



## Additional faunistic records of Protosternini from China (Coleoptera: Hydrophilidae: Sphaeridiinae)

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### Abstract

Two species of the Oriental endemic tribe Protosternini Hansen, 1991 (Coleoptera: Hydrophilidae: Sphaeridiinae), *Protosternum arunvallense* Hebauer, 2002 and *Rhombosternum birmanense* J. Balfour-Browne, 1942, are reported from China for the first time. *Protosternum arunvallense* is the third known species of the genus *Protosternum* Sharp, 1890 in China, while *R. birmanense* is the first record of the genus *Rhombosternum* J. Balfour-Browne, 1942 for the country. Both species are diagnosed and illustrated based on Chinese specimens. An identification key to the Chinese species of Protosternini is provided.

**Key words:** Protosternini, new record, *Protosternum*, *Rhombosternum*, Hydrophilidae, China

### Introduction

The terrestrial water scavenger beetle tribe Protosternini Hansen, 1991 are relatively poorly studied, currently containing 23 species classified in four genera: *Protosternum* Sharp, 1890, *Rhombosternum* J. Balfour-Browne, 1942, *Mucetum* d'Orchymont, 1926 and *Sphaerocetum* Fikáček, 2010 (Fikáček *et al.* 2015). *Protosternum* is a genus associated with bananas (*Musaceae*) and includes 11 known species. It is distributed in the south part of Asia, ranging from southern India and Sri Lanka eastward across Southeast Asia and extending to Sulawesi, Indonesia. *Protosternum atomarium* Sharp, 1890 was introduced to the Mascarene Islands in the Afrotropical region (Bameul 1997a; Hebauer 2002a; Hansen 1999; Fikáček *et al.* 2018). *Rhombosternum* is a little-known genus inhabiting decaying organic matter and includes 8 species, occurring Southeast Asia, and extending eastward to New Guinea (Bameul 1997b; Hebauer 2001, 2002b). *Mucetum* is a monotypic genus represented by *M. carinatum* d'Orchymont, 1926, which was described from Singapore (d'Orchymont 1926; Bameul 1997b). *Sphaerocetum*, a myrmecophilous genus, comprises three species, all of which are known from Peninsular Malaysia (Fikáček 2010; Fikáček *et al.* 2015). Protosternini are similar to Coelostomatini in external morphology and can be distinguished from Coelostomatini by anterolateral corner of metaventrite with an arcuate ridge (Hansen 1991).

The Protosternini fauna of China is particularly poorly known. Only two species of *Protosternum* were recorded from China: *Protosternum abnormale* (d'Orchymont, 1913) from Taiwan and *Protosternum hainanense* Fikáček, Liang, Hsiao, Jia & Vondráček, 2018 from Hainan. There are currently no records of Protosternini from Chinese mainland outside these islands (Bameul 1997a; Fikáček *et al.* 2018). In this study, we updated the species in Chinese mainland based on recently collected material from southern Xizang, Yunnan, and Guangxi.

### Material and methods

Representative specimens were dissected. After 10 min in 10% KOH at 70°C, dissected male genitalia were transferred to a drop of distilled water, and the cleaned genitalia were subsequently mounted in a drop of soluble

resin (fish glue after transparent treatment) on a piece of paper card attached below the respective specimen. For taking photographs, the cleaned and relaxed male genitalia were placed in a drop of glycerine. Photographs of genitalia were taken using a Zeiss AxioCam HRc camera mounted on a Zeiss AX10 microscope with the Axio Vision SE64 software. These images were then stacked in Helicon focus (v7.0.2). Habitus photographs were taken using a Nikon DS-Ri2 mounted on a Nikon SMZ25; layers were captured and stacked in the NIS-Elements software. SEM photographs were taken with Apreo 2 scanning electronic microscope using uncoated specimens and the low-vacuum mode. Habitat images were taken using a Canon 7D digital camera. Specimens are deposited in the following collections:

SNUC      Shanghai Normal University, Shanghai, China (Z.-W. Yin, L. Tang)  
SYSU      Sun Yat-sen University, Guangzhou, China (F.-L. Jia, W.-C. Xie).

## Taxonomy

### Genus *Protosternum* Sharp, 1890

*Protosternum* Sharp, 1890: 356. Type species: *Protosternum atomarium* Sharp, 1890.

### *Protosternum arunvallense* Hebauer, 2002

(Figs 1, 2)

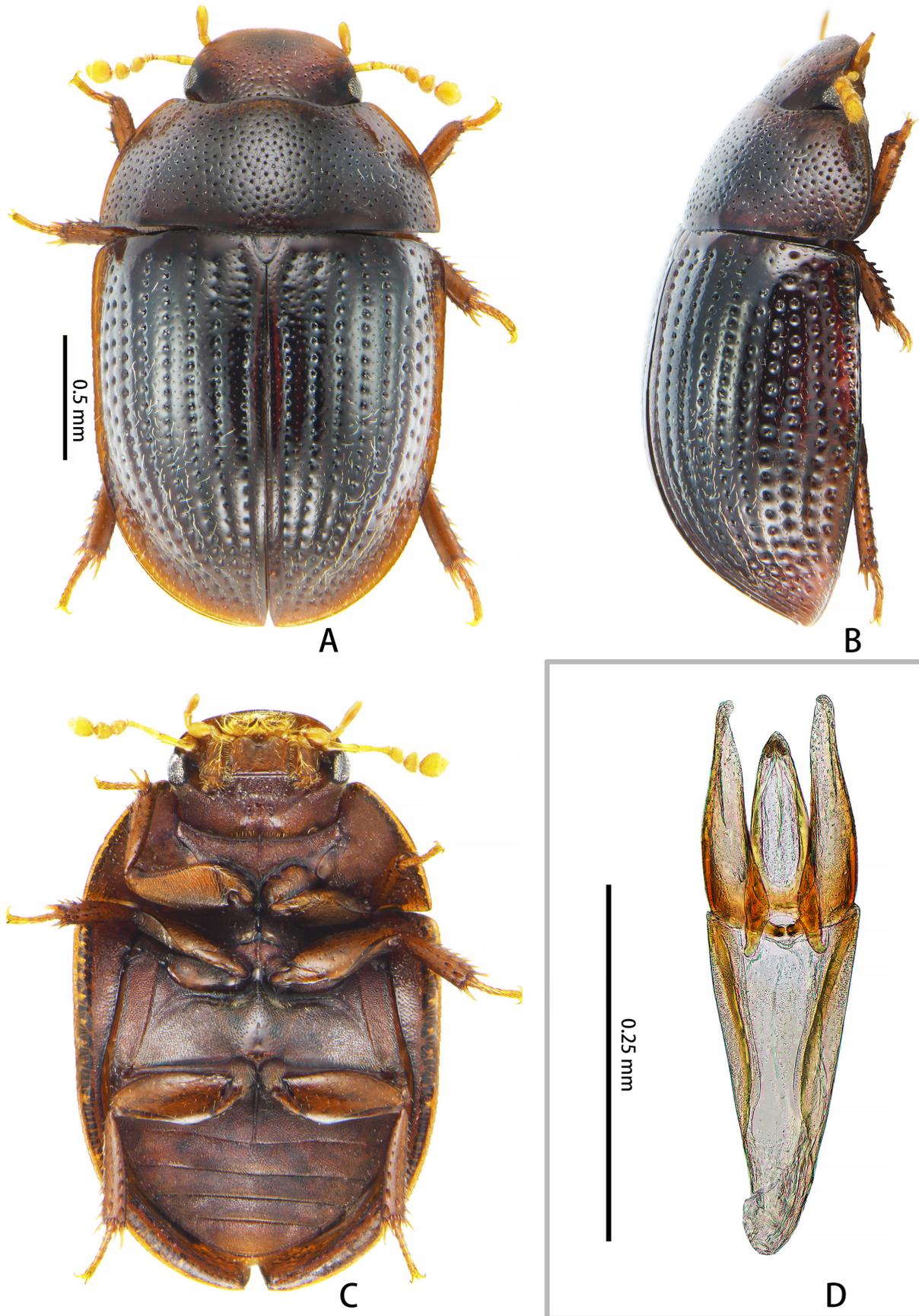
*Protosternum arunvallense* Hebauer, 2002a: 34. Type locality: Nepal, Arun Valley, Sankhua Sabha.

*Protosternum arunvallense*: Przewoźny 2022: 37.

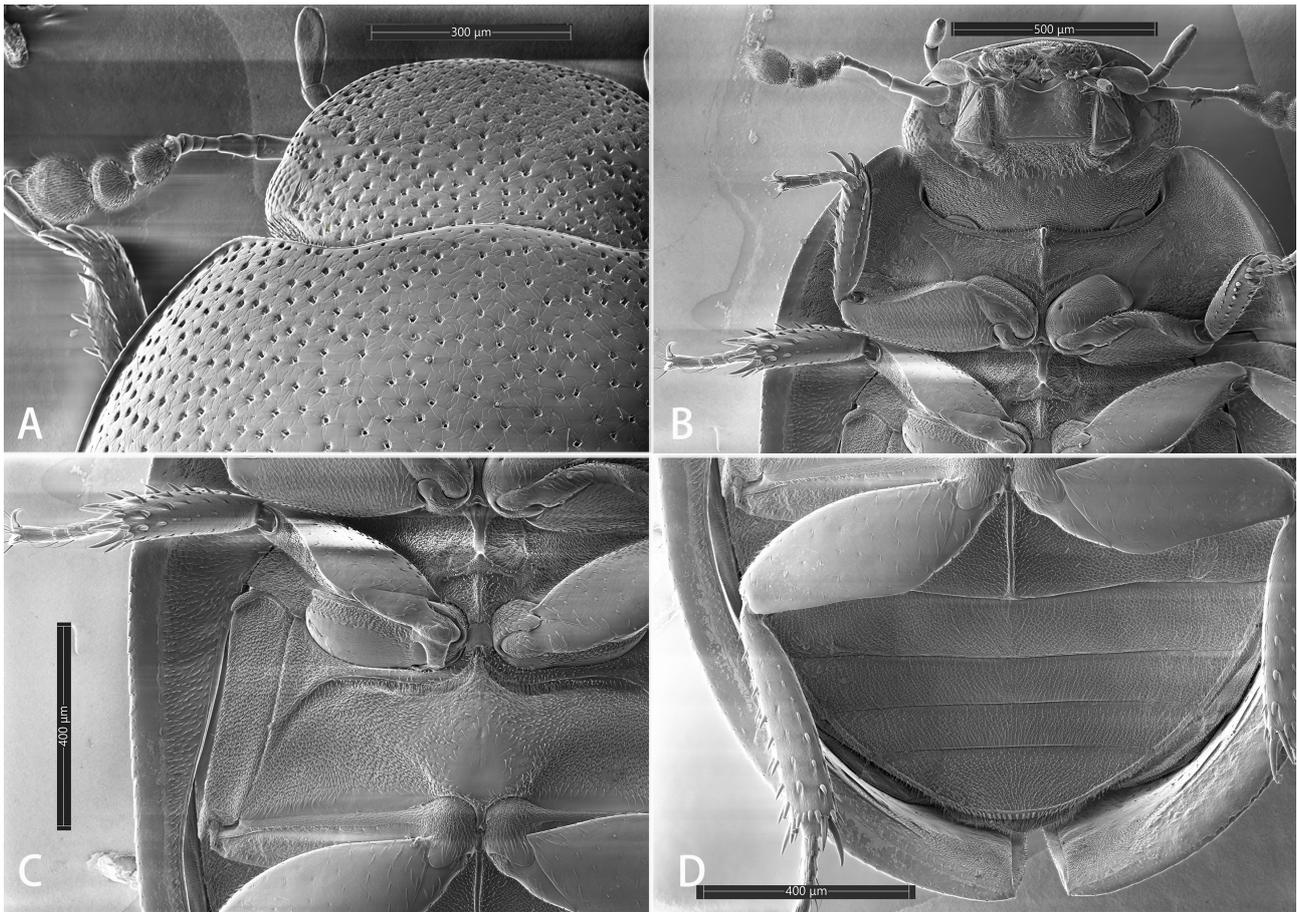
**Material examined.** 2 ♂♂, 3 ♀♀ (SYSU), labeled “China: Xizang, Nyingchi City (= Linzhi), Mêdog County, Forest behind the Renqingbeng Temple (仁青崩寺后山), 2104 m, 29.3086°N, 95.3471°E, 18.VI.2023, Zu-Qi Mai & Wen-Kai Kou leg. Primary forest, flight intercept trap with rotten jackfruits, bamboo shoots and human dung around”. 5 exx. (SYSU), labeled “China: Xizang Autonomous Region, Xigazê, Yadong County, Xiayadong Town, Pangda Village, forest behind the village, 2160 m, 27.3055°N, 89.0058°E, 26–28.VI.2023, Zu-Qi Mai, Cheng Liang & Yue-Zheng Tu leg., flight intercept trap in primary forest, with rotten jackfruits, bamboo shoots and mushroom around”

**Diagnosis.** Length 2.2–2.4 mm; width 1.3–1.4 mm. Body oval and nearly parallel-sided in middle, moderately convex (Fig. 1A, B). Dorsum reddish black to dark reddish brown. Head and pronotum with dense and coarse punctures, interstices with distinct star-like microsculptures around each puncture (Fig. 2A). Lateral margins of pronotum broadly rimmed. Each elytron with 10 rows of coarse punctures and slightly impressed into striae in posterior half. Intervals of serial punctures slightly convex, with sparse and fine punctures, without microsculpture. Mentum with fine microreticulation (Fig. 2B). Prosternum with median carina and a fine prominent tooth anteromedially (Fig. 2B). Mesoventral process moderately raised, arrowhead-shaped, with a tooth anteromedially and a distinct longitudinal carina. Metaventral process slightly bulged between mesocoxae, and contact with mesoventrite anteromedially; metaventricle with a groove and two fringes of yellow hairs behind mesocoxae (Fig. 2C). Anterolateral ridge of metaventricle strongly bent backwards, without femoral lines (Fig. 2C). First abdominal ventrite with complete median carina (Fig. 2D). Aedeagus (Fig. 1D) with median lobe shorter than parameres, narrowing from base to apex; parameres straight and narrowly rounded apically; phallobase slender, half as long as parameres.

**Remarks.** We identified the individuals from southern Xizang as *Protosternum arunvallense* based on the original description and the proximity to the type locality (Hebauer 2002a). The specimens we examined were generally consistent with the original morphological description, except for differences in male genitalia: the type specimens were described as having a phallobase as long as the parameres, but the specimens from Xizang with phallobase much longer than parameres. We speculate that the reason for this difference may be that Hebauer described the species based on dried male genitalia, this inaccurate description is often due to deformation of specimens. Therefore, further comparison with the type specimens is necessary. Comparing with other *Protosternum* species, *P. arunvallense* is morphologically similar to *Protosternum newtoni* Bameul, 1997 from Sri Lanka. Both



**FIGURE 1.** *Protosternum arunvallense* Hebauer, 2002. **A–C.** Habitus. **D.** Aedeagus of male genitalia. **A.** Dorsal view. **B.** Lateral view. **C.** Ventral view.



**FIGURE 2.** SEM photos of *Protosternum arunvallense*. **A.** Punctation of head and pronotum. **B.** Ventral view of head, and prothorax. **C.** Ventral view of meso- and metathorax. **D.** Abdominal ventrites.

species exhibit distinct microsculptures on the pronotum and coarse serial punctures on the elytra. However, *P. arunvallense* has a larger body size (2.2–2.4 mm in length), whereas the body length of *P. newtoni* is less than 2 mm.

**Biology.** All specimens were collected using flight intercept traps in high-altitude forests at elevations between 2000 and 2500 m. No banana trees were found in the vicinity of the collection sites. Therefore, we consider it unlikely that this species inhabits banana pseudostems. Instead, we infer that it may inhabit moist organic substrates such as forest leaf litter.

**Distribution.** It is distributed in the southern Himalayas. In addition to its type locality in Nepal (Arun Valley), the species is now recorded from the border areas of southern Xizang of China, near India, Bhutan and Nepal.

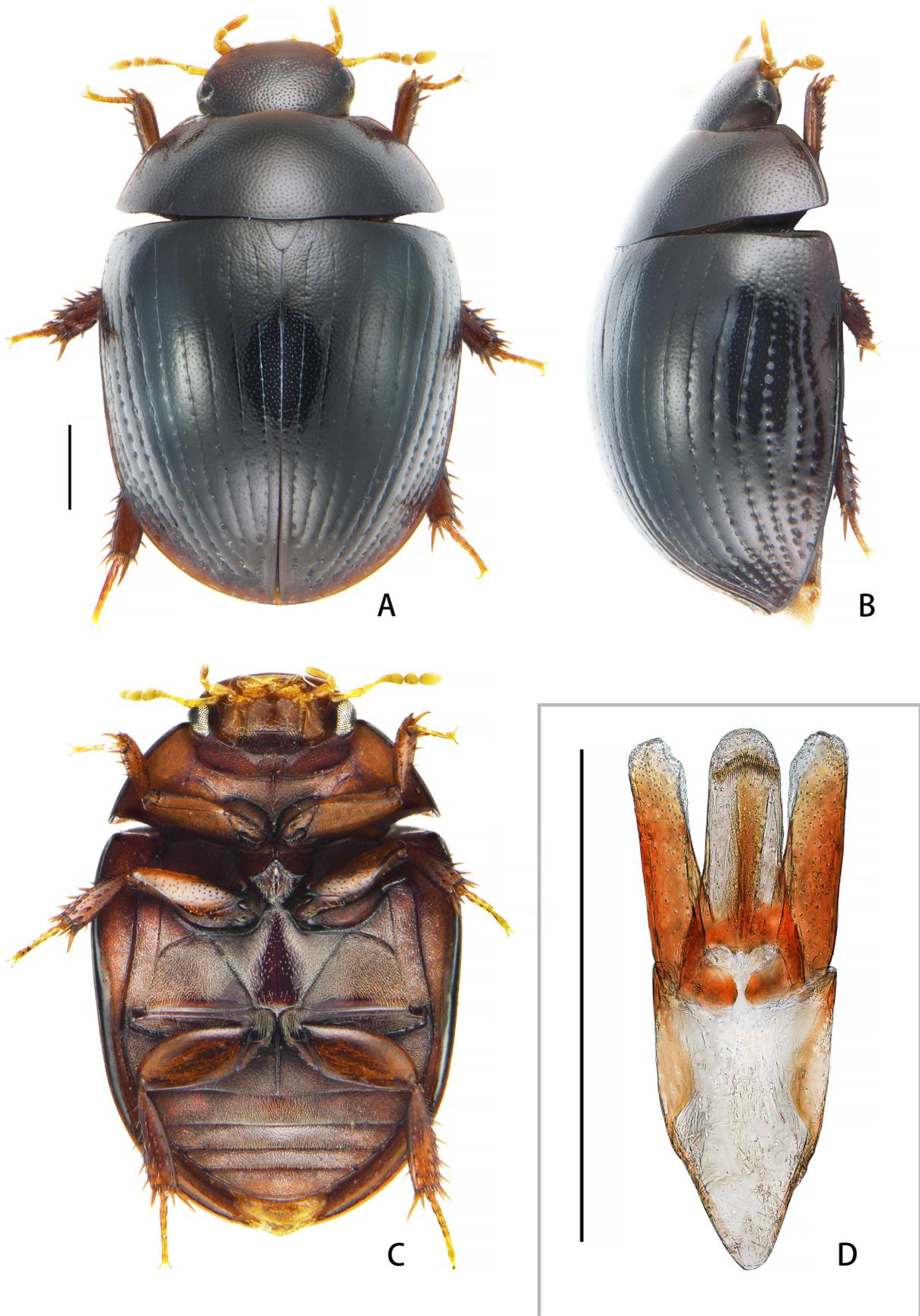
### **Genus *Rhombosternum* J. Balfour-Browne, 1942**

*Rhombosternum* J. Balfour-Browne, 1942: 863. Type species: *Dactylosternum wagneri* Knisch, 1921.

#### ***Rhombosternum birmanense* J. Balfour-Browne, 1942**

(Figs 3–5)

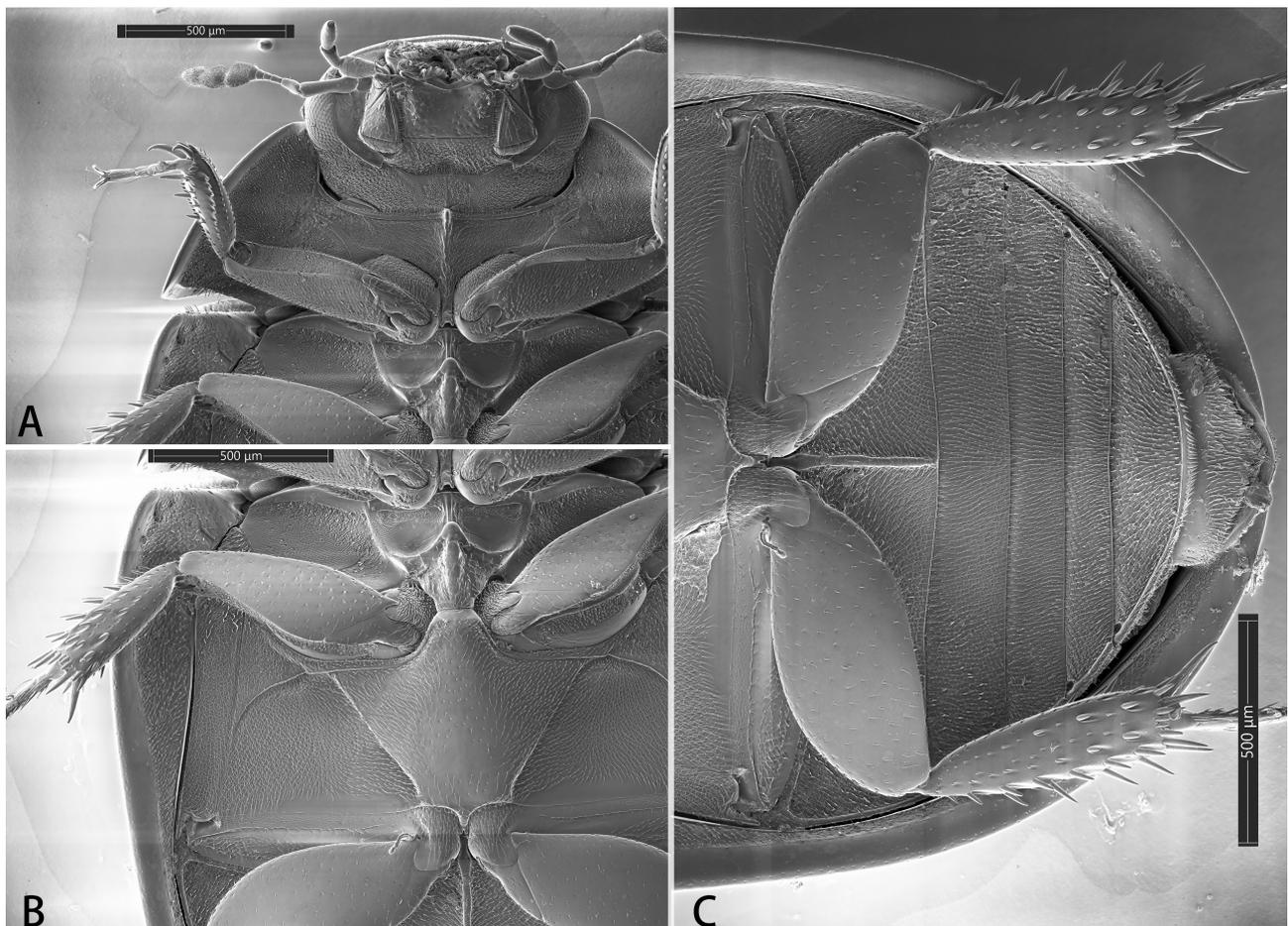
*Rhombosternum birmanense* J. Balfour-Browne, 1942: 864. Type locality: Myanmar, Ruby Mines, District N of Mandalay.



**FIGURE 3.** *Rhombosternum birmanense* J. Balfour-Browne, 1942. **A–C.** Habitus. **D.** Aedeagus of male genitalia. **A.** Dorsal view. **B.** Lateral view. **C:** Ventral view. Scale bars 0.5 mm.

**Material examined. Yunnan:** 3 ♂♂, 4 ♀♀ (SYSU), labeled “Dehong Dai and Jingpo Autonomous Prefecture, Yingjiang County, Tongbiguan, Xima Town, Hulukou, Xingyun Secondary power station (星云二级电站), in rotten jackfruits and rotten bananas, 24.7759°N 97.6582°E, 1021 m, 18–20.VIII.2022, Yu-Chen Zheng, Yue-Zheng Tu & Zu-Qi Mai leg.”. 3 exx. (SYSU), labeled “Dehong Dai and Jingpo Autonomous Prefecture, Yingjiang County, Tongbiguan Town, Jinzhuzhai village, jackfruit trap, 1280 m, 97.5993°E 24.6146°N, 24.VIII.2022, Yu-Chen Zheng, Yue-Zheng Tu & Zu-Qi Mai leg.” 3 exx. (SYSU), labeled “Dehong Dai and Jingpo Autonomous Prefecture, Longchuan County, Husa village, Banggunjianshan Mountain, in rotten bamboo shoots, 24.3617°N, 97.8316°E, 1388 m, 12–15.VIII.2022, Yu-Chen Zheng, Yue-Zheng Tu & Zu-Qi Mai leg.” **Guangxi:** 1 ♂ (SNUC), labeled “China: Guangxi Prov., Lin’gui County, Huaping N.R., Guangfuding, 14.VII.2011, alt. 1400–1780 m, Ma, Chen & Peng Leg.”

**Diagnosis.** Length 2.8–3.4 mm; width 1.7–2.1 mm. Body broadly oval, moderately convex. Dorsum dark reddish brown to black (Fig. 3A, B). Head and pronotum with dense and fine punctures, interstices smooth. Lateral margins of pronotum narrowly rimmed. Each elytron with 10 rows of moderately coarse punctures and impressed into striae. Intervals of serial punctures flat, with sparse and fine punctures as those on pronotum, without microsculpture. Mentum with sparse and fine punctures. Prosternum with median carina and a fine prominent tooth anteromedially (Fig. 4A). Mesoventral process strongly raised, arrowhead-shaped, with a fine tooth anteromedially and a distinct longitudinal carina. Metaventral process raised and projecting anteriorly between mesocoxae and broadly contacting posterior margin of mesoventral process; without groove behind mesocoxae (Fig. 4B). Anterolateral ridge of metaventrite strongly bent backwards; metaventrite with complete femoral lines crossing anterolateral ridge (Fig. 4B). First abdominal ventrite with complete median carina (Fig. 4C). Aedeagus (Fig. 3D) with median lobe as long as parameres, slightly narrowing from base to apex, apex rounded; paramere straight, inner apical angle with concavity; phallobase slightly longer than parameres.



**FIGURE 4.** SEM photos of *Rhombosternum birmanense*. **A.** Ventral view of head, and prothorax. **B.** Ventral view of meso- and metathorax. **C.** Abdominal ventrites.



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# 中国前胸牙甲族Protosternini新记录（鞘翅目：牙甲科：陆牙甲亚科）

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**摘要:** 报道中国前胸牙甲族（鞘翅目：牙甲科：陆牙甲亚科）两新纪录种，即阿龙谷前胸牙甲 *Protosternum arunvallense* 和缅甸箭胸牙甲 *Rhombosternum birmanense*。前者为中国前胸牙甲属第三种，后者代表了中国箭胸牙甲属的首笔记录；提供了两个新纪录种的重要鉴别特征和图片和中国前胸牙甲族种检索表。

**关键词:** 前胸牙甲族, 新记录, 前胸牙甲属, 箭胸牙甲属, 牙甲科, 中国