

Designation of the neotype of *Velutinodorcus carinulatus* (Nagel, 1941) (Coleoptera: Lucanidae)

Jing-Zhi LIN (林敬智)

2F., No. 3, Aly. 152, Ln. 68, Yangguang St., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)
e-mail: leslie9562@gmail.com

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Abstract. In this research, *Velutinodorcus carinulatus* (Nagel, 1941) (Coleoptera: Lucanidae) is reviewed and a neotype is designated. Confirming the destruction of the original holotype, a neotype was designated to ensure taxonomic stability. The neotype specimen, matches the original description and is from the same locality; it is provided to replace the missing holotype. Also, this study provides crucial insights into the taxonomy and distribution of *Velutinodorcus carinulatus* in Taiwan.

INTRODUCTION

The genus *Velutinodorcus* (Coleoptera: Lucanidae) was proposed by Maes (1992). However, it was treated as invalid by Huang & Chen (2013) based on ICZN article 13.1 due to the absence of a description and was included in genus *Dorcus* MacLeay, 1819.

Subsequently, Yi (2023) suggested that species of *Velutinodorcus* typically exhibit dense and long setae on their elytra. Based on this characteristic, the genus has been revalidated. Currently, a total of 14 species are recognized worldwide, including two known species in Taiwan: *Velutinodorcus carinulatus* (Nagel 1941) and *Velutinodorcus taiwanicus* (Nakane & Makino 1985).

The late stag beetle expert Paul Nagel described *Dorcus carinulatus* Nagel, 1941 from a single male specimen and it is believed that the original holotype was destroyed during the 1943 bombing of the Zoologische Institute und Zoologische Museum, the repository of Nagel's personal collection (Huang & Chen 2023). A search of other German museums failed to locate these original specimens. As the holotype was destroyed, a neotype is designated in this study to stabilise the nomenclature. The designation of a neotype is required for reasons of taxonomic stability according to ICZN (1999), art. 75.

MATERIAL AND METHODS

The study is based on specimens in the author's private collection (JZLT) in Taipei, Taiwan. The species list provides the localities and dates of collection, along with the number of specimens collected in brackets. All specimens were legally obtained.

The length of the body (LB) is measured from the apex of the mandible to the end of the elytra. Identification was based on recent literature on stag beetles (Nagel 1941; Huang

& Chen 2013) and compared accordingly. Distribution records were obtained from Chang (2006) and Huang & Chen (2013), as well as specimens in the collection of the author. The neotype specimen will be stored in the Biodiversity Research Museum, Academia Sinica, Taiwan (ASIZHX).

RESULT

Tribe Dorcini Parry, 1864 Genus *Velutinodorcus* Yi, 2023

Chinese common name: 鏞鍬形蟲屬

Velutinodorcus carinulatus (Nagel, 1941) (Figs. 1-2)

Chinese common name: 直顎鏞鍬形蟲

Dorcus carinulatus Nagel, 1941: 56-57 (type locality: Horisha [= Puli], Central Taiwan), fig. 3 for ♂ holotype; Chang 2006: 38-39, fig. for male, female and natural history; Huang & Chen 2013: 422-423, figs. for habitus and genitalia.

Velutinodorcus carinulatus (Nagel, 1941), Yi 2023: 14. (new comb).

Type material. Neotype (♂): “Taiwan/ Nantou County, / Puli Town, / V. 2018. J-Z.Lin, bred. (on a white label); Neotype / *Velutinodorcus carinulatus* / Nagel, 1941 / des. J-Z.Lin, 2024 (on a red label), (ASIZHX).

Additional material: Taiwan: 2 ♂♂, (JZLT), Taichong County, Dongshi, reared and emerged in X. 2018; 3 ♂♂, (JZLT), Taichong, Guguan, bred and emerged in 2022; 2 ♂♂, (JZLT), Taichong County, Xinshe Dist, 12. IX.2021, purchased; 3 ♂♂, (JZLT), Nantou County, Puli Town, bred and emerged in V. 2018.

Neotype designation. Four specimens were examined from the original type locality, Puli, Central Taiwan. The specimen selected as neotype (Figs. 2-3) has the same body length as the type specimen originally described (LB: 19 mm). The specimen matches the original description and figure in most characters and is from the original type locality. This specimen (Fig. 1) is a male, 19 mm long, in perfect condition and with prepared genitals (Fig. 3).

LB. Males: 14-25 mm (Zhang 2006). Females: 17-22 mm (Zhang 2006).

Distribution. Taiwan: Hsinchu, Miaoli, Taichung, Nantou, Kaohsiung, Pingtung, Yilan (0-800 m).

REMARKS

Velutinodorcus koreanus (Jang & Kawai 2008) was considered a subspecies of *V. carinulatus* by Han et al. (2010). However, this molecular research was performed using only

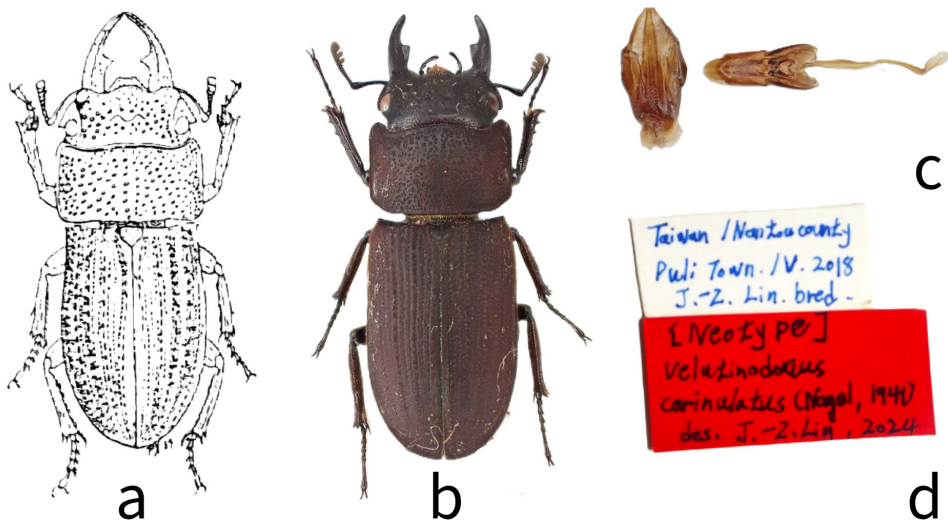


Fig. 1. Habitus of *Velutinodorcus carinulatus* (Nagel, 1941): a- (holotype after Nagel 1941); b- neotype dorsal aspect; c- neotype of aedeagus and 9th abdominal segment of neotype; d- neotype labels.

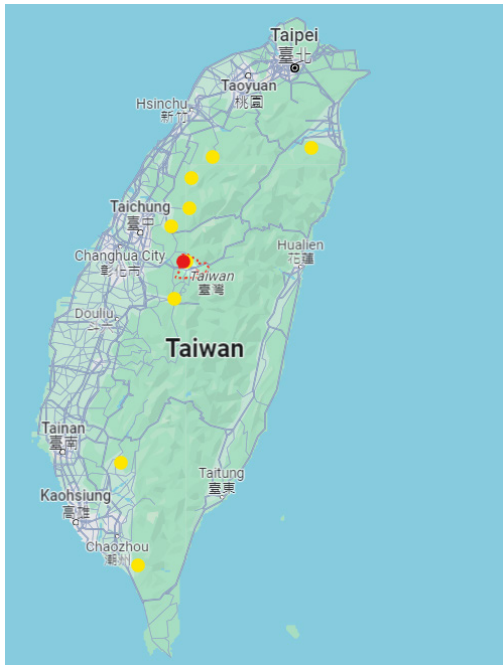


Fig. 2. The locality of *Velutinodorcus carinulatus* (Nagel, 1941) from Taiwan. Red circular mark indicates the toptype, Puli, Taiwan. The map was extracted from Google maps <https://www.google.com/maps/search/taiwan>

one partial gene sequence, and the genome information of species included in the genus *Dorcus* were noticeably insufficient. Therefore, this report supports the species level of *V. koreanus* based on morphological differences. This revalidation is supported by another Korean researcher, Eunjoong Kim (personal communication 2024).

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