

Two new species of the genus *Coraebus* from China (Coleoptera: Buprestidae: Agrilinae: Coraebini)

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Abstract. Two new species of the genus *Coraebus* Gory & Laporte de Castelnau, 1839 (Coleoptera: Buprestidae: Agrilinae: Coraebini: Coraebina) are described from China: *Coraebus businskyorum* Xu & Kubáň, sp. nov. from Hubei, Chongqing and Sichuan, and *C. volkovitshi* Xu & Kubáň, sp. nov. from Guangxi and Yunnan. Both are illustrated in details and compared with morphologically similar species.

Key words. Coleoptera, Buprestidae, Agrilinae, Coraebini, Coraebina, *Coraebus*, taxonomy, new species, China

Introduction

The genus *Coraebus* Gory & Laporte de Castelnau, 1839 (Coleoptera: Buprestidae: Agrilinae: Coraebini: Coraebina) is distributed in the Palearctic, Saharo-Arabian, Sino-Japanese, Oriental, and Oceanian Regions (zoogeographic regions defined by HOLT et al. (2013)). BELLAMY (2008) registered 228 species in the world fauna, 108 of which were recorded in China (KUBÁŇ 2006, BELLAMY 2008).

During the study visit of two of the authors, H. Xu and V. Kubáň, to the United States National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A. (kindly sponsored by that institution), extensive material of Coraebini Bedel, 1921 was examined and compared to specimens from various institutional collections in China. The examined specimens were also compared to relevant specimens from the collections of NMPC and VKCP, as well as to the relevant type specimens from the Z. Peng collection (JSNC). As a result, two undescribed species were recognized in the genus *Coraebus*: *Coraebus businskyorum* Xu & Kubáň, sp. nov. and *C. volkovitshi* Xu & Kubáň, sp. nov.

Material and methods

All color images were taken with a Canon D-550 digital camera with Canon MP-E65mm f/2.8 1–5× macro lens. Each photo was taken as several separate images and then composed in the Helicon focus software. The following codens of the collections are used in the text:

EKCS	Emil Kučera collection, Soběslav, Czech Republic;
HBUM	Museum of Hebei University, Baoding, Hebei, China;
JSNC	Jiangxi Forest Pest and Disease Control Station, Nanchang, Jiangxi, China;
MNHN	Museum national d'Histoire Naturelle, Paris, France;
NMPC	National Museum, Prague, Czech Republic;
VKCP	Vítězslav Kubáň collection, deposited in National Museum, Prague, Czech Republic.

Data from locality labels of the types are cited verbatim with our comments in square brackets '[]'. The following abbreviations are used to indicate the form of the text: p – printed, h – handwritten. Individual labels are separated by a single slash ('/').

Morphological terminology follows detailed diagnosis of the genus *Coraebus* by KUBÁŇ (1995).

Measurements. Length – the maximum distance from frons to the elytral apex, width – the maximum body width. Elytral (or pronotal) length / width – maximum length / width of elytra (pronotum) across broadest portion. Length of prosternum – minimum distance between the anterior margin and coxal cavity; width of prosternum – maximum prosternal width. Width of the prosternal process was measured at the level of the midpoint of procoxae and is compared with a maximum width of the prosternum.

Taxonomy

Coraebus businskyorum Xu & Kubáň, sp. nov.

(Figs. 1, 2, 5, 7, 9, 11, 13)

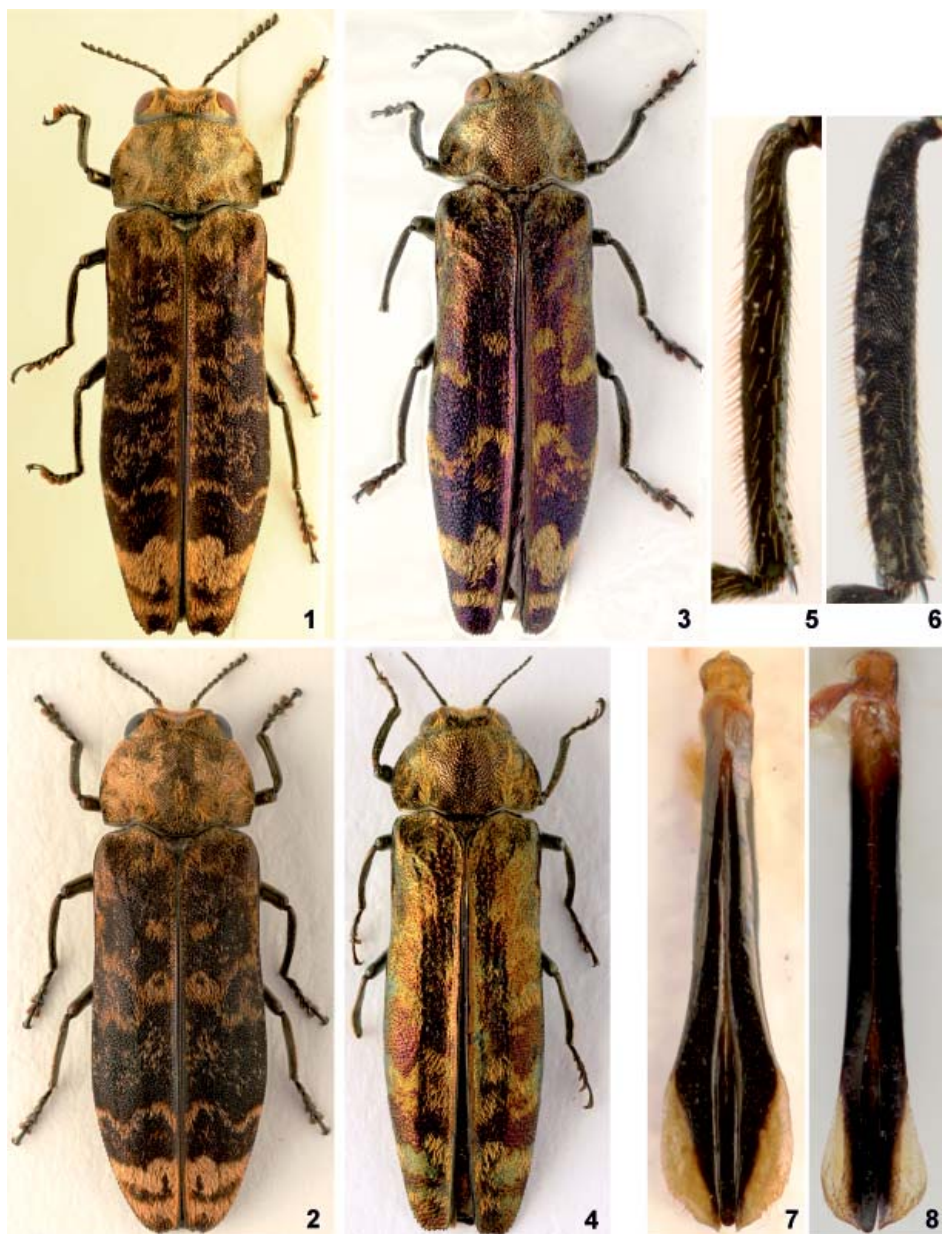
'*Coraebus obscurus* Peng, 1991' sensu KUBÁŇ (1997): 29 (misidentification).

Type locality. Central China, western Hubei, Shennongjia county, Yanzi pass, 31°43'N 110°28'E, 2200 m a.s.l.

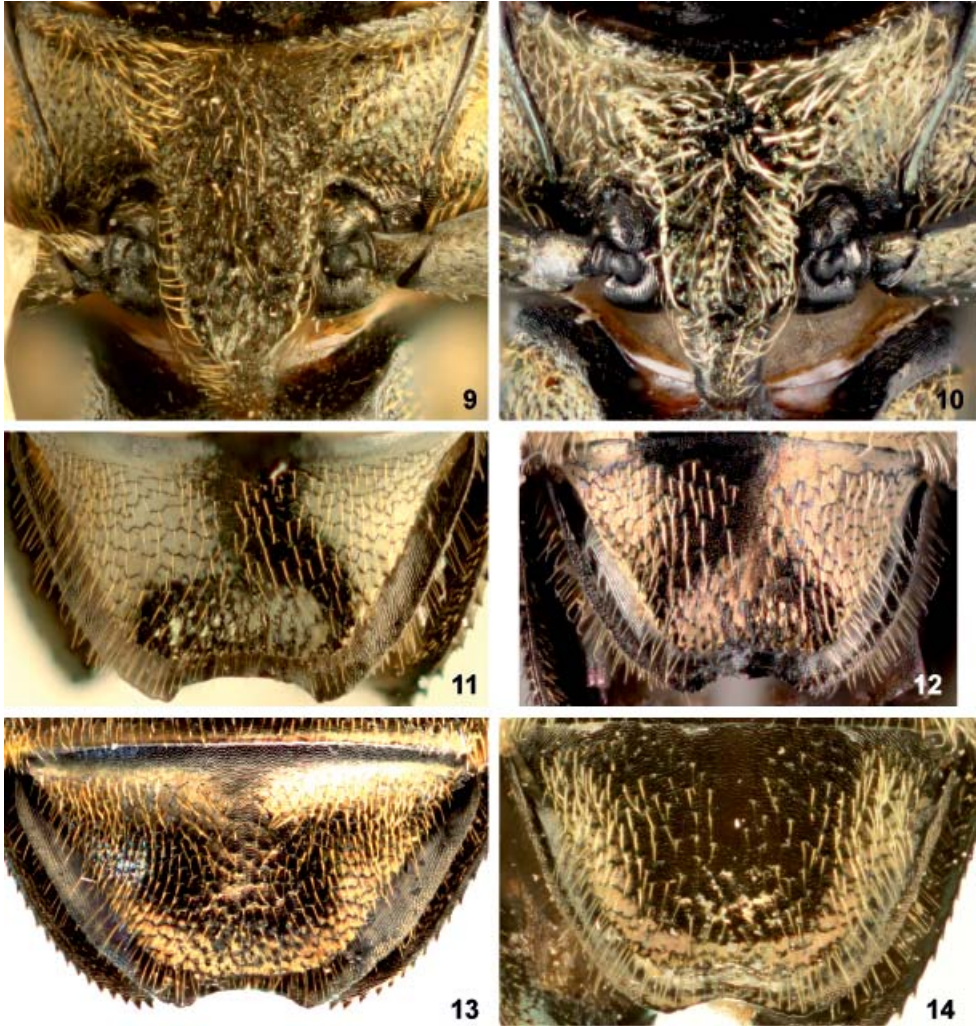
Type material. HOLOTYPE: ♂ (NMPC): Central CHINA: Western HUBEI: 'CHINA, W - HUBEI, SHENNONGJIA Co., YANZI PASS, 31°43'/110°28', 2200 m, 23.–26.6.[19]95 L.+R.BUSINSKÝ lgt. [p]. \ *Coraebus businskyorum* sp. nov. ♂ H. Xu & V. Kubáň det. 2013 [p, red label]'. PARATYPES (5 ♂♂ 5 ♀♀): CHINA: 'Mennkia tsai', 10.iv.1920, Licent leg. (1 ♂, MNHN). CHONGQING: Chongqing, Jinfoshan mts., 29.vii.2003, Liu, Wang & Yuan leg. (1 ♂, HBUM). Western HUBEI: the same data as holotype (1 ♂ 1 ♀, VKCP). Northern SICHUAN: Nanping, Abazhou, 33°15'N 104°15'E, 2000 m, 8.–13.vi.1990; Nanping, 9.–11.vi.2000, E. Kučera leg. (1 ♂ 1 ♀, EKCS, 1 ♀ VKCP); Jiuzhaigou, 12.–17.vi.2000, E. Kučera leg. (1 ♂ 1 ♀, VKCP).

Description of the holotype (Fig. 1). Elongate, cylindrical. Length 10.5 mm, width 3.2 mm. Head, pronotum and scutellum black with golden lustre. Elytra black with suture, basal and apical fifth metallic purple, remaining parts with deep blue-black metallic lustre, laterally slightly changing to purple. Underside and legs shiny black. Head and pronotum densely covered with yellow pubescence. Scutellum asetose. Elytra with black and yellow pubescence, the latter forming ornamentation as in Fig. 1.

Head. Vertex with distinct longitudinal median line. Frons with deep wide longitudinal median impression, each side near eyes with subacuminate tubercle. Supra-antennal grooves narrow, open at outer side; carina above supra-antennal grooves connected in middle, sinuate.



Figs 1–8. 1–4 – habitus. 1–2 – *Coraebus businskyorum* Xu & Kubáň, sp. nov. (1 – holotype ♂, Hubei, 10.5 mm; 2 – paratype ♀, Hubei, 10.8 mm); 3–4 – *C. amplithorax* (Fairmaire, 1889) (3 – ♂, China, Yunnan, Deqen (VKCP), 8.5 mm; 4 – lectotype ♀, China, Yunnan, Deqen (MNHN), 8.8 mm). 5–6 – metatibia (5 – *C. businskyorum* sp. nov., ♂, holotype; 6 – *C. amplithorax*, ♂, same specimen as in Fig. 3). 7–8 – aedeagus (7 – *C. businskyorum* sp. nov., holotype; 8 – *C. amplithorax*, same specimen as in Fig. 3).



Figs 9–14. 9–10 – prosternum (9 – *Coraebus businskyorum* Xu & Kubáň, sp. nov., holotype ♂, Hubei; 10 – *C. amplithorax* (Fairmaire, 1889) ♂, China, Yunnan, Deqen (VKCP)). 11–14 – ventrite 5 (11 – *C. businskyorum* Xu & Kubáň, sp. nov., holotype ♂; 12 – *C. amplithorax* ♂, China, Yunnan, Deqen (VKCP); 13 – *C. businskyorum* sp. nov., paratype ♀, Hubei; 14 – *C. amplithorax*, lectotype ♀, China, Yunnan, Deqen (MNHN)).

Frontoclypeal keel distinct, straight, at the center of antennal grooves. Impression above frontoclypeal keel connected to supra-antennal grooves. Width of clypeus between antennal grooves slightly narrower than their diameter. Antennal grooves large with inner margin elevated and forming a keel, outer margin open obliquely downwards. Lower margin of clypeus emarginate, lateral sides expanded to a blunt tooth. Sculpture of head formed of dense and

Table 1. Differences between *Coraeus businskyorum* Xu & Kubáň, sp. nov. and *C. amplithorax* (Fairmaire, 1889).

	<i>Coraeus businskyorum</i> sp. nov.	<i>Coraeus amplithorax</i> (Fairmaire, 1889)
Body	stout and robust, 3.0–3.2 times longer than wide; coloration and ornamentation of the dorsal side as in Figs 1, 2	somewhat slender, 3.2–3.4 times longer than wide; coloration and ornamentation of the dorsal side as in Figs 3, 4
Pronotum	maximum width at midlength; prelateral carina absent	maximum width at posterior 1/3; prelateral carina present
Elytron	indistinct longitudinal carina in middle (Figs 1, 2)	distinct longitudinal carina in middle (Figs 3, 4)
Prosternal process	setae shorter (Fig. 9)	setae longer (Fig. 10)
Ventrite 5	as in Figs 11, 13	as in Figs 12, 14
Metatibia of male	slender, inner margin distally curved outwards and coarsely serrate along distal 1/4 (Fig. 5)	thicker, inner margin straight and weakly serrate along distal 1/3 (Fig. 6)
Aedeagus	as in Fig. 7	as in Fig. 8

coarse punctation separated by narrow wrinkles, middle part of frontal impression and top of frontal tubercles smooth, asetose and shiny. Antennae ca 1.15 times longer than pronotal length, serrate from antennomere 4. First three antennomeres subconical, scape shorter than pedicel, antennomeres 3–11 subequal in length and shorter than pedicel.

Pronotum 1.53 times wider than long with maximum width in the middle, anterior margin strongly arcuate medially, lateral sides rounded, hind angles obtusely angulate, and hind margin sinuate, produced towards scutellum in the middle. Basal V-shaped impression connected to large oval impressions at posterior corners. Prelateral carina absent. Medial convex area with rasp-like sculpture, remaining parts with linear furrows. Lateral margins crenulate. Lateral edges strongly bent downwards at midlength in lateral view.

Prosternum 3.10 times wider than long (Fig. 9). Mentonniere distinct, narrow, prosternal process wedge-shaped, weakly convex, sculpture composed of coarse, irregular furrows.

Scutellum 1.6 times as wide as long, subcordiform, shagreened.

Elytra 2.52 times longer than wide, humeri wider than base of pronotum. Lateral margins in anterior 1/4 subparallel, then gradually slightly arcuate widening to 2/3 length and then gradually rectilinearly narrowing to apex. Lateroposterior margin serrulate, apex emarginate. Sculpture formed of tightly packed, posteriorly elevated tile-like rugae.

Legs. Metatibia slender, inner margin distally curved outwards and coarsely serrate along distal 1/4 length (Fig. 5).

Abdomen. Ventrite 5 deeply impressed before apex, its posterior margin with a broad curved emargination. Submarginal edge of ventrite 5 projecting, roof-like, its margin weakly emarginate and indistinctly serrate (Fig. 11).

Aedeagus as in Fig. 7.

Sexual dimorphism. Female (Fig. 2). Antenna 0.85 times as long as pronotum. Pronotum 1.43 times wider than long. Elytra 2.36 times longer than wide. Meso- and metatibiae unarmed. Posterior emargination of ventrite 5 narrower than in males. Submarginal edge of ventrite 5 projecting, roof-like, not emarginate (Fig. 12).

Variability. Length 6.4–11.0 mm, width 2.0–3.6 mm. Emargination of elytral apex variable, in holotype strong, other specimens weakly emarginate to apparently truncate and in a few specimens rounded.

Differential diagnosis. See Table 1.

Etymology. This species is named after the collectors of the type specimens, Roman Businský, Czech botanist and specialist in the taxonomy of *Pinus* (Pinaceae), and his wife Ludmila.

Distribution. China (Chongqing, Hubei, Sichuan).

Coraebus volkovitshi Xu & Kubáň, sp. nov.

(Figs 15–17, 19, 21, 23, 25, 27)

Type locality. Southwestern China, northwestern Yunnan, Yulongxue Shan mts., 20 km southern of Daju, 27°15'34.3"N 100°14'27.5"E, 2480 m a.s.l.

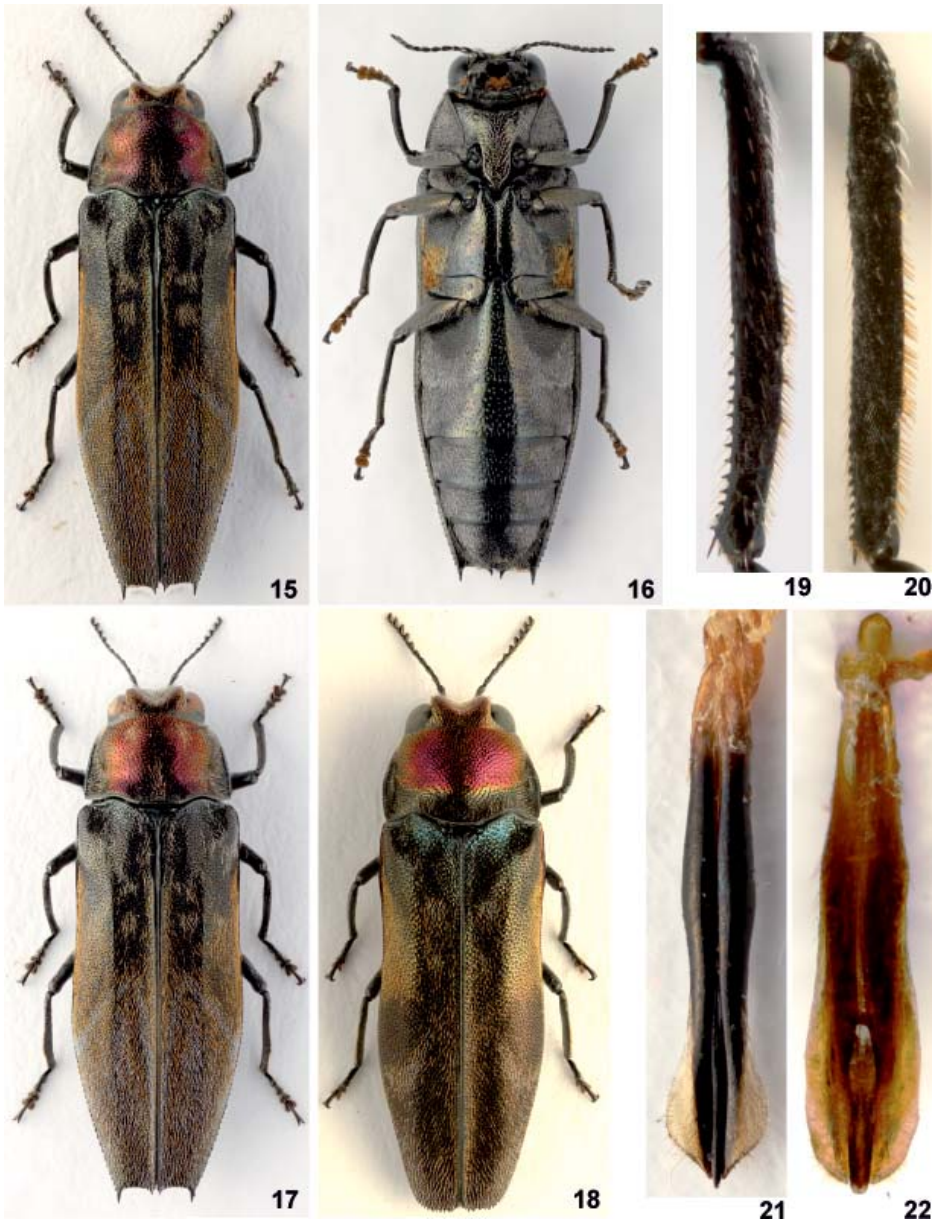
Type material. HOLOTYPE: ♂ (NMPC), Southwestern CHINA: Northwestern YUNNAN: 'SW China, NW Yunnan, Yulongxue Shan mts., DAJU (20 km S), 27°15'34.3"N 100°14'27.5"E, 2480 m, 28.v.2002 [p] \ *Coraebus volkovitshi* sp. nov. ♂ H. Xu & V. Kubáň det. 2013 [p, red label]'. PARATYPES: Northwestern GUANGXI: Tianlin [Leli], Yaojiawan, 1200–1400 m, 2.vi.2002, X. Yang leg. (1 ♀, HBUM). Northwestern YUNNAN: Habaxue Shan mts., Habashan, 27°20'N 100°09'E, 2800–3150 m, 8.–11.+18.–19.vi.2004 (1 ♀, VKCP).

Description of the holotype (Fig. 15). Elongate, flattened above and convex below. Length 10.2 mm, width 3.3 mm. Vertex and frons above supra-antennal grooves coppery-red, frons below supra-antennal and clypeal grooves black, pronotum coppery-red, lateral sides with broad black margin, elytra black, ventral side black with metallic lustre. Predominant pubescence of upper surface black. Lower parts of frons and genae with white pubescence. Vertex and pronotum with white pubescence, pronotum with ornamentation as in Fig. 15. Elytra with white and yellow pubescence, the latter forming ornamentation as in Fig. 15. Scutellum asetose. Ventral side with white and yellow pubescence, the latter forming ornamentation as in Fig. 16.

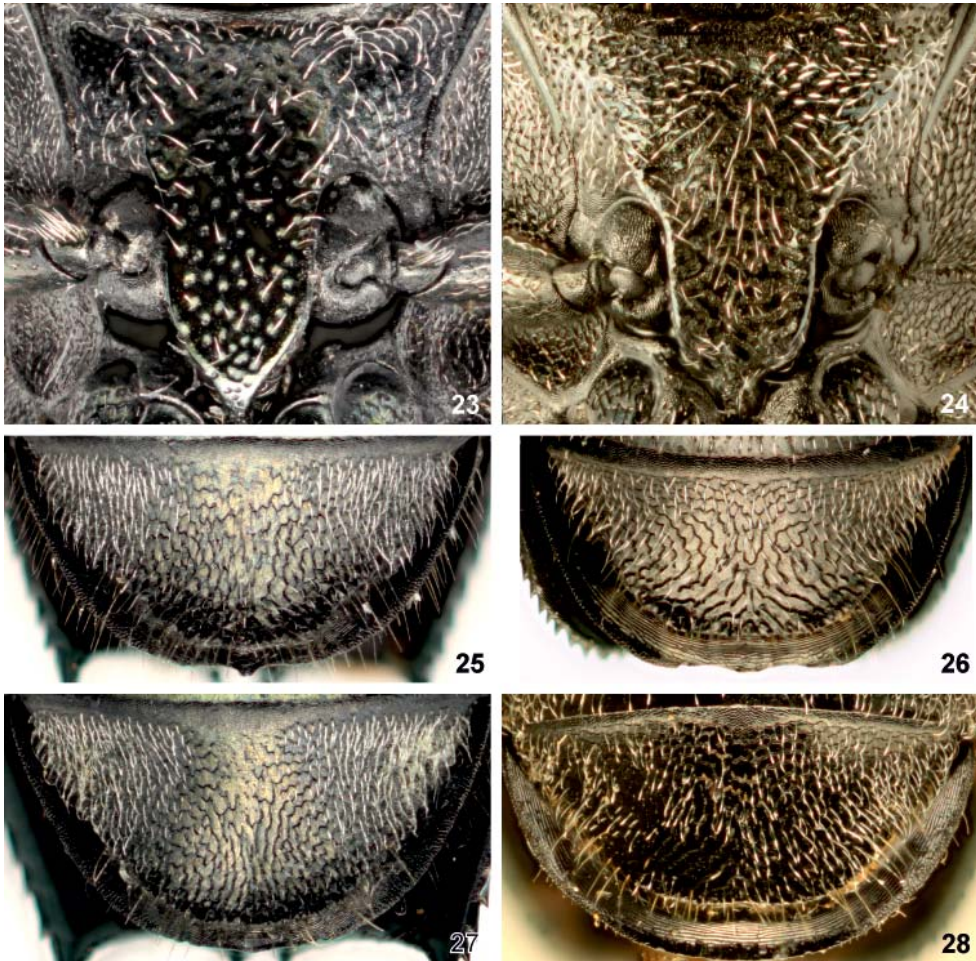
Head. Vertex with distinct longitudinal median line. Frons with deep wide longitudinal median impression, each side near eyes with subacuminate tubercle. Supra-antennal grooves wide, open at outer side, carina above supra-antennal grooves connected in the middle, sinuate. Frontoclypeal keel distinct, straight, at the center of antennal grooves. Impression above frontoclypeal keel connected to supra-antennal grooves. Width of clypeus between antennal grooves slightly narrower than their diameter. Antennal grooves large with inner margin elevated and forming keel, outer margin open obliquely downwards. Lower margin of clypeus emarginate, lateral sides expanded to blunt tooth. Sculpture of head formed by punctuation and furrows, punctures usually well-separated. Antennae ca 1.15 times longer than pronotal length, serrate from antennomere 4. First three antennomeres subconical, scape and pedicel equal in length, antennomeres 3–11 subequal in length and much shorter than pedicel.

Pronotum 1.55 times as wide as long, maximum width near base, anterior margin strongly arcuate medially, lateral sides relatively straight, arcuately narrowed forwards, hind angles almost rectangular, hind margin sinuate, widely and arcuately produced towards scutellum. Base with V-shaped impression connected with large oval impressions at posterior corners. Prelateral carina absent. Sculpture formed by coarse punctuation and rasp-like furrows, becoming gradually sparser and shallower at lateral sides and base.

Prosternum 2.6 times as wide as long (Fig. 23). Mentonniere distinct, narrow, prosternal process subparallel, sculpture composed of coarse, sparse punctuation.



Figs 15–22. 15–18 – habitus. 15–16 – *Coraebus volkovitshi* Xu & Kubáň, sp. nov., holotype ♂, Yunnan, 10.2 mm (15 – dorsal view; 16 – ventral view); 17 – same species, paratype ♀, Yunnan, 11.2 mm, dorsal view; 18 – *C. linnei* Obenberger, 1922 ♂, China, Fujian (NMPC), 9.2 mm, dorsal view. 19–20 – metatibia (19 – *C. volkovitshi* Xu & Kubáň, sp. nov., holotype ♂; 20 – *C. linnei* ♂). 21–22 – aedeagus (21 – *C. volkovitshi* Xu & Kubáň, sp. nov., holotype ♂; 22 – *C. linnei* ♂).



Figs 23–28. 23–24 – prosternum (23 – *Coraebus volkovitshi* Xu & Kubáň, sp. nov., holotype ♂, Yunnan; 24 – *C. linnei* Obenberger, 1922 ♂, China, Fujian (NMPC)). 25–28 – ventrite 5 (25 – *C. volkovitshi* sp. nov., holotype ♂; 26 – *C. linnei* ♂; 27 – *C. volkovitshi* sp. nov., paratype ♀; 28 – *C. linnei*, syntype ♀, China, Hongkong (NMPC)).

Scutellum 2.0 times as wide as long, subtriangular. Surface smooth, shiny.

Elytra 2.5 times as long as wide, at humeri wider than base of pronotum. Lateral margins in anterior 1/4 subparallel, then gradually slightly arcuate widening to 2/3 length and then gradually rectilinearly narrowing to apex. Lateroposterior margin serrulate, apex of elytra truncate. Sutural apex with a few denticles and small spine. Posterior outer corner of elytra extended to produce a large and sharp spine. Disc of elytra with distinct longitudinal carina in middle of each elytron; prebasal impression deep, extensive; impression between carina

Table 2. Differences between *Coraebus volkovitshi* Xu & Kubáň, sp. nov. and *C. linnei* Obenberger, 1922.

	<i>Coraebus volkovitshi</i> sp. nov.	<i>Coraebus linnei</i> Obenberger, 1922
Body	coloration and ornamentation of the dorsal side as in Figs 15, 17	coloration and ornamentation of the dorsal side as in Fig. 18
Pronotum	widest at the base; lateral margins narrowed anteriorly (Figs 15, 17)	lateral margins subparallel in basal 1/3, then narrowed anteriorly (Fig. 18)
Elytron	longitudinal carina in middle distinct; apex truncate, with distinct, long external spine and shorter sutural spine (Figs 15, 17)	longitudinal carina in middle indistinct; apex regularly rounded, densely and finely dentate (Fig. 18)
Prosternal process	sparsely punctate, setae shorter (Fig. 23)	punctures coarse, anastomosing, setae longer (Fig. 24)
Ventrite 5	as in Figs 25, 27	as in Figs 26, 28
Metatibia of male	slightly bent outwards, inner margin with sharp teeth along distal half (Fig. 19)	straight and parallel-sided, inner margin indistinctly toothed only along distal third (Fig. 20)
Aedeagus	as in Fig. 21	as in Fig. 22

and elevated suture distinct, particularly on apical 3/4 of elytra. Sculpture formed by relatively dense, fine punctation and even, transverse furrows.

Legs. Metatibia in distal half of outer margin sinuate and setose, inner margin with denticles on distal half (Fig. 19).

Abdomen (Fig. 16). Hind margin of ventrite 5 evenly rounded, with indistinct median denticle (Fig. 25).

Aedeagus as in Fig. 21.

Sexual dimorphism. Female (Fig. 17). Length 10.9–11.2 mm, width 3.8–4.0 mm. Antenna 1.05 times as long as pronotum. Pronotum 1.63 times as wide as long. Elytra 2.36 times as long as wide. Metatibiae in distal 1/2 of outer margin even and setose, inner margin without denticles. Hind margin of ventrite 5 weakly rounded, smooth (Fig. 27).

Variability. No variability was observed except in size. Length 10.2–11.2 mm, width 3.3–4.0 mm.

Differential diagnosis. See Table 2.

Etymology. Named in honor of our friend and colleague Mark G. Volkovitsh (Zoological Institute, Academy of Sciences, St. Petersburg, Russia), well known specialist in the taxonomy of Buprestidae.

Distribution. China (Guangxi, Yunnan).

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References

- BELLAMY C. L. 2008: *A world catalogue and bibliography of the jewel beetles (Coleoptera: Buprestoidea). Volume 3. Buprestinae: Pterobothrini through Agrilinae: Rhaeboscelina*. Pensoft Series Faunistica No. 78. Pensoft Publishers, Sofia-Moscow, pp. 1260–1931.
- HOLT B. G., LESSARD J. P., BORREGAARD M. K., FRITZ S. A., ARAÚJO M. B., DINITROV D., FABRE P. H., GRAHAM C. H., GRAVES G. R., JØNSSON K. A., NOGUÉS-BRAVO D., WANG Z. H., WHITTACKER R. J., FJELDSÅ J. & RAHHEK G. 2013: An update of Wallace's zoogeographic regions of the world. *Science* **339**: 74–78.
- KUBÁŇ V. 1995: Palaearctic and Oriental Coraebini (Coleoptera: Buprestidae). Part I. *Entomological Problems* **26**: 1–37.
- KUBÁŇ V. 1997: Palaearctic and Oriental Coraebini (Coleoptera: Buprestidae). Part IV. *Entomological Problems* **28**: 25–50.
- KUBÁŇ V. 2006: Catalogue. Buprestidae: Agrilinae: Agrilini (without Agrilus), Aphanisticini (without Aphanisticina), Coraebini, Trachysini. Pp. 403–404, 406–421. In: LÖBL I. & SMETANA A. (eds.): *Catalogue of Palaearctic Coleoptera. Volume 3. Scarabaeoidea – Scirtoidea – Dascilloidea – Buprestoidea – Byrrhoidea*. Apollo Books, Stenstrup, 690 pp.