



Description of the male of *Pterorthochaetes yunnanensis* Ballerio, 2014 (Coleoptera: Scarabaeoidea: Hybosoridae: Ceratocanthinae)

RI-XIN JIANG^{1,2}, ALBERTO BALLERIO³, HAO-YI LIU⁴ & SHUO WANG^{1,5}¹ College of Marine Science and Biological Engineering, Qingdao University of Science and Technology, 53 Zhengzhou Road, Qingdao, 266042, P. R. China.² maoshuwuyouzhi@163.com; <https://orcid.org/0000-0002-5339-853X>³ Viale Venezia 45, Brescia, 2512, Italy.alberto.ballerio.bs@aballerio.it; <https://orcid.org/0000-0001-9772-976X>⁴ Zhengzhou Foreign Language School-New Fengyang Campus, 66 Cuizhu Street, Zhengzhou, 450001, P. R. China.3137068712@qq.com; <https://orcid.org/0000-0002-5600-1921>⁵ Corresponding author. shuowang@qust.edu.cn; <https://orcid.org/0000-0003-0412-3799>

The ceratocanthine genus *Pterorthochaetes* Gestro, 1898 (Coleoptera: Scarabaeoidea: Hybosoridae) includes about 26 valid species and occurs from the eastern Himalaya (Nepal and India) and southern China to northern Australia (Queensland) and Vanuatu Islands (Paulian 1978, 1987; Ballerio 1999, 2006, 2013, 2014).

In China, Ballerio (2014) recorded the genus *Pterorthochaetes* from Yunnan Province with a record of *P. insularis* Gestro, 1898 and the description of *P. yunnanensis* Ballerio, 2014 based on a single female specimen.

Recently, a series of specimens of *P. yunnanensis* were collected from Yingjiang County (Yunnan, China) in rotten wood. Those specimens were identified as *P. yunnanensis* due to overall morphology matching the holotype and thanks the presence of a female displaying the same morphology of bursal sclerites of the holotype. In this paper, we describe the male of *P. yunnanensis* for the first time and add a supplementary description for the female.

Specimens examined in this study are deposited in the Insect Collection of Mianyang Normal University, Mianyang, China (MYNU, Hao Xu) and Alberto Ballerio personal collection, Brescia, Italy (ABCB).

Label data are quoted verbatim. Chinese translation of each locality below provincial level is included in parentheses at the first appearance in the text.

Habitus images were taken using a Canon 5D SR camera in conjunction with a Canon MP-E 65mm f/2.8 1- 5X Macro Lens, and a Canon MT-24EX Macro Twin Flash was used as light source. Images of the morphological details were taken using a Canon 5D SR camera in conjunction with a Mitutoyo Plan NIR 10 lens. Zerene Stacker (version 1.04) was used for image stacking. All images were modified and grouped into plates in Adobe Photoshop CS5 Extended.

The following abbreviations are used: L—length; W—width; HL—length of head from the clypeal tip to the occipital constriction; HW—width of head from left genal tip to right genal tip; PL—length of pronotum along the midline; PW—maximum width of pronotum; EL—length of elytra along the suture; EW—maximum width of elytra; BL—length of body is the sum of HL + PL + EL.

Pterorthochaetes yunnanensis Ballerio, 2014 (云南毛球金龟)

(Figs 1–3)

Pterorthochaetes yunnanensis Ballerio, 2014: 277 (type locality: “China: Yunnan, Xishuangbanna (西双版纳), ca. 15 km w Menglun (勐仑), 5.11.1999, ca. 700–800 m a.s.l., leg. Jäch, et al.”, deposited in the Naturhistorisches Museum Wien, Vienna, Austria).

Material examined (4 specimens): 3 ♂♂, 1 ♀, labeled: “China: Yunnan Prov., Dehong Autonomous Prefecture (德宏傣族景颇族自治州), Yingjiang County (盈江县), Taiping Town (太平镇), Mangyun Village (芒允村), H: 930 m, 10.VIII.2020, in rottenwood, local people leg.” (2 ♂♂ and 1 ♀ in MYNU, 1 ♂ in ABCB).

Description of male. Body (Fig. 1) dark-brown to black, large sized, surface shiny, and covered with dense large punctures and short erect clavate setae.

Head (Fig. 1A), wider than long, subpentagonal, clypeus triangular, apex blunt, anterior margin serrate. Interocular distance about 9 times of the maximum width of dorsal ocular area. Genae obviously protruding outwards, dorsal ocular area large. Punctures of head strongly impressed and horseshoe-shaped on frons and clypeal disc, becoming irregular transverse lines near clypeal apex, all punctures on disc bearing an erect simple short seta. Antennae short, with nine antennomeres: scape securiform, pedicel about as long as wide and rounded; flagellomeres I about as long as wide, near trapezoidal, II-IV similar, strongly transverse, antennal club (flagellomeres V-VII) covered with dense short yellow hair.

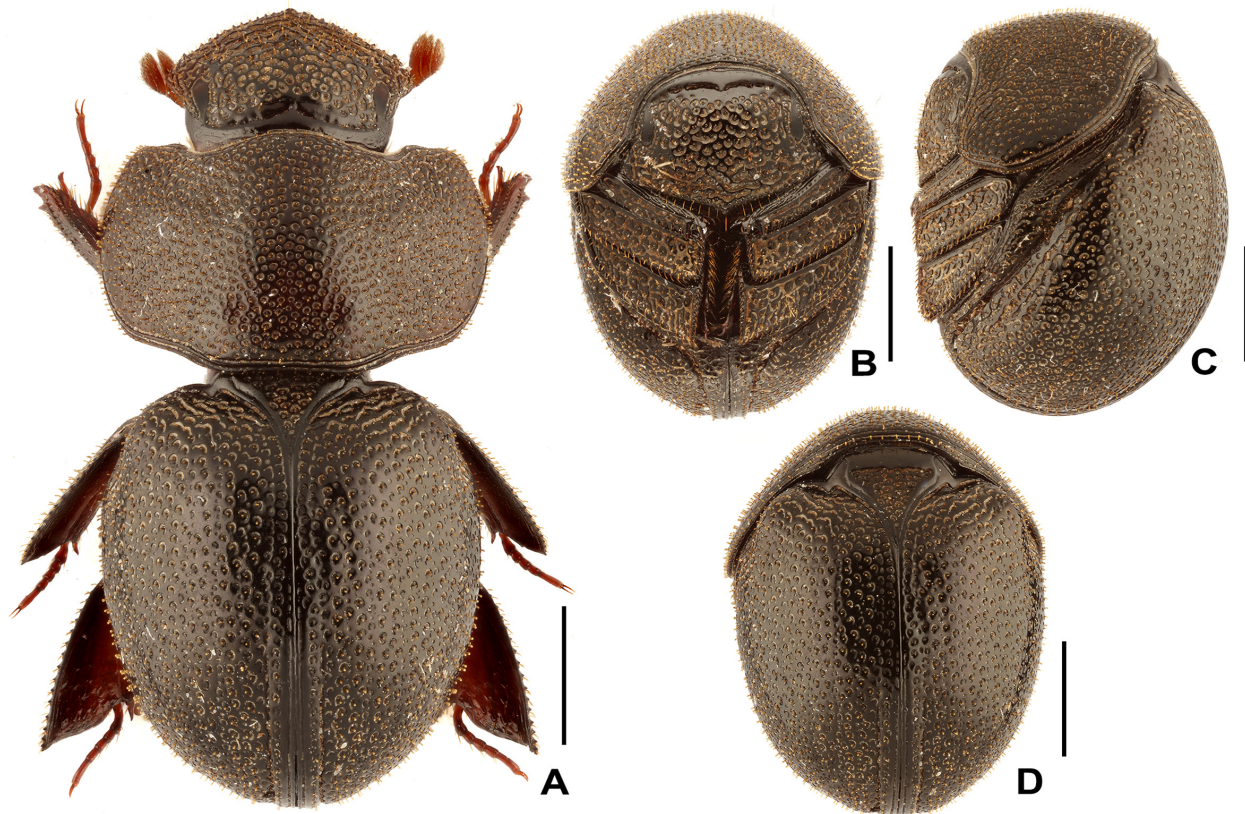


FIGURE 1. Male habitus of *Pterorthochaetes yunnanensis* Ballerio, 2014. **A**, dorsal view; **B**, enrolled, ventral view; **C**, enrolled, lateral view; **D**, enrolled, dorsal view. Scale bars: 1.0 mm.

Pronotum (Fig. 1A) transverse, widest at middle. Anterior angles rounded, lateral margins curved, fringed with a row of short simple setae spaced out by an interval about their length. Margins of pronotum with thin but distinct groove. Disc of pronotum covered with dense ocellate punctures, larger ocellate punctures present also at discal sides then becoming larger horseshoe-shaped punctures, with opening directed outwards, punctures at sides bigger than on disc, each punctures with a pore in the middle and bearing a clavate erect short seta. Interpunctural distance shorter than (or rarely equal to) punctural diameter.

Scutellum (Figs 1A, D), slightly wider than long, lateral sides proximally subparallel and distinctly notched by apical portion of mesepisternum, base and sides smooth, apex elongate and acute and sides slightly curved inwards. Dorsal surface covered with dense horseshoe-shaped punctures with opening directed backwards, each with a pore in the middle and bearing a clavate erect short seta. Punctures on scutellum are larger at base and smaller at apex.

Elytra (Figs 1A, D) suboval in shape, strongly convex, longer than wide, surface, apart from base, which is covered by some transverse irregular short lines, covered with dense small horseshoe-shaped punctures, with opening directed backwards or outwards, each one with a pore in the middle bearing a clavate erect short seta, a few simple fine punctures mixed to horseshoe-shaped punctures. Interpunctural distance of horseshoe-shaped punctures equal to or shorter than punctural diameter.

Legs. Outer margin of protibiae (Figs 2A–B) with an irregular number of weak outer teeth and apex with two stronger outer teeth, apical spur abruptly hooked at apex. Mesofemora (Fig. 2E) obviously expanded near middle, mesotibiae (Fig. 2C) slightly expanded basally, with a short inner apical spur bent inward at a right angle. Metatibiae (Fig. 2D) subtriangular, strongly expanded apically, apex with two short spurs, the inner one longer and tortile.

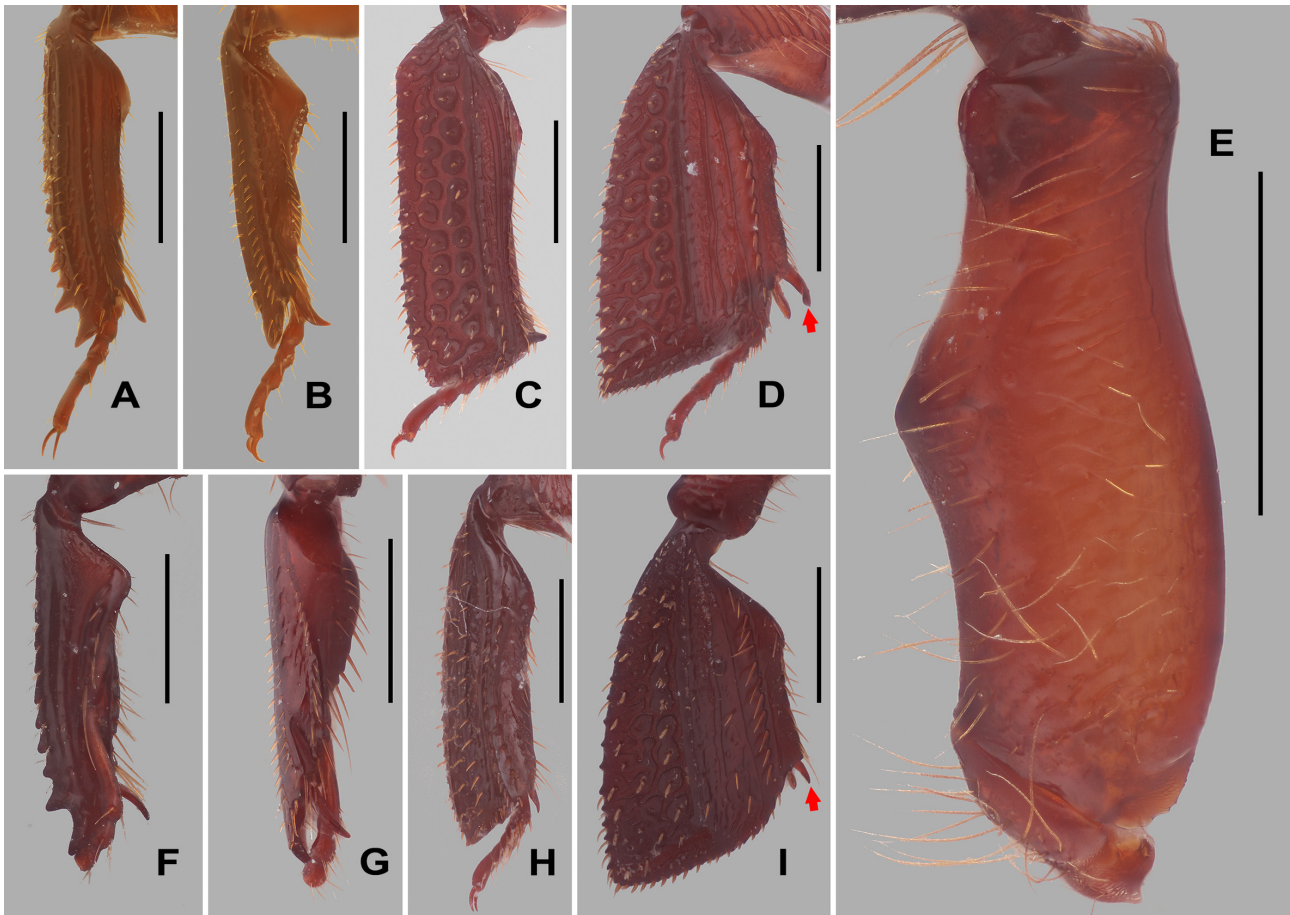


FIGURE 2. Diagnostic characters of *Pterorthochaetes yunnanensis* Ballerio, 2014. **A**, protibia, male, dorsal view; **B**, protibia, male, lateral view; **C**, mesotibia, male, ventral view; **D**, metatibia, male, ventral view; **E**, mesofemur, male, dorsal view; **F**, protibia, female, dorsal view; **G**, protibia, female, lateral view; **H**, mesotibia, female, ventral view; **I**, metatibia, female, ventral view. Scale bars: 0.5 mm.

Male genitalia. Aedeagus (Figs 3A–E), asymmetrical and tortile, basal piece about 2.5 times the length of parameres. Parameres as in Figs. 3A–E. Internal sac with a distinctive weak sclerotized plate irregularly S-shaped occupying about half the length of the sac and with a transverse thick short sclerification in the middle (Fig. 3F). Genital segment (Fig. 3G) asymmetrical and curved with branches apically fused and with short manubrium.

Measurements of male: BL: 5.65–5.95 mm; HL: 0.95–1.00 mm, HW: 1.75–1.85 mm; PL: 1.70–1.80 mm, PW: 2.80–2.95 mm; EL: 3.00–3.15 mm, EW: 2.70–2.75 mm.

Supplementary description of female (based on the specimen from Mangyun village). Generally similar to male, apical spur of protibiae (Figs 2F–G) thinner and straighter; apical spur of mesotibiae (Fig. 2H) straight. Outer apical spur of metatibiae (Fig. 2I) straight and sharp. Spermatheca (Fig. 3I) C-shaped, both extremities flattened in lateral view.

Measurements of female: BL: 5.75 mm; HL: 1.00 mm, HW: 1.80 mm; PL: 1.75 mm, PW: 2.85 mm; EL: 3.00 mm, EW: 2.65 mm.

Distribution. China: Yunnan Province: Dai Autonomous Prefecture of Xishuangbanna (type locality), Dehong Autonomous Prefecture (new record).

Habitat and biology. The adults of *P. yunnanensis* can be collected from rotten wood. The locality of new specimens in this study is in the tropical rainforest climate and characterized by the presence of a moist broadleaf evergreen primary forest (Zeng, 2018). They were also found associated with adults and larvae of Passalidae species inside rotten wood, this latter observation confirms what has already been reported for the genus *Pterorthochaetes* in Malaysia (Kon *et al.* 2010, 2014).

Discussion. The discovery of more specimens of *P. yunnanensis* allows us to better define the species. The distinguishing characters listed by Ballerio (2014) are confirmed and can be better defined. The species is characterized by: a) the presence of small impressed ocellate punctures on pronotal disc, present also at discal sides, although larger, then

becoming horseshoe-shaped and distinctly larger at pronotal sides; b) pronotal interpunctural distance smaller than punctural diameter, c) pronotal lateral margins fringed with a row of long simple setae, spaced out by an interval about their length or longer, d) elytral punctation made of dense medium sized impressed horseshoe-shaped punctures with opening directed backwards, spaced out by an interval subequal to (or shorter than) their diameter, mixed with simple impressed punctures irregularly distributed, e) shape of bursal sclerites, f) shape of endophallites. *Pterorthochaetes insularis* is confirmed as the species closest to it and the differences listed by Ballerio (2014) are also confirmed apart from the periscutellar punctation, which is basically the same with some transverse irregular lines. The endophallites are different from the ones present in *P. insularis*, a species which lacks the weak sclerotized plate irregularly S-shaped occupying about half the length of the sac.



FIGURE 3. Diagnostic characters of *Pterorthochaetes yunnanensis* Ballerio, 2014. **A**, aedeagus, dorsal view; **B**, aedeagus, ventral view; **C**, parameres of aedeagus, dorsal view; **D**, left paramere; **E**, right paramere; **F**, internal sac of aedeagus; **G**, genital segment of male; **H**, bursal sclerites; **I**, spermatheca. Scale bars: 0.5 mm for A–G, 0.25 mm for H–I.

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