



# Article

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## Checklist and distribution atlas of the Scarabaeinae (Coleoptera: Scarabaeidae) of Costa Rica

ÁNGEL SOLÍS<sup>1</sup> & BERT KOHLMANN<sup>2</sup>

<sup>1</sup>INBio, Apdo. 22-3100, Santo Domingo de Heredia, Costa Rica. Email: asolis@inbio.ac.cr

<sup>2</sup>Universidad EARTH, Apdo. 4442-1000, San José, Costa Rica. Email: bkohlman@earth.ac.cr

### Abstract

The 182 species of Scarabaeinae known to occur in Costa Rica are listed with synonymies included. We place *Uroxys macrorocularis* Howden & Young as a synonym of *U. boneti* Pereira & Halffter (**new synonym**); we also place *Uroxys depressifrons* Howden & Young as a synonym of *U. pauliani* Balthasar (**new synonym**). We conducted a mitochondrial DNA cytochrome oxidase I barcoding analysis in order to clarify some taxonomic uncertainties with *Phanaeus pyrois* Bates and *Sulcophanaeus noctis* (Bates). We elevate *Phanaeus pyrois malyi* Arnaud to *Phanaeus malyi* and revalidate *Phanaeus excelsus* Bates as valid species. We consider the species *Dichotomius nevermanni* Luederwaldt as *incertae sedis*. A Costa Rican distribution map is provided for all species except *Dichotomius costaricensis*, which is only known from a country record. We report, map, and estimate the spread of the invasive species *Euoniticellus intermedius* (Reiche) for Central America, from Chiapas to Costa Rica.

**Key words:** checklist, species revalidation, new synonym, new combination, invasive species, mitochondrial DNA, barcoding analysis

### Introduction

During the last 22 years, the National Biodiversity Institute (INBio) in Costa Rica has conducted an extensive nationwide insect survey. Material from this survey has yielded many new species. To illustrate this, Table 1 records the increase of known species in Costa Rica from 1990, when INBio was founded, to the present day. Since INBio started operating there has been a 45% increase in the number of recorded species of Scarabaeinae in Costa Rica.

The present checklist has been compiled by verification of specimens mainly from the insect collection at INBio. However, several errors from other publications are corrected at the end of this paper. Still, our checklist might require some changes in the future because some groups, like the *Deltochilum*, have not been comprehensively reviewed so there are undoubtedly new species awaiting description and names that should be placed in synonymy. Currently, Scarabaeinae are represented in Costa Rica by seven tribes, 28 genera, and 182 species. These numbers will certainly increase in the future as new species and new country records are discovered. Additionally, preliminary results using the mitochondrial cytochrome c oxidase I (COI) gene (Hebert *et al.* 2003) suggest that new additions to this list will need to be published in a future paper. We consider Costa Rica to be perhaps one of the best-known tropical countries in relation to the taxonomy and distribution of the Scarabaeinae.

Perhaps the second best studied country in Central America in relation to the Scarabaeinae is Panama. A comparison between both countries (Table 2) would certainly put the Costa Rican fauna into context, besides making this comparison meaningful as both countries share many similar ecological, historical, and biogeographic characteristics, as well as having comparable surface areas (Costa Rica 51,100 km<sup>2</sup>, Panama 78,200 km<sup>2</sup>).

**TABLE 1.** Increase of known species of Scarabaeinae from Costa Rica starting in 1990.

1990	1993	1996	1997	2001	2002	2003	2004	2006	2008	2009	2012
125	127	136	142	153	160	163	169	171	175	179	182