



<http://dx.doi.org/10.11646/zootaxa.3869.4.7>

<http://zoobank.org/urn:lsid:zoobank.org:pub:7446EA9F-1C54-47AB-ABF1-0A82B1E59687>

Revalidation of the Brazilian Atlantic Forest dung beetle species *Coprophanaeus (Metallophanaeus) machadoi* (Pereira & d'Andretta, 1955) (Coleoptera: Scarabaeidae: Scarabaeinae: Phanaeini) based on morphological and distributional evidence

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Abstract

Coprophanaeus machadoi, species described based on a single male from Minas Gerais, was recently synonymized with *C. saphirinus* (Sturm, 1826). In this work, based on examination of more than 500 specimens from Brazilian Atlantic Forest, we introduce new evidence supporting the validity of *C. machadoi*, including differences in male pronotal ornamentation, in the form of the parameres, and in distribution. We also describe for the first time the female of *C. machadoi* and discuss the intraspecific color variation of *C. saphirinus*.

Key words: Phanaeina, *Coprophanaeus saphirinus*, scarab beetle, cryptic species, endangered species, synonymy

Introduction

As here interpreted, *Coprophanaeus* d'Olsoufieff, 1924 comprises 43 valid species in three subgenera, *Coprophanaeus s. str.*, *Megaphanaeus* d'Olsoufieff, 1924, and *Metallophanaeus* d'Olsoufieff, 1924. Despite the extensive review of the genus by Edmonds & Zidek (2010), who recognized 38 species, as well as subsequent contributions by Kohlmann & Solís (2012) and Cupello & Vaz-de-Mello (2013), taxonomic problems still persist. Some of these questions involve the definition of supraspecific taxa, including subgenera and species groups (especially the confusing relationship of *Metallophanaeus* with the other subgenera), but others concern species delimitation and, in fact, this latter problem is related to described names based on only few specimens. Nonetheless, with a larger number of specimens, some synonyms or doubts about the validity of certain species were clarified: Kohlmann & Solís (2012), in addition to describing a new species from Panama (*C. gephyra* Kohlmann & Solís, 2012), concluded in a study based on more than 1000 specimens that *C. kohlmanni* Arnaud, 2000 and *C. uhleri* Malý & Pokorný, 2008, synonymized with, respectively, *C. morenoi* Arnaud, 1982 and *C. chiriquensis* (d'Olsoufieff, 1924) by Edmonds & Zidek, are valid species and distinguishable by both morphological and distributional data. After them, Cupello & Vaz-de-Mello (2013), with five new specimens in addition to the holotype, showed that *C. terrali* Arnaud, 2002 is a valid species restricted to the high lands of the Juruena-Xingu interfluvium, in Central Brazil, and not a synonym of *C. dardanus* (MacLeay, 1819). In the present work, we introduce new evidence that demonstrates the validity of another species, *Coprophanaeus (Metallophanaeus) machadoi* (Pereira & d'Andretta, 1955), from southeastern Brazil.

Coprophanaeus machadoi was described as *Phanaeus (Metallophanaeus) machadoi* by Pereira & d'Andretta (1955) based in a single male from Açucena, eastern Minas Gerais, Brazil. They considered this species a close

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