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Four new species of the genus *Lobrathium* Mulsant & Rey (Coleoptera: Staphylinidae: Paederinae) from China

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Abstract

Four new species of the genus *Lobrathium* Mulsant & Rey, 1878 from the mainland China are described: *L. quadrum* sp. n. from Sichuan, *L. rutilum* sp. n. from Hubei, *L. tortuosum* sp. n. from Zhejiang and *L. zonalis* sp. n. from Sichuan. In addition, the paper reviews the history of the research on the Chinese fauna of the genus. Some important morphological characters are illustrated for the new species.

Key words: New species, *Lobrathium*, Paederinae, Staphylinidae, China

Introduction

The Holarctic genus *Lobrathium* Mulsant & Rey, 1878 forms a very species-rich fauna in the Eastern Palearctic region that is still largely unknown. Especially the fauna of the mainland China requires further investigation (Assing 2012). Recent revisionary studies of the East Palearctic *Lobrathium* (Assing 2010, 2012) that included a revised diagnosis of the genus, descriptions of numerous new species and identification keys, promoted further advances in the study of this genus in China. An obstacle remaining in the study of *Lobrathium* is lack of any sound infrageneric classification or a species-group division for this large genus, that circumstance making a task of comparisons for newly discovered species more difficult. Hopefully such classification can be attempted in the near future when the alpha-taxonomic knowledge of this genus in the poorly studied regions like China becomes more complete.

Before this study, a total of 43 species were recorded in China (Assing 2010, 2012). The first species of *Lobrathium* described from China was *L. hongkongense* (Bernhauer) from Hongkong (Bernhauer 1931, in *Lobrathium* as a subgenus of *Lathrobium*). Later, Koch (1939) described *L. rotundiceps* (Koch) from Zhejiang (as *Lathrobium rotundiceps*). Then a few more species were described from Sichuan by F.K. Zheng: *L. emeiense* Zheng, *L. gladiatum* Zheng, *L. hebeatum* Zheng, *L. sibynium* Zheng (synonymized with *L. hongkongense* Bernhauer in Assing 2012) and *L. tortile* Zheng (Zheng 1988), as well as *L. wui* Zheng from Zhejiang, Tianmushan (Zheng 2001). The last species was moved to the genus *Tetartopeus* (Assing 2012). *Lobrathium bimaiculatum* Li, Tang & Zhu was described from Guizhou, Leigongshan (Li et al. 2007), but later was synonymized with *Tetartopeus wui* (Zheng) (Assing 2012). Assing (2010) described 18 additional species from Taiwan, and moved *Lathrobium taiwanense* Watanabe to the genus *Lobrathium*. Finally, another 18 species from the mainland China were described in Assing (2012). *Lobrathium regulare* (Sharp) listed for the fauna of China in Smetana (2004) was transferred to the genus *Pseudolathra* by Assing (2012a).

Here we describe four new species based on the recently collected material accumulated in the collection of the Institute of Zoology, Chinese Academy of Sciences (IZCAS). Thus the total number of the Chinese species of the genus *Lobrathium* increases to 47.

Materials and methods

Specimens were relaxed in warm water (60°C) for 10–12 hours for dissection of the last abdominal segments containing the aedeagus, and the mouthparts. Detached parts were placed into KOH (10%) for 10–24 hours (depending on the degree of sclerotization) to clean the labrum, mandibles, sternites VIII–IX and the aedeagus from muscles, fat and other surrounding tissues. Then they were placed into 75 % alcohol for ca. two minutes and transferred to the vials with glycerin for observation. After observation, dissected parts were placed in the plastic genitalia vials, the latter pinned under respective specimens. Observations and drawings were made under a compound microscope (Leica MZ–APO). The type specimens are deposited in the Institute of Zoology, Chinese Academy of Sciences (IZCAS), some duplicate paratypes – in the collection of the Natural History Museum of Denmark (Zoological Museum of the University of Copenhagen, ZMUC).

All measurements were taken with an eyepiece micrometer. They are given in millimeters and abbreviated as follows:

HL	head length (from base of labrum to neck constriction)
HW	head width (maximal)
EL	eye length (in dorsal view)
AL	antennal length (from base of antennomere 1 to the apex of antennomere 11)
PL	pronotum length (along median line)
PW	pronotum width (maximal)
ELL	elytral lateral length (from the elytral base at the level of base of scutellum to lateral angle of an elytron)
EW	elytral width (maximal, includes both elytra)
ESL	elytral sutural length (from tip of scutellum to sutural angle)
ABW	width of abdomen (maximal)

1. *Lobrathium quadrum* sp. n.

(Figs. 1A–I, 5A)

Type material. Holotype, ♂, CHINA: Sichuan Province, Mountain Qingcheng, 24. VIII. 2005, leg. Xiaoyan Li; Paratypes, 2 ♀♀, same data as holotype (IZCAS).

Description. Length: 6.7–7.7 mm; width: 1.09–1.14 mm. Body parts (all in mm): HL 0.98; AL 2.05; PL 1.16; ELL 1.29; HW 0.98; PW 0.87; ELW 1.07; ABW 1.12.

Body blackish-brown to brown with luster. Elytra blackish–blue with slight metallic luster, with pair of pale yellowish spots close to posterior margin. Antennae, legs and abdomen more or less brown.

Head with broadly rounded posterior margins, as long as wide. Eyes relatively large, protruded laterally; HL/EL = 3.3, eye length slightly longer than gena but shorter than temple (gena : eye : temple = 0.24 : 0.30 : 0.44 mm). Punctuation on head irregular, coarse and dense, punctures of different size, denser and coarser laterally, especially around eyes. All punctures bearing setae of different length and pale brown color. Vertex and middle front smooth and glossy with very sparse and coarse punctures.

Pronotum only slightly longer than wide (PL/PW = 1.2), lateral sides with slight and s-shaped line borders; surface with yellowish brown hairs. Scutellum v-shaped and slightly longer than wide; surface without luster, with reticulate microsculpture and very weak punctuation.

Elytra with ELL/ELW = 1.2, ESL/ELL = 0.8, epipleural ridge absent in the basal fifth of elytral length. Punctures on elytra 1.5 times as large as those on pronotum, each puncture with brownish yellow seta, intervals between punctures slightly shorter than diameter of puncture. Brownish yellow spots on elytra large, taking ca. 1/3 of elytral length.

Abdomen widest at segment VI (4th visible), where it is slightly wider than head, pronotum or elytra. Setiferous punctures on tergites fine and dense, denser laterally, base of tergites unevenly punctured with same sized punctures, posterior and lateral areas with sparse black hairs.

Aedeagus (Figs. 1G–I) robust and symmetrical, length/width = 2.3. Median lobe (except dorsal plate) short and thick, slightly curved ventrally, with short, robust ventral process. Dorsal plate of median lobe with basal part thin and broadened posteriad, widest at apical 1/3 and sharply constricted forming acute apex. Ventral plate strongly chitinized and rather projected ventrally, posterior part with a rhombic structure in ventral view.

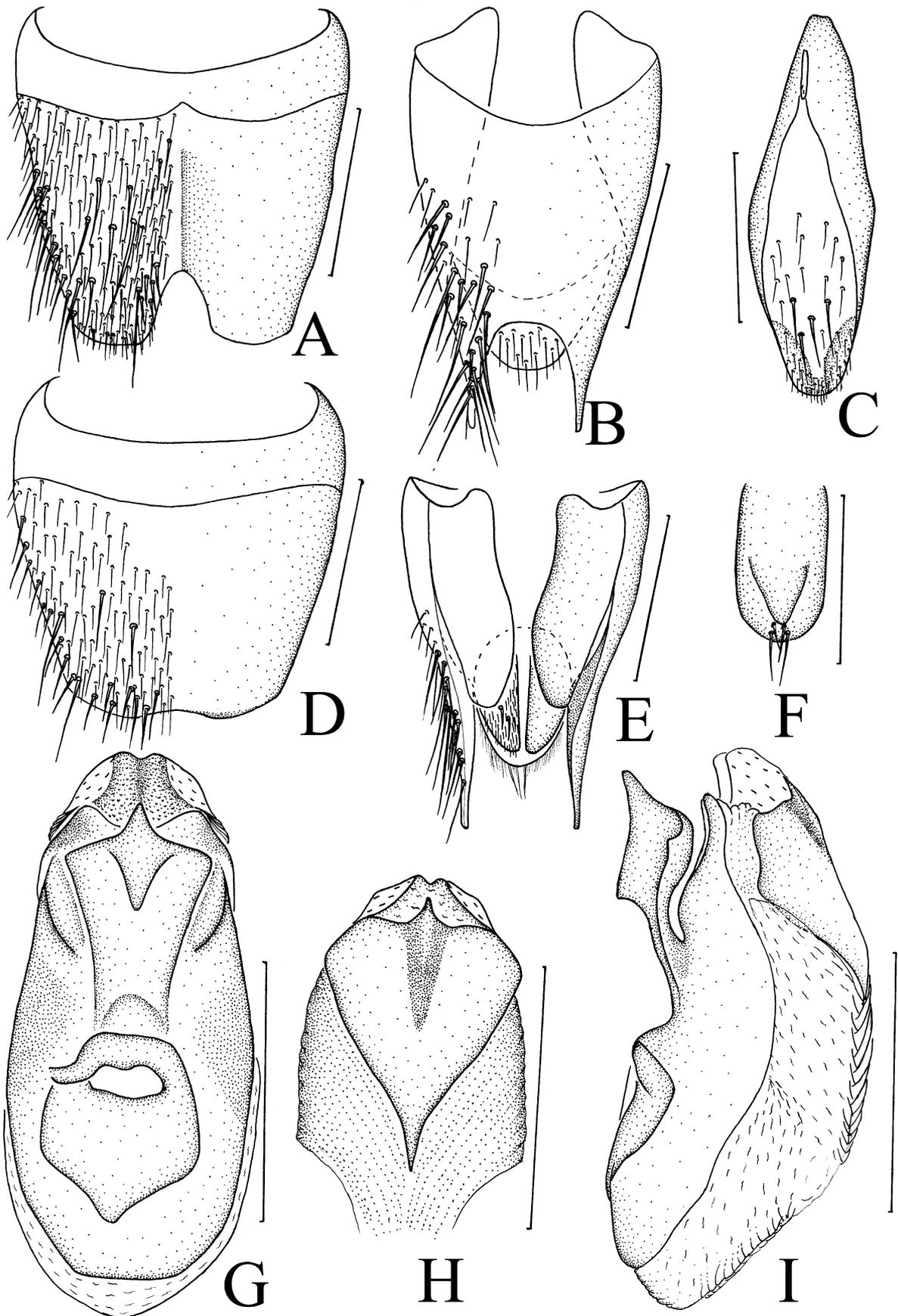


FIGURE 1. *Lobrathium quadrum* sp. n. from Sichuan. A. sternite VIII, male; B. tergites IX–X, male; C. sternite IX, male; D. sternite VIII, female; E. sternites IX–X, female; F. tergite IX, female; G. aedeagus, ventral view; H. apex of aedeagus, dorsal view; I. aedeagus, lateral view. Scale= 0.5 mm.

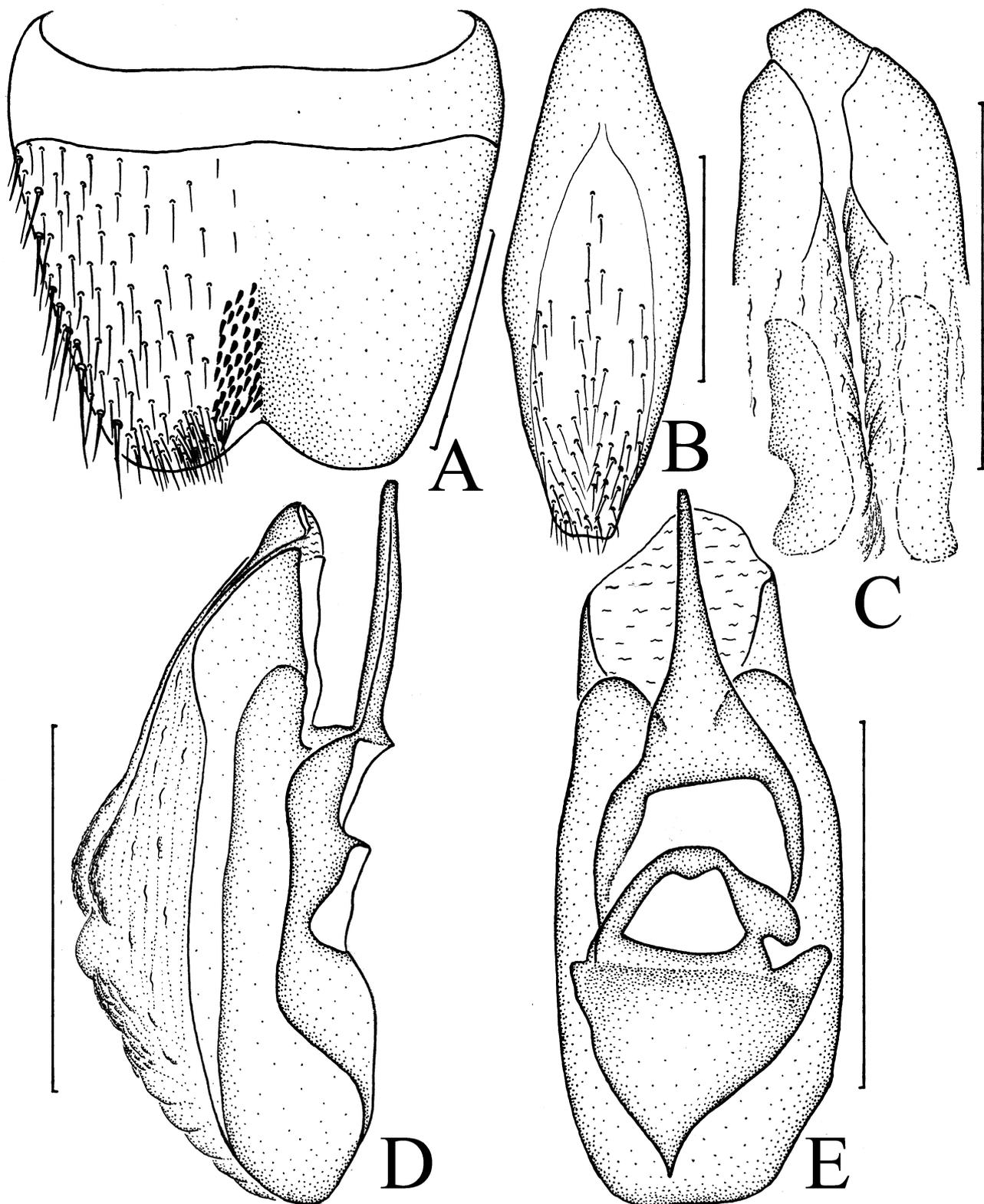


FIGURE 2. *Lobrathium rutilum* sp. n. from Hubei. A. sternite VIII, male; B. sternite IX, male; C. apex of aedeagus, dorsal view; D. aedeagus, lateral view; E. aedeagus, ventral view. Scale= 0.5 mm.

Secondary sexual dimorphism.

Both sexes differ from each other in the structure of terminalia. In male sternite VI with shallow midlongitudinal depression; posterior margin of sternites VII–VIII with narrow notch and longitudinal depression basally to the notch, the notch and depression of sternite VIII (Fig. 1A) distinctly longer than those on sternite VII;

sternite IX (Fig. 1C) distinctly asymmetrical. Tergite IX (Fig. 1B) broad with semicircular notch; tergite X semicircular.

In female sternite VIII (Fig. 1D) with shallow emargination on posterior margin; lateroventral parts of tergite IX (Fig. 1E) with rather acutely pointed apex; anterior and posterior gonocoxites separated; sternite IX (Fig. 1F) with small protrusion and four setae.

Etymology. The specific epithet is the Latin noun in apposition, meaning quadrate and referring to somewhat angular shape of elytral spots.

Remarks. Externally the new species *L. quadrum* **sp. n.** is similar to *L. tortile* Zheng and *L. hongkongense* Bernhauer, but it differs from both of them in the length of the color spots on elytra. In *L. quadrum* **sp. n.**, color spot is about 1/3 of elytral length, whereas in the latter two species they are about 1/2 of elytral length. Also, the ventral process of the aedeagus in the new species is much broader and shorter (Figs. 1G, I) than in *L. tortile* Zheng. In contrast to *L. hongkongense* with the deep and short depression, the new species has shallow and very elongate median depression on sternite VIII that is about the entire length of the sternite. In *L. quadrum* **sp. n.** that depression in its middle area is covered by setiferous punctures that are much sparser than in *L. hongkongense* (Fig. 1A).

Distribution. *Lobrathium quadrum* **sp. n.** is known only from the type locality at the foothills of the Mountain Qingcheng located ca. 2 km of town Qingcheng in the south of Sichuan Province. The type specimens were collected under dense and wet grass at the moist edge of a creek. All specimens were collected in August at the altitude of about 1100 m.

2. *Lobrathium rutilum* **sp. n.**

(Figs. 2A–E, 5B).

Type material. Holotype, ♂, CHINA: Hubei Province, Shennongjia Gangou, 1610 m, 1–8. VIII. 1998, leg. Xiaodong Yu (IZCAS).

Description. Length: 9.20 mm; width: 1.25 mm. Body parts (all in mm): HL 1.42; AL 2.80; PL 1.33; ELL 1.36; HW 1.23; PW 1.15; ELW 1.25; ABW 1.09.

Body, including antennae and legs, brownish red with luster.

Head with distinct posterior angles, rather parallel-sided, with HL/HW = 0.9, vertex slightly convex, anterolateral margin narrow. Eyes rather small and even; HL/EL = 14.2, diameter of eye shorter than gena and much shorter than temple (gena : eye : temple = 0.29 : 0.10 : 1.03 mm). Vertex and middle front smooth and glossy with punctures sparse but large.

Pronotum oblong with PL/PW = 1.2 and punctation consisting of punctures larger than such on head. Scutellum U-shaped, longer than wide, surface without luster but with larger setiferous punctation.

Elytra as long as wide, ESL/ELL = 0.7 with uneven surface, epipleural ridge absent in the basal fifth of elytral length, punctures dense and coarse, diameter of punctures similar but denser than punctures on pronotum, each puncture with an oblique yellowish brown seta, intervals between punctures larger than diameter of a puncture. Hind wings rather reduced, shorter than elytra.

Abdomen widest at segment VI (4th visible), narrower than head, pronotum or elytra; setiferous punctures on tergites fine and dense, each bearing black setae, punctures denser laterally; punctures on sternites of the same size, with pale setae. Middle areas of sternites III–VI slightly convex with sparse punctures.

Aedeagus (Figs. 2C–E) slightly asymmetrical, length/width = 2.5. Dorsal plate of median lobe small, of irregular shape, gradually broadened posteriad, with sinuate apex. Ventral process strongly sclerotized and straight (Figs. 2D, E).

Male secondary sexual characters: sternite VII with slightly depressed middle area and shallowly emarginated posterior margin; hind margin of sternite VIII (Fig. 2A) with deeply rounded and broad notch and rather dense, hard hairs and, medially, with dense thorns; sternite IX (Fig. 2B) with base and setiferous part symmetrical.

Females unknown.

Etymology. The specific epithet is the Latin adjective *rutilum* (brownish red) that refers to the coloration of this species.

Remarks. This new species can be easily distinguished from all other species of *Lobrathium* by the following characteristics: 1) robust, long and brownish red body; 2) the posterior part of elytra without color spots; 3) straight

and slender ventral process of the aedeagus (Figs. 2D–E). Although *L. rotundiceps* (Koch) also has red body and elytra without color spots, its head is about as long as wide and rounded in dorsal view (Zheng 1988; Assing 2012). The new species, on the contrary, has quadrate-like head in dorsal view that is distinctly longer than wide.

Distribution. The only known specimen of *Lobrathium rutilum* sp. n. was found in the northwest of Hubei Province in Shennongjia Nature Reserve in the mountains with well developed forest and grass vegetation. It was collected in August by pitfall trap with the mixture of sugar, vinegar, water and alcohol at the altitude of 1600 m.

3. *Lobrathium tortuosum* sp. n.

(Figs. 3A–F, 5C).

Type material. **Holotype**, ♂, **CHINA: Zhejiang Province**, Longquan, Mountain Fangyang, 1400 m, 28. VII. 2007, leg. Zongyi Zhao (IZCAS); **Paratypes**, 1♀, 3♂♂, same data as holotype; 1♀, 1♂, Mountain Fengyang Er'zhepu, 1400 m, 29. VII. 2007, Zongyi Zhao (IZCAS, ZMUC).

Description. Length: 7.5–8.3 mm; width: 1.25–1.28 mm. Body parts (all in mm): HL 1.09; AL 2.66; PL 1.28; ELL 1.55; HW 1.06; PW 1.02; EW 1.24; ABW 1.25.

Body black with slight bluish metallic luster; elytra with a pair of yellow spots; mandibles and legs blackish brown.

Head slightly rounded and as long as wide. Eyes relatively small, slightly protruded laterally; HL/EL = 3.41, eye length slightly longer than gena but shorter than temple (gena : eye : temple = 0.25 : 0.32 : 0.52 mm). Punctuation on head irregular and sparse, consisting of large punctures varying in size. All punctures with brown setae of different length. Vertex smooth and glossy without punctuation.

Pronotum with PL/PW = 1.3, widest at apex. Disc rather flat with punctuation on disk sparser, but, laterally, denser than on head. Scutellum U-shaped, longer than wide, surface with reticulate microsculpture and fine punctuation, shiny.

Elytra with ELL/ELW = 1.3 and ESL/ELL = 0.8, with elytral epipleural ridge absent in the basal third and in posterior end of elytral length. Punctures on disk of elytra large, dense, with setae; along elytral suture small, and posterior part of elytra without distinct punctures; diameter of puncture on disc larger than punctures and intervals between them on pronotum. Setae oblique and brown. Posterior 1/3 of elytra with a pair of blackish brownish rounded spots. Hind wings extending back to basal of elytra but flightless species.

Abdomen widest at segment VI (4th visible), wider than head or pronotum and as wide as elytra. Surface of tergites with fine microsculpture, posterior and lateral areas with sparse dark hairs. Punctures on sternites larger than on tergite, middle area of each sternite with sparse punctures.

Aedeagus (Figs. 3D–F), length/width = 2.9. Median lobe, except dorsal plate, short and thick, slightly curved dorsally, basal part rounded and slightly sinuate laterally, apex broadly rounded. Dorsal plate of median lobe irregular, basal part thin and broadened posteriad, apex rounded in dorsal view. Ventral plate strongly sclerotized, with ventral process sharply projected and curved ventrally.

Secondary sexual dimorphism.

Both sexes differ from each other in the structure of terminalia. In male sternite VI slightly depressed in middle; sternite VII with posterior margin slightly notched, area before the notch with shallow and \cap -shaped depression; sternite VIII (Fig. 3A) with the similar notch and depression but broader and longer than sternite VII; sternite IX (Fig. 3B) with anterior part asymmetrical.

In female sternite VIII (Fig. 3C) with lateral sides slightly sinuate and posterior margin truncated.

Etymology. The specific epithet is the Latin adjective “curved” that refers to the shape of the ventral process of the aedeagus of this species.

Remarks. The new species *L. tortuosum* sp. n. is similar to *L. gladiatum* Zheng, but both species differ in the structure of their sternite VIII and the ventral process as follows: 1) the notch of the sternite VIII in the new species (Fig. 3A) has rather short thorns without setae, whereas in the latter species it has setae; 2) in *L. tortuosum* sp. n. the ventral process is narrow and curved ventrally with the posterior part hooked (Figs. 3D–F); but in the latter species it is broad, with sinuate line on the surface, with straight posterior part and small apex.

Distribution. The species is known only from the type locality, Mountain Fangyang, Longquan County in Zhejiang Province. The type series was collected in the mountains in leaf litter at the altitude of 1400 m in June.

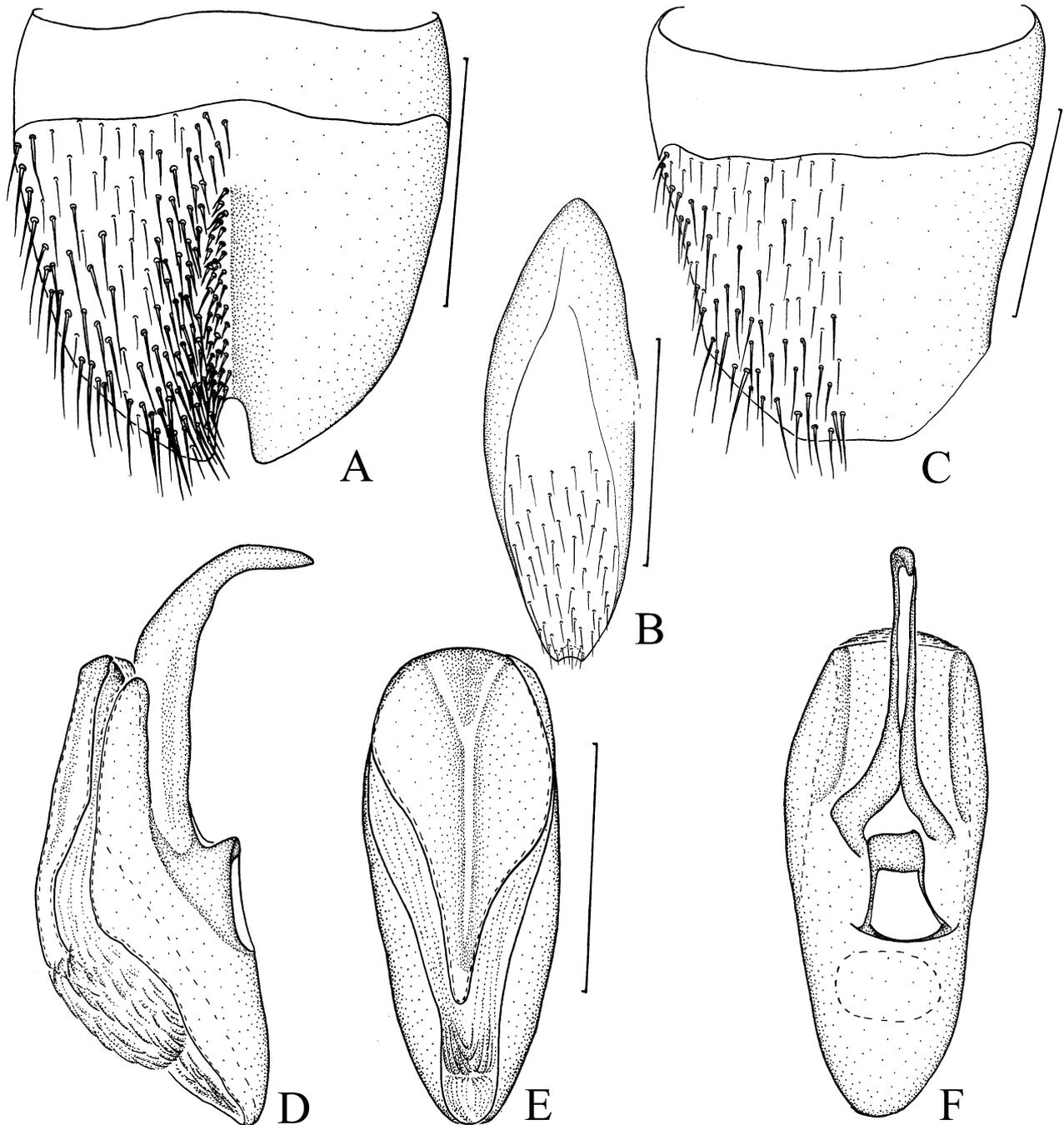


FIGURE 3. *Lobrathium tortuosum* sp. n. from Zhejiang. A. sternite VIII, male; B. sternite IX, male; C. sternite VIII, female; D. aedeagus, lateral view; E. aedeagus, dorsal view; F. aedeagus, ventral view. Scale= 0.5 mm.

4. *Lobrathium zonalis* sp. n.

(Figs. 4A–I, 5D).

Type material. **Holotype**, ♂, **CHINA: Sichuan Province**, Baoxing, Guobayan, 1900 m, 18. VIII. 2003, leg. Yejun Zhang (IZCAS); **Paratypes**, 4♀♀, 3♂♂, same data as holotype; 1♂, Bujigou, 2300 m, 14. VIII. 2003, leg. Jie Wu; 1♂, Guobayan, 2070 m, 4. VII. 2001, leg. Hongzhang Zhou (IZCAS, ZMUC).

Description. Length: 6.3–6.8 mm; width: 1.11–1.15 mm. Body parts (all in mm): HL 0.91; AL 2.00; PL 1.07; ELL 1.47; HW 0.90; PW 0.85; EW 1.14; ABW 1.06.

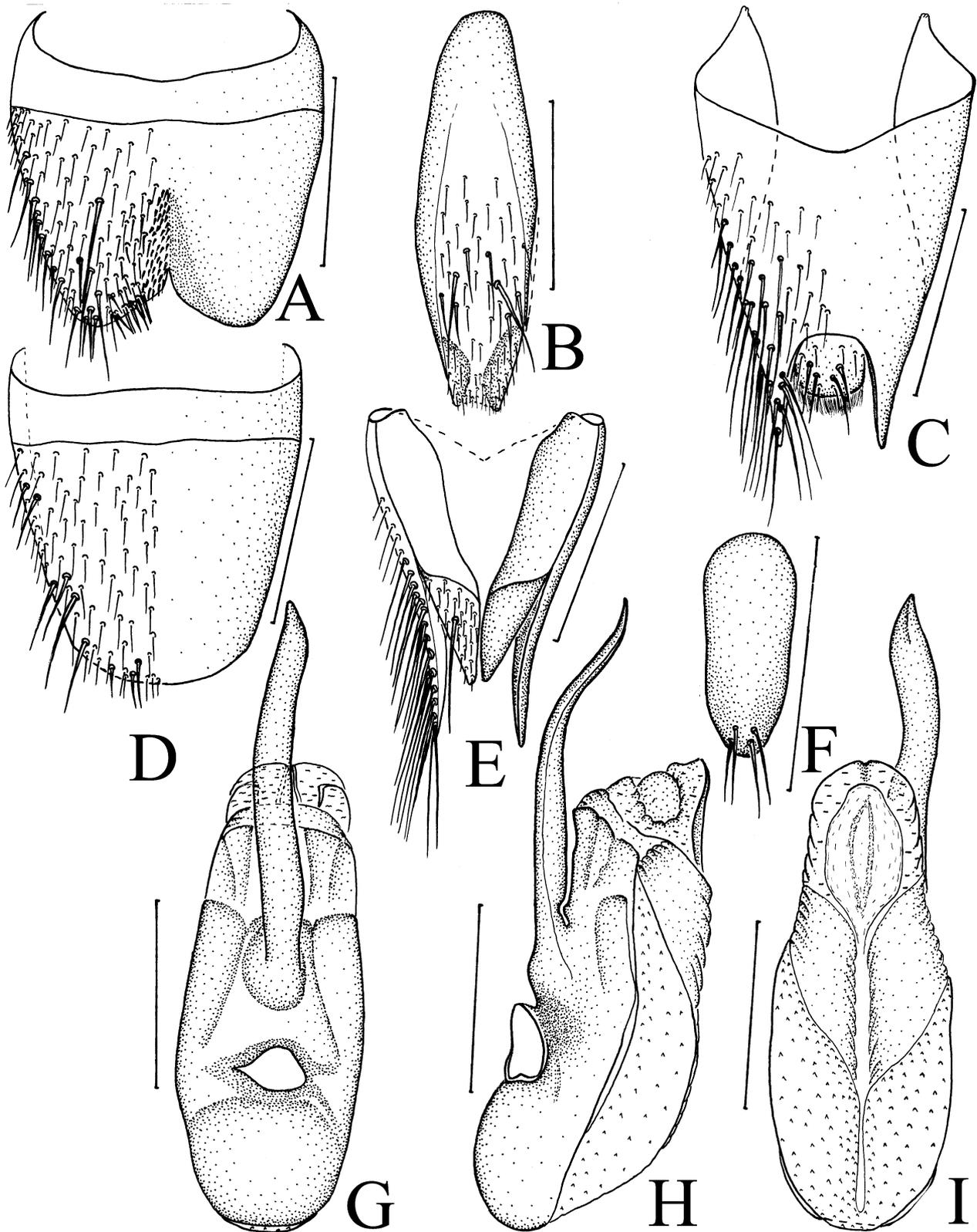


FIGURE 4. *Lobrathium zonalis* sp. n. from Sichuan. A. sternite VIII, male; B. sternite IX, male; C. tergites IX–X, male; D. sternite VIII, female; E. sternites IX–X, female; F. sternite IX, female; G. aedeagus, ventral, view; H. aedeagus, lateral view; I. aedeagus, dorsal view. Scale= 0.5 mm.

Body black, glossy, with slight metallic luster. Basal antennomere, posterior part of elytra and tarsi somewhat blackish brown.

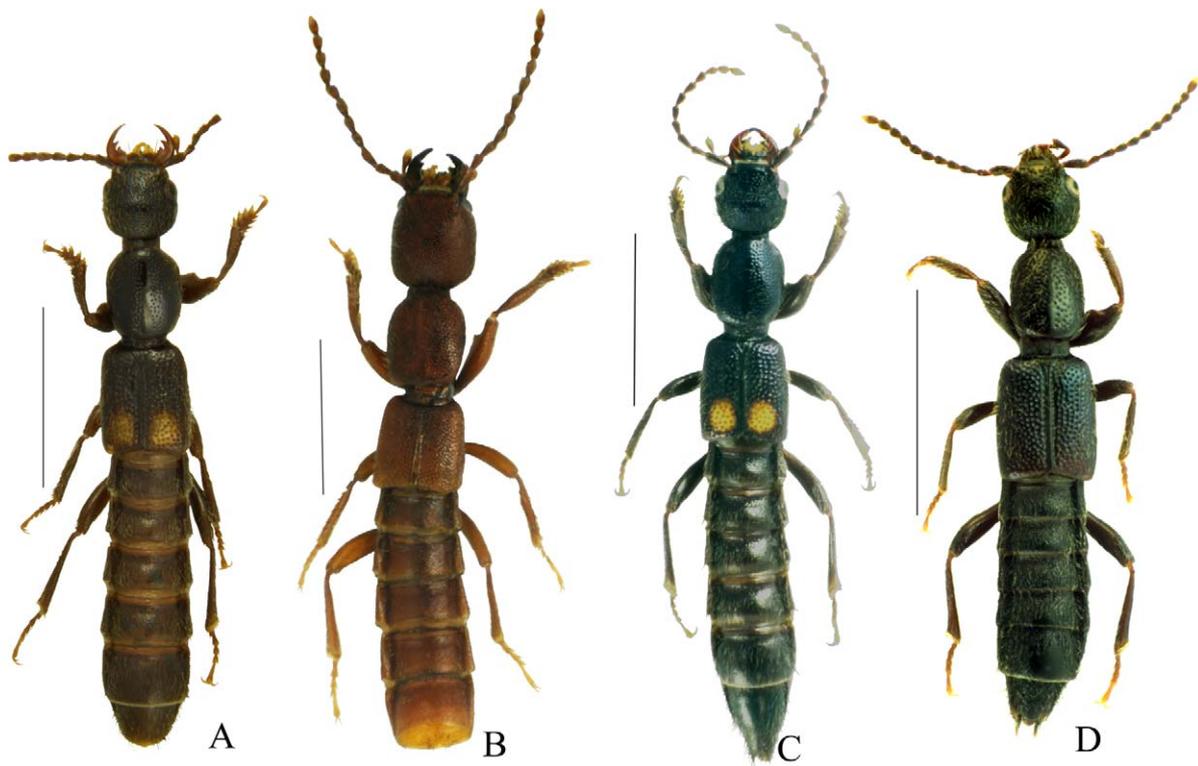


FIGURE 5. Habitus of new species. **A.** *Lobrathium quadrum* sp. n.; **B.** *Lobrathium rutilum* sp. n.; **C.** *Lobrathium tortuosum* sp. n.; **D.** *Lobrathium zonalis* sp. n..

Head nearly square-shaped and as long as wide. Eyes relatively large, slightly protruded laterally; HL/EL = 3.0, eye length slightly longer than gena but shorter than temple (gena : eye : temple = 0.24 : 0.30 : 0.37 mm). Punctuation with pale setae of different length. Vertex and middle front smooth and glossy where punctures sparse but coarse.

Pronotum with PL/PW = 1.3. Disc with punctures larger than on head. Scutellum U-shaped, longer than wide, dull and with fine setiferous punctuation.

Elytra with ELL\ELW = 1.3, ESL/ELL = 0.8, epipleural ridge absent in the basal fifth of elytral length; surface with punctures distinctly larger and denser than those on head or pronotum, slightly finer laterally, intervals between punctures distinctly shorter than their diameter. Posterior 1/8 of elytral length brown. Hind wings extending back to basal of elytra but flightless species.

Abdomen widest at segment VI (4th visible), wider than head or pronotum but distinctly narrower than elytra. Punctuation on sternites as on tergites. Middle area of sternites VI–VII slightly depressed with sparse punctures.

Aedeagus (Figs. 4G–I) slender, length/width = 3.5. Median lobe, except dorsal plate, short and thick, slightly curved dorsally, with apex slightly bilobed in dorsal view and with round structure in lateral view. Dorsal plate slightly elongate, broad in its middle part, gradually narrowed posteriad and anteriorad, with round apex. Ventral plate strongly chitinized, elongate and sinuate, with long and curved ventral process.

Secondary sexual dimorphism.

Both sexes differ from each other in the structure of terminalia. In male sternite VII with posterior margin shallowly notched, laterally from notch with medially oblique hairs; hind margin of sternite VIII (Fig. 4A) with deeply V-shaped notch, anterior to the notch with distinct depression having dense papillose thorns; sternite IX (Fig. 4B) rather symmetrical with pair of lateral lobes in posterior part; tergites IX–X (Fig. 4C) symmetrical, posterior margin of tergite X round.

In female sternite VIII (Figs. 4D) with posterior margin broadly rounded; lateroventral parts of tergite IX (Fig. 4E) with rather long hairs, anterior and posterior gonocoxites fused with transverse ridge; sternite IX (Fig. 4F) with posterior margin slightly rounded and with two pairs of setae on posterior part.

Etymology. The specific epithet is the Latin adjective meaning zonal.

Remarks. Externally the new species is rather similar to *L. hebeatum* Zheng, but both species can be easily

distinguished from each other by characters of the middle notch of the male sternite VIII and form of the aedeagus as follows: 1) the middle notch in the new species is narrowly acute (Fig. 4A), whereas in *L. hebeatum* Zheng it is broadly rounded; 2) the ventral process of the aedeagus of the new species is sinuate with acute apex (Figs. 4G–I), whereas in the latter species the ventral process is not narrowed apically and has teeth.

Distribution. *Lobrathium zonalis* sp. n. is known only from the type locality: Guobayan in the County Baoxing, Sichuan. The type series was collected in the mountains with well developed vegetation of wet and fresh grass, in the period from June to August, at the range of altitudes between 1900 and 2300 m.

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