





<https://doi.org/10.70590/ice.2024.01.12>
<http://zoobank.org/urn:lsid:zoobank.org:pub:6064BA49-9A5E-46FA-96A6-E263BEA9346C>

● *Dorcus zhouchaoi* sp. nov., a new stag beetle from Sichuan, China (Coleoptera: Lucanidae)

Cheng-Bin WANG¹ & Tian-Long HE^{2*}

¹Engineering Research Center for Forest and Grassland Disaster Prevention and Reduction, Mianyang Normal University, Mianyang 621000, Sichuan Province, China;  <https://orcid.org/0000-0002-7913-8779>;  entomologist@qq.com

²Donghuaxincheng, Wangfenggang, Xiejiaji District, Huainan 232046, Anhui Province, China;  <https://orcid.org/0000-0001-7301-5105>;  htl1988@qq.com

*Corresponding author

Abstract: A new species of the genus *Dorcus* MacLeay, 1819 (Coleoptera: Lucanidae: Lucaninae), *D. zhouchaoi* sp. nov., is described and illustrated from Sichuan, China. It is closely related to *D. liyingbingi* Huang & Chen, 2013, *D. menci*us (Kriesche, 1935) and *Dorcus tianlongi* Wang & Zhou, 2019. Diagnostic characters of the four species are compared.

Keywords: Diagnosis, Dorcini, morphology, new species, taxonomy

● 中国四川一锹甲新种——周超大锹（鞘翅目：锹甲科）

王成斌¹ & 贺天龙^{2*}

¹森林与草原防灾减灾工程研究中心，绵阳师范学院，绵阳 621000，四川省，中国

²东华鑫城，望峰岗，谢家集区，淮南 232046，安徽省，中国

*通讯作者

摘要: 本文描绘了一种产于中国四川的大锹属新种——周超大锹 *Dorcus zhouchaoi* sp. nov.（鞘翅目：锹甲科：锹甲亚科）。该新种近于李氏大锹 *D. liyingbingi* Huang & Chen, 2013、孟子大锹 *D. menci*us (Kriesche, 1935)与天龙大锹 *Dorcus tianlongi* Wang & Zhou, 2019。本文比较了此四种锹甲的鉴别特征。

关键词: 鉴别，刀锹族，形态，新种，分类

Citation: Wang C-B & He T-L 2024: *Dorcus zhouchaoi* sp. nov., a new stag beetle from Sichuan, China (Coleoptera: Lucanidae: Lucaninae). *The Indochina Entomologist*, 1 (12): 95–104. [王成斌 & 贺天龙 2024: 中国四川一锹甲新种——周超大锹（鞘翅目：锹甲科：锹甲亚科）。中南半岛昆虫学家, 1 (12): 95–104.]
<https://doi.org/10.70590/ice.2024.01.12>

Accepted by Jiang ZHU: 13.XI.2024; published online: 13.XI.2024

Copyright Cheng-Bin WANG & Tian-Long HE. This is an open access article distributed under the terms of the Creative Commons Attribution License (CCBY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Introduction

The genus *Dorcus* MacLeay, 1819 (Coleoptera: Lucanidae: Lucaninae: Dorcini) is a speciose group of stag beetles with members distributed in the Nearctic, Oriental and Palearctic Realms. However, the genus dispersal centre is in Aisa with many congeners similar in external morphology. Huang & Chen (2013, 2017) excellently revised Chinese species of *Dorcus* in the fascicles II and III of their milestone books, *Stag Beetles of China*. Up to date, 73 species (ignoring subspecies) were recorded from China (Huang & Chen 2013, 2017, 2020, 2023; Bartolozzi *et al.* 2016; Wang & Zhou 2019; Huang *et al.* 2020).

In the present study, we describe and illustrate a new *Dorcus* species based on a series of specimens from Sichuan Province of China. The differential diagnosis of the new species from its closely related species *D. liyingbingi* Huang & Chen, 2013, *D. menciuis* (Kriesche, 1935) and *D. tianlongi* Wang & Zhou, 2019 is provided.

Material and methods

Specimens were relaxed and softened in a HH-2 digital homoeothermic water bath at 44.4°C for 12 hours and then placed in distilled water for cleaning and dissection. In order to examine the genitalia of both sexes, the abdomens were detached and treated with a 10% solution of potassium hydroxide for 12 hours, then transferred to distilled water to flush the remaining KOH and stop any further bleaching. After examination, the dissected body parts were mounted on a slide using Euparal Mounting Medium for future studies. Images were taken with a Canon macro photo lens MP-E 65 mm on a Canon 5DsR. Images of the same object at different focal planes were combined using Zerene Stacker 1.04 stacking software. Adobe Photoshop CS6 was used for postprocessing. The terminology adopted in this paper for external features of the body and genitalia follows Holloway (2007) and Huang & Chen (2010, 2013, 2017). Measurement criteria in millimetres (mm) follow Wang & Zhou (2019).

The material examined for this study is deposited in the following collections: **BMNH**—Natural History Museum (formerly British Museum), London, United Kingdom; **CTLH**—collection of Tian-Long He, Huainan, China; **MYNU**—Invertebrate collection of Mianyang Normal University, Mianyang, China.

Taxonomy

Genus *Dorcus* MacLeay, 1819 大锹属

Dorcus zhouchaoi sp. nov. 周超大锹

<https://zoobank.org/D1767CD4-45E0-4059-AEC8-9C8583555FB5>

Figs 1A–F; 2A–G; 3A–D

Type material: 18♂♂14♀♀. **Holotype:** 1♂ (BMNH), **CHINA, Sichuan:** Liangshan Prefecture, Huidong County, Xinjie Town [新街镇], 2200 m, 3.VIII.2022, Tian-Long He leg. **Paratypes:** 2♂♂2♀♀ (2♂♂1♀ in MYNU and 1♀ in BMNH), same as holotype except 5.VIII.2021, Zheng-You Gao leg.; 3♂♂1♀ (CTLH), same as holotype except 2800 m, 11.VIII.2021, Zheng-You Gao leg.; 3♂♂3♀♀ (CTLH), same as holotype except 2600 m, 20.VIII.2021, Zheng-You Gao leg.; 5♂♂2♀♀ (CTLH), same as holotype; 4♂♂6♀♀ (CTLH), same as holotype except 2.VII.2024, Guo-Quan Jiang leg.

Etymology. The new species is dedicated to our friend, Mr. Chao Zhou (Chengdu, China), an enthusiastic amateur entomologist. The name is a noun in the genitive case.

Description. Holotype, large-sized male. Size relatively small for the genus, body 30.3 mm long, widest at anterior 1/3 of pronotum. Length of particular parts (mm): head (4.4), mandible (4.9), pronotum (6.7), elytra (14.6); width (mm): head (9.7), pronotum (11.3), elytra (10.7).

Habitus (Figs 1A, B). Color black. Body generally lustreless and glabrous; some distinct, recumbent, yellowish pubescence sparsely present on lateral parts of metasternum and densely along posterior margin of abdominal sternite VII.

FIGURE 3. Genitalia of *Dorcus zhouchaoi* **sp. nov.**: **A–C** aedeagus **D** female genitalia. (**A, D** ventral views **B** dorsal view **C** lateral view)

Female paratypes. Body 24.5–25.2 mm long. Length of particular parts (mm, n=3): head (3.3 mm), mandible (2.5 mm), pronotum (6.2 mm), elytra (13.4 mm); width: head (6.7 mm), pronotum (9.2 mm), elytra (9.8 mm).

Habitus (Figs 1E, F). Color black. Body somewhat lustrous and glabrous; metasternum almost without pubescence; some fine, recumbent, yellowish and pubescence sparsely along posterior margin of abdominal sternite VII.

Head about twice as broad as long, broadest at canthi, surface strongly rugose, densely and irregularly covered with rather coarse punctures, interstices shagreened. Vertex inconspicuously depressed anteriorly. Clypeolabrum small, subtrapezoidal, slightly emarginate at anterior margin. Canthus without posterior angle. Mandible about 3/4 length of head, right and left ones similar to each other, each with one dorsal tooth, one inner tooth ahead of middle and two slight protuberance basally. Preocular margin slightly emarginate. Postocular margin relatively short. Mentum subtrapezoidal, rugose, rather coarsely punctate, with anterolateral angles rounded. Submentum inverted trapezoidal, moderately punctate. Gula elongate, smooth.

Pronotum 1.5 times as wide as long, widest at anterior 4/9, and 1.4 times as wide as head. Lateral margin crenulated, gently arcuate. Posterior margin almost simply curved. Surface mostly smooth, densely and irregularly covered with rather coarse punctures, strengthening along posterior part of midline and in lateral parts, interstices shagreened.

Scutellar shield linguiform. Surface moderately and roundly punctate, interstices microreticulate.

Elytra 1.4 times as long as wide, widest around anterior 3/8, about 1.1 times as wide as pronotum. Surface rugose, except small round punctures beside suture, most rather densely covered with rather coarse punctures which in rows. Longitudinal carinae relatively narrow.

Legs. Protibia with 5–6 large teeth, more or less bluntly rounded along outer margin; apex bifurcate with branches bluntly rounded at tip. Except apical spurs and spines, each meso- and metatibia with one spine along outer margin.

Female genitalia. Abdominal tergite VIII (Fig. 2A) semicircular, with broad membranous area at middle of anterior half, without lateral angle; sternite VIII (Fig. 2B) with subtriangular membranous area at middle of anterior half and rather thin membranous area along midline of posterior half, weakly emarginate at middle of posterior margin. Hemisternite (Fig. 3D) with apical part slender and narrowly round at apical margin. Central conjunction of tergite IX (Fig. 3D) protruding medially and roundly narrowed at tip. Spermatheca (Fig. 3D) inflated, suboval and weakly sclerotized. Spermathecal duct (Fig. 3D) short. Spermathecal gland (Fig. 3D) small, oval and membranous. Spermathecal gland duct (Fig. 3D) slender and thin. Accessory gland (Fig. 3D) oblong.

Differential diagnosis. This new species should be assigned to the *Dorcus reichei* group (*sensu* Huang & Chen, 2013). It can be distinguished from *Dorcus liyingbingi* Huang & Chen, 2013, *D. menci* (Kriesche, 1935) and *D. tianlongi* Wang & Zhou, 2019 by the combination of characters shown in Tables 1 & 2.

Distribution. China (Sichuan).

TABLE 1. Selected important morphological differences among large-sized males of *Dorcus liyingbingi* Huang & Chen, 2013, *D. menci*us (Kriesche, 1935), *D. tianlongi* Wang & Zhou, 2019 and *D. zhouchaoi* **sp. nov.**

Characters	<i>D. liyingbingi</i>	<i>D. menci</i> us	<i>D. tianlongi</i>	<i>D. zhouchaoi</i> sp. nov.
Body size	moderate	relatively large	moderate	relatively small
Head	widest at postocular process	widest at eyes	widest at eyes	widest at postocular process
Mandible	incurved at middle, single-toothed; inner tooth present at basal 1/3, pointing inward and round at apex	incurved at apical 1/3, triple-toothed in large size or double-toothed (the small one vestigial but still visible) in small size; largest inner tooth present at basal 1/3 and round at apex	incurved at middle, single-toothed; inner tooth present at middle, pointing forward and truncated at apex	incurved at middle, single-toothed; inner tooth present at basal 1/3, pointing inward and round at apex
Pronotum	lateral angles acute	lateral angles obtuse	lateral angles obtuse	lateral angles lacking
Protibia	outer teeth more or less acute	outer teeth more or less acute	outer teeth more or less bluntly rounded	outer teeth slightly acute
Tergite VIII	membranous area relatively smaller	membranous area relatively broader	membranous area relatively smaller	membranous area relatively broader
Sternite VIII	a pair of membranous areas at middle of anterior part	a pair of or a transverse membranous area at middle of anterior part	a transverse membranous area at middle of anterior part	a transverse membranous area at middle of anterior part
Tergite IX	lateral extensions relatively slender	lateral extensions relatively stouter	lateral extensions relatively slender	lateral extensions relatively slender
Pleurite IX	separated dorsally	separated dorsally	conterminous dorsally	separated dorsally
Sternite IX	a small protuberance at middle of posterior margin	a transverse membranous area along posterior margin	a small membranous area at middle of posterior margin	a small membranous area at middle of posterior margin
Aedeagal basal piece	ventral plate at apical end bifurcate at apex	ventral plate at apical end not bifurcate at apex	ventral plate at apical end not bifurcate at apex	ventral plate at apical end not bifurcate at apex
Median lobe	relatively wide, constricted in middle	relatively wide, hardly constricted in middle	relatively slender, distinctly constricted in middle	slender, distinctly constricted in middle

TABLE 2. Selected important morphological differences among females of *Dorcus liyingbingi* Huang & Chen, 2013, *D. menci*us (Kriesche, 1935), *D. tianlongi* Wang & Zhou, 2019 and *D. zhouchaoi* **sp. nov.**

Characters	<i>D. liyingbingi</i>	<i>D. menci</i> us	<i>D. tianlongi</i>	<i>D. zhouchaoi</i> sp. nov.
Canthus	?	without posterior angle	with rounded posterior angle	without posterior angle
Mandible	?	left with one inner tooth around middle and three small tubercles basally	left with one inner tooth ahead of middle and one slight protuberance basally	left with one inner tooth ahead of middle and two slight protuberance basally
Pronotum	densely and irregularly covered with coarse punctures	smooth, only densely covered with coarse punctures along margins	densely and irregularly covered with coarse punctures except smooth areas beside midline	densely and irregularly covered with rather coarse punctures
Protibia	with 5–6 outer teeth	with 6–7 outer teeth	without outer teeth, weakly undulated along outer margin	with 5–6 outer teeth
Sternite VIII	?	transverse membranous area at middle of anterior half and wide membranous area along midline of posterior half	oblong membranous area at middle of anterior half and moderately wide membranous area along midline of posterior half	subtriangular membranous area at middle of anterior half and rather thin membranous area along midline of posterior half
Hemisternite	apical part longer, round at apical margin	apical part longer, round at apical margin	apical part shorter, straight at apical margin	apical part slender, narrowly round at apical margin
Spermatheca	smaller, globular	larger, suboval	smaller, reniform	smaller, suboval
Spermathecal gland duct	slender and thin	short and thick	slender and thin	slender and thin
Accessory gland	oblong	oblong	clavate	oblong

Acknowledgements

We would like to express our sincere gratitude to Chang-Chin Chen [陈常卿] (Tianjin, China), Georgi A. Geshev and Ye-Jie Lin [林业杰] (both Imperial College London, United Kingdom), Li He [何力] and Chao Zhou [周超] (both Chengdu, China), Jian-Yue Qiu [邱见玥], Lu Qiu [邱鹭] and Hao Xu [许浩] (all Mianyang Normal University, Mianyang, China), Ping Wang [王平] and Guang-Lin Xie [谢广林] (both Yangtze University, Jingzhou, China), and Bi-Sheng Zhan [詹毕晟] (Zhenjiang, China) for their considerable help in this study. We thank two anonymous reviewers for their constructive comments on earlier versions of the manuscript.

References

- Bartolozzi L, Sprecher-Uebersax E & Bezděk A 2016: Family Lucanidae Latreille, 1804. In: Löbl I & Löbl D (Eds) *Catalogue of Palaearctic Coleoptera. Vol. 3. Scarabaeoidea—Scirtoidea—Dascilloidea—Buprestoidea—Byrrhoidea. Revised and updated edition*. Brill, Leiden and Boston, pp. 58–84.
- Holloway BA 2007: Lucanidae (Insecta: Coleoptera). In: *Fauna of New Zealand. Ko te Aitanga Pepeke o Aotearoa. Number 61*. Manaaki Whenua Press, Lincoln, Canterbury, New Zealand, 254 pp.
- Huang H & Chen C-C 2010: *Stag Beetles of China I*. Formosa Ecological Company, Taipei, viii + 288 pp. [黄灏 & 陈常卿 2010: 中华锹甲 [壹]. 福尔摩沙生态有限公司, 台北, viii + 288 pp.]
- Huang H & Chen C-C 2013: *Stag beetles of China II*. Formosa Ecological Company, Taipei, xviii + 716 pp. [黄灏 & 陈常卿 2013: 中华锹甲 [贰]. 福尔摩沙生态有限公司, 台北, xviii + 716 pp.]
- Huang H & Chen C-C 2017: *Stag Beetles of China III*. Formosa Ecological Company, Taipei, xii + 524 pp. [黄灏 & 陈常卿 2017: 中华锹甲 [叁]. 福尔摩沙生态有限公司, 台北, xii + 524 pp.]
- Huang H & Chen C-C 2020: New or little-known stag beetles (Coleoptera: Lucanidae: Lucaninae) from China. *Beetles World*, 21: 2–11.
- Huang H & Chen C-C 2023: Revisional notes and new descriptions of stag beetles from China (Coleoptera: Lucanidae). *Beetles World*, 25: 7–37.
- Huang H, Chen C-C, Tao R-C & Xiao C-M 2020: Two new species of Lucanidae (Coleoptera) from SE Tibet, China. *Beetles World*, 21: 19–25.
- Wang C-B & Zhou C 2019: *Dorcus tianlongi*, a new species from central China (Coleoptera: Lucanidae: Lucaninae). *Zootaxa*, 4691 (5): 575–588.
<https://doi.org/10.11646/zootaxa.4691.5.9>

Additional information

Author contributions: Conceptualization: C-B Wang & T-L He. Project administration: T-L He. Resources: T-L He. Supervision: T-L He. Visualization: C-B Wang. Writing—original draft: C-B Wang. Writing—review and editing: C-B Wang & T-L He.

Conflict of interest: The authors have declared that no competing interests exist.

Data availability: All of the data that support the findings of this study are available in the main text.

Ethical statement: No ethical statement was reported.

Funding: This study was self-funded by the authors.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of *ICE* and/or the editor(s). *ICE* and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.