

A new species of the genus *Neocalaphodius* Bordat, 1988 (Coleoptera: Scarabaeidae: Aphodiinae) from Malaysia

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Abstract. A new species of the genus *Neocalaphodius* Bordat, 1988 is described and illustrated: *Neocalaphodius karolinae* sp. nov., from Malaysia. Aedeagus and epipharynx of the new species are compared with another species of the genus: *Neocalaphodius moestus* (Fabricius, 1801). Key to species of the genus is given.

INTRODUCTION

In the course of an examination of material in my collection, I discovered a new species of the genus *Neocalaphodius* Bordat, 1988. The new species generally agrees with the description of the genus presented in Bordat, Paulian et Pittino (1990), and can be easily assigned to the genus *Neocalaphodius* with a key given by Dellacasa G., Bordat et Dellacasa M. (2001). A description of the new species is presented below.

MATERIAL AND METHODS

The specimens were observed by using the MBS-10 stereoscopic microscope. The photos published here were taken by the use of the Meopta laboratory microscope and CMOS5 digital camera with the Helicon Focus programme.

The aedeagus and epipharynx were treated by boiling with a 10% sodium hydroxide solution.

For morphological terms used in the description of epipharyngeal structures I follow works by Dellacasa G., Bordat et Dellacasa M. (2001), and Dellacasa G., Dellacasa M. et Mann (2010).

The material examined was compared with other materials of genus from the author's collection, and additionally with materials from Ladislav Mencl's private collection by him. Each specimen of the new species is indicated by a red, printed label added to the same pin and bearing the status of the specimen (holotype or paratype), sex, its name, name of the author, month and year of the designation.

The holotype and 9 paratypes are deposited in the author's private collection, additionally 2 paratypes will be deposited in the Ladislav Mencl private collection, 1 paratype in Marco Dellacasa private collection, and 1 paratype in Institute of Systematics and Evolution of Animals in Kraków.

Addenda and remarks are found in brackets, separate label lines are indicated by slash (/), separated labels by double slash (//).

RESULTS

***Neocalaphodius karolinae* sp. nov.**

(Figs. 1-3, 7-9, 13, 14, 17, 18)

Type locality. Malaysia, Batu Gajah, Perak.**Type material** (14 specimens). Holotype (♂): Malaysia / Batu Gajah / Perak / 08.iv.1998 [white printed label] // 2086 / Dok. L. Mencl, 2015 [light green label] // HOLOTYPE (♂) / *Neocalaphodius / karolinae* sp. nov. / det. Ł. Minkina (06.2015) [red printed label]. Paratype (♀): Malaysia / Batu Gajah / Perak / 08.iv.1998 [white printed label] // 2087 / Dok. L. Mencl, 2015 [light green label] // PARATYPE (♀) / *Neocalaphodius / karolinae* sp. nov. / det. Ł. Minkina (06.2015) [red printed label]. Paratypes (2 ♂, 10 ♀): Malaysia / Batu Gajah / Perak / 08.iv.1998 [white printed label] // PARATYPE ([sex]) / *Neocalaphodius / karolinae* sp. nov. / det. Ł. Minkina (06.2015) [red printed label].**Description of holotype.** Dorsum (Fig. 1) Total body length 5.8 mm. Body elongate, moderately convex, moderately shiny, nearly glabrous. Yellowish brown, epistome, disc of pronotum, elytral striae brownish black, on fourth and sixth interstices very long, cloudy, poorly marked, brownish stripes (Figs. 1-2).

Head wide, moderately shiny, with double and irregular punctation more dense and coarse on sides; epistome slightly gibbous; clypeus truncate anteriorly, widely rounded on sides, thinly bordered, with border distinctly bristled, anteriorly very faint downturned; genae small, rounded, slightly more protruding than eyes, with very short bristles; frontal suture distinctly impressed, not tuberculate; moderately microreticulate.

Pronotum transverse, convex, narrowed toward front, moderately shiny, with double, irregular and relatively sparse punctation; anterior and hind angles widely rounded; front and basal margin not bordered; moderately microreticulate.

Scutellum relatively small, elongate, pentagonal with sides parallel toward base, apically acuminate, very strongly microreticulate, sparsely and superficially punctured.

Elytra elongate, not denticulate at shoulders, moderately convex, moderately shiny, apically with few very short and sparse yellowish bristles. Striae fine, distinctly punctured, feebly crenulate, first one before apex shallower and narrower, joined with tenth, which has the same structure, others do not reach the apex. Interstices very slightly elevated, very slightly convex, sparsely punctured; strongly microreticulate.

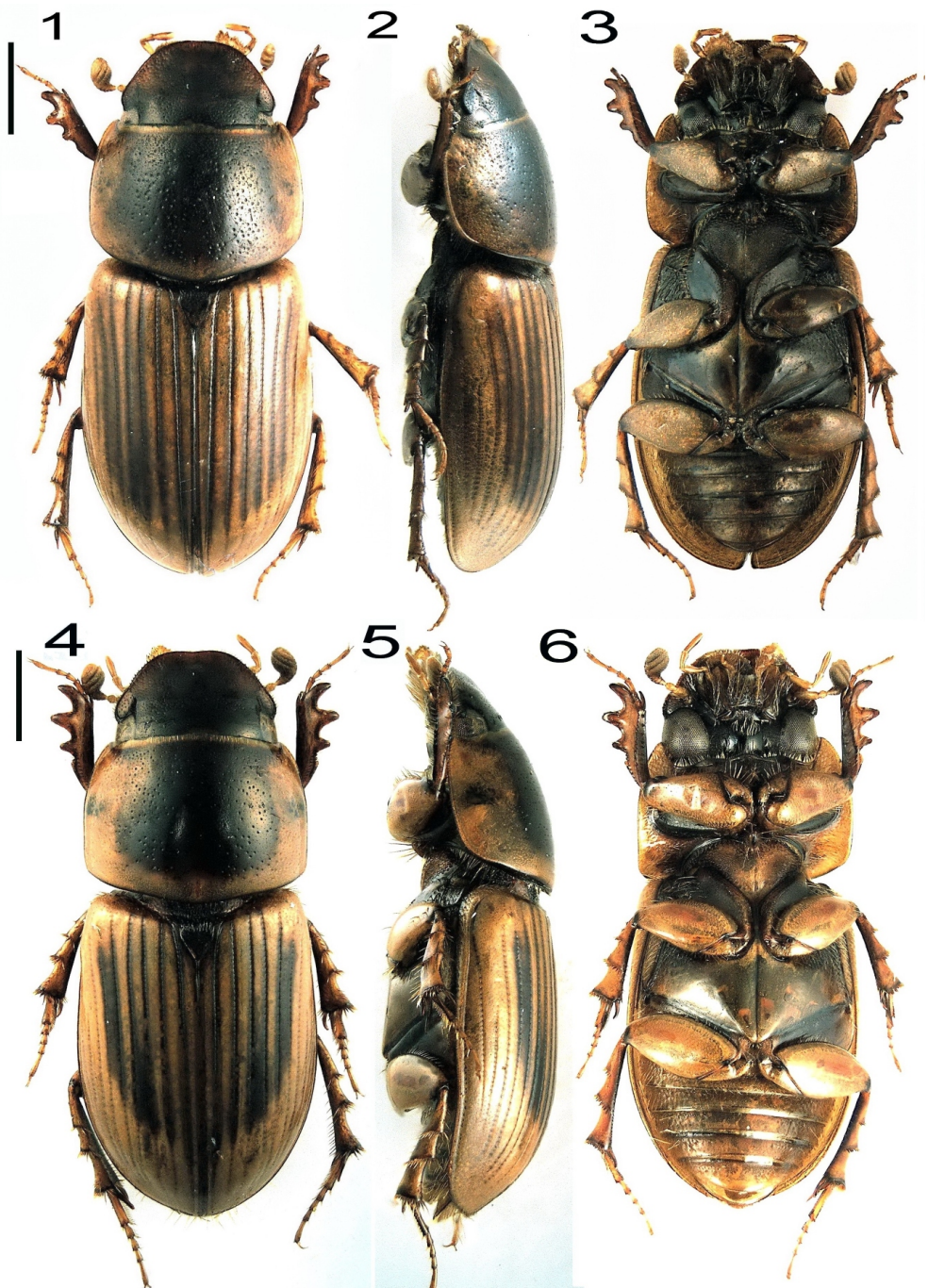
Femora moderately shiny, with regular punctation; on the front margin with few yellowish setae, hind margin bordered; rather strongly microreticulate. Fore tibiae distinctly tridentate and proximally not serrulate at outer margin; upper side smooth; with apical spur short and slightly bent downward. Middle and hind tibiae with strong transverse carinae on outer part, apically fimbriate with spinules of unequal length. Hind tibiae superior apical spur slightly longer than half the first tarsal segment, latter as long as following three combined. Claws fine, regularly arcuate.

Macropterous.

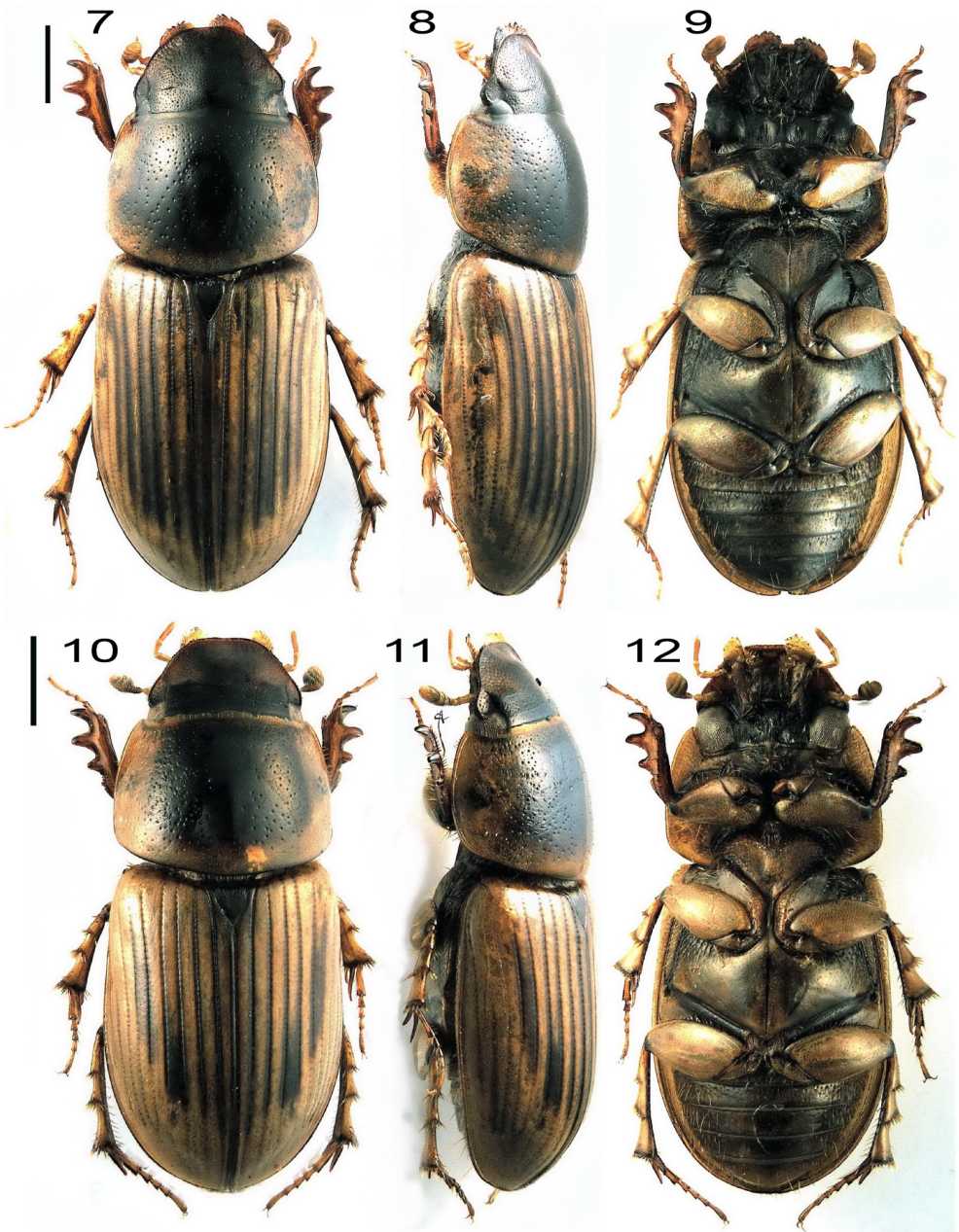
Venter (Fig. 3). Metasternal plate with rather broad, not very deep longitudinal groove in the middle, with fine and rather regular punctation, denser on sides and in longitudinal groove; slightly microreticulate. Sternites with fine and regular punctation, and with few much coarser punctures. Coarse punctures denser on sides; provided with elongate, yellowish setae. Pygidium with few straight and very elongate, yellowish setae; rather strongly microreticulate.

Aedeagus (Figs. 17, 18) with parameres rather elongate, about twice as long as wide as their basis, with elongate apex in lateral view.

Epipharynx (Figs. 13, 14) transverse, slightly, regularly rounded at front margin, rounded on sides, epitorma faint, corypha with six elongate apical spiculae more protruding beyond front margin; chaetopariae setiform, short and dense; pedia finely pubescent.

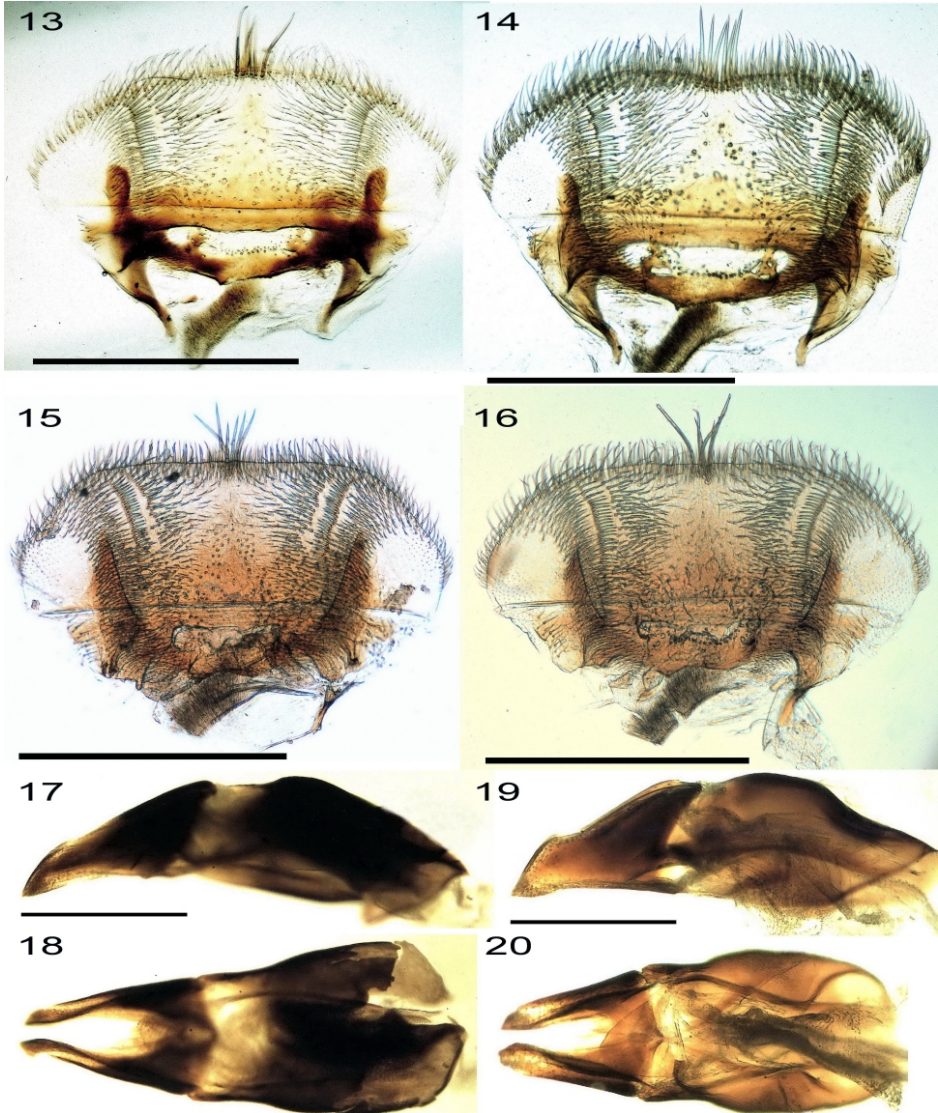


Figs. 1-3. *Neocalaphodius karolinae* sp. nov., ♂, holotype; Figs. 4-6. *Neocalaphodius moestus* (Fabricius, 1801), ♂ from India, Madras. 1, 4-dorsal view; 2, 5-left lateral view; 3, 6-ventral view. Scale lines 1 mm.



Figs. 7-9. *Neocalaphodius karolinae* sp. nov., ♀, paratype; Figs. 10-12. *Neocalaphodius moestus* (Fabricius, 1801), ♀ from India, Madras. 7, 10-dorsal view; 8, 11-left lateral view; 9, 12-ventral view. Scale lines 1 mm.

Sexual dimorphism. Female (Figs. 7-9). In female epistome relatively more convex; pronotum slightly more narrowed anteriorly; fore tibiae apical spur more acuminate, less downward bent; metasternal plate longitudinal groove shallower, slightly narrower and with sparser punctation, front margin of epipharynx bisinuate, sides of epipharynx regularly rounded. In male front margin of epipharynx slightly rounded, sides of epipharynx rounded but very slightly more stretched than in females.



Figs. 13, 17, 18. *Neocalaphodius karolinae* sp. nov., ♂, holotype; Fig. 14. *Neocalaphodius karolinae* sp. nov., ♀, paratype; Figs. 15, 19, 20. *Neocalaphodius moestus* (Fabricius, 1801), ♂ from India, Madras; Fig. 16. *Neocalaphodius moestus* (Fabricius, 1801), ♀ from India, Madras. 13-16-epipharynx; 17, 19- aedeagus, left lateral view; 18, 20- aedeagus, dorsal view. Scale lines 0.5 mm.

Variability. Based on the type material of the new species, the body size ranges from 5.7 to 7.0 mm. Body color is very variable: there are specimens from light yellowish brown body, where elytral striae are light yellowish brown too, and stripes on fourth and sixth interstices are almost absent, to specimens with body dark brown. Body proportions are poorly variable, however length of clypeus is the most variable part. Microreticulation of pronotum from nearly invisible to very distinct. Bigger punctures of pronotum can be more or less coarse. Smaller punctures of pronotum, and punctuation of interstices are more or less distinct.

Distribution. Malaysia, Perak, Batu Gajah.

Name derivation. Name of new species is dedicated to my daughter Karolina.

KEY TO NEOCALAPHODIUS SPECIES

- 1(2) Elytra with short, fine bristles. Body length: about 4 mm. Known only from Northern India.
..... *Neocalaphodius* (?) *mussooriensis* (Mittal, 1993)
- 2(1) Elytra only apically with few very short and sparse yellowish bristles. Body length: 5-7 mm.
..... 3
- 3(4) Shiny, yellowish. Epistome, pronotal disc, elytral striae and two longitudinal stripes on fourth and sixth interstice brownish black. Clypeus almost truncate anteriorly, very slightly sinuate at middle. Head and pronotum with double punctation: bigger punctures finer and slightly sparser. Elytra with interstices not elevated, flat. Hind tibia superior apical spur relatively longer, distinctly longer than half the first tarsal segment. Aedeagus with parameres comparatively shorter, less than twice as long as wide at their basis, with truncate apex in lateral view. Widespread *Neocalaphodius moestus* (Fabricius, 1801)
- 4(3) Moderately shiny, yellowish brown. Epistome, pronotal disc, elytral striae brownish black, rather frequently on fourth and sixth interstice very long, cloudy, brownish stripes. Clypeus truncate anteriorly. Head and pronotum with double punctation: bigger punctures coarser and slightly denser. Elytra with interstices very slightly elevated, and very slightly convex. Hind tibia superior apical spur relatively shorter, slightly longer than half the first tarsal segment. Aedeagus with parameres comparatively longer, about twice as long as wide at their basis, with elongate apex in lateral view. Known only from Malaysia.
..... *Neocalaphodius karolinae* sp. nov.

DISCUSSION

Two species of the genus *Neocalaphodius* are now known. The new species has all important characters of genus included in genus diagnosis i.e. front and basal margin of pronotum not bordered, scutellum pentagonal with sides parallel toward base, hind tibiae with strong transverse carinae on outer margin, apically fimbriate with spinules of unequal length, clypeus entirely bristled, frontal suture not at all tuberculate.

Neocalaphodius moestus and *Neocalaphodius karolinae* are closely related and both are relatively variable, whereby part of characters can be deceptive i.e. body colour and thickness of punctuation. Body colour of both species is very variable, however, *Neocalaphodius moestus* is generally lighter, and the new species is generally darker. In Asian populations, in comparison with other populations, that I examined, it is easier to find specimens of *Neocalaphodius moestus* with relatively coarser punctuation, quite similar to punctuation of the new species. The study of the epipharynx revealed a certain differences not only between the two species, but between

males and females, too. It would be desirable to examine a larger number of specimens to investigate the variability of both species. The photographs presented in the article show distinct differences of epipharyngi i.e. epipharynx of *Neocalaphodius moestus* (presented specimens comes from India, Madras) has straight front margin, epipharynx of male of new species has slightly, regularly rounded front margin, and epipharynx of female of new species has bisinuate front margin. Variability of that part of epipharynx seems to be high, because some populations of *Neocalaphodius moestus* from Africa have bisinuate front margin. Shape of sides of epipharynx seems to be attribute of sexual dimorphism. In my opinion the best differences are possible to find in structure of labral foramen or apotormae.

In the Catalogue of Palearctic Coleoptera, in genus (formerly subgenus) *Neocalaphodius* is placed *Aphodius mussooriensis* Mittal, 1993 from northern India. Mittal described *Neocalaphodius mussooriensis* as *Aphodius*, without accurate classification. Besides description in article of Mittal is insufficient to classify that species to genus *Neocalaphodius*, and until today there is no article showing any evidence of its classification to the genus *Neocalaphodius* or a redescription of that species. Additionally no specimen of *Neocalaphodius mussooriensis* was available to me for the examination. For the above reasons I include that species in the key by using only two features that are possible to find in the article by Mittal and appear to be sufficiently clear. Additionally based on description *Neocalaphodius mussooriensis* can be distinguished from *Neocalaphodius moestus* by elevated interstices; from *Neocalaphodius karolinae* by clypeus sinuate at middle, and distribution; from both species by lack of longitudinal stripes on elytra, and (especially!) by the shape of the aedeagus.

Insufficient description and some characteristics of the body unusual for *Neocalaphodius* (bristled elytra, body length) make it necessary to prove membership of *Neocalaphodius mussooriensis* to the genus. A second matter that requires a study is the variability of the epipharynx in all species of the genus.

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