

A new genus of Orphninae (Coleoptera: Scarabaeidae) from Madagascar

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A new genus, *Renorphnus* gen. n., is established for the Madagascar species *Orphnus clementi* Petrovitz. The new genus differs from other representatives of Orphninae in distinctive shape of the fore tibia of male, shape of clypeus, presence of 2 more or less prominent tubercles on pronotum in both sexes, and widened and pectinate setae on costal margin of wings. *Orphnus clementi* is redescribed. Diagnostic key to Madagascar Orphninae genera is given.

Key words: scarab beetles, *Renorphnus* gen. n., taxonomy

INTRODUCTION

Scarab beetles of the subfamily Orphninae occurring in Madagascar have long been recognized as a unique and taxonomically diverse group (Paulian 1937, 1977, 1992). All the described species are endemic to the island. Most of them belong to the three genera also endemic to Madagascar, namely *Triodontus* Westwood, 1846, *Pseudorphnus* Benderitter, 1913, and *Madecorphnus* Paulian, 1992. But one rare Madagascar species, *Orphnus clementi* Petrovitz, 1971, was originally placed in the large Afro-Asian genus *Orphnus* Macleay, 1819. This species was so far known from one male specimen. In the past years, however, reasonable number of specimens of both sexes was collected by colleagues from University of Helsinki and provided to us. Examination of this material as well as the holotype showed that the species does not share diagnostic characters of the genus *Orphnus*, nor does it fit diagnoses of the three known Madagascar genera. A new genus is therefore established for it.

Habitus photographs were taken with a Leica MZ12 stereo microscope, and photographs of aedeagi, internal sacs, and wing were taken with a Leica DMLB compound microscope from specimens in glycerol. Partially focused serial images were combined

in Helicon Focus software (Helicon Soft Ltd.) to produce completely focused image. Distribution map was generated with ArcGIS software (ESRI Ltd.). Coordinates of the localities were taken with a GPS receiver (majority of localities) or from the NGA GEOnet Names Server (GNS, <http://earth-info.nga.mil/gns/html/index.html>).

The material used for this study is kept in the following institutions: MHNG, Natural History Museum, Geneva; MNHN, Natural History Museum, Paris; UHHE, University of Helsinki; ZISP, Zoological Institute of Russian Academy of Sciences, St. Petersburg.

Genus *Renorphnus* gen. n.

Type species: *Orphnus clementi* Petrovitz, 1971.

Diagnosis. Medium-sized beetles with uniform brown coloration. Clypeus symmetrical, wide, somewhat emarginate anteriorly, with risen anterior margin somewhat tuberculate in males. Mandibles subsymmetrical, of equal length. Head smooth. Frontal tubercles absent. Pronotum wider than long, smooth, lateral margins crenulate, with long sparse setae. Disc of pronotum similar in both sexes, with shallow, sometimes almost indistinct depression

anteriorly and 2 small tubercles aside the depression. Elytra with only first stria distinct. Wings fully developed, costal margin with apically widened and pectinate setae. Anterior tibiae of males with apical outer tooth directed almost parallel to the inner margin of tibia. Parameres symmetrical.

From the members of the genus *Orphnus*, it differs in the distinctive shape of the fore tibiae, shape of the clypeus, and pronotum with 2 more or less prominent tubercles in both sexes. From the other Madagascar genera, *Renorphnus* gen. n. can be separated by the characters given in the key below. The peculiar shape of setae on costal margin of wings is not known in other genera and is probably an autoapomorphy of *Renorphnus* gen. n.

Etymology. The new genus is named after Renaud Paulian, whose publications provided a major basis for the taxonomic research of African and Madagascar Orphninae and who supposed that *Orphnus clementi* should be placed in a separate genus. The gender of the name is masculine.

***Renorphnus clementi* (Petrovitz, 1971),
comb. n.**

(Figs 1-7, 14, 15)

Orphnus (*Parorphnus*) *clementi* Petrovitz, 1971: 21; Paulian, 1977: 1201.

Type material examined. *Holotype*. MHNG; male, **Madagascar**, Ivoloina, Tamatave; Clement leg.

Additional material examined. ZISP; 1 male; **Madagascar**, Andahahelo, wet forest, fish bated trap; 23 March 2004; I. Hanski group leg.; 1 female; Andasibe protected area, wet forest, alt. 800 m, fish bated trap; March 2004; I. Hanski group leg.; 1 female; Ambila, littoral forest, alt. 50 m, fish baited trap; March 2004; I. Hanski leg.; 1 male; Beza-Mahafaly, Betsioky, alt. 140 m., semi-dry eucalypt forest, fish baited pitfall trap; 10 Apr. 2006; I. Hanski group leg. MNHN, ZISP; 2 males and 2 females; **Madagascar**, St. Luce, Manafiati, alt. 0 m, humid forest, fish baited pitfall trap; 16 Apr. 2006; I. Hanski group leg. UHHE, ZISP; 2 males, 2 females; **Madagascar**, Andahahelo, wet forest, fish bated trap; 26.4.2006; I. Hanski group leg. UHHE, ZISP, MNHN; 3 males and 1 female;

Madagascar, Ambatotsirongorongo, fish baited trap; Febr. 2005; I. Hanski group leg. MRAC; 1 male and 1 female; **Madagascar**, Forest 25 km W of Morarano-Chrome; 13-25 Apr. 1991; A. Pauly leg.

Male. Medium-sized beetle with elongated, oval, strongly shiny body (Fig. 1). Colour brown, legs and apices of elytra somewhat paler.

Clypeus slightly convex anteriorly, obtusely rounded, anterior margin setose and crenulate in dorsal view. Genae very small, crenulate, not protruding past eyes. Eyes relatively large (diameter larger than distance between eye and gula in ventral view), incompletely divided by canthus into smaller dorsal and larger ventral parts. Frontal suture absent. Clypeus not tuberculate, with more or less raised anterior margin in the middle; in some specimens it forms a sort of flattened triangular tubercle, although it is never as robust and horn-like as in *Triodontus* and *Pseudorphnus* males. Dorsal surface of head impunctate.

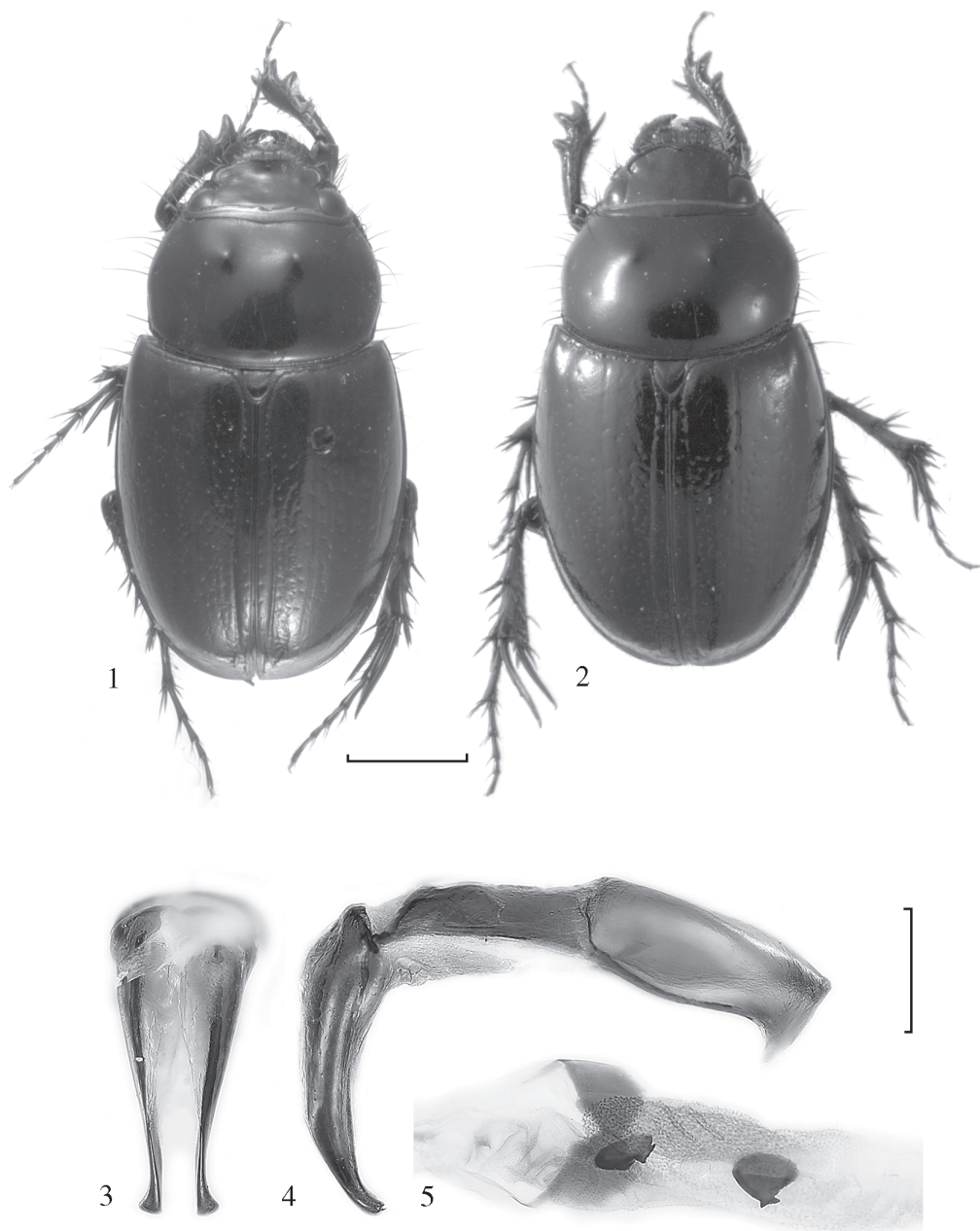
Labrum somewhat bilobate, slightly sinuate in the middle and feebly protruding past clypeus. Length in the middle is 1/5 width (in dorsal view).

Pronotum 1.6 times as wide as long, widest at midlength. Anterior margin with wide border, base with fine border. Lateral margins densely punctate, appearing crenulate in dorsal view. Disc of pronotum with shallow, occasionally almost indistinct depression anteriorly, with 2 small tubercles aside the depression. Surface of pronotum smooth, without punctures. Lateral margins with long, brown setae.

Scutellum triangular, narrowly rounded apically, about 1/10 length of elytra.

Elytra convex, with feebly marked humeral umbones. Maximum width approximately at the middle. First stria distinct and reaching apex of elytron, other striae feebly marked to indistinct. Disc of elytra with sparse punctures. Epipleura with long, sparse, brown setae. Base of elytra bordered.

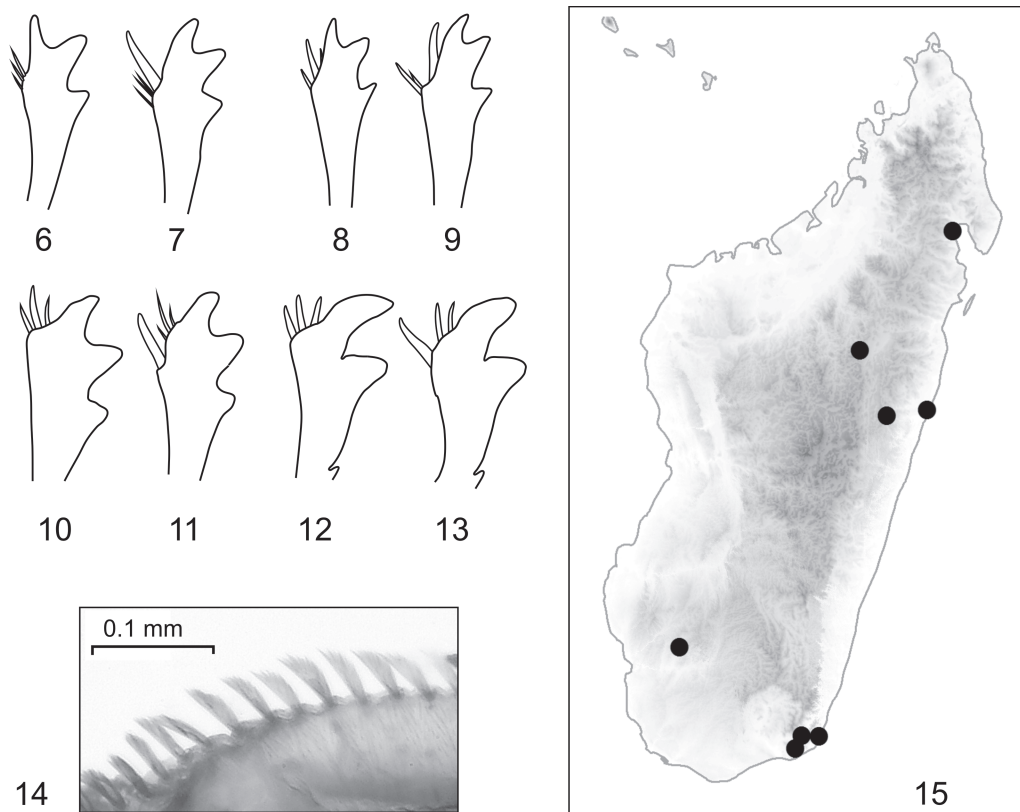
Wings fully developed.



Figs 1-5. *Renorphnus clementi*. **1, 2**, general view (1, male; 2, female; scale bar 2 mm); **3**, parameres in dorsal view; **4**, aedeagus in lateral view; **5**, internal sac of aedeagus (3-5 scale bar 0.5 mm).

Fore tibia with 3 outer teeth. Apical tooth directed almost parallel to inner margin of tibia (Fig. 6). Lateral margin basad of outer teeth not crenulate. Apex and inner margin of tibia with robust, spur-like setae

becoming slender towards the base of tibia. Fore tarsi well developed, about $4/5$ length of protibiae. Claws $1/2$ length of apical tarsal segment. Apical segment of anterior tarsus as long as segments 3 and 4 combined, as



Figs 6-15. Orphninae. **6, 7, 14, 15,** *Renorphnus clementi*. **8, 9,** *Madecorphnus* sp. **10, 11,** *Triodontus* sp. **12, 13,** *Pseudorphnus* sp. **6-13,** anterior tibia (6, 8, 10, 12: male; 7, 9, 11, 13: female); **14,** wing costal area (scale bar 0.1 mm); **15,** distribution map.

thick as other segments. Ventral surface of anterior tibia smooth with two rows of setae along sides and sparse longer setae in the middle. Ventral surface of femora smooth.

Middle and posterior legs similar in shape; posterior femora and tibiae about 1/8 longer than middle ones. Tibiae somewhat triangular, with two apical spurs. Longer tibial spur as long as two basal segments of tarsus. Claws 1/3 length of last tarsal segment. Femora almost impunctate, with two rows of long setae.

Abdominal sternites with somewhat granular sculpture. Sternite 6 medially as long as sternites 4 and 5 combined.

Pygidium transverse, irregularly punctate, concealed under elytra.

Aedeagus. Parameres symmetrical, tapering apically in lateral view and with a minute teeth at very apex (Figs 3, 4). Internal sac with an area composed of small spinules and with 2 characteristic semicircular sclerites (Fig. 5).

Female. In comparison to other Orphninae genera, sexual dimorphism in *R. clementi* is weak. Females (Fig. 2) are similar to males in shape of pronotum, although they have smaller medial tubercles in overage. Female of *R. clementi* can however be readily separated from male by a character shared by all orphnins – presence of a long, robust apical spur on fore tibia (Fig. 7).

Variation. The length of the examined males varies from 8.0 to 8.7 mm, females

from 7.0 to 9.5 mm. Most of specimens of both sexes have distinct tubercles on disc of pronotum, although some specimens have feebler tubercles or only traces of them; 2 females from St. Luce have no tubercles, although the males from the same series have distinct tubercles.

Distribution and habitat. Judging from the examined material, *Renorphnus* gen. n. is widely distributed in Madagascar although it is probably rare in all parts of its range. The beetles were collected in wet forests in the eastern part of the island including littoral forests on the eastern coast and in relatively dry areas with secondary forest in western part of Madagascar. In all cases where the data are available, the beetles were collected with pitfall traps baited with fish. Trapping setup and timing is described in more detail in our paper about *Pseudorphnus hiboni* (Frolov, Montreuil, 2006). As with the latter species, short-time exposures of the traps suggest that specimens of *R. clementi* were attracted to the carrion rather than captured accidentally.

Key to the Madagascar genera of Orphninae

1. Anterior tibiae with 2 outer teeth apically and one much smaller outer tooth basally (Figs 12, 13) ***Pseudorphnus***
 - Anterior tibiae with 3 outer teeth in apical half (Figs 6-11) 2
2. Lateral margin of pronotum with 4 long setae: 2 near anterior margin, 1 in the middle, and 1 near posterior margin. Some or all setae may be abraded, but 4 setiferous punctures are always distinct. Left and right mandibles can differ strongly in length in males, and clypeus is somewhat asymmetrical in such cases. Disc of pronotum smooth, without processes or excavations ***Madecorphnus***
 - Lateral margin of pronotum with numerous setae (at least more than 10) evenly distributed along the margin; setae may differ strongly in length. Left and right mandibles of about equal length, clypeus symmetrical. Disc of pronotum may be with more or less developed tubercles, ridges and excavations 3
3. Width of eye in dorsal view about 8-10 times smaller than distance between eyes. Propleura with longitudinal ridge bearing

row of setae parallel to lateral margin of pronotum. Disc of pronotum with more or less developed tubercles, ridges and excavations in males, and smooth in females. Apical outer tooth of fore tibia in males directed laterally, at reasonable angle to inner margin of tibia (Fig. 10) ***Triodontus***

- Width of eye in dorsal view about 3-4 times smaller than distance between eyes. Propleura without longitudinal ridge, only with sparser row of setae. Disc of pronotum with two feebly developed tubercles in the middle or without tubercles (in females). Apical outer tooth of fore tibia almost parallel to the inner margin of tibia (Fig. 6) ***Renorphnus***

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