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NEW SPECIES OF THE MADAGASCAN SCARAB BEETLE GENUS *MADECORPHNUS* PAULIAN, 1992 (COLEOPTERA: SCARABAEIDAE: ORPHNINAE)

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ABSTRACT

Three new species of the scarab beetle genus *Madecorphnus*, endemic to Madagascar, are described from the material collected by the staff of the California Academy of Sciences. The new species are: *M. fisheri* sp. nov. (mid-elevation rain forest on the eastern flank of the Anosyenne Mountains, southern Madagascar), *M. saintemariensis* sp. nov. (coastal forest, Sainte Marie Island, eastern Madagascar), and *M. tuberculatus* sp. nov. (low elevation rain forest, Betampona Reserve, eastern Madagascar).

Key words: scarab beetles, orphnines, Madagascar

НОВЫЕ ВИДЫ ПЛАСТИНЧАТОУСЫХ ЖУКОВ МАДАГАСКАРСКОГО РОДА *MADECORPHNUS* PAULIAN, 1992 (COLEOPTERA: SCARABAEIDAE: ORPHNINAE)

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РЕЗЮМЕ

По материалам, собранным сотрудниками Калифорнийской академии наук описаны три новых вида пластинчатоусых жуков эндемичного мадагаскарского рода *Madecorphnus*: *M. fisheri* sp. nov. (среднегорный дождевой лес на восточных склонах гор Аносьен, южный Мадагаскар), *M. saintemariensis* sp. nov. (прибрежный лес, остров Сен-Мари, восточный Мадагаскар), and *M. tuberculatus* sp. nov. (низинный дождевой лес, заповедник Бетампона, восточный Мадагаскар).

Ключевые слова: пластинчатоусые жуки, орфнины, Мадагаскар

INTRODUCTION

Madecorphnus Paulian, 1992 is currently the largest genus of the Madagascan Orphninae comprising 16 described species (Frolov 2010, 2012). In the present paper three new species of this genus are described based on the material collected by Brian Fisher and his team (California Academy of Sciences, San-Francisco, U.S.A. — CAS). The new species include the first Orphnine species from Sainte Marie Island,

eastern coast of Madagascar, and a species from the Andohahela National Park which is the southernmost recorded *Madecorphnus* locality to date.

MATERIAL AND METHODS

Preparation of genitalia follows the common technique used in entomological research. Photographs of the habitus and parameres were taken with a Leica MZ9.5 stereo microscope from dry specimens. Par-

tially focused serial images were combined in Helicon Focus software to produce completely focused images. Photographs of the internal sac armatures were taken with the same microscope from specimens in glycerol. Photographs were not altered except for digital enhancing with Adobe Photoshop (levels and tone correction, background elimination, sharpening). To analyze the distribution of the species, maps were generated with ArcGIS software. As the base map, a Madagascar vegetation map (CEPF Madagascar Vegetation Mapping Project of Royal Botanic Gardens, Kew, Missouri Botanical Garden, and Conservation International's Center for Applied Biodiversity Science; <http://www.vegmad.org>) was used.

SYSTEMATICS

Family Scarabaeidae Latreille, 1802

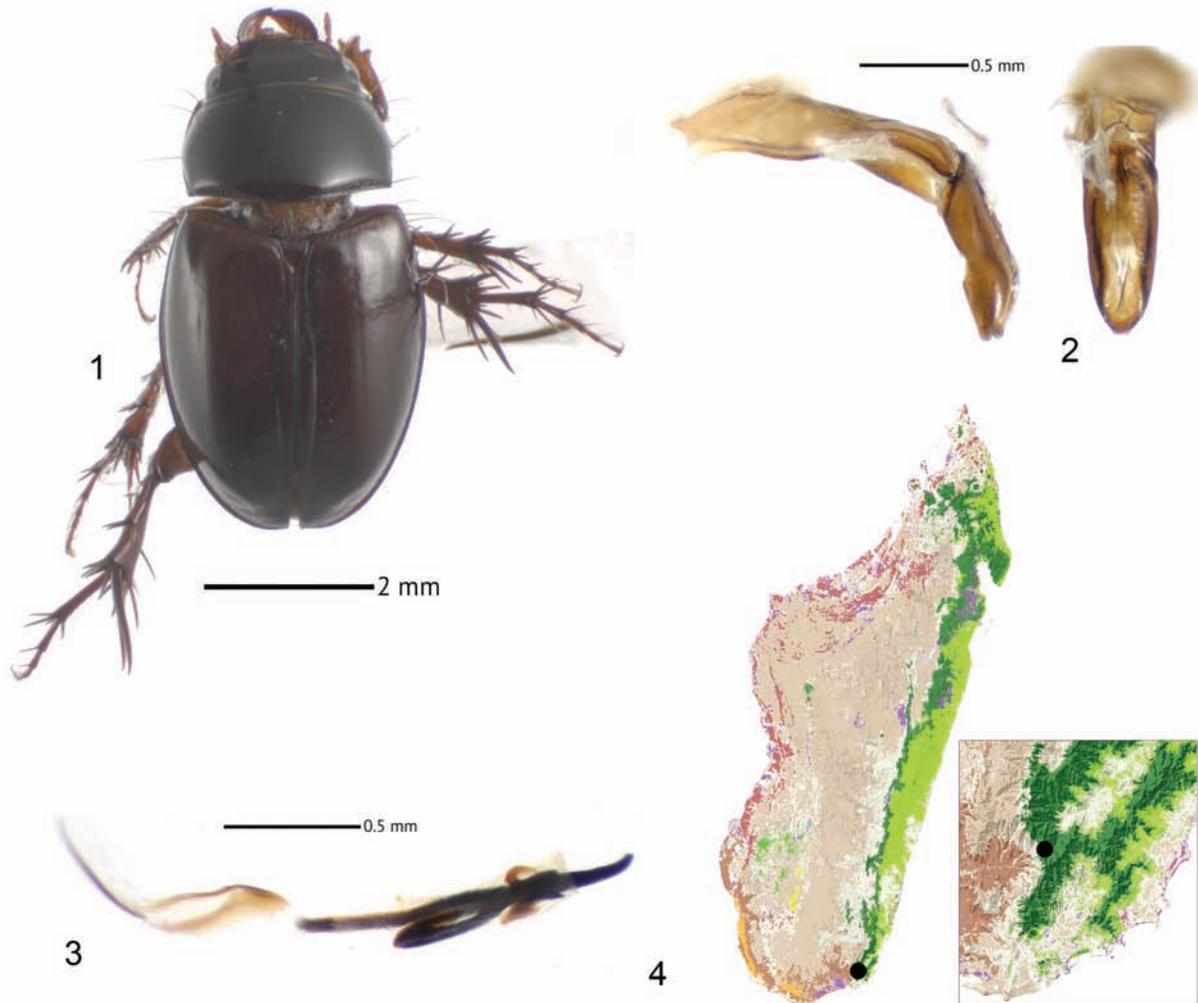
Subfamily Orphninae Erichson, 1847

Genus *Madecorphnus* Paulian, 1992

Madecorphnus fisheri sp. nov.

(Figs 1–4)

Holotype. Male with the labels “MADAGASCAR: Toliara Prov., Parc National d’Andohahela, Col du Sedro, 3.8 km 113° ESE Mahamavo, 37.6 km NNW Tolagnaro, 21–25 I 2002”, “24°45’50’’S 46°45’6’’E coll. Fisher, Griswold et al. California Acad. of Sci-



Figs 1–4. *Madecorphnus fisheri* sp. nov., holotype, male. 1 – habitus, 2 – parameres in dorsal and lateral view, 3 – internal sac of aedeagus, 4 – collecting locality map.

ences, sifted litter, mountain rainforest, elev 900 m code: BLF5010", "CASENT 5504179" (CAS).

Etymology. The new species is named after Brian Fisher, ant team leader at the California Academy of Sciences.

Differential diagnosis. *M. fisheri* sp. nov. differs from other species of the genus in having internal sac of aedeagus with very long sclerites but without fields of small spinules (Fig. 3), and in long, relatively wide parameres with somewhat triangular apices (in lateral view, Fig. 2).

Description. Holotype, male (Figs 1, 2, 3). Body length 5.8 mm. Color uniformly blackish brown.

Right mandible slightly longer than left, without tooth behind apex. Labrum trapezoidal, with broadly rounded sides, length about 1/6 width (in dorsal view). Clypeus very slightly asymmetrical, apically obtuse, with 2 long and 2 shorter setae on the apical margin. Genae very small, not protruding beyond eyes. Canthus and frontal suture absent. Clypeus slightly depressed apicomediaally. Head without traces of frontoclypeal suture, finely punctate with minute punctures separated by greater than 4 times their diameter.

Pronotum approximately 1.7 times wider than long, widest medially. Disc of pronotum convex, without any depressions, tubercles, or ridges. Punctuation on pronotum finer than on head, almost indistinct. Margins with relatively wide border, lateral margins with 4 long setae: 1 seta on basal angle, 1 seta approximately in the middle of lateral margin, and 2 setae on the apical angle. Base with a row of relatively large longitudinally elongated punctures.

Scutellum triangular, right angled apically, about 1/11 length of elytra.

Elytra convex, with distinct humeral calli, widest at basal third, glabrous. First stria distinct and reaching the apex of elytron, other striae indistinct. Disc of elytra sparsely punctate with minute punctures. Epi-pleura with long, sparse, brown setae. Base of elytron with border from scutellum to humeral callus. Wings fully developed.

Parameres relatively large, about 1.5 time shorter than phallobase, with almost indistinct lateral teeth, somewhat triangular in lateral view (Fig. 2). Internal sac with 2 very long sclerites and 2 smaller somewhat tooth-shaped sclerites (Fig. 3), without fields of small spinules.

Female unknown.

Distribution and habitat. The type specimen of *M. fisheri* sp. nov. was collected in Parcel 1 of the Parc

National d'Andohahela (Fig. 4). This is the southernmost recorded locality of *Madecorhynchus*. This locality lies within mid-elevation rain forest biome on the eastern flank of the Anosyenne Mountains, the southernmost rain forest in Madagascar and one of the few rain forests areas south of the tropic of Capricorn (Goodman 1999).

***Madecorhynchus saintemariensis* sp. nov.**
(Figs 5–8)

Holotype. Male with the labels "MADAGASCAR: Toamasina Prov., Ile Sainte Marie, Foret Ambohidena, 22.8 km 44°NW Ambodifotatra, el 20m 21 November 2005" and "16°49'28''S 049°57'51''E California Acad. of Sciences coll. Brian L. Fisher et al. sifted litter, littoral rainforest coll. code: BLF12840" (CAS). Female with the same data as the holotype (CAS).

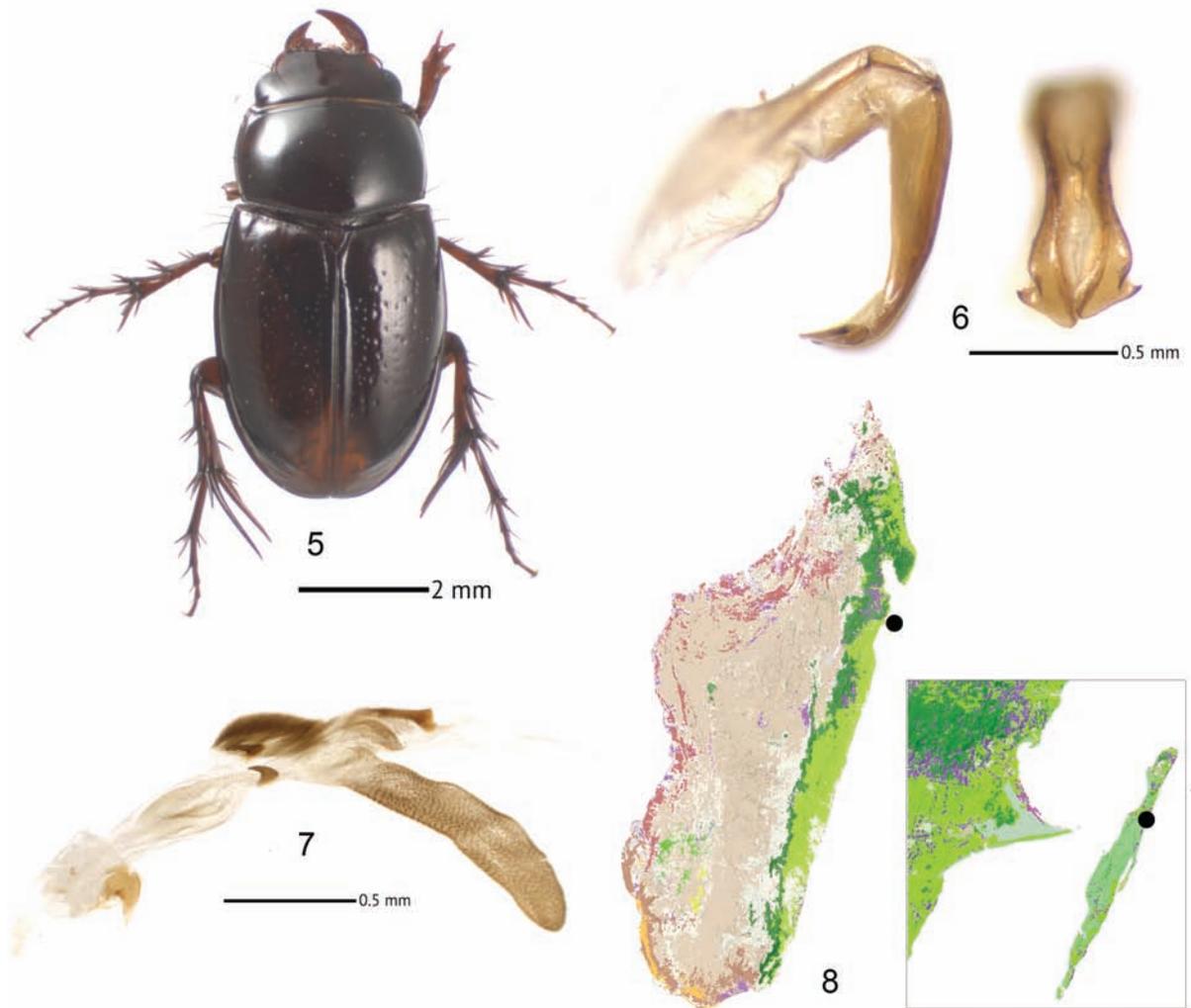
Etymology. The name of the new species is derived from the name of Sainte Marie island.

Differential diagnosis. *M. saintemariensis* sp. nov. differs from other species of the genus in having internal sac of aedeagus with 2 tooth-shaped sclerites, 1 longer sclerite and a few fields of minute spinules one of which forms a finger-shaped process of the sac (Fig. 7), and in parameres with large lateral teeth (Fig. 6).

Description. Holotype, male (Figs 5–7). Body length 6.9 mm. Color uniformly dark brown, pronotum and disc of head almost black, legs somewhat paler.

Right mandible almost 1.5 times longer than left, without tooth behind apex. Labrum trapezoidal, with broadly rounded sides, length about 1/6 width (in dorsal view). Clypeus asymmetrical, apically obtuse, with 4 setae on the apical margin 3 of which are displaced to the left side. Genae very small, not protruding beyond eyes. Canthus and frontal suture absent. Clypeus depressed apicomediaally. Head without traces of frontoclypeal suture, finely punctate with minute punctures separated by 5–10 times their diameter.

Pronotum approximately 1.6 times wider than long, widest medially. Disc of pronotum convex, without any depressions, tubercles, or ridges. Punctuation on pronotum is similar to that on head. Margins with relatively wide border, lateral margins with 4 long setae: 1 seta on basal angle, 1 seta ap-



Figs 5–8. *Madecorphnus saintemariensis* sp. nov., holotype, male. 5 – habitus, 6 – parameres in dorsal and lateral view, 7 – internal sac of aedeagus, 8 – collecting locality map.

proximately in the middle of lateral margin, and 2 setae on the apical angle. Base with a row of longitudinally elongated punctures, smaller and sparser than in *M. fisheri* sp. nov.

Scutellum triangular, right angled apically, about 1/11 length of elytra.

Elytra convex, with distinct humeral calli, widest at basal third, glabrous. First stria distinct and reaching the apex of elytron, other striae indistinct. Disc of elytra with double punctuation consisting of large sparse punctures and minute ones. Epipleura with long, sparse, brown setae. Base of elytron with border from scutellum to humeral callus. Wings fully developed.

Parameres relatively large, about 1.4 time shorter than phallobase, wide, with large lateral teeth (Fig. 6). Internal sac of aedeagus with 2 tooth-shaped sclerites, 1 longer sclerite and a few fields of minute spinules one of which forms a finger-shaped process of the sac (Fig. 7).

Female. Differs from male in having a well developed apical spur of anterior tibia and mandibles of subequal length.

Distribution and habitat. *M. saintemariensis* sp. nov. is the first orphnine species found on Sainte Marie Island (Nosy Boraha), a small island 6 km off the eastern coast of Madagascar (Fig. 8). Primary vegetation of the island, consisting of low altitude

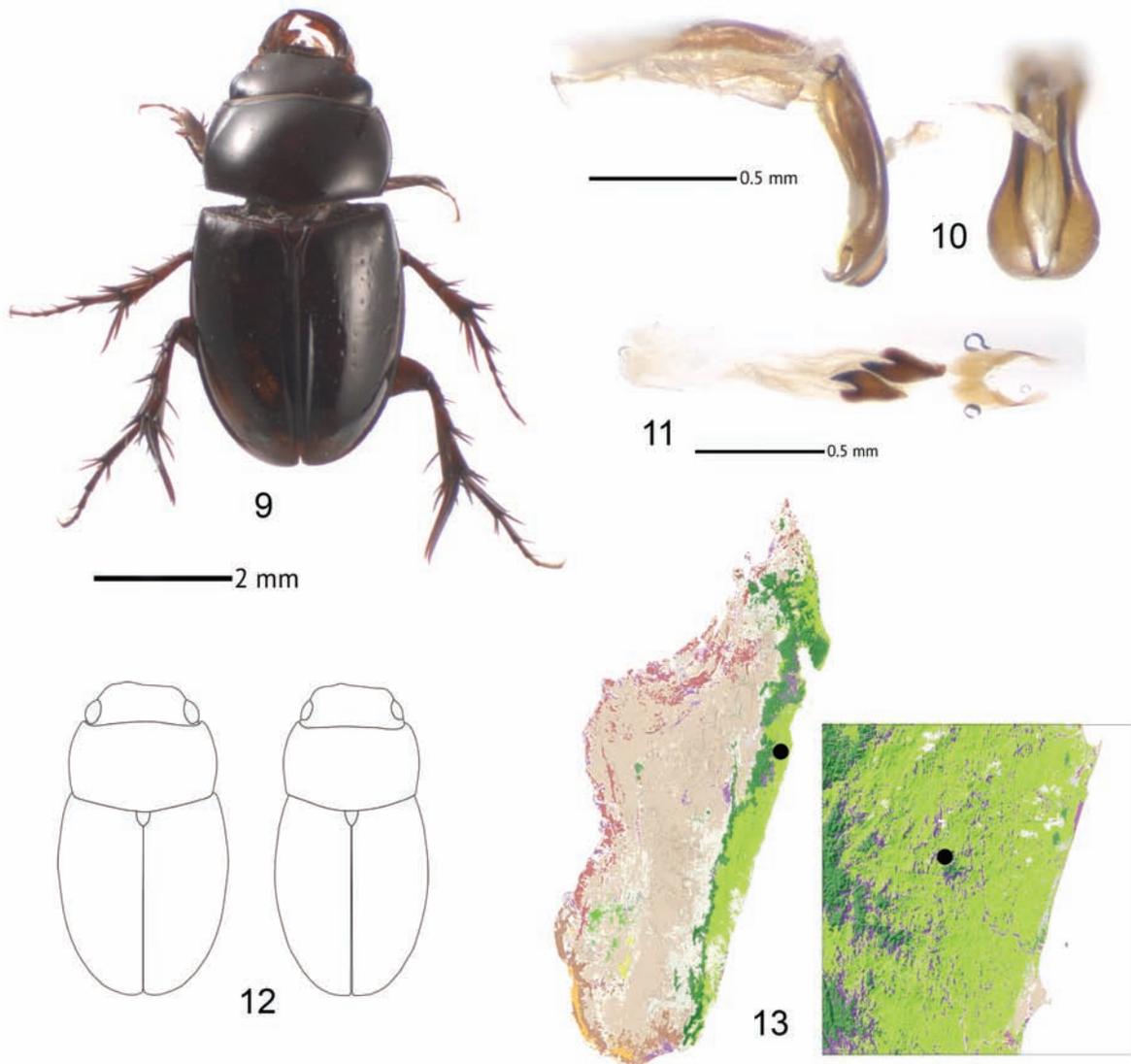
rainforest and coastal forest, is largely disturbed (Du Puy and Moat 1996). *M. saintemariensis* sp. nov. is one of the few orphnine species inhabiting coastal forests in Madagascar.

***Madecorphnus tuberculatus* sp. nov.**
(Figs 9–13)

Holotype. Male with the labels “MADAGASCAR: Toamasina Prov., Reserve Betampona Camp

Vohitsivalana, 37.1 km 338° Toamasina elev 520 m 1–3 Dec 2005” and “17°53′12″S 049°12′09″E California Acad. of Sciences coll. Brian L. Fisher et al. sifted litter rainforest collection code: BLF13242” (CAS).

Differential diagnosis. This new species is similar to *M. montreuili* Frolov, 2010, and *M. barclayi* Frolov, 2012, in having 2 tubercles on mentum and bidentate apex of right mandible. It is most similar to the latter species in having internal sac of aedeagus with two sclerites but the shape of the sclerites is different:



Figs 9–13. *Madecorphnus tuberculatus* sp. nov., holotype, male. 9 – habitus, 10 – parameres in dorsal and lateral view, 11 – internal sac of aedeagus, 12 – body outline in dorsal view (left – *M. tuberculatus* sp. nov., holotype, right – *M. barclayi*, holotype; not to scale), 13 – collecting locality map.

they are much larger and heavily sclerotized (Fig. 11). *Madecorphnus tuberculatus* sp. n. also differs from *M. barclayi* in having a relatively wider body with relatively larger eyes (Fig. 12).

Description. Holotype, male (Figs 9–12). Body length 5.8 mm. Color uniformly dark brown, legs somewhat paler. Right mandible about 1.5 times longer than left, strongly curved, with a tooth behind apex. Labrum trapezoidal, with rounded anterior angles, its length about 1/8 width (in dorsal view). Mentum with 2 conical tubercles. Clypeus slightly asymmetrical, almost flat anteriorly, obtuse, with a group of 4 setae displaced to the left side. Genae very small, not protruding beyond eyes. Canthus and frontal suture indistinct. Head dorsally with minute punctures separated by more than 4 puncture diameters.

Pronotum 1.7 times wider than long, widest medially. Disc of pronotum convex, without any depressions, tubercles, or ridges. Punctuation on pronotum finer than on head, almost indistinct. Margins with relatively wide border, lateral margins with 4 long setae: 1 seta on basal angle, 1 seta approximately in the middle of lateral margin, and 2 setae on the apical angle. Base with a row of feebly elongated punctures, smaller and sparser than in *M. fisheri* sp. nov.

Elytra convex, with distinct humeral and apical calli. Maximum width approximately in the middle. First stria distinct and reaching apex of elytron, other striae indistinct. Epipleura with long, sparse, brown setae. Base of elytra with border connected to first elytral interval. Elytra with double punctuation: sparse large punctures on disc and minute, feebly visible punctures throughout elytron. Wings fully developed.

Parameres large, about 1.3 times shorter than phallobase, wide and rounded apically (in dorsal view),

with small lateral teeth and large excavations between teeth and paramere apices (Fig. 10). Internal sac of aedeagus with 2 tooth-shaped sclerites (Fig. 11).

Distribution and habitat. *Madecorphnus tuberculatus* sp. n. is known from one locality in the Betampona Reserve, a patch of primary low elevation rain forest about 25 km inland of the eastern coast (Fig. 13)

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