

## A new *Carinaulus* species (Coleoptera: Scarabaeidae: Aphodiinae: Aphodiini) from Nepal

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**Taxonomy, new species, Coleoptera, Scarabaeidae, Aphodiinae, Aphodiini, *Carinaulus*, Nepal, Palaearctic Region**

**Abstract.** A new species of the genus *Carinaulus* Tesař, 1945, *Carinaulus kucerai* sp. nov., from Nepal is described and illustrated. Original works including still known species of the genus are quoted. The geographical distribution of the genus is briefly discussed. The type series of the new species comes from West Nepal.

### INTRODUCTION

In the work presented here, a new species of Aphodiini from Nepal is described which belongs to the genus *Carinaulus* Tesař, 1945. The taxon *Carinaulus* was originally established by Tesař (1945) as a monotypical subgenus of the genus *Aphodius* Hellwig, 1798 for *Aphodius (Carinaulus) vseteckai* Tesař, 1945. The subgenus was thoroughly revised by Červenka (2000), who considered 17 species of the genus in that revision (16 species keyed and one species from South Korea left beyond the key). It was subsequently raised to the generic level by Dellacasa et al. (2001). Further three species of the genus have been described since then (Červenka 2003, Masumoto et al. 2018).

In the second edition of the Catalogue of Palaearctic Coleoptera, the species *C. meghalayensis* (Červenka, 2000), is considered to occur in the Indian state Uttar Pradesh (Dellacasa et al. 2016). According to Červenka (2000), the species of the genus are known from the Indian state Meghalaya, which, however, belongs to the Oriental Region and thus, the present authors believe that it should be deleted from the CPC.

Most species of the genus occur in east Palaearctic areas; one species is also known from the Oriental Region. The geographical distribution of the genus (based on works quoted in the preceding two paragraphs) can be summarized as follows: China (Fujian, Gansu, Qinghai, Shaanxi, Sichuan, Yunnan, Taiwan, Xinjiang, Xizang), India (Meghalaya, Sikkim), Japan, Kazakhstan, Nepal, North Korea, Russian Federation (East Siberia, Far East), South Korea.

## MATERIAL AND METHODS

The specimens were observed by using the MBS-10 and SZP 1120-T stereoscopic microscopes. The photos published here were taken by the use of the Meopta laboratory microscope, CMEX 5 digital camera and Helicon Focus programme.

Male genitalia (aedeagi) were treated by boiling with a 10% sodium hydroxide solution.

Morphological terminology concerning the epipharyngeal structures was adopted from Dellacasa et al. (2010).

Specimens of the newly described species are provided with printed labels as follows: white labels presenting the collecting data, pale green labels specifying numbers related to a photo-documentation system by the second author (L. Mencl) and red labels determining the status of each type specimen.

The following acronyms identify the collections housing the material examined:

EKCS Emil Kučera private collection, Soběslav, Czech Republic;

LMCT Ladislav Mencl private collection, Týnec nad Labem, Czech Republic;

MRCD Miloslav Rakovič private collection, Dobřichovice, Czech Republic;

NMPC National Museum, Praha, Czech Republic (Jiří Hájek).

## TAXONOMY

### *Carinaulus kucerai* sp. nov.

(Figs. 1-22)

**Type locality.** Nepal, Dadeldhura [West Nepal, Sudurprashhim Province, Dadeldhura District].

**Type material.** Holotype (♂), allotype (♀) (both NMPC), 5 paratypes (3 EKCS, 1 LMCT and 1 MRCD): West Nepal, Dadeldhura. The holotype bears the following printed labels: “NEPAL west / Dadeldhura / 13. iv. - 18. iv. 2017 / Lgt. E. Kučera [white label] // 2447 / Dok. L. Mencl 2018 [pale green label] // HOLOTYPE / *Carinaulus kucerai* sp. / nov. / D. Král, L. Mencl & M. / Rakovič det. 2020 [red label]”. The allotype and paratypes bear the same white labels as the holotype; a paratype has the same pale green label as the holotype except for number 4448 instead of 4447, remaining four paratypes being not provided with pale green labels; the allotype and paratypes are equipped with same red labels as the holotype, but the world HOLOTYPE is replaced by ALLOTYPE or PARATYPE, respectively. See also Figs. 21 and 22 for photos of etiquettes under the holotype and allotype, respectively.

**Additional material studied.** We also examined further two specimens similar to the new species described here, but either the aedeagus was rather different or the locality was remote. Thus, we preferred to mention them, but not to include them into the type series. Their locality data are as follows: 1) Nepal, Badaure - Pokhara, 3.iv.-8. iv. 2017, lgt. E. Kučera (EKCS); 2) Nepal, 30.v.1990, Langtang Nat. Park, Dunche, 2000 m., S. Bílý leg. (NMPC).

### **Description of holotype (♂) including some data on allotype (♀) wherever necessary.**

Dorsum (Figs. 1-2). Total body length of 5.3 mm. Body oblong oval, boader behind, broadest at about 0.57 elytra length, convex, moderately shining. Colour reddish brown, smaller areas (genae, pronotum lateral and basal margins, elytra at base, and elytral apex) rather paler, remaining areas darker. Ventrum (Fig. 3.). Ventral surfaces rather paler, particularly mesofemora and metafemora yellowish brown.

Head (Fig. 4) anteriorly rounded each side of shallow anteromedian emargination. Head margins moderately narrowly upturned. Genae about semicircular, their anterior margins well differentiated from clypeus lateral margins, moderately protruding beyond outline of eyes. Frontoclypeal suture without tubercles, line-shaped, narrow, but quite distinct. Most head surfaces (clypeus, frons) considerably punctate - punctures either nearly coalescent or separated by intervals smaller than puncture diameter; punctures on genae rather obsolete; occiput nearly impunctate or at most with few individual small punctures.

Epipharynx (Fig. 14). Anterior margin shallowly bisinuate medially, regularly rounded anterolaterally; epitorma approximately pentagonal, regularly widened posteriad; corypha reaching distinctly anterior margin, with six short, celtes; acanthopariae finely densely macrosetaceous; acropariae with dense, long macrosetation; prophobae considerably densely macrosetaceous; chaetoparia slender with row of about 20 stout macrosetae; tormae relatively short, acute apically; nesium with irregularly sized ankosensillae laterally.

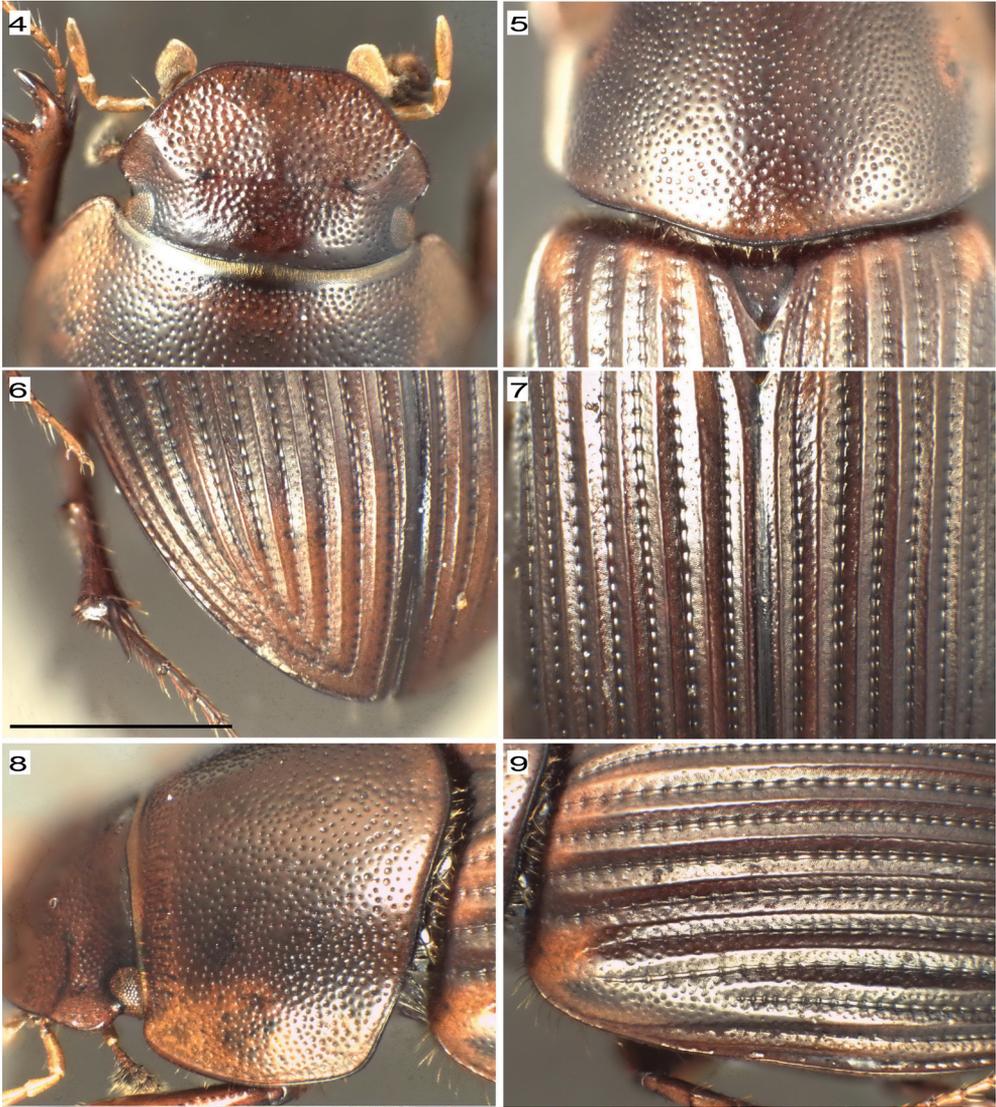
Pronotum (Fig. 8) transversal (length-to-width ratio of 0.70), narrower anteriorly, considerably wider posteriorly; anterior corners moderately rounded, posterior corners very broadly rounded, lateral margins arcuate. Lateral and basal margins bordered. Pronotum surface with medium-sized punctures intermixed with very fine punctures. Contrastingly to head punctation, medium-sized punctures well separated one from another.

Scutellar plate triangular, its surface with few punctures.

Elytra (Figs. 9, 5-6, 7, 13) elongate (length-to-width ratio of 1.40), at widest point 1.15 times wider than pronotum. With ten striae and ten intervals, without humeral denticles. Striae narrow, with longitudinal punctures only slightly crenating intervals; intervals wide, sharply carinate throughout, with small microscopic punctures arranged in irregular



Figs. 1-3. *Carinaulus kucerai* sp. nov., holotype, ♂, habitus: 1- dorsal view; 2- dorsolateral view; 3- ventral view. Scale line 1 mm. Photographs by L. Mencl.



Figs. 4-9. *Carinaulus kucerai* sp. nov., holotype, ♂, details of head, pronotum and elytra: 4- head and anterior part of pronotum, dorsal view; 5- posterior part of pronotum and anterior part of elytra (dorsal view); 6- elytral apex; 7- elytra, area behind scutellum, dorsal view; 8- pronotum, dorsolateral view; 9- elytra, lateral view. Scale lines 1 mm. Photographs by L. Mencl.

longitudinal rows (punctures in short area of fusion of intervals 8-9 behind humeral callus larger as shown in Figs. 2 and 9); details of striae and intervals microsculpture as in Fig. 13.

Meso-metaventum (Fig. 3) finely punctate, with distinctly concave (impressed) area surrounding narrow median line.



Figs. 10-14. *Carinaulus kucerai* sp. nov., holotype, ♂, details of legs, elytra and epipharynx: 10- anterior leg, ventral view; 11- intermediate leg, ventral view; 12- posterior leg, ventral view; 13- part of elytra (small area left of scutellum); 14- epipharynx. Scale lines 1 mm for Figs 10-12, 0.2 mm for Figs, 13-14. Photographs by L. Mencl.

Legs. Protibia outside margin with three large teeth in apical part, with only two small, indistinct denticles in basal part; upper surface not distinctly punctate; underside with relatively weak longitudinal inferior carina. Meso- and metatibia moderately triangularly widened towards apex, with two macrosetaceous transversal ridges; metatibia apex fringed with short, acute, nearly equal macrosetae; superior terminal spine of metatibia shorter than basimetatarsite. Undersides of pro-, meso-, as well as metafemora finely punctate (Figs. 10, 11 and 12, respectively).

Abdominal ventrites finely, obsolete punctate; ventrites 3-5 glabrous, ventrite 6 sparsely macrosetaceous and, in addition, with two large macrosetae on each lateral margin (Figs. 19-20).

Pygidium darker than abdominal ventrites. Pygidial macrosetae eight in number (Fig. 19).

Aedeagus including details of the microsculpture as in Figs. 15-18.



Figs. 15-22. *Carinaulus kucerai* sp. nov., details of aedeagus, abdomen and etiquettes: 15- holotype, ♂, aedeagus, lateral view; 16- holotype, ♂, aedeagus, ventral view; 17- holotype, ♂, apex of parameres, dorsal view; 18- holotype, ♂, apex of left paramere, lateral view; 19- holotype, ♂, abdomen, ventral view; 20- allotype, ♀, abdomen, ventral view; 21- etiquettes under holotype; 22- etiquettes under allotype. Scale lines 0.1 mm for Figs. 15-18, 1 mm for Figs. 19-20, Figs. 21-22 are out of scale. Photographs by L. Menci.

**Sexual dimorphism.** There are only small differences between external characters as follows. Shapes of the ventrite 6 are different as shown in Figs. 19 and 20.

**Variability.** The body length is of 4.6-5.5 mm within the whole type series. In the elytra, small paler areas on the background of the prevalent darker, reddish brown surface are moderately variable.

**Differential diagnosis.** The consideration of data on the species of the genus, as quoted in the Introduction, shows that only one species has been still known from Nepal - *C. dierli* (Balthasar, 1967) which, however, is quite different in many characters, for example as follows: it is larger (5.5-6 mm), dark piceous, prevalently matt, elytral intervals are mostly

only convex (not carinate), elytral striae are relatively wider (about half elytral interval width, etc.). The following combination of characters may be helpful in the separation of the new species described here from species inhabiting other areas: the body length is of 4.6 to 5.5, the specimens are fairly shining, prevalently reddish brown, the elytra have small paler spots or areas on the background of the prevailing reddish brown surface, elytral intervals are carinate throughout, the carinae have triangular cross section, the detail of the elytral microsculpture is as in Fig. 13, the punctation of the head and pronotum surface is as in Figs. 4 and 8, respectively.

**Distribution.** West Nepal, Sudurprashhim Province, Dadeldhura District.

**Name derivation.** The specific name is dedicated to the Czech coleopterist Emil Kučera, who provided the authors of the present work with the material of the species described here.

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