gonopore situated at the base.

Etymology. The species name is derived from a Latin word '*strangulatio*', meaning 'contraction'. Refers to the contraction of the median lobe.

Remark. Based on the morphology characters of elytra and mesoventral process, this species fits the definition of the subgenus *Hydatotrepis*. This species is similar to *E. laoticus* Hebauer, 2005 in external morphology and colour. It can be distinguished from the latter by elytra with 5 longitudinal rows of punctures and a marginal series (elytra with 10 rows of punctures in *E. laoticus*), apex of the median lobe pointed (apex of the median lobe truncated in *E. laoticus*).

Biology. Occurs in streams with shallow water.

Distribution. China (Guangxi) (Fig. 5).

***Enochrus tathagatus* sp. nov.**

Chinese common name: 如来苍白牙甲
(Figs 4, 5)

Type material. HOLOTYPE: CHINA: male (SYSU), "China: Xizang, Medog County, Deergong Village (西藏墨脱县德尔贡村), a pond beside road. 1675 m, 29.1829°N, 95.1480°E, 19.VI.2023, Zu-qi Mai & Wen-kai Kou leg."
PARATYPES: CHINA: 1 male, 8 females (SYSU), same data as the holotype.

Diagnosis. Length 5.8–6.3 mm. Body oblong-oval, dorsum black to yellowish brown with paler part laterally, which is gradually blurring with the dark part; head with two connected preocular spots, each spot about $1/2\times$ as wide as base of clypeus. Elytra with 10 rows of punctures, which are somewhat indistinct and not depressed into striae. Mesoventral process conical shaped and not compressed from the side, which is hardly directed posteriorly (Fig. 4D). Hind margin of the fifth ventrite with a semicircular incision filled with a fringe of yellowish setae. Aedeagus with median lobe slightly longer than parameres, slender, almost the same width from basal third to near apex; median lobe strongly curved towards the ventral side at mid-length; apex of median lobe slightly dilated and bifurcated. Parameres curved outwards near apices, apices dilated and rounded (Fig. 4E, F).

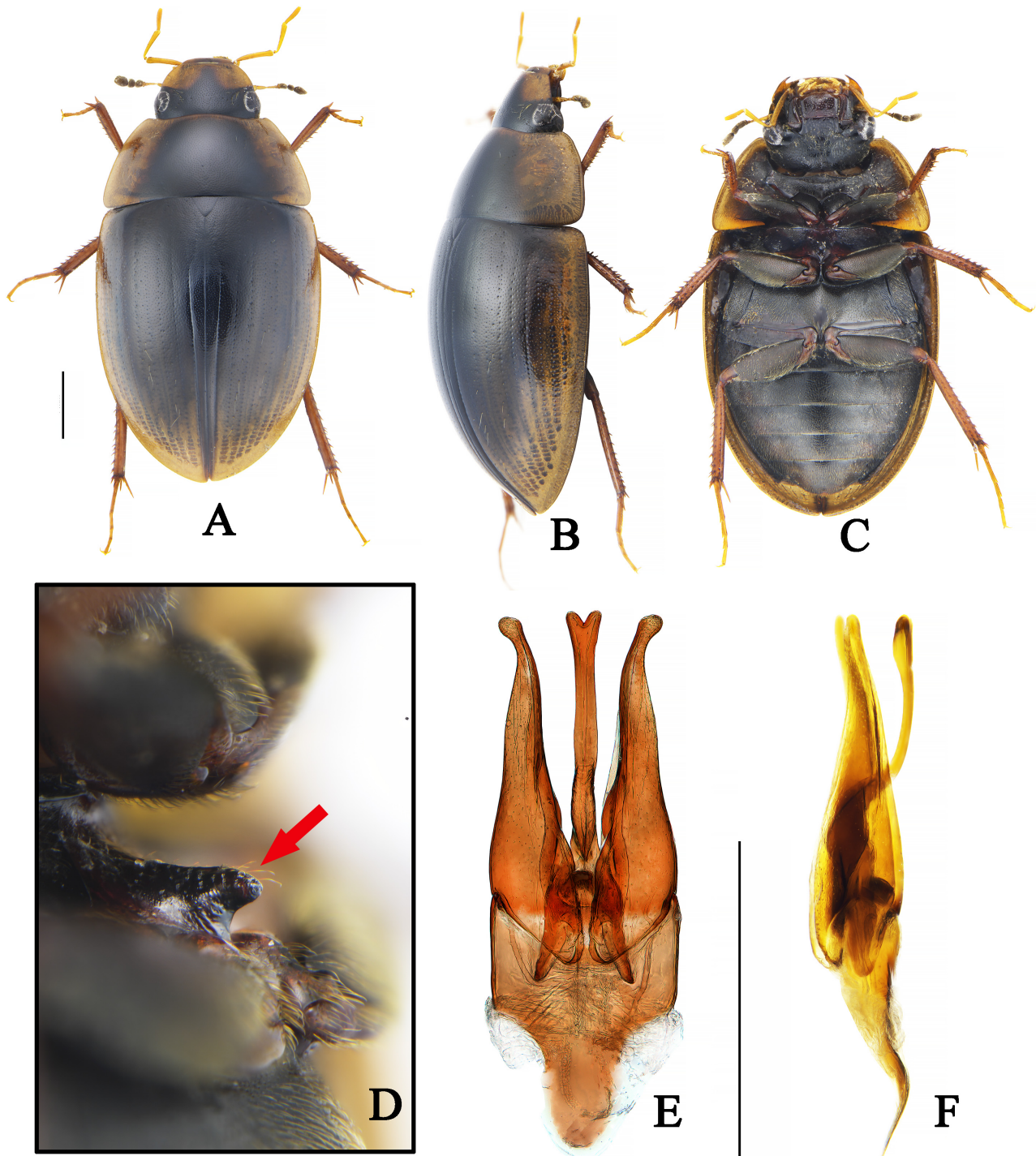


FIGURE 4. *Enochrus tathagatus* sp. nov. A–C. Habitus. A. Dorsal view. B. Lateral view. C. Ventral view. D. Mesoventral process (indicated by arrow) E, F. Aedeagus, dorsal (E) and lateral (F). Scale bars 1 mm.

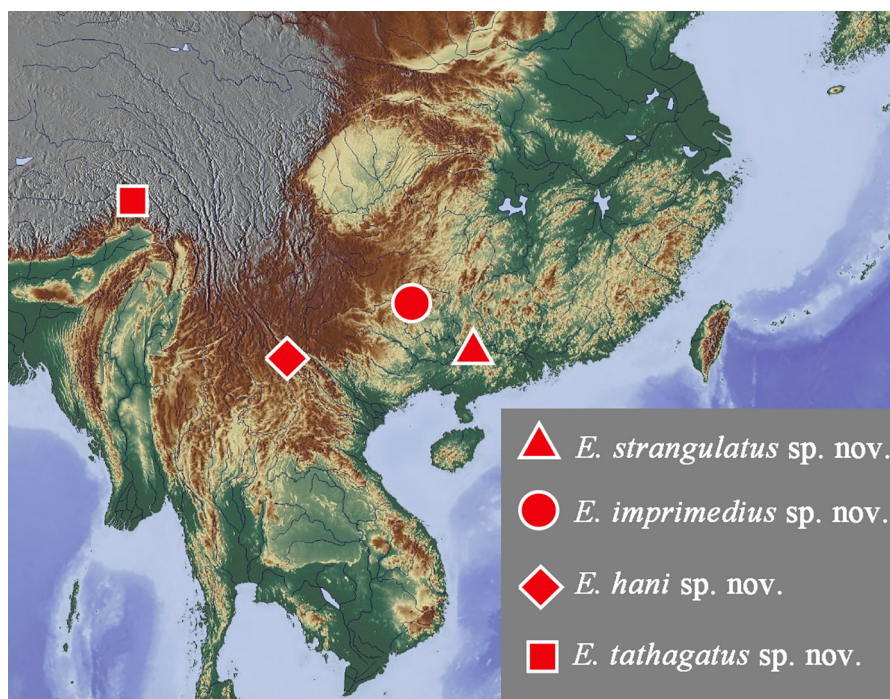


FIGURE 5. Distribution map of the new *Enochrus* species.

Description. Form and Colour (Fig. 4A–C). Body length 5.8–6.3 mm, width 3.2–3.4mm. Oblong-oval, moderately convex. Black with metallic reflection. Head black, with a pair of large yellow preocular spots and a black central subtriangular spot, each preocular spot about $1/2\times$ as wide as base of clypeus, preocular spots connected anteromedially. Labrum black with yellow margin anteriorly; the narrow membrane between labrum and clypeus yellow. Pronotum black medially, with yellowish-brown anterior margin and wide yellowish-brown band laterally. Elytra black on disc with yellow band laterally, gradually blurring with the black part. Ventral surface black or dark brown. Mentum and labium reddish black, Maxillary palpi yellow, not darkened apically. Antennae yellow with brown clubs. Legs reddish brown, tarsi with somewhat paler.

Head. Dorsal surface with dense fine puncture and distinct systematic punctures. Labrum transverse and emarginate anteriorly, surface with dense fine punctures. Eyes not emarginate anteriorly, separated by $4.5\times$ the width of one eye. Mentum subtrapezoid, moderately depressed anteriorly; anterior margin of mentum convex; surface with fine punctures. Antennae 9-segmented, pedicel about $1/2\times$ as long as scape. Labial palpi with apical segment asymmetrical, slightly shorter than penultimate. Maxillary palpi ca. as $1.1\times$ as width of head, with apical segment distinctly bended outwards, shorter than penultimate, the second segment slightly curved outwards.

Thorax. Pronotum widest at base, with similar fine punctures as on head and fine systematic punctures; anterior, lateral and posterior margins of pronotum with fine rims. Anterior and posterior corners rounded. Scutellum triangular, almost as wide as long, with fine punctures slightly denser than pronotum. Elytra with ground punctures slightly denser than pronotum; elytra with 10 rows of punctures which are somewhat indistinct; 1st overlaps with the sutural stria and bifurcates into two rows of punctures at the end of the sutural stria (anterior fifth of elytra). Elytra without striae except for a sutural stria that reaches anterior fifth. Prosternum with dense hydrofuge pubescence; anterior margin protruding anteromedially, with a transverse groove anteriorly, without medial carina. Mesosternum narrowed anteriorly widely reaching anterior margin, raised posteriorly to form a conical shaped mesoventral process which is hardly directed posteriorly and bearing tuft of long setae, not compressed from the side (Fig. 4D). Metasternum elevated medially with a small glabrous area. Legs stout, femora densely pubescent except glabrous apical fifth, with tibial groove beneath; tibiae with strong spines, tarsi 5-segmented; claws not sexually dimorphic.

Abdomen. With 5 visible ventrites, densely pubescent. The first ventrite without carina. Hind margin of the fifth ventrite with a semicircular incision filled with a fringe of yellowish setae.

Aedeagus (Fig. 4E, F). Phallobase slightly shorter than parameres. Parameres widest at the base, gradually narrowed apicad, abruptly curved outwards subapically, apices dilated and rounded. Median lobe slender and

slightly longer than parameres, widest at the base, abruptly narrowed at basal third, then almost the same width to near apex; median lobe strongly curved towards the ventral side at mid-length; apex of median lobe dilated and bifurcated; gonopore situated at the base.

Etymology. The species name ‘tathagatus’ is derived from the Roman word Tathāgata, means Rudraksha, a mythical figure in Buddhism, ‘the one who has thus come’ or sometimes ‘the one who has thus not gone’. It means that this species has always inhabited this area, and we are lucky to have travelled to this natural environment to find them.

Remark. Based on the morphology characters of elytra with 10 rows of punctures, this species fits the definition of the subgenus *Holcophilydrus*. This species is similar to *E. laoticus* Hebauer, 2005, *E. niisatoi* Minoshima, 2017 and *E. hani* **sp. nov.** It can be distinguished from *E. laoticus* and *E. niisatoi* by the apices of parameres rounded (apices truncated in *E. laoticus* (see Hebauer 2005: 55; narrowed in *E. niisatoi* (see Minoshima 2017: 64), apex of median lobe dilated and bifurcated (truncated and hardly dilated in *E. laoticus*; strongly enlarged towards apex in *E. niisatoi*). It can be distinguished from *E. hani* **sp. nov.** by elytra with 10 rows of punctures which are somewhat indistinct (with 10 distinct rows of punctures in *E. hani* **sp. nov.**), mesoventral process hardly directed posteriorly (mesoventral process directed somewhat posteriorly in *E. hani* **sp. nov.**), the apices of parameres dilated (not dilated in *E. hani* **sp. nov.**), median lobe strongly curved towards the ventral side at mid-length (slightly curved towards the ventral side in *E. hani* **sp. nov.**).

Biology. Adults were collected in a pond under forests, inhabit leaf litter in shallow water along the pond.

Distribution. China (Xizang) (Fig. 5).

Discussion

The diverse genus *Enochrus* has long been a taxonomic challenge. While species within this genus generally exhibit relatively uniform morphology. Some species have distinct differential morphological characters (Hansen 1999), but some sharing very similar morphology, and even displaying morphological variations in different distributions (Minoshima 2019). To facilitate species identification, *Enochrus* has been divided into six subgenera based on combinations of morphological features. Some of these subgenera, are facing taxonomic controversies. For example, *Holcophilydrus* Kniž, 1911 was established for *Enochrus ussuriensis* Kniž, 1911 (synonym of *E. simulans* (Sharp) by Jia and Wang in 2010) based on the elytra with 10 longitudinal rows of striae. There are currently seven valid species in this subgenus, except for *E. curtus* Balfour-Browne, 1958 and *E. seriatus* (Régimbart, 1903) are Afrotropical species (Hansen 1999, Jia & Wang 2010). The remaining five species are only distributed in Asia. The Palearctic species *E. simulans* (Sharp, 1873) exhibits the most distinctive morphological characters, including the elytra with 10 longitudinal sharp striae, mesosternum strongly elevated posteriorly and compressed from the sides, the claws sexually dimorphic (the front claws of males being strongly curved and featuring a distinct basal tooth), and the fifth abdominal ventrite entire. Based on our knowledge, *E. simulans* shares more characters with the species of the subgenus *Lumetus* Zaitzev, 1908, except for the 10 longitudinal striae on elytra. The differences between *E. simulans* and other species of the subgenus *Holcophilydrus* are more distinct.

Hebauer (2005) described *Enochrus laoticus* Hebauer, 2005 from Laos and assigned it to subgenus *Holcophilydrus* only based on the elytra with 10 longitudinal rows of punctures, instead of sharp striae as *E. simulans*. But he also mentioned that *E. laoticus* with a semicircular incision on the hind margin of the fifth ventrite, the mesoventral process conical shaped and not compressed from the side, and non-sexually dimorphic claws. These characters are actually more typical of the subgenus *Hydatotrephis* Macleay, 1990. Jia and Short (2013) described a Chinese species *E. algarum* Jia & Short, 2013, which has characters of the subgenus *Holcophilydrus*: elytra with 10 longitudinal rows of punctures and an entire fifth abdominal ventrite. Furthermore, this species has short maxillary palps, a feature common to the subgenus *Enochrus* s. str. Therefore, this species has not been assigned to any known subgenus. Another species from Laos, *Enochrus niisatoi* Minoshima, 2017 was assigned to *Holcophilydrus* due to its striking similarity to *E. laoticus*. Minoshima (2017) suggested that the character distinguishes *Holcophilydrus*, multiple rows of punctures on the elytra, is variable and plastic in *Enochrus* as well as in other aquatic hydrophilids, indicating that this character may not reliably reflect the taxonomic status of species.

Given the absence of a comprehensive phylogenetic study of *Enochrus*, the validity of some subgenera remains unverified. There is no doubt that systematic taxonomic revision and phylogenetic studies of *Enochrus* are essential.

In addition to external morphological characters, the structure of the male genitalia and the geographical distribution of species should also be considered.

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中国南部苍白牙甲属*Enochrus*四新种（鞘翅目：牙甲科）

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摘要: 描述中国苍白牙甲属*Enochrus*四新种; 云南的哈尼苍白牙甲*Enochrus hani* **sp. nov.**和西藏的如来苍白牙甲*E. tathagatus* **sp. nov.**在形态上与老挝苍白牙甲*E. laoticus*和新里苍白牙甲*E. niisatoi*非常相似, 贵州的中介苍白牙甲*E. imprimediatus* **sp. nov.**与梁氏苍白牙甲*E. liangi*和日本苍白牙甲*E. japonicus*在颜色和体型上近似, 广西的窄茎苍白牙甲*E. strangulatus* **sp. nov.**与老挝苍白牙甲*E. laoticus*相似, 但鞘翅上仅具5条纵向的刻点列和一条外缘刻点列; 提供了四个新种的鉴别特征、图版以及地图分布。

关键词: 牙甲科; 苍白牙甲亚科; 新种; 东洋区; 中国