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● Two new species of Ceratocanthinae from the Dayao Mountains, Guangxi, China (Coleoptera: Hybosoridae)

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Abstract: Two new species of ceratocanthine beetles, namely *Cyphopisthes erlangshen* sp. nov. and *Madrasostes lini* sp. nov., are herein described from the Dayao Mountains, Guangxi, China. The former represents a new national record for the genus *Cyphopisthes* Gestro, 1899. Illustrations of the habitus and diagnostic characters of both species are provided.

Keywords: *Cyphopisthes*, *Madrasostes*, morphology, new genus record, Oriental region, pill scarab beetles, taxonomy

● 中国广西大瑶山球金龟亚科两新种（鞘翅目：驼金龟科）

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摘要: 本文记述了来自中国广西大瑶山的两球金龟新种——二郎神佯球金龟 *Cyphopisthes erlangshen* sp. nov. 与林氏玛球金龟 *Madrasostes lini* sp. nov.。其中佯球金龟属 *Cyphopisthes* Gestro, 1899 系中国新记录属。文中提供两新种整体形态与鉴别特征图版。

关键词: 佯球金龟属，玛球金龟属，形态，新纪录属，东洋区，球金龟，分类

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● Introduction

Ceratocanthine beetles, commonly referred to as “pill scarab beetles”, belong to the family Hybosoridae (Coleoptera) and exhibit the remarkable ability to roll into a compact ball with all parts perfectly matching. This group comprises more than 360 species ascribed in 43 genera and 3 tribes (Ballerio & Grebennikov 2016).

The Ceratocanthinae fauna in China is notably limited, with merely six species recorded to date (Ballerio & Bezděk 2016; Jiang *et al.* 2020): *Eusphaeropeltis chenchao mingi* Jiang, Ballerio, Guo & Wang, 2020 (Yunnan), *Madrasostes deharvengi* Gao, 2009 (Guangxi), *Madrasostes suzukii* Ochi, Tsai & Masumoto, 2005 (Taiwan), *Madrasostes taiwanense* Ochi, Tsai & Masumoto, 2005 (Taiwan), *Pterorthochaetes insularis* Gestro, 1898 (Yunnan) and *Pterorthochaetes yunnanensis* Ballerio, 2014 (Yunnan).

In the present study, a new species of the genus *Cyphopisthes* Gestro, 1899 and a new species of the genus *Madrasostes* Paulian, 1975, both associated with *Hodotermopsis sjostedti* Holmgren, 1911 (Isoptera: Termopsidae), are described. These specimens were collected from several different nests at a single site in the Dayao Mountains, Guangxi Zhuang Autonomous Region, China. It is worth noting that this study marks the first record of the genus *Cyphopisthes* in China. Detailed illustrations of the diagnostic characters of both new species are provided.

● Material and methods

Specimens were initially relaxed and softened in an HH-2 digital homeothermic water bath maintained at 44.4°C for 6 hours, after which they were immersed in distilled water for cleaning and dissection. To examine the genitalia, the abdomens were detached using fine-tipped tweezers and subsequently cleared with a trypsin enzyme solution at room temperature for 12 hours. Thereafter, they were placed in a 70% ethanol solution to remove residual trypsin. Following examination, the dissected body parts were mounted on a slide using Euparal Mounting Medium for future studies. Digital images were acquired with a Canon MP-E 65 mm macro photo lens on a Canon 5DsR camera, and images of the same object taken at different focal planes were merged using Zerene Stacker 1.04 stacking software. Post-processing of the images was performed with Adobe Photoshop CS6. Morphological terminology adheres to Ballerio & Grebennikov (2016), while the punctuation patterns of the integuments follow the conventions set forth by Ballerio *et al.* (2011) and Ballerio (2013). Measurement criteria, expressed in millimetres (mm), are based on the standards of Jiang *et al.* (2020, 2021). The type material of the new species is deposited in the Invertebrate Collection of Mianyang Normal University, Mianyang, China (MYNU).

Abbreviations used in the parentheses of figure labels are as follows: **as**—anterosuperior view, **d**—dorsal view, **ll**—left lateral view, **pi**—posteroinferior view, **rl**—right lateral view, **v**—ventral view.

● Taxonomy

Family Hybosoridae Erichson, 1847 驼金龟科

Subfamily Ceratocanthinae Martínez, 1968 球金龟亚科

Genus *Cyphopisthes* Gestro, 1899 伛球金龟属

Type species: *Cyphopisthes amphicyllis* (Sharp, 1875), by original designation.

10 spp. in Ocampo & Ballerio (2006) and 12 spp. in Ballerio & Grebennikov (2016).

A large number of generic characters are not reiterated in the following description of the new species; consult Paulian (1978), Ballerio (2013) and Ballerio & Grebennikov (2016) for diagnostic characters of the genus.

***Cyphopisthes erlangshen* sp. nov.** 二郎神伛球金龟

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Figs 1A–C; 2A–E; 3

FIGURE 6. Characters of *Madrasostes lini* **sp. nov.**, ♂, holotype: **A–D** genital segment **E, F** aedeagus **G** parameres **H** left paramere **I** right paramere **J** median lobe & internal sac.

Elytra (Fig. 5C) strongly convex, as long as wide, widest around anterior $\frac{1}{3}$, 0.9 times as long as pronotal width. Humeral callus indistinct. Sculpture dense and deeply impressed; disc with rather large, comma-shaped punctures, each with a small simple pore posteriorly, sometimes connect to each other forming longitudinal lines; basal area and sides with irregular anastomosing lines, intervals with small simple pores and narrower than anastomosing lines. Sutural stria impressed and visible in about posterior $\frac{1}{6}$. Inferior sutural stria rather wide, gradually narrowing anteriorly and absent in anterior $\frac{1}{7}$ of elytral length. Articular area rather narrow. Marginal area with wide anastomosing lines, intervals with fine simple pores; intervals narrower than anastomosing lines. Articular process well developed, surface smooth.

Wings largely reduced.

Legs. Protibia slightly denticulate along outer margin, with apical two teeth much larger; one inner apical spur, bisinuate, strongly bent down in apical part. Mesotibia with one straight inner apical spur. Metatibia with two straight inner apical spurs, the inferior one somewhat inflated.

Abdomen. Tergites and sternites moderately densely covered with fine punctures; tergite VIII (Fig. 5D) relatively large, rounded at posterior margin; sternite III (Fig. 5E) with a seta tuft centrally; sternite VIII (Fig. 5E) extremely transverse.

Male genitalia. Genital segment (Figs 6A–D) asymmetrical; sternite IX semicircular; manubrium short. Aedeagal basal piece (Figs 6E, F) twisted, about 2.3 times as long as parameres. Parameres (Fig. 6G) slightly asymmetrical, curving inwards at apices, and strongly bent dorsally in apical part (Figs 6H, I). Median lobe (Fig. 6J) subpentagonal. Internal sac (Fig. 6J) with 4 or 5 sclerites, longest one thick and flagellate.

Female. Unknown.

Host. *Hodotermopsis sjostedti* Holmgren, 1911 (Isoptera: Termopsidae).

Distribution. China (Guangxi).

Differential diagnosis. *Madrasostes lini* sp. nov. is distinguished from all other congeners by the presence of dense, deeply impressed anastomosing lines that cover the head, pronotum, and the basal and lateral parts of the elytra — a character not observed to such an extensive degree in any other known species of the genus. Moreover, this new species is also characterized by a strongly reduced dorsal ocular area, with the interocular distance being approximately 26.6 times the maximum width of the dorsal ocular region.

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● Additional information

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