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***Moronius miguelangeli* new genus and new species of Areodina from western Brazil (Melolonthidae, Rutelinae, Rutelini)**

***Moronius miguelangeli* género nuevo y especie nueva de Areodina del Oeste de Brasil (Melolonthidae, Rutelinae, Rutelini)**

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ABSTRACT

A new genus and species of Rutelinae are described based on several specimens collected in Mato Grosso state, Brazil near the border of Chapada dos Guimarães. The new genus belongs to the subtribe Areodina and can be readily distinguished from other genera of the subtribe mainly by characters of head and clypeus. An updated key for the genera of Areodina is also provided. The subtribe Areodina now includes 11 genera distributed in the Western Hemisphere and Africa.

Key words. Neotropical region, new taxa, Scarabaeoidea.

RESUMO

Um novo gênero e uma nova espécie são descritos com base em vários espécimes coletados no estado de Mato Grosso, Brasil próximo à borda da Chapada dos Guimarães. O novo gênero pertence à Areodina e pode ser prontamente distinguido dos demais desta subtribo em especial pelos caracteres da cabeça e do clipeo. Uma chave atualizada para a identificação dos gêneros de Areodina é também apresentada. A subtribo agora possui 11 gêneros distribuídos no Hemisfério Oeste e África.

Palavras chave. Novos táxons, Região Neotropical, Scarabaeoidea.

Within the leaf chafers (Rutelinae: Rutelini), the Areodina forms a distinctive subtribe and includes ten described genera: nine distributed in the New World and one (*Xenoproctis* Kolbe) in Africa with four species (Bouchard 1995). Areodines are distinguished from other Rutelini by the shape of the mandibles shape with external margins broadly rounded and without a well-developed preapical tooth (Jameson 1990). Of the nine New World genera, three are exclusive to South America: *Areoda* MacLeay (revised by Ratcliffe and Jameson [1989]), *Byrsopolis* Burmeister (reviewed, in part, by Soula [2010]), and *Oplognathus* MacLeay. Species of Areodina are diurnal or nocturnal. Males of a *Byrsopolis* species have been observed flying high during the hottest hours of the day (personal observation P.C.G and F.Z.V.). Species of this genus were also collected at light traps as happen with *Areoda* and *Oplognathus* (Ratcliffe & Jameson 1998 and personal observation P.C.G.).

Monophyly of the subtribe is equivocal and requires further study. As part of a larger study of the tribe Rutelini, phylogenetic analysis using morphological characters demonstrated that only one symplesiomorphic character supported monophyly of the group (Jameson 1998). This study included only three areodine genera, all of which were from North America, thus more exemplars are essential to

address sister group relationships and relationships between genera. Phylogenetic study of Areodina based on exemplars from all genera and limited morphological characters hypothesized that a clade comprised of South American genera and a clade comprised of North and Central American genera were sister groups (Jameson 1990). In this analysis, African genus *Xenoproctis* was early diverging in the Areodina. Based on this analysis, Jameson (1990) also discussed the biogeography of the Areodina and proposed a dispersal hypothesis to explain the disjunct distribution of the subtribe between the Western Hemisphere and African. Ongoing molecular phylogenetic analyses aim to examine this disjunction and the relationship of *Xenoproctis* to other scarab beetles (Keller, Moore, Garner, and Jameson in prep.). Members of the subtribe are poorly known and have little biological information except for *Cotalpa* Burmeister, 1844, *Paracotalpa* Ohaus, 1915 and *Pseudocotalpa* Hardy, 1971 (e.g. Kaufman & Jameson 2009 and references cited in this paper). Only collecting data are known for the South American genera.

Recent collecting from the western Brazilian region in Mato Grosso state included flight intercept traps and surprised us with an undescribed genus and species of Areodina that, at first glance, resembles the Central American genus *Viridimicus* Jameson with its predominantly metallic

green coloration. Curiously, no females were collected among the hundreds of males, suggesting that females do not use to fly and may have a fossorial life history. This is similar to another areodine group, *Parachrysinina* Bates which includes six species but only two female specimens are known in the entire genus (Jameson 1991). In this paper, we describe the new genus and species, compare it with similar genera, and incorporate it in Jameson's key of Areodina (Jameson 1990).

MATERIAL AND METHODS

A total of 450 male specimens were studied and are deposited in the following institutional and private collections: CEMT (Coleção Zoológica da Universidade Federal de Mato Grosso, Cuiabá, Mato Grosso, Brazil - Fernando Z. Vaz-de-Melo), CERPE (Coleção Entomológica da Universidade Federal Rural de Pernambuco, Recife, Pernambuco, Brazil - Paschoal C. Grossi), EPGC (Everardo and Paschoal Grossi Collection, Nova Friburgo, Rio de Janeiro, Brazil), MAMC (Miguel Ángel Morón Collection, Xalapa, México), DCC (Daniel Curoe Collection, México), MNRJ (Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil - Marcela L. Monné), MZSP (Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil - Sônia M. A. Casari), FIOC (Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brazil - Jane. M. Costa), INPA (Instituto Nacional de Pesquisas na Amazônia, Manaus, Amazonas, Brazil - Márcio de Oliveira). Terminology follows in part the works of Ratcliffe & Jameson (1989) and Jameson (1990). Males of all color variations were dissected and aedeagi were studied. The aedeagus was extracted from an aperture made between the propygidium and the last tergite; genitalia was removed from inside the abdomen, cleaned and glued on a card that was pinned just below the specimen, or just pulled out from the apex of the abdomen. Images were taken with a Leica® DFC 500 digital camera attached to a stereo microscope Leica® MZ 16. Images were captured by using the IM 50 (Image Manager) software, and then manipulation was performed by using the Automontage® (Syncroscopy) software. Images editing (contrast manipulation) was made in Adobe Photoshop CS3®.

Moronius Grossi & Vaz-de-Mello gen. n.

Type-species: *Moronius miguelangeli* Grossi and Vaz-de-Mello, here designated

Description. *Melolonthidae*, *Rutelinae*, *Rutelini*, *Areodina*. **Form:** Body short, dorsally weakly convex; elytra parallel-sided. **Length:** 14.5–20.1 mm. **Width across humeri:** 8.1–10.9 mm. **Color:** Surface very variable, predominantly metallic green with some elytral variation from light to dark green (may appear black with illumination and magnification), but some specimens with metallic reddish reflections mainly on pronotum, scutellum and legs; other specimens with golden-yellow areas (but always with green reflections) on clypeus,

pronotal disc and sides, scutellum, elytra, legs, thorax and abdomen. **Head:** Clypeus subpentagonal, length shorter than length of frons at the middle; apex truncate to weakly emarginated, reflexed; surface strongly concave. Eyes small, interocular width equals 5 transverse eye diameters. Frontoclypeal suture complete. Antennae 10-segmented, club with three lamellae, twice as long as antennomeres 2-7. Labrum truncate, anteriorly straight, transverse, 4.5 times wider than long, quadrate, and completely hidden by clypeus in dorsal and frontal views. Mandibles hidden under clypeus in dorsal view, abruptly incurved at apex; apical internal edge with three teeth. Maxilla with 5 teeth on lacinia (1 apical, 2 medial and 2 basal); last maxillary palpus with broad sensorial area confined to basal half. Mentum subquadrate, narrower anteriorly; apex weakly sinuate. **Pronotum:** Widest at middle. Margins widest at base, narrowed toward apex. Marginal bead incomplete posteriorly; complete or effaced at middle anteriorly; complete laterally. Surface moderately punctate. Scutellum subtriangular to parabolic, moderately to densely punctate, sometimes with a longitudinal mid-line. **Elytra:** Dorsal surface distinctly punctate; striae distinct, punctures larger than those of interstriae; suture sparsely punctate. Hind wings with anterior margin near RA₁₊₂, RA₃, and apical hinge setose; setae, short and outward directed (Fig. 12). **Venter:** Surface punctate and setose; punctures C-shaped, moderately dense; setae long, moderately dense, tawny. Mesosternal process nearly obsolete, knob-shaped, and not exceeding apex of mesocoxae. **Legs:** Anterior tibiae with three well developed external teeth, posteriorly decreasing in size; foretibial claws simple, larger claw with longitudinal striations. Mesotibia with outer claw robust, not slender when compared to fore- and hind claws. Metatibia with more than 20 spinules on apex, never more than 35; metafemora large, ovoid shaped. **Abdomen:** Pygidium finely rugose, glabrous. Ventrites weakly punctate; punctures setose; sixth ventrite widely sinuate. **Parameres:** Symmetrical, apex bifurcated, margins excavated longitudinally.

Diagnosis. *Moronius* gen. nov. is distinguished by other genera of *Areodina* by the following combination of characters: Body small, less than 30 mm, surface usually metallic green or with greenish reflections; antennae 10-segmented, club twice longer than segments 2-7 combined; labrum and mandibles almost completely hidden by clypeus; clypeal shape pentagonal with apex weakly emarginated and strongly reflexed at apex, and surface strongly concave; frontoclypeal suture complete; mandibles with external margin rounded and with 3 internal teeth; mesotarsi distinctly shorter than hindtarsi, thick; hind femora large, ovoid shaped and glabrous on disc; hind wings with anterior margin setose.

Etymology. The new genus is named in honor to our friend and great specialist in Scarabaeoidea, Miguel Ángel Morón Rios, who has contributed tremendously to the advancement of Neotropical scarab beetles.

***Moronius miguelangeli* Grossi & Vaz-de-Mello sp. n.**

Type specimens. Holotype male with black bordered, red label, a) “BRASIL, Mato Grosso,/ Cuiabá, Faz. Mutuca, 22-xi-/2008, 300m, 15°18’51”S/ 55°58’18”W, FIT, / L.G.O. Nunes leg.” b) “*Moronius miguelangeli*/ Grossi & Vaz-de-Mello, 2015/ HOLOTYPUS” (Specimen deposited at CEMT). 449 paratypes male with yellow paratype labels: 156 labeled as holotype. 116 labeled as holotype, except with: “09-xi-2008,/ 15°18’50”S/ 55°58’20W” (57 specimens); “29-xi-2008” (6 specimens); “04-x-2008/ 15°18’24”S/ 55°58’08”W” (1 specimen); 12-vi-2009/ 15°18’23”S/ 55°58’02”W (1 specimen); “25-x-2008/ APP” (5 specimens); 15-xi-2008” (7 specimens); “11-x-2008/ 15°18’23”S/ 55°58’10”W” (4 specimens); 18-x-2008/ 15°18’17”S/ 55°58’03”W” (6 specimens); “18-x-2008/ 15°18’23”S/ 55°58’02”W” (4 specimens); “30-vii-2009/ 15°18’23”S/ 55°58’02”W” (2 specimens); “18-x-2008/ 15°18’23”S/ 55°58’10”W” (7 specimens); “15-xi-2008/ 15°18’50”S/ 55°58’20W” (119 specimens); “22-xi-2008/15°18’50”S/ 55°58’20W” (4 specimens); “04-x-2008/ 15°18’50”S/ 55°58’20W” (1 specimen); “25-x-2008/ 15°18’23”S/ 55°58’10”W” (3 specimens); “09-xi-2008” (60 specimens); “01-xi-2008/ 15°18’17”S/ 55°58’03”W” (1 specimen); “Jangada, Floresteca/ xi-2008, 220m” (2 specimens). Paratypes deposited at CEMT (215), CERPE (200), MNRJ (03), MZSP (03), MAMC (06), EPGC (16) and MCC (06).

Description, holotype male, not dissected. **Length:** 18.9 mm. **Width across humeri:** 10.2 mm. **Color:** Surface predominantly metallic green; clypeus and elytra dark dull green; frons, legs and venter dark green; abdomen with sternites metallic green, laterally pale brown; pygidium with some lighter non-metallic areas. **Head:** Surface uniformly and moderately punctate; punctures moderate in size, becoming larger and deeper behind eyes; clypeus strongly reflexed, apex weakly emarginated; strongly and widely concave from frontoclypeal suture to apex; frontoclypeal suture complete, simple curved; frons with red metallic line at sides, converging to disc. **Pronotum:** Total wide at middle 8 mm; anterior angles incurved, obtuse; anterior and posterior middle with bead incomplete; surface uniformly punctate; punctures fine, becoming larger near sides, and with some coarser and very fine punctures among them. Scutellum subtriangular in shape, densely punctate, and with a longitudinal mid-line from base to near mid-disc. **Elytra:** Dorsal surface with 7 distinct striae; 1 sutural, 3 discal and 3 laterad of humerus; interstriae with fine to moderate punctures, last discal and lateral with fine punctures; elytral borders with micropunctures, becoming rugose at apex. **Legs:** Anterior tibiae with three well-developed external teeth, posteriorly decreasing in size; claws simple, larger claws with longitudinal striations; mesotarsi short compared to foretarsi; outer claw robust, not slender when compared to fore and hind claws; fore femora large, ovoid shaped, 1.42 times wider than long; surface uniformly punctate, disc glabrous. **Abdomen:**

Pygidium weakly convex, more distinctly convex near apex.

Variation. Male paratypes differ from holotype in size and color as follows: **Length:** 14.5–20.1 mm. **Width across humeri:** 8.1–10.9 mm. **Color:** Surface with some elytral variation from light to dark green, some specimens with metallic reddish reflections mainly on pronotum, scutellum and legs; some specimens with golden-yellow areas (but always with greenish reflections) on clypeus, pronotum, scutellum, elytra, legs, thorax and abdomen. **Parameres:** Apex bifurcated, divergent, each prolongation short and rounded; sides excavated, constricted, forming two ventro-longitudinal carinae.

Female. Unknown.

Etymology. The specific epithet is a patronym for Dr. Miguel Ángel Morón Ríos.

Remarks. Almost all specimens were collected using flight intercept traps, a method unusual for Rutelinae in Brazil. Typically, Rutelinae are collected on flowers or at artificial light at night. Surprisingly, all specimens are males with a wide variation in color and size. Given the collect method used, the high number of individuals seems to be indicative of a very active flying species. In Brazil, all other Areodina genera are attracted by artificial light. We lack data for other collecting methods, although few specimens of *Byrsopolis* aff. *castanea* Burmeister, 1844 were collected at the hottest hours of the day flying high and other species near *B.* aff. *laticollis* Burmeister, 1855 were found at baited human dung pitfall traps (considered an accidental collect) [PCG and FVM personal observations]. It is probable that more new species may be found, especially if collecting efforts are directed in habitats within the Chapada’s formations in Brazil Chapada dos Guimarães is a region that delimitates the Brazilian Precambrian Shield from the Chacoan Depression, both with very different faunas. Specimens were collected in planted Eucalyptus forest, with flight intercept traps. As no specimens have been collected in light traps we strongly believe them to be diurnal. Active searching during different times of the day (not in the same dates however) provided no females (maybe brachypterous and hypogeous?) nor additional males. Specimens of a different population belonging to the same genus, not included here because they came to us only after the submission of the paper, were collected in mistnets in the early morning in a savannah region in a southern region.

Key to the Areodina genera (modified from Jameson 1990)

1. Apex of metatibia with more than 10 spinules. North America to South America 2
- 1’. Apex of metatibia with fewer than 10 spinules. Africa. *Xenoproctis* Kolbe
- 2(1). Antenna 10-segmented 3
- 2’. Antenna 8- or 9-segmented. Mexico *Parachrysinina* Bates

- 3(2). Mesosternum with keel extending anteriorly beyond mesocoxae 4
- 3'. Mesosternum without keel extending anteriorly beyond mesocoxae 5
- 4(3). Clypeus in ventral view extending past labrum; weakly trilobed apically in male, rounded apically in female. Brazil *Oplognathus* MacLeay
- 4'. Clypeus in ventral view not extending past labrum, rounded apically in male and female. Brazil *Areoda* MacLeay
- 5(4). Antenna with club longer than segments 2-7 combined 10
- 5'. Antenna with club shorter than or subequal to segments 2-7 combined 6
- 6(5). Terminal segment of maxillary palpus as long or longer than antennal club. California and Nevada, south to Mexico (Sonora) *Pseudocotalpa* Hardy
- 6'. Terminal segment of maxillary palpus shorter than antennal club (nearly as long as antennal club in *Cotalpa consobrina* Horn) 7
- 7(6). Apex of mentum sinuate or bisinuate or emarginate . 8
- 7'. Apex of mentum notched 9
- 8(7). Pronotum glabrous. Clypeus subrectangular, angles narrowly rounded. Large claw of at least metatarsus cleft in males; all claws simple in females. Canada, USA and Mexico *Cotalpa* Burmeister
- 8'. Pronotum setose, at least in places. Clypeus semicircular (widest at base), angles broadly rounded (*P. deserta* Saylor with subrectangular clypeus). Claws simple in males and females. USA *Paracotalpa* Ohaus
- 9(7). Males metallic green; females metallic green, dark brown, or black. Parameres rounded apically. Central Mexico to Honduras *Viridimicus* Jameson
- 9'. Males and females reddish-brown, brown, or black. Parameres truncate apically. Southern Arizona to central Mexico *Parabyrsopolis* Ohaus
- 10(4). Antennal club generally longer than antennomeres 2-7 combined but never twice as long. Mandibles and labrum (dorsal view) completely obscured by clypeus; labrum with apex truncate. Clypeus broadest at middle, apex quadrate; surface widely concave. Body surface usually metallic green or with testaceous areas with greenish reflections. Western Brazil *Moronius* n. gen.
- 10'. Antennal club generally twice as long as antennomeres 2-7 combined. Mandibles and labrum (dorsal view) partially obscured by clypeus; labrum with apex bilobed. Clypeus broadest at base, apex semicircular, quadrate or lobed; surface weakly concave or flat. Body surface usually brownish, some species with weak greenish reflections. Brazil and French Guyana *Byrsopolis* Burmeister

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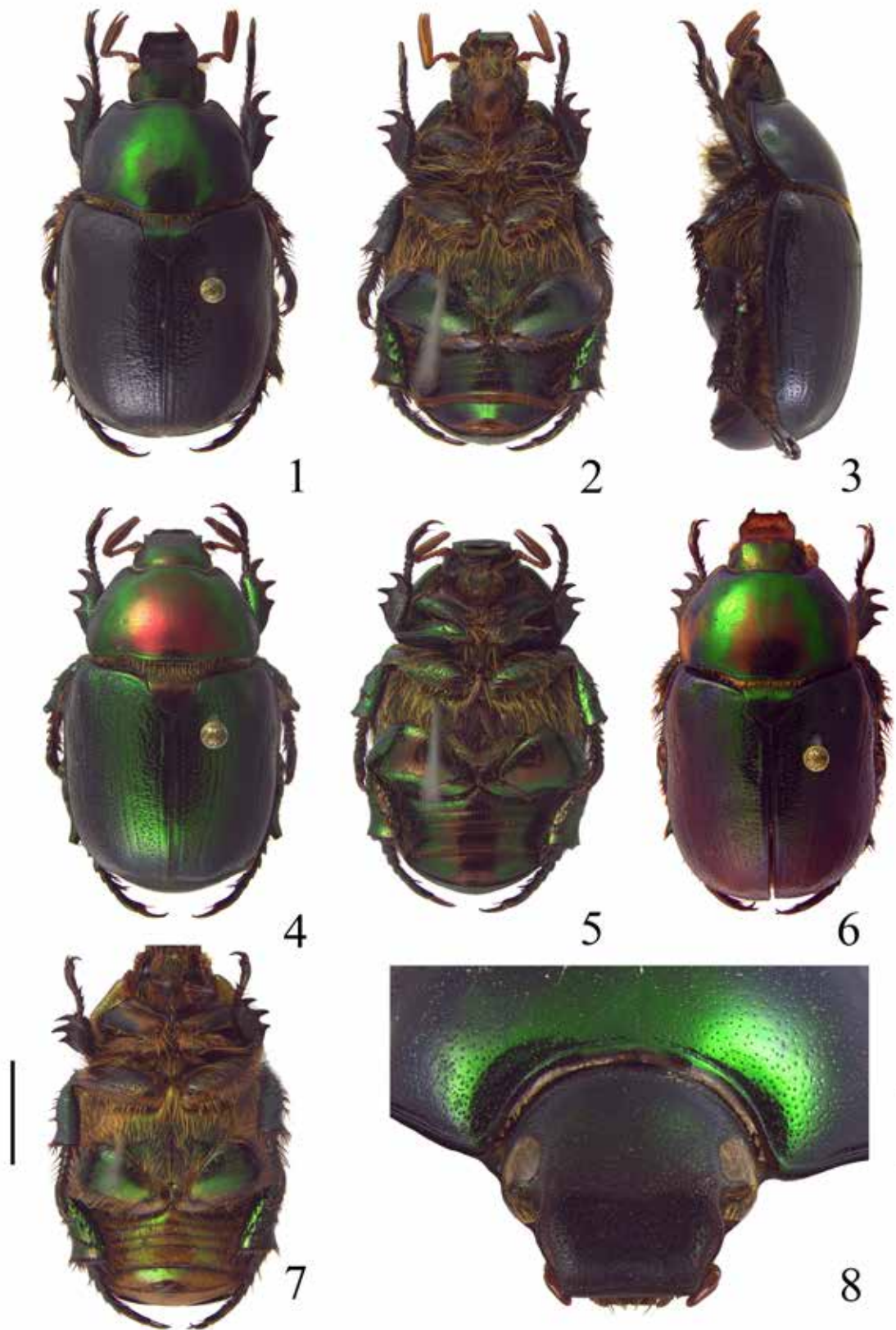
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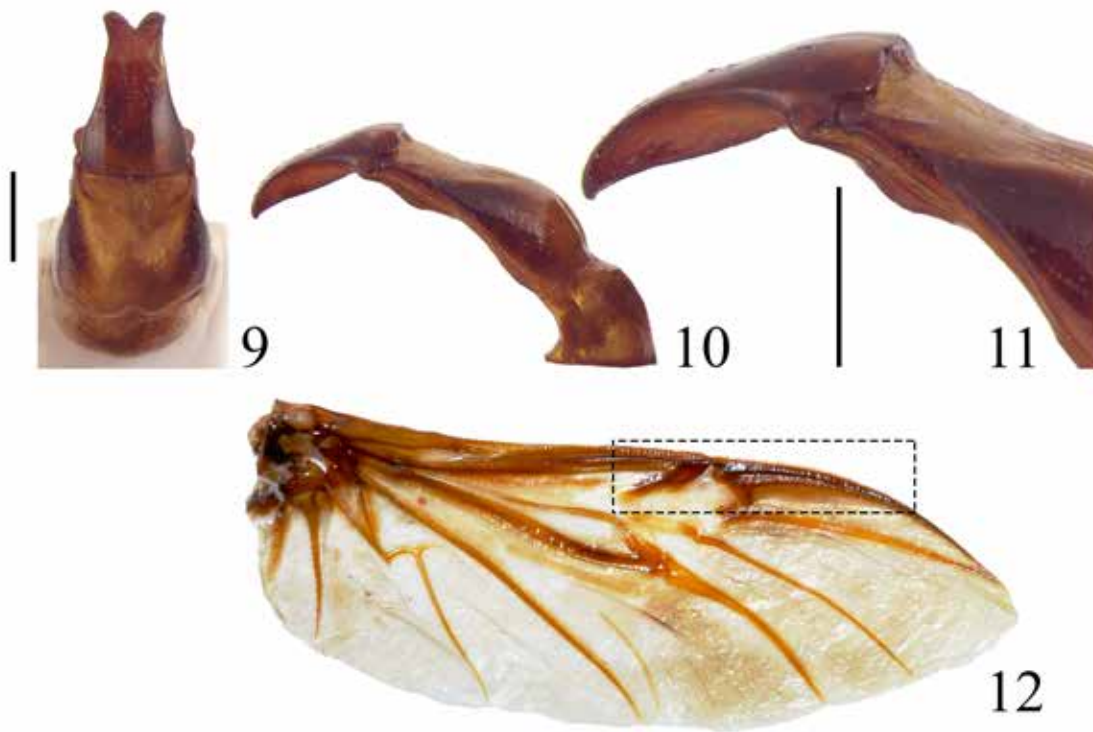
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Figures 1-8. *Moronius miguelangeli*, males. 1-3) Holotype showing dorsal, ventral and lateral views, respectively. 4-5) Paratype, metallic red variant, showing dorsal and ventral views. 6-7) Paratype, variant with yellow and green maculae, dorsal view. 8) Detail of head and pronotum. Scale bars = 5 mm (1-7) and 1 mm (8).



Figures 9-12. *Moronius miguelangeli*, paratype male. 9-10) Aedeagus, caudal and lateral views. 11) Parameres (close-up of figure 10), lateral view. Scale bars = 1 mm. 12) Right hind wing in dorsal view, dashed rectangle showing the wing area bearing setae. No scale attributed.