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Cheng-Bin Wang, Tian-Long He. Neolucanus yemaoi sp. nov., a new stag beetle from Daweishan National Nature Reserve of Yunnan, China (Coleoptera: Lucanidae). *The Indochina Entomologist*, 2024, 1 (19), pp.153-164. 10.70590/ice.2024.01.19 . hal-04819717

HAL Id: hal-04819717

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Submitted on 4 Dec 2024

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● *Neolucanus yemaoui* sp. nov., a new stag beetle from Daweishan National Nature Reserve of Yunnan, China (Coleoptera: Lucanidae)

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Abstract: A new species of the genus *Neolucanus* Thomson, 1862 (Coleoptera: Lucanidae: Lucaninae), *N. yemaoui* sp. nov., is described and illustrated from Daweishan National Nature Reserve of Yunnan, China. It belongs to the *N. fuscus* group and most resembles *N. lehmanni* Baba, 1995 from South Myanmar. Diagnostic characters of the two species are compared.

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

● 中国云南大围山国家级自然保护区一锹甲新种——叶茂圆翅锹（鞘翅目：锹甲科）

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摘要：本文描述了一种产于中国云南大围山国家级自然保护区的圆翅锹属新种——叶茂圆翅锹 *Neolucanus yemaoui* sp. nov.（鞘翅目：锹甲科：锹甲亚科）。该新种属于棕色圆翅锹种团 *N. fuscus* group 并且最似缅甸南部的 *N. lehmanni* Baba, 1995。本文比较了两者的鉴别特征。

关键词：鉴别，奥锹族，形态，新种，分类

Citation: Wang C-B & He T-L 2024: *Neolucanus yemaoui* sp. nov., a new stag beetle from Daweishan National Nature Reserve of Yunnan, China (Coleoptera: Lucanidae). *The Indochina Entomologist*, 1 (19): 153–164. [王成斌 & 贺天龙 2024: 中国云南大围山国家级自然保护区一锹甲新种——叶茂圆翅锹（鞘翅目：锹甲科）。*中南半岛昆虫学家*, 1 (19): 153–164.]
<https://doi.org/10.70590/ice.2024.01.19>

Accepted by Jiang ZHU: 4.XII.2024; published online: 4.XII.2024

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FIGURE 1. Habitus of *Neolucanus yemai* sp. nov., ♂, large-sized, paratype, dorsal view.

Introduction

The genus *Neolucanus* Thomson, 1862 (Coleoptera: Lucanidae: Lucaninae: Odontolabini) is established by American entomologist James Thomson, with *Odontolabis baladena* Hope, 1842 as its type species from Bangladesh (Thomson 1862). This genus is closely related to *Calcodes* Westwood, 1834, *Heterochthes* Westwood, 1864 and *Odontolabis* Hope, 1842, which includes 62 species (excluding subspecies) occurring in East Asia and Southeast Asia (Fujita 2010; Zhang *et al.* 2016; Bartolozzi *et al.* 2016; Tsuchiya 2021; Yi 2023; unpublished data of the authors).

In the present study, we describe and illustrate a new *Neolucanus* species from Daweishan National Nature Reserve of Yunnan Province, China, which belonging to the *N. fuscus* group. The differential diagnosis of the new species from *N. lehmanni* Baba, 1995 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; **CMYX**—collection of Mao Ye, Xiangyang, China; **CTLH**—collection of Tian-Long He, Huainan, China.

Taxonomy

Genus *Neolucanus* Thomson, 1862 圆翅锹属

Neolucanus yemaai sp. nov. 叶茂圆翅锹

<https://zoobank.org/43CBCC3A-88C5-4E38-96CA-5DDF6E04AC96>

Figs 1; 2A–F; 3A–C; 4A–H; 5A–D; 6A–C; 7C

Type material: 6♂♂6♀♀. **Holotype:** ♂ (BMNH), **CHINA, Yunnan:** Honghe Prefecture, Pingbian County, Daweishan National Nature Reserve [大围山国家级自然保护区], 2090 m, 16.V.2016, Lu Qiu leg. **Paratypes:** 1♂1♀ (CMYX), same as holotype except 2000 m, 19–21.V.2015, Tian-Long He leg.; 1♂ (CMYX), same as holotype except 2000 m, 29.V.2016, Tian-Long He leg.; 1♂5♀♀ (CTLH), same as holotype except 2000 m, 25.V.–10.VI.2019, Li Wang leg.; 1♂ (CTLH), same as holotype except 2050 m, 30.V.2020, Tian-Long He leg.; 1♂ (CTLH), same as holotype except 2050 m, 4.VI.2022, Tian-Long He & Zi-Dan Xu leg.

Etymology. The new species is dedicated to our friend, Mr. Mao Ye [叶茂] (Xiangyang, China), an enthusiastic amateur entomologist, for his continuous support and assistance over the past sixteen years. The name is a noun in the genitive case.

Description. Large-sized male. Body 42.3 mm long, widest across anterior 3/8 of pronotum. Length of particular parts (mm): head (4.7), mandible (10.0), pronotum (8.8), elytra (18.8); width (mm): head (11.3), pronotum (15.0), elytra (14.5).

Habitus (Figs 1; 2A–C; 7C). Color most black; elytra blackish along suture, disc gradually changed from black



FIGURE 2. Habitus of *Neolucanus yemaoi* sp. nov., ♂♂: A–C large-sized, paratype D–F small-sized, holotype. (A, D dorsal views B, E ventral views C, F lateral views)

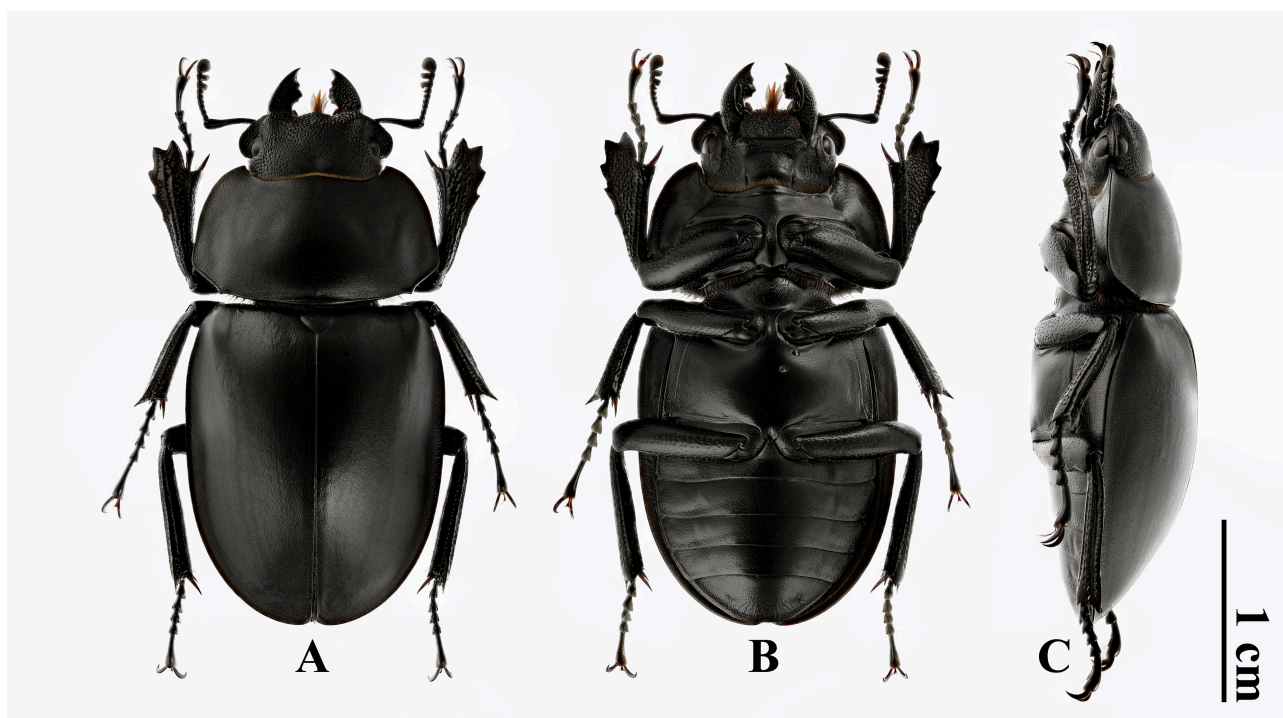


FIGURE 3. Habitus of *Neolucanus yemaoi* sp. nov., ♀: **A** dorsal view **B** ventral view **C** lateral view.

at base to rufous towards apices. Body somewhat lustrous and glabrous; some yellowish pubescence present on mouthparts, anterior and posterior margins of pronotum and legs.

Head about 2.4 times as broad as long, broadest across anterior end of preocular margin, surface entirely covered with rather fine punctures, interstices shagreened. Vertex inconspicuously depressed in a triangular center area. Clypeolabrum rather short and small, slightly protruding downwards. Mandible about 2.1 times as long as head, distinctly incurved in apical half; dorsal tooth situated around apical 3/8, stout in lateral view; two inner teeth present before dorsal tooth, apical one slightly tuberculate, basal one subtriangular. Preocular margin slightly emarginate. Postocular margin gently rounded. Anterior angles subround. Antennal club with three pubescent antennomeres; antennomere 7 subtriangular at inner angle; antennomeres 8–10 lamellate. Mentum oblong, surface microrugose, with anterolateral angles rounded. Submentum inverted trapezoidal, surface microrugose. Gula elongate, smooth.

Pronotum 1.7 times as wide as long, widest across anterior 3/8, and 1.3 times as wide as head. Lateral margin slightly emarginate before lateral angle, and distinctly so after. Posterior margin gently bisinuate. Anterior angles narrowly rounded. Lateral angles rounded. Posterior angles obtuse. Surface almost smooth except shallowly depressed along posterior margin, entirely covered with rather fine punctures, interstices shagreened.

Scutellar shield linguiform. Surface finely and roundly punctate, interstices microrugose.

Elytra 1.3 times as long as wide, widest around anterior 1/3, with width subequal to pronotum. Surface smooth, entirely covered with rather fine punctures, interstices shagreened.

Legs. Protibia with 3 large teeth, subtriangular along outer margin, first one from base acuter; apex bifurcate with branches slightly acute at tip; inner margin gently arcuate before base. Meso- and metatibia without spine or denticle along outer margin.

Abdomen. Abdominal sternite VII slightly emarginate at middle of posterior margin. Abdominal tergite VIII (Fig. 4C) semicircular, with ill-defined small membranous area at middle of posterior part; sternite VIII (Fig. 4D) transverse, without membranous area, simply round at posterior margin. Abdominal tergite IX (Fig. 4E) emarginate at posterior margin, deeply so at anterior margin, without lateral extensions (Fig. 4F); pleurite IX (Fig. 4E) distinctly

separated dorsally; sternite IX (Fig. 4G) with small subtriangular membranous area at middle of posterior margin, gently arcuate in lateral view (Fig. 4H).

Aedeagus (Fig. 5A) in ventral view about 3.1 times as long as wide; basal piece (Fig. 5A, B) distinctly constricted in anterior part, about 1.4 times as long as parameres, with paired sclerotized broad dorsal plates (Fig. 5B); ventral caudal plate (Fig. 5A) protruding anteriorly; paramere without basal process (Fig. 5A, B), weakly upturned at narrowed apex in lateral view (Fig. 5C); median lobe (Fig. 6A–C) about 4/5 length of parameres, distinctly asymmetric, left lobe slightly longer than right one; flagellum (Fig. 5A–C) long, thick, about 4.0 times as long as parameres, apex weakly enlarged.

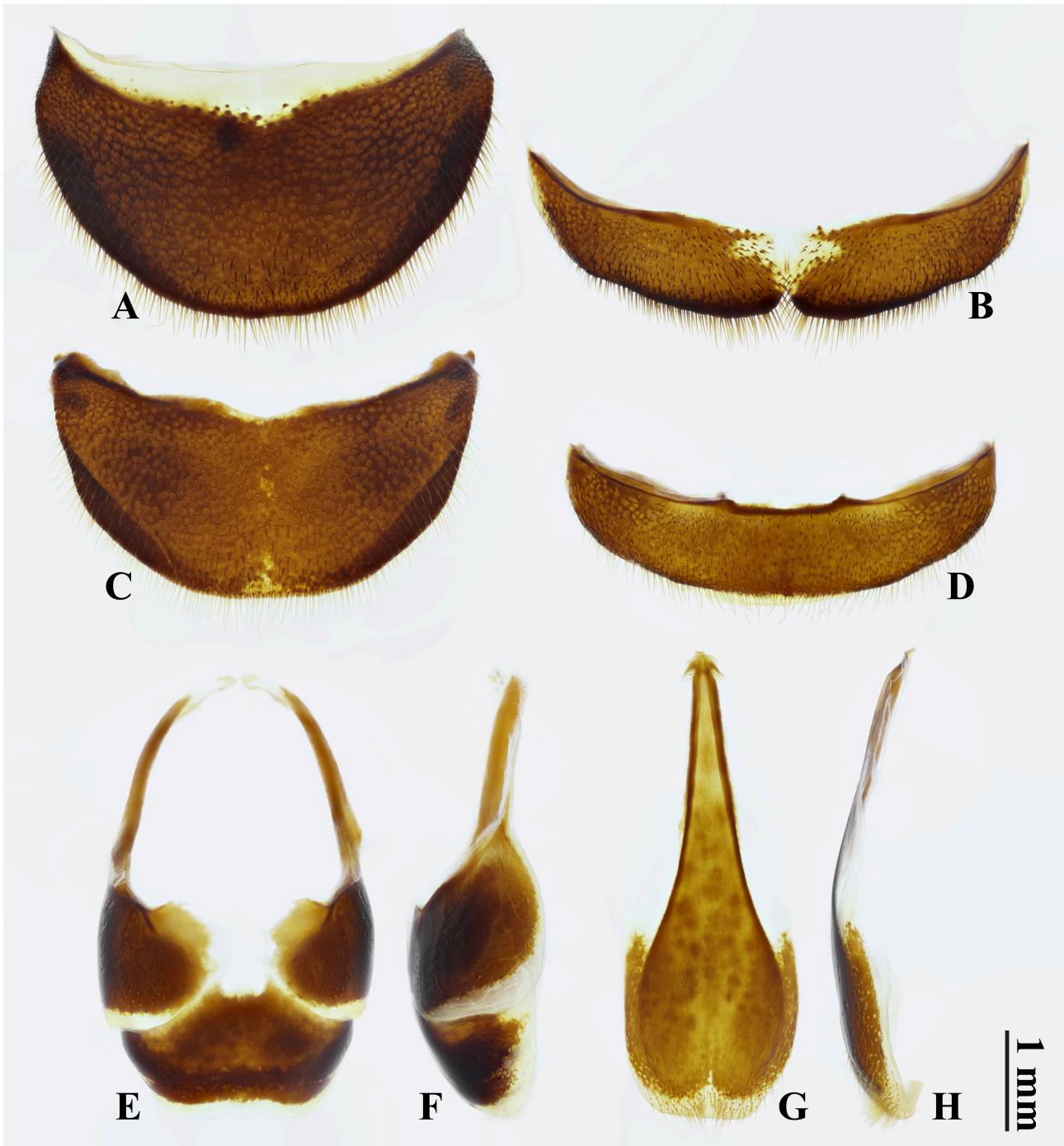


FIGURE 4. Abdominal segments VIII & IX of *Neolucanus yemaoi* sp. nov.: **A** tergite VIII, ♀ **B** sternite VIII, ♀ **C** tergite VIII, ♂ **D** sternite VIII, ♂ **E, F** tergite and pleurite IX, ♂ **G, H** sternite IX, ♂. (**A, C, E** dorsal views **B, D, G** ventral views **F, H** lateral views)

Male paratypes. Body 32.2–40.5 mm long. **Small-sized male** (Fig. 2D–F). Length of particular parts (mm, n=3): head (4.1), mandible (6.2), pronotum (6.8), elytra (15.6); width (mm): head (8.1), pronotum (12.2), elytra (12.3).

Small-sized males have no evident variations to large-sized males except: mandible about 1.5 times as long as head, with 4 small inner teeth before dorsal tooth, second one from apex much smaller; pronotum widest across lateral angles.

Female paratypes. Body 30.0–32.2 mm long. Length of particular parts (mm, n = 3): head (3.6 mm), mandible (2.6 mm), pronotum (7.2 mm), elytra (17.4 mm); width: head (8.5 mm), pronotum (13.6 mm), elytra (14.3 mm).

Habitus (Fig. 3A–C). Color black. Body somewhat lustrous and glabrous; some yellowish pubescence present on mouthparts, anterior and posterior margins of pronotum and legs.

Head about 2.4 times as broad as long, broadest across canthi, surface entirely covered with coarse punctures, attenuating posteriorly, interstices shagreened. Vertex declined in apical part. Clypeolabrum rather short, transverse, slightly protruding downwards. Mandibles about 3/4 length of head, asymmetric, left mandible with 3 tuberculate teeth and right one with 4. Preocular margin slightly arcuate. Postocular margin weakly arcuate. Anterior angles subrounded. Antennal club with three pubescent antennomeres; antennomere 7 tuberculate at inner angle; antennomeres 8–10 lamellate. Mentum semicircular, surface densely covered with coarse punctures, distinctly depressed in middle, without anterolateral angles. Submentum inverted trapezoidal, surface sparsely covered with coarse punctures. Gula elongate, smooth.

Pronotum 1.9 times as wide as long, widest across lateral angles, and 1.6 times as wide as head. Lateral margin substraight just before and after lateral angle. Posterior margin slightly bisinuate. Anterior angles angulate. Lateral angles rounded. Posterior angles angulate. Surface almost smooth except shallowly depressed along posterior margin, entirely covered with rather fine punctures, interstices shagreened.

Scutellar shield linguiform. Surface finely and roundly punctate, interstices microrugose.

Elytra 1.2 times as long as wide, widest around anterior 1/3, about 1.1 times as wide as pronotum. Surface smooth, entirely covered with rather fine punctures, interstices shagreened.

Legs. Protibia with 4 or 5 large teeth, subtriangular along outer margin, first one or two from base much smaller and acuter; inner margin gently curved before base. Meso- and metatibia without spine or denticle along outer margin.

Abdomen. Abdominal tergite VIII (Fig. 4A) semicircular, without membranous area; sternite VIII (Fig. 4B) with “T”-like membranous area at middle, deeply and triangularly notched at middle of posterior margin.

Female genitalia. Hemisternite (Fig. 5D) with apical part almost oblique at lateral margins, narrowly round apically. Central conjunction of tergite IX protruding medially and sharp at tip. Accessory gland membranous, slender. Median oviduct short, stout. Bursa copulatrix long, stout, tubiform and longitudinally folded. Spermathecal duct rather short. Spermatheca (Fig. 5D) symmetrically paired, bulb-shaped, situated at the apex of spermathecal duct, bulb-shaped. Spermathecal gland absent.

Differential diagnosis. This new species belongs to the *Neolucanus fuscus* group and most resembles *N. lehmanni* Baba, 1995 from South Myanmar. It can be distinguished from the latter by the combination of the following characters (*N. lehmanni* in brackets):

In male: elytral disc gradually changed from black at base to rufous towards apices (almost entirely black or yellow); mandibular dorsal tooth stout in lateral view (slender); mandible with 2 inner teeth in large-sized male (3), and 4 in small-sized male (5 or 6); head anterior angles subround (angulate); metasternum not pubescent (pubescent except middle part); protibial inner margin gently arcuate before base (rather projected).

In female: left mandible with 3 teeth and right one with 4 (3 and 3); metasternum not pubescent (pubescent except middle part); protibia with 4 or 5 teeth (5 to 7).

Distribution. China (Yunnan) (Fig. 7A, B).

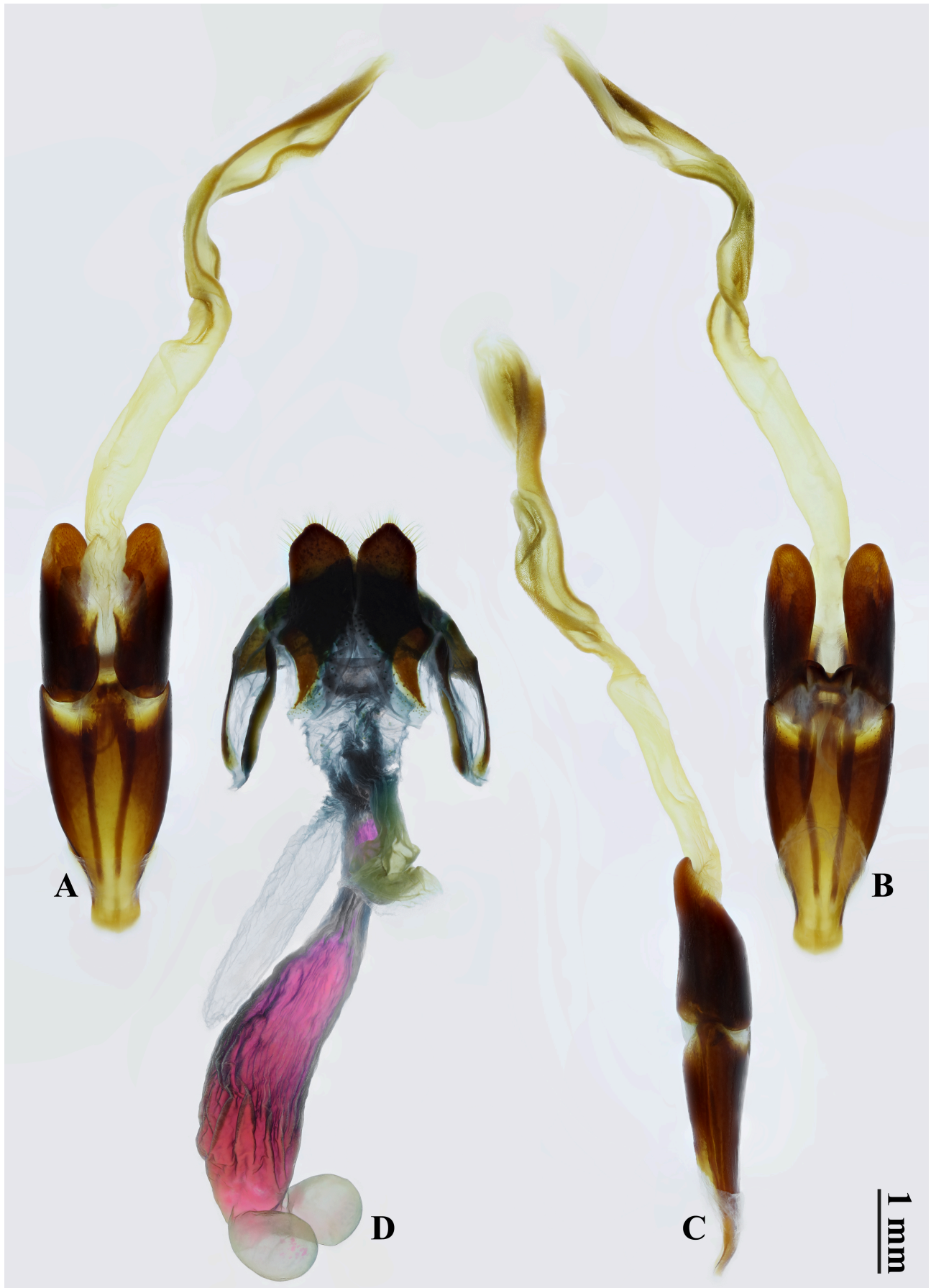


FIGURE 5. Genitalia of *Neolucanus yemaoi* sp. nov.: A–C aedeagus D female genitalia. (A, D ventral views B dorsal view C lateral view)



FIGURE 6. Aedeagal median lobe of *Neolucanus yemai* sp. nov.: **A** ventral view **B** lateral view **C** dorsal view.



FIGURE 7. Field observations of *Neolucanus yemaoi* **sp. nov.** at Daweishan National Nature Reserve of Yunnan, China: **A** habitat (© Tian-Long He) **B** mountain road (© Tian-Long He) **C** a living male on the ground of mountain road (© Jian-Bo Yang).

Acknowledgements

We appreciate two exceptional taxonomists, a master and an apprentice, Zhi-Hao Qi [齐志浩] and Hai-Tian Song [宋海天] (both Fujian Academy of Forestry), who rekindling our enthusiasm for Lucanidae and Buprestidae.

We are indebted to the staffs of Pingbian Administration Branch of Daweishan National Nature Reserve for providing collection permit and supporting in the field. We would like to express our sincere gratitude to Chang-Chin Chen [陈常卿] (Tianjin, China), Georgi A. Geshev (Imperial College London, United Kingdom), Li He [何力], Zi-Dan Xu [许子聃] and Chao Zhou [周超] (all Chengdu, China), Jian-Yue Qiu [邱见玥], Lu Qiu [邱鹭] and Hao Xu [许浩] (all Mianyang Normal University, Mianyang, China), Xia Wan [万霞] (Anhui University, Hefei, China), Ping Wang [王平] and Guang-Lin Xie [谢广林] (both Yangtze University, Jingzhou, China), Jian-Bo Yang [杨建波] (Daweishan National Park, China), Mao Ye [叶茂] (Xiangyang, 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.

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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.

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