



A Taxonomic Revision of the *Dichotomius reclinatus* (Felsche, 1901) Species Group (Coleoptera: Scarabaeidae: Scarabaeinae)

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Abstract

The taxonomic revision of the *Dichotomius reclinatus* species group (Coleoptera: Scarabaeidae: Scarabaeinae: *Dichotomius* Hope, 1838) sensu Arias-Buriticá and Vaz-de-Mello (2019) is presented. The group comprises four species previously included in the *Dichotomius buqueti* species group: *Dichotomius horridus* (Felsche, 1911) from Brazil, French Guiana, and Suriname; *Dichotomius nimuendaju* (Luederwaldt, 1925) from Bolivia, Brazil, and Peru; *Dichotomius quadrinodosus* (Felsche, 1901) from Brazil; and *Dichotomius reclinatus* (Felsche, 1901) from Colombia and Ecuador. A definition of the *D. reclinatus* species group and an identification key are presented. In the key we included to *Dichotomius camposeabrai* Martínez, 1974, this species due the external morphology can be confused with the *D. reclinatus* species group and for the first time photographs of males and female of this species are presented. For each species of the *D. reclinatus* species group, the following information is provided: taxonomic history, citation of the species in published literature, redescription, list of material examined, photographs of the external morphology, illustrations of male genital organs and the endophallites, and distribution map.

Keywords Taxonomy · Neotropical · Dung beetles · Scarabaeinae · *Dichotomius sensu stricto*

Introduction

Dichotomius Hope, 1838 (Scarabaeidae: Scarabaeinae) is a dung beetle genus, with around 190 species distributed in four subgenera: *Dichotomius sensu stricto* Hope, 1838; *Seleoncopris* Burmeister, 1846; *Homocanthionides* Luederwaldt 1929; and *Cephagonus* Luederwaldt 1929 (Nunes and Vaz-de-Mello 2019). It is distributed from northeastern of the USA to Central Argentina, with highest diversity in South America where there are about 130 species (Kohlmann

2003; Nunes and Vaz-de-Mello 2019). The *Dichotomius* species are part of the large diggers group, with diurnal and nocturnal species using various substrates for nest building (dung, carrion, mushrooms, fruits) (Cambefort 1991; Gill 1991; Nunes and Vaz-de-Mello 2019). Specimens of the genus are abundant in tropical ecosystems from pasture to forest habitats, becoming the dominant group at biomass and number of species in certain ecosystems and playing important ecological roles such as nutrient cycling, aeration of soil, water infiltration, seed dispersal, and pest control (Gill 1991; Nichols et al. 2007).

The last general revision of the genus was carried out by Luederwaldt (1929); this author proposed the division of the species into sections (here worked as groups) to facilitate the approach of taxonomy of *Dichotomius*. After Luederwaldt's study, only Pereira (1942a, 1942b, 1953) performed the taxonomic reviews of three groups proposed by Luederwaldt. However, many others authors contributed by only describing and synonymizing species, so that knowledge about this genus taxonomy was unclear (Génier 2000). In the first years of this millennium, different authors proposed that the taxonomic revision of this genus was urgent (Génier 2000; Vaz-de-Mello et al. 2001; Kohlmann 2003). In the last few years, there has

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been a significant advance in the taxonomy of *Dichotomius*; different authors have contributed with the revision and redefinition of different species group sensu Luederwaldt (1929) and the transfer of others species to different genera within Scarabaeinae (Arias-Buriticá and Vaz-de-Mello 2012, 2013, 2019; Maldaner et al. 2015; Nunes et al. 2016; Rossini and Vaz-de-Mello 2017, 2020; Valois et al. 2017; Maldaner et al. 2018; Nunes and Vaz-de-Mello 2019).

Recently, Arias-Buriticá and Vaz-de-Mello (2019) in the taxonomic revision of *D. buqueti* species group (sensu Luederwaldt 1929), based on characters of external morphology and male genitalia, proposed the division of this group and proposed the creation of the *Dichotomius reclinatus* (Felsche 1901) species group, where four species were included: *Dichotomius horridus* (Felsche 1911), *Dichotomius nimuendaju* (Luederwaldt 1925), *Dichotomius quadrinodosus* (Felsche 1901), and *Dichotomius reclinatus* (Felsche 1901). In this paper, the *D. reclinatus* species group sensu Arias-Buriticá and Vaz-de-Mello (2019) is reviewed, the identification key of the species is presented, and the complete information, photographs, and illustrations from each species are included. In the identification key, we include to *Dichotomius camposeabrai* Martínez, 1974. The head and pronotum male's morphology can confuse this species with the *D. reclinatus* species group, and with ignorance it could be described as a "new species" of this group. However, this species was placed in the *D. bitiensis* species group due to characteristics of body length (less than 16 mm), external morphology, the male genital organ, and endophallites (Arias-Buriticá and Vaz-de-Mello 2012).

Materials and methods

This study was based on the examination of 368 specimens deposited in the following entomological collections (name of each collection curator in parentheses):

CEMT Seção de Entomologia da Coleção Zoológica da Universidade Federal de Mato Grosso, Cuiabá, Brazil (Fernando Vaz-de-Mello).
CEUA Colección Entomológica Universidad de Antioquia, Medellín, Colombia (Martha Wolff).
CMNC Canadian Museum of Nature, Ottawa, Canada (François Génier).
ECC Colección Escarabajos Coprófagos de Colombia, Bogotá, Colombia (Alejandro Lopera).
IAvH Instituto de Investigación de Recursos Biológicos Alexander Von Humboldt, Villa de Leyva, Boyacá, Colombia (Jhon Neita).
MNHN Muséum National d'Histoire Naturelle, Paris, France (Olivier Montreuil and Antoine Mantilleri).
MZSP Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (Sonia Casari and Carlos Campaner).

NMNH National Museum of Natural History, Washington, USA (Terry Erwin, material provided by Trond Larsen).

OUMHN Oxford University Museum of Natural History, Oxford, United Kingdom (Darren Mann).

SMTD Staatliches Museum für Tierkunde, Dresden, Germany (Olaf Jäger and Klaus-D. Klass).

UPTC Colección entomológica de referencia Museo de Historia Natural "Luis Gonzalo Andrade" Universidad Pedagógica y Tecnológica de Colombia, Tunja, Boyacá, Colombia (Irina Morales).

Species identification was performed using original descriptions (Felsche 1901, 1911; Luederwaldt 1925), specific keys (Luederwaldt 1929; Pereira 1954), and the examination of all type specimens of the group. For the preparation of specimens, Medina et al. (2003) methodology was followed. Male genitalia (*aedeagus*) dissection and preparation was carried out under Zunino methodology (1978).

Photographs of the male *habitus* and differences within the pronotum and head of females are presented, as well as illustrations of *aedeagus* in lateral, dorsal, and ventral view, and endophallites were produced. Terminology of the external morphology and male genitalia was assigned according to Nunes and Vaz-de-Mello (2019). For the endophallite nomenclature, Tarasov and Solodovnikov (2011) and Génier (2019) were followed.

For each species, the taxonomic treatment developed shows the following information: location of the type specimens, nomenclatural history, material examined, redescription of the male and female, comments, and geographical distribution. Distribution maps were made in Quantum GIS (QGIS version 3.16.8-Hannover). In the material examined, information was extracted *ipsis litteris* from the labels. The characteristics of the type labels are described before the label's information in braces brackets (e.g., {Printed text on red label}) and supplementary information for the labels in square brackets (e.g., [Brazil]). In the additional specimens, the information was organized as follows: country name in capital and bold letters (e.g. Brazil), state/department/province name in bold letters (e.g., Pará) and the other information in the original language of the label. Information of the number of examined males (♂) and females (♀) is followed by the text of the label. Finally, the entomological collection they are housed is indicated after each label description in brackets (e.g. [CEMT]).

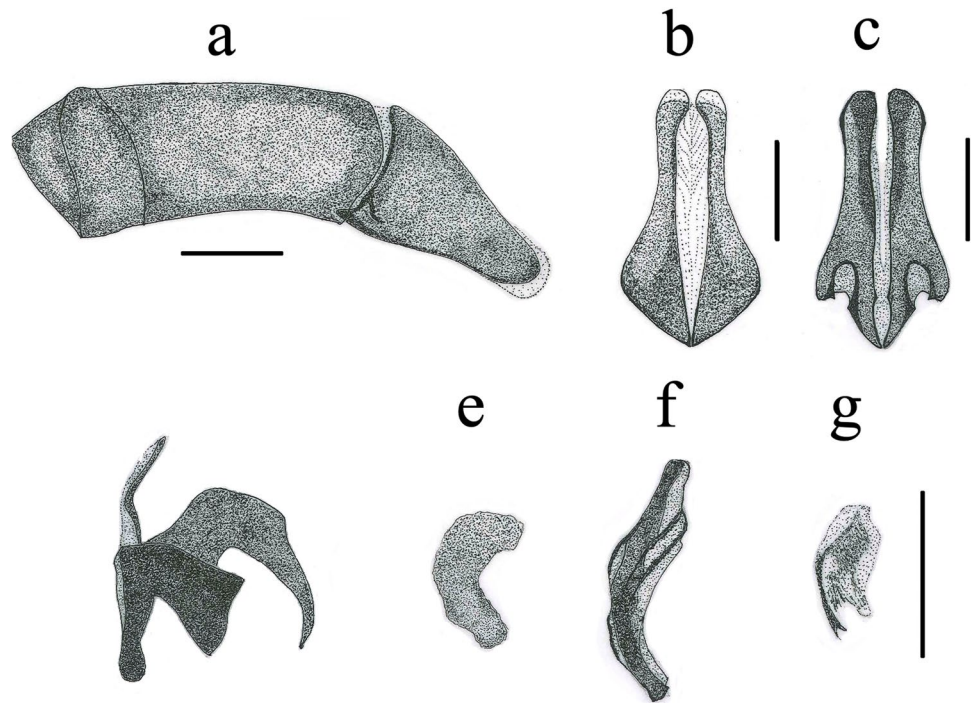
Results and discussion

Diagnosis of the *Dichotomius reclinatus* species group

The species of the *D. reclinatus* species group are recognized by the following combination of characters: (1) medium- to large-sized individuals, body length

Fig. 1 *Dichotomius horridus*.

a. Lateral view of aedeagus.
b. Dorsal view of parameres.
c. Ventral view of parameres.
d. LC—Lamella copulatrix. **e.** SRP—superior-right peripheral sclerite. **f.** A + SA complex—sclerites of axial and subaxial complex. **g.** FLP—Fronto-lateral peripheral sclerite (scale bar 1 mm)



17–32 mm, width 11–16.5 mm. (2) Head oval and twice wider than long. (3) Clypeal margin complete with two smooth and blunt teeth. (4) Clypeal surface with strong and well-defined transverse wrinkles. (5) Male's head with three horns the first one is central, directed backwards, subcylindrical, and blunt-tipped. The others two horns in the clypeus or at the base of the first horn (In *D. quadrinodosus* where the first horn is dorsoventrally flattened or very short (males 2)). (6) Male's pronotum with antero-medial excavation that takes up two-thirds of its length (except in males 2 of *D. quadrinodosus*). Female's pronotum with a central excavation similar or less to the males or with a central two-pointed process. (7) Pygidium with basal margin complete. (8) Aedeagus in ventral view lacking subgenital plate (Figs. 1c, 2c, 3c, and 4c). (9) Parameres with straight inner edge, basal region extended to the phallobase and with an excavation beside this projection (except in *D. quadrinodosus*) (Figs. 1a, 2a, 3a, and 4a). (10) Lamella copulatrix (LC) well sclerotized, large, and asymmetrical (Figs. 1d, 2d, 3d, and 4d).

Identification key to the species of the *Dichotomius reclinatus* species group and species that may be confused*

1 Small body (less than 16 mm). Protibial spur abruptly bent downward near the apex (Fig. 5a, b). Male's frons with an only short horn, females with a simple process (Fig. 5a, b). Pronotum of females lacking excavation

(Fig. 5b). Mata Atlântica, States of Espírito Santo, and Minas Gerais, Brazil.....

.....*D. camposeabrai** (Fig. 5a–d).

- Large body (more than 18 mm). Protibial spur simple and not bent down near apex. Both sexes with cephalic processes different to the previously description. Pronotum of both sexes with excavation or processes.....2

2 Head of both sexes with three horns, the first one long, central, and directed backwards. The others two horns completely separated in the clypeal region.....3

- Head of both sexes with cephalic process different to the previously description.....4

3 Interstriae with shallow microsculpture giving shiny appearance (Fig. 6e). Male sexual organ with slender parameres apex in lateral view (Fig. 1a). Parameres in ventral view with deep excavation near to base (Fig. 1c). Northeast Amazon region from Brazil, French Guiana and Suriname (Fig. 7 (diamond)).....

.....*D. horridus* (Figs. 1a–g and 6a–e)

- Interstriae with heavily shagreened microsculpture giving opaque appearance (Fig. 8e). Male sexual organ with widened parameres apex in lateral view (Fig. 4a). Parameres in ventral view smooth excavation near to base (Fig. 4c). The Chocó Biogeographical region of Colombia and Ecuador (Fig. 7 (circle)).....

.....*D. reclinatus* (Figs. 4a–g and 8a–e)

4 Striae bicrenate and distinctly impressed with deep ocellate punctures (Fig. 9e). Interstriae with deep and dense

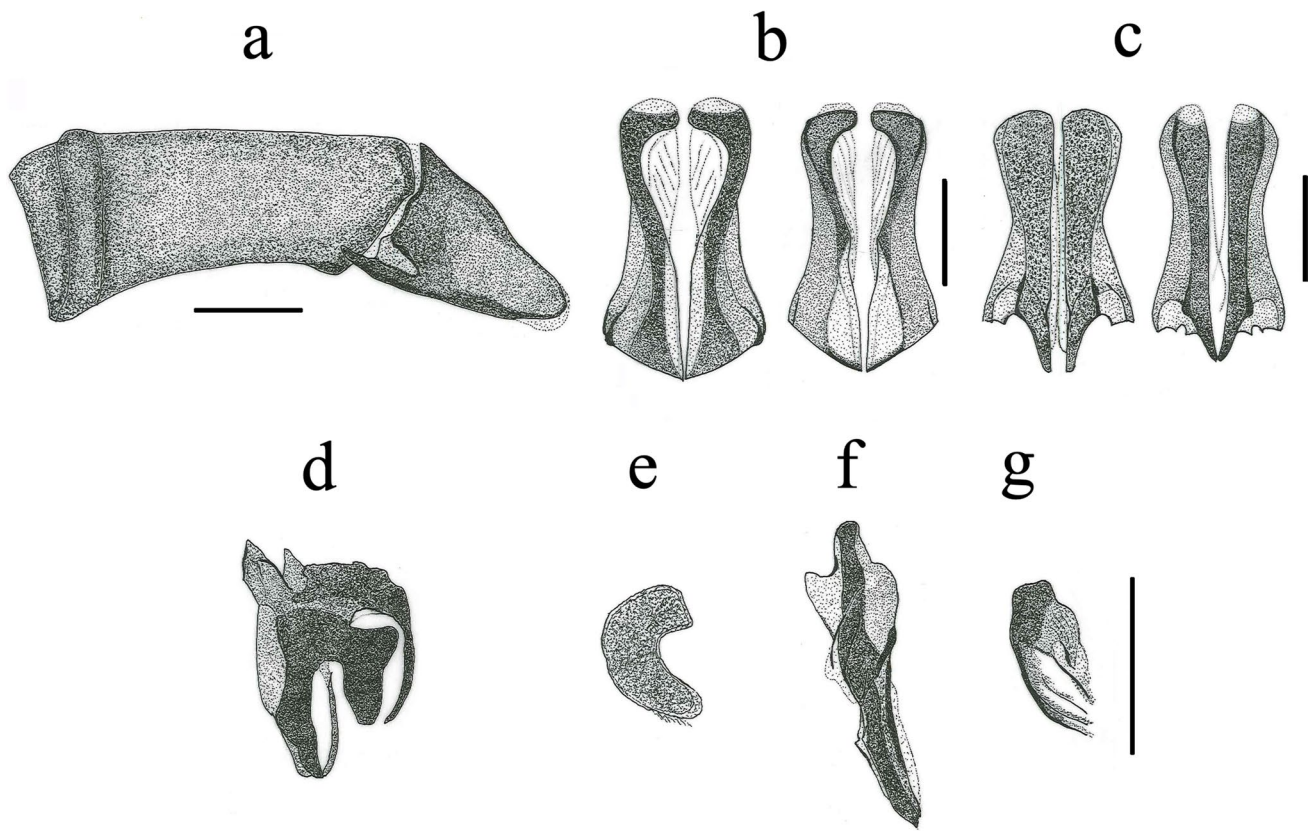


Fig. 2 *Dichotomius nimuendaju*. **a.** Lateral view of aedeagus. **b.** Dorsal view of parameres. **c.** Ventral view of parameres. **d.** LC—Lamella copulatrix. **e.** SRP—superior-right peripheral sclerite. **f.** A + SA com-

plex—sclerites of axial and subaxial complex. **g.** FLP—Fronto-lateral peripheral sclerite (scale bar 1 mm)

punctures (Fig. 9e). Male's frons with three horns, the first one directed backwards, long, wide, and dorsoventrally flattened (Fig. 9a, c) or very short (males 2) (Fig. 10a). The others horns are lateral, at the base of the first and less to 2 mm (Figs. 9a, c and 10a). Male sexual organ with asymmetrical parameres. In lateral view, parameres with prolonged apex directed downwards (Fig. 3a–c). Fronto-clypeal region of females with four-pointed cephalic process, the two central larger (Fig. 9b, d). Brazilian Atlantic forest, from Bahia to Santa Catarina, Brazil (Fig. 7 (square)).....
.....*D. quadrinodosus* (Figs. 3a–g, 9a–e, and 10a–b)

- Striae bicarinate and shallow impressed with small ocellate punctures (Fig. 11e). Interstriae with shallow and sparse punctures (Fig. 11e). Male's frons with three horns, the first one directed backwards, long and subcylindrical, and two laterals with 2 mm or more (sometimes joined at the base of the first horn) (Figs. 11a, c and 12a–c). Male sexual organ with symmetric parameres. In lateral view, parameres with widened apex. Fronto-clypeal region of females with three-pointed cephalic process (Fig. 11b, d–i). Amazonian evergreen forests and seasonal south of the Amazon watershed

from Brazil, Bolivia, and Peru (Fig. 7 (triangle)).....
.....*D. nimuendaju* (Figs. 2a–g, 11a–e, and 12a–i)

Dichotomius camposeabrai Martínez, 1974*

(Fig. 5a–d).

Males: Length 15.0–16 mm; width 8.8–8.9 mm. Black color, with brown setae at both sides of head and pronotum.

Diagnosis: Small species up to 16 mm. Protibial spur abruptly bent downward near the apex. Male's frons with a process, subtriangular at the base and ending in a short spine, females with a simple process. Antero-medial region of the male's pronotum with an excavation that takes up two-thirds of its length. Female's pronotum regularly convex with one weak concavities on the anterior side. Lateral foveae of pronotum deep and elongated; below them a fold is formed on the side. Elytral interstriae surface shagreened with small punctures separated by three times their diameter. Elytral striae bicarinate with ocellate punctures separated by three times their

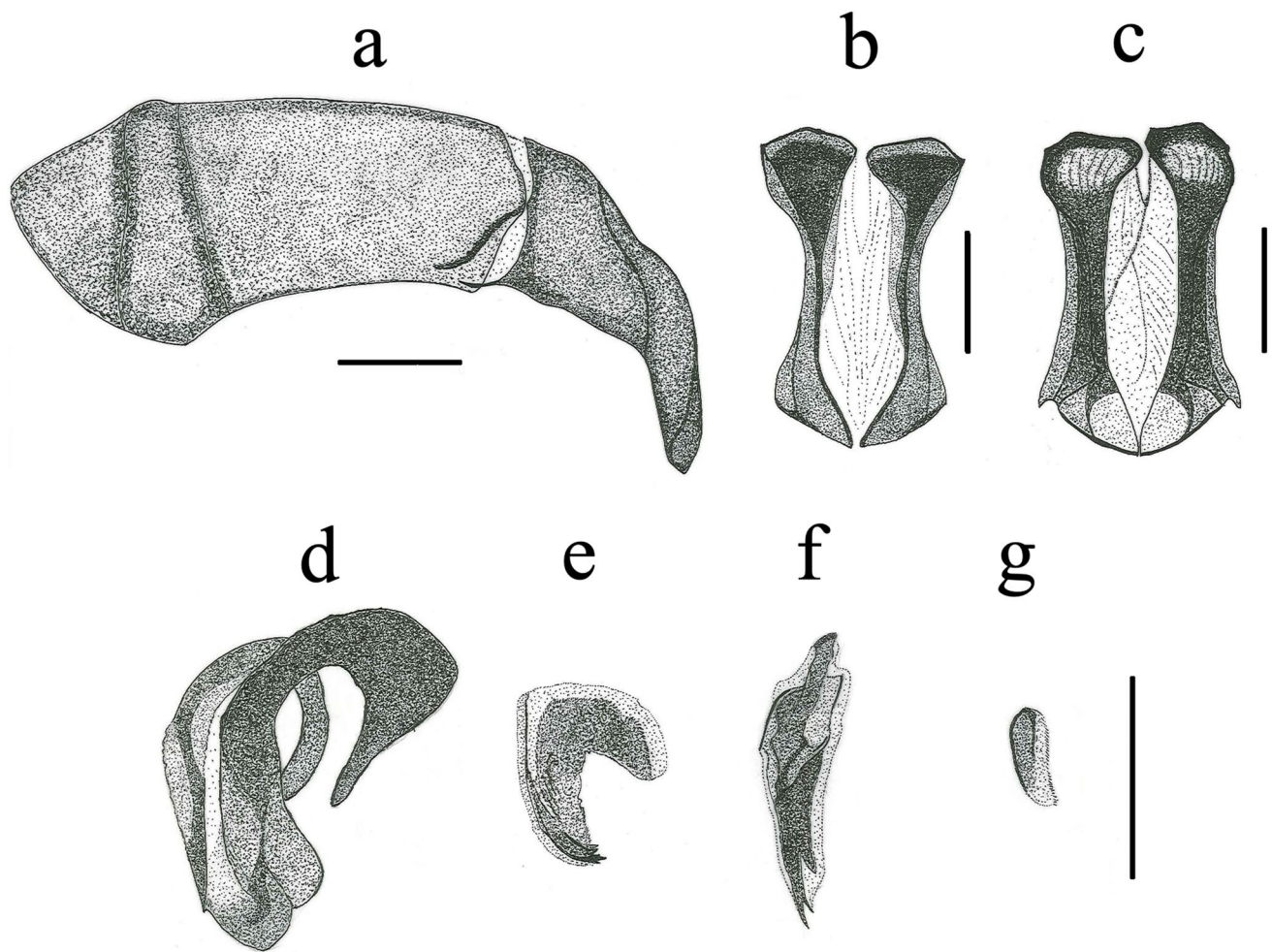


Fig. 3 *Dichotomius quadrinodosus*. **a.** Lateral view of aedeagus. **b.** Dorsal view of parameres. **c.** Ventral view of parameres. **d.** LC-Lamella copulatrix. **e.** SRP-superior-right peripheral sclerite. **f.**

A+SA complex—sclerites of axial and subaxial complex. **g.** FLP—Fronto-lateral peripheral sclerite (scale bar 1 mm)

diameter (for a detailed description see Arias-Buriticá and Vaz-de-Mello 2012).

Commentaries: For the first time, photographs of males and female of this species are presented. Due to the morphology of the head and pronotum of male, this species can be confused with the *D. reclinatus* species group. We include this species in the key to prevent it from being described in the future as a new species of the “reclinatus” species group. Recently, for characteristics of the external morphology such as the shape of the lateral pronotum, pronotal punctures, striae and elytra interstriae and hypomere punctures, the pro, meso and metaepisternum, and the male genital organ, the species was placed in the “bitiensis” species group (Arias-Buriticá and Vaz-de-Mello 2012).

Dichotomius (*Dichotomius*) *horridus* (Felsche, 1911)

(Figs. 1a–g, 6a–e, 7, 13a–d (diamond)).

Pinotus horridus Felsche 1911: 136–137 (original description).

Pinotus horridus Luederwaldt (1929): 21 (characters in key); 24 (misidentification); Pereira (1954): 464 (characters in key).

Dichotomius horridus Vulcano and Pereira 1967: 584 (characters in key); Medina et al. (2001): 138 (misidentification, citation); Brûlé et al. (2011): 32, 193 (citation, photography); Boilly and Vaz-de-Mello (2013): 112 (citation).

As *Dichotomius reclinatus* Sarmiento-Garcés and Amat-García (2014): 33–34, 117 (misidentification, misidentification holotype photography).

Material examined (9♂♂, 3♀♀). **Holotype:** Labels: {1: Printed and handwritten text on red label with black margins} **HOLOTYPE** ♂ / {2: handwritten text on white label with black margins} Cayenne / {3: handwritten text on white label with red margins} horridus felsche Cayenne / {4: handwritten text on brown label with black margins} Moroni /

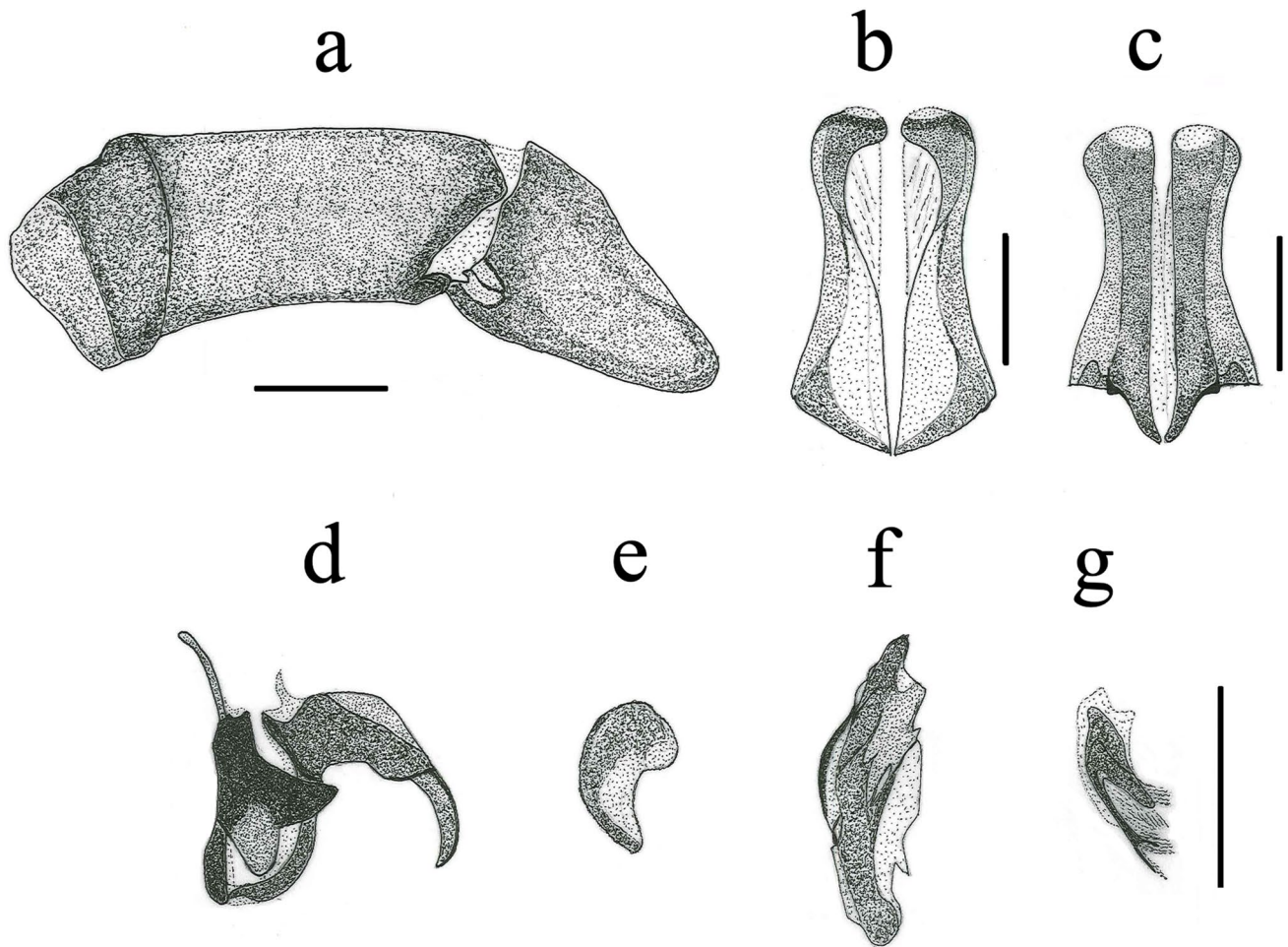


Fig. 4 *Dichotomius reclinatus*. **a.** Lateral view of aedeagus. **b.** Dorsal view of parameres. **c.** Ventral view of parameres. **d.** LC—Lamella copulatrix. **e.** SRP—superior-right peripheral sclerite. **f.** A+SA com-

plex—sclerites of axial and subaxial complex. **g.** FLP—Fronto-lateral peripheral sclerite (scale bar 1 mm)

{5: printed text on red label with black margins} Typus. /{6: printed text on green label with black margins} Coll. C. Felsche Kauf 20, 1918. 1♂. [SMTD]. **Additional specimens.** **BRAZIL: Pará:** Almeirim, Monte Dourado, Jari 01° 11' 13.8" S 52° 38' 44.5" W, 230 m, 8.v.2009, Pitfall Fez. Hum Suina 1:1, G. Schiffler. 1♂. [CEMT]. **FRENCH GUIANA:** Cayenne, X/1910. 1♂. [MZSP]. Petit Saut, PK19, 11/2000 (Guyane). 1♂. [CEMT]. FES Env. de Cacao, III/2007, P. Bonin leg. 1♀. [CEMT], I/2009. 2♂. 1♀. [CEMT]. Nouveau Chantier, Collection Le Moul. 1♂. [OUMHN]. Gourdonville, E. Le Moul. 1905.6. 1♂. [OUMHN]. Cayenne, Kourou, Rt Cayenne-Sinnamary, RN1PK84, FIT, I/2003, M. Duranton. 1♀. [CEMT]. **SURINAME:** Sipaliwini Dist[ri]ct, Kwamalasamutu Region, Kutari River, 02° 10'N 56° 47'W, 250 masl, CI RAP Survej, 18–24.VIII.2010. T. Larsen. 1♂ [NMNH].

Diagnosis: This species can be distinguished from the others of the *D. reclinatus* species group because the head of both sexes has three horns; the first one is long, central,

and directed backwards. The others two horns completely separated in the clypeal region (Fig. 6a–d). *D. horridus* is similar to *D. reclinatus* in their external morphology, to separate this species of *D. reclinatus* is necessary to review the elytral interstriae microsculpture; this is shallow in *D. horridus* giving shinny appearance (Fig. 6e). The male genital organ in lateral view with elongated and slender parameres (Fig. 1a), in ventral view with excavation near to the base (Fig. 1c), shape of endophallites (Fig. 1d–g), and its distribution (Northeast of Amazon basin and Guiana shield) (Fig. 7 (diamond)).

Males: Length 25–27.8 mm; width 14.5–15.8 mm (Fig. 6a). Black color and brown in teneral individuals.

Head: Wider than long. Anterior margin is oval with a projection in the central area. Clypeal teeth are weak, curved, and directed upwards (Fig. 6a, c). Clypeal surface strongly wrinkled. Central area with two cephalic horns located at the height of the inner side edge of the eyes. The horns are flat and wide at the base, directed upwards, and terminating

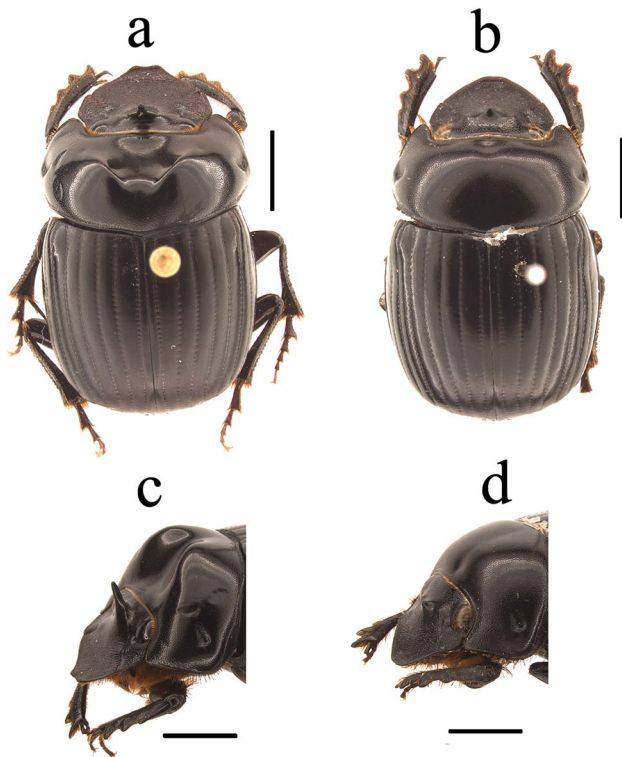


Fig. 5 *Dichotomius camposeabrai*. **a.** Dorsal habitus of the male. **b.** Dorsal habitus of the female **c.** Lateral view of head and pronotum of male. **d.** Lateral view of head and pronotum of female (scale bar 2 mm)

in a sharp tip, with a length of 2.5–5 mm (Fig. 6c). Genae surface with shallow wrinkles. Frons with a central cephalic horn is long, backwards, flattened, and triangular in the 1/3 basal, then compressed and becoming cylindrical, smooth, and ending in a blunt tip (Fig. 6c).

Thorax: Pronotum twice wider than long. Antero-central region with a central excavation forming a hump on each side (Fig. 6a, d). Surface with small punctures separated by at least two to three times their diameter. Punctures with circular shape in the posterior area and elongated toward the lateral area. Hypomeron with shagreened surface and setigerous punctures of different sizes separated by once their diameter and in some areas joined. Prosternum shagreened with small setigerous punctures in the posterior area and large in the central area. Elytral striae bicarinate with shallow, small, and ocellate punctures spaced by about five times their diameter (Fig. 6e). Elytral interstriae with shallow microsculpture giving shiny appearance (Fig. 6e). Mesosternum strongly shagreened, some specimens with short and weak setae. Central area with a smooth surface that goes to the middle of the meso-metaasternal suture. Mesepisternum shagreened with large setigerous punctures separated by less than once their diameter. Meso-metaasternal

suture complete, some specimens in central area covered with a smooth surface that begins in the mesosternum. Metasternum with central area shagreened, shiny and without setae; with strong carina from 1/3 of metasternum to the back ending in a deep fovea. Edges of the anterior area shagreened with dense setigerous punctures, posterior area shagreened with large setigerous punctures separated by once their diameter. Metaepisternum with similar surface to mesepisternum.

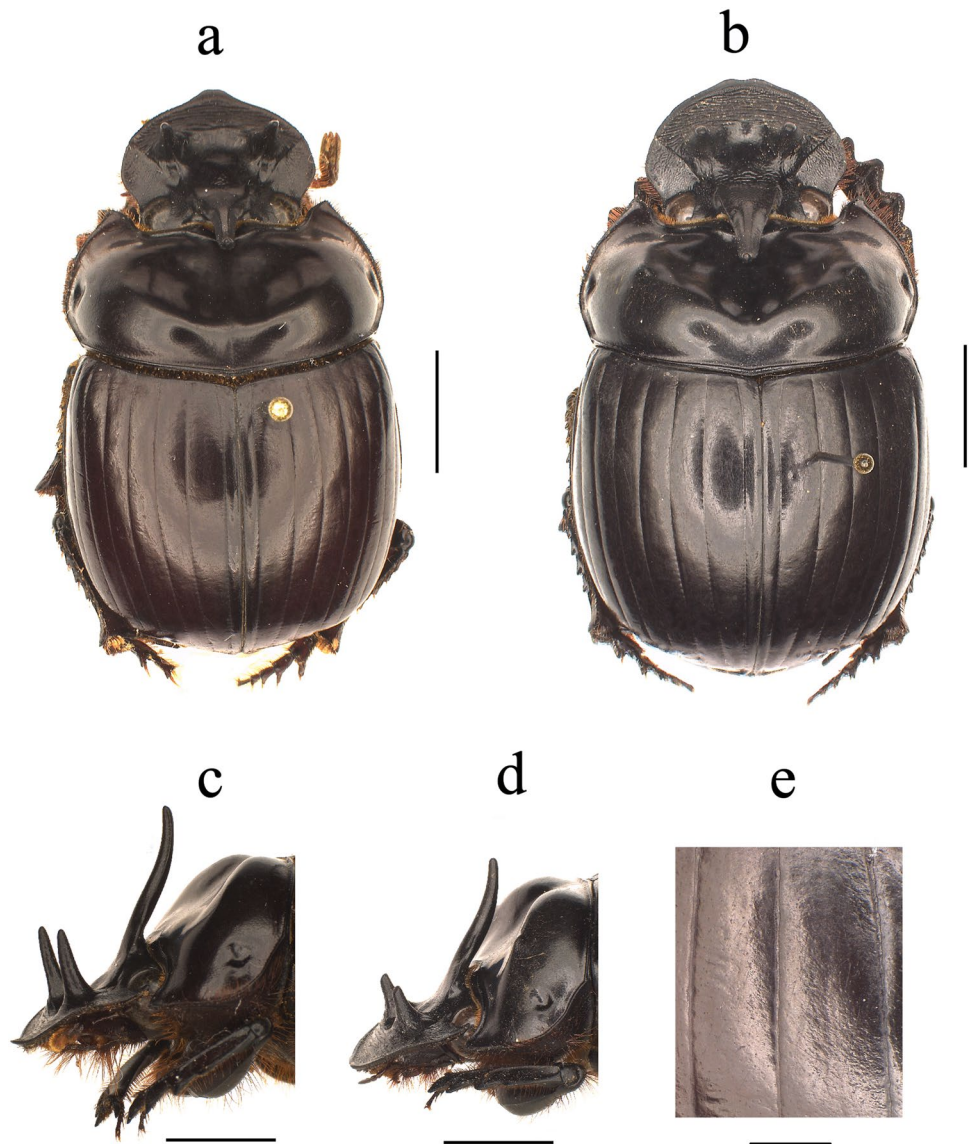
Abdomen: Shagreened ventrites with one or two rows of ocellate points in the anterior area becoming denser toward the side. Sixth ventrite very narrow medially. Pygidium shagreened with some shallow punctures spaced by more than five times their diameter. Pygidium with basal margin complete.

Legs: Protibia with four lateral teeth. Protibial spur simple going to the base of the fourth tarsomere. Meso and metatibia widened gradually toward apex, five lateral teeth, each with long erect setae; dorsal surface with two longitudinal lines of setae, apical side with setae throughout. Mesotibia with two spurs, unequal in length and acute apically. Metatibial spur apically truncate going to the base of the fourth tarsomere. Meso and metatibia with five tarsomeres, the first four sub-triangular, flattened dorsoventrally, inner edge with long continuous erect setae, outer edge with three to four setae, and the apices with tufts of setae.

Male genital organ: Lateral view of aedeagus with sub-quadrangular phallobase, basal area with a medium bulge on both sides, apex with a constriction of approximately 115° and a notch on the lower edge. Parameres subtriangular, widened at the base, slender and curved at the apex, with a fleshy membrane; lower basal area with an invagination (Fig. 1a). Dorsal view with symmetrical parameres with widened base. Central area with a constriction and widening apically. Apex of parameres curved and robust, with a shallow curvature on the inside edge (Fig. 1b). Ventral view with symmetrical parameres. At the base exhibiting a deep excavation in the middle of each paramere and, on the inside, an extension that extends beyond the edge of the phallobase, inner edge straight with insertion of a membrane from the basal to apical area (Fig. 1c). **Endophallites:** Lamella copulatrix (LC) is large, asymmetrical and sclerotized (Fig. 1d). Sclerites of axial and subaxial complex (A + SA complex) with undefined form, more sclerotized in the central area surrounded by a semi-sclerotized membrane (Fig. 1f). Superior-right peripheral sclerite (SRP) has “C” form, wide and with undefined edges (Fig. 1e). Fronto-lateral peripheral sclerite (FLP) enlarged in the apical area and basal area with some hair-shaped structures (Fig. 1g).

Female: Length 27.8–31 mm; width 15.5–18.2 mm. Differs from male by presenting the clypeus without the central projection, with two well-formed and visible

Fig. 6 *Dichotomius horridus*. a. Dorsal habitus of the male. b. Dorsal habitus of the female. c. Lateral view of head and pronotum of male. d. Lateral view of head and pronotum of female (scale bar 5 mm). e. Stria and interstriae (scale bar 1 mm)



clypeal teeth (Figs. 6b, d and 13). Clypeal horns are shorter and robust (some specimens less than 2 mm) (Figs. 6b, d and 13). Frons process is shorter, wide and with evident punctures in the basal area (some specimens less than 2 mm) (Figs. 6b, d and 13). The depression formed between cephalic processes is shallow (Figs. 6b, d and 13). Pronotum with less excavation in the central area, so that the pronotal humps are more prominent toward to the central area of pronotum (Figs. 6b, d and 13). Sixth abdominal ventrite not shortened medially.

Commentaries: This species is associated with Amazonian evergreen forests located north of the Amazon basin and humid forests of the Guiana shield. It is a rare species in entomological collections and with field captures of very few individuals. There are individuals from very old collections from around 1900, and the material

recently collected by Bonin, Larsen, and Schiffler (cited in material examined).

Distribution: Only known from Brazil (Pará state), French Guiana, and Suriname (Sipaliwini district) (Fig. 7 (diamond)).

***Dichotomius (Dichotomius) nimuendaju* (Luederwaldt, 1925)**

(Figs. 2a–g, 7, 11a–e, 12a–i (triangle)).

Pinotus nimuendaju Luederwaldt 1925: 67 (original description).

Pinotus nimuendajui Luederwaldt (1929): 126, 154 (unjustified amendment); Pereira (1954): 463 (characters in key).

Dichotomius nimuendajui Vulcano et al. (1976): 517 (synonym of *Dichotomius calcaratus*); Vulcano and Pereira

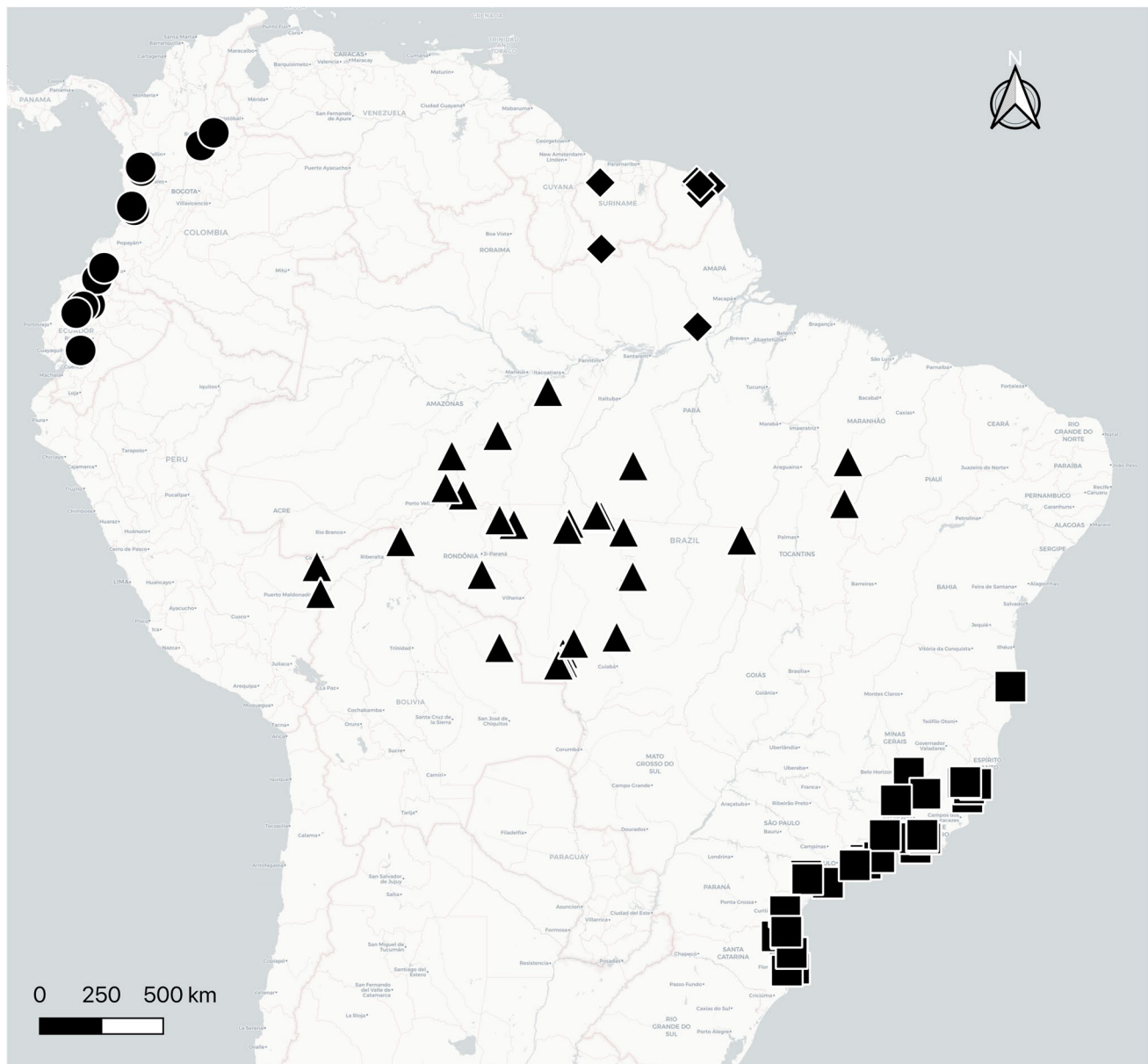


Fig. 7 Known distribution of the *D. reclinatus* species-group: *Dichotomius horridus* (diamond), *Dichotomius nimuendaju* (triangle), *Dichotomius quadrinodosus* (square), *Dichotomius reclinatus* (circle)

1967: 584 (characters in key); Spector and Ayzama (2003): 398 (citation).

As *Dichotomius calcaratus* Hamel-Leigue et al. (2006): 2, 5 (misidentification), 29–30 (photography cited as *Dichotomius* sp. 2).

Dichotomius aff. *nimuendaju* Vaz-de-Mello et al. (2011): 88, 94 (citation).

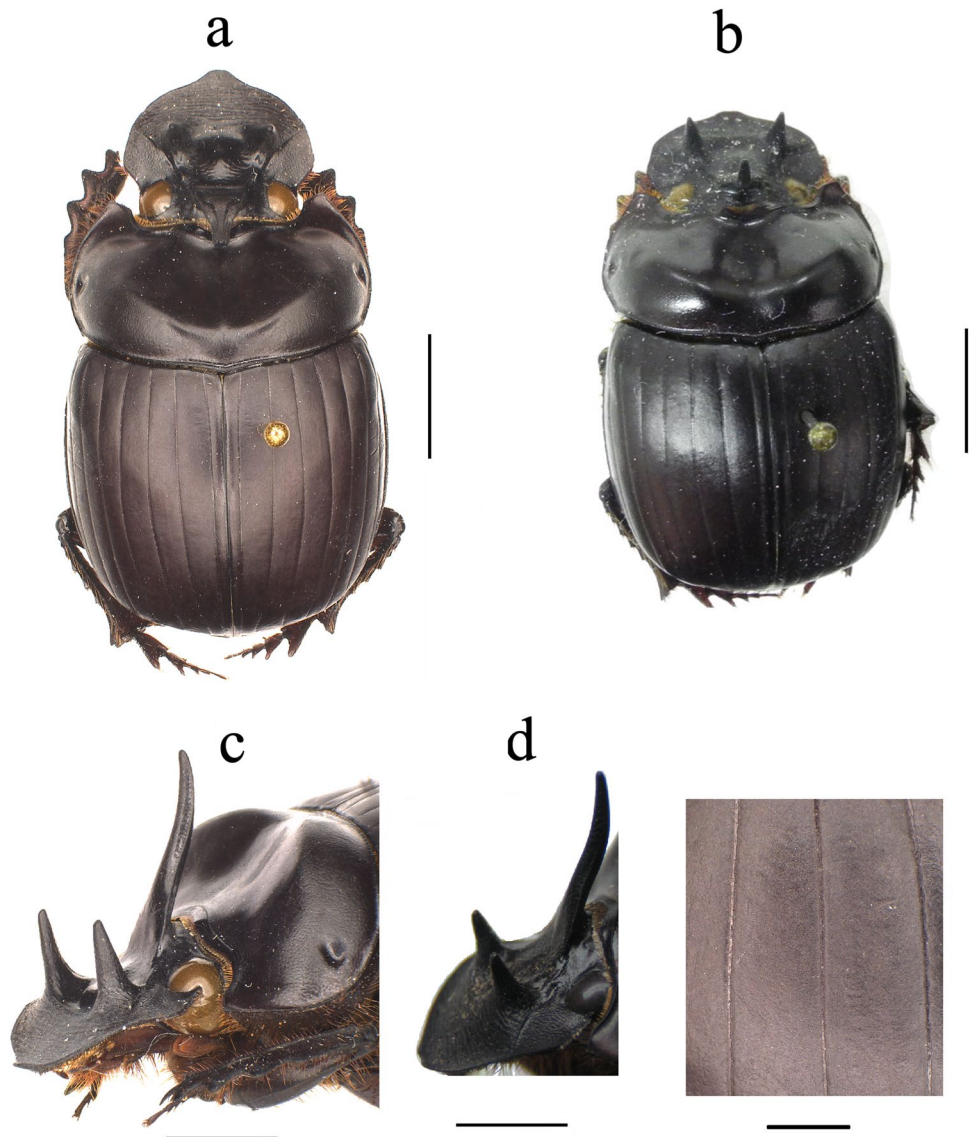
Dichotomius nimuendaju Arias-Buriticá and Vaz-de-Mello (2019): 44 (stat. rev.)

Material examined (33♂♂, 28♀♀). **Holotype:** Labels: {1: printed text on red label with black margins} **TIPO** / {2: handwritten text on white label} Brasil Est. Amazonas

Manicoré XII/1923 H.C. Boy / {3: handwritten text by Luederwaldt on white label} Pinotus nimuendaju Luedet-25 / {4: triangular label} [male genital organ] / {5 printed text on white label} 17,012. 1♂. [MZSP]. **Additional specimens.** **BOLIVIA: Pando:** Cobija, Reserva San Sebastian, Tahuamanu, Distr. Amaz. Frst, 11° 24' 27" S 69° 01' 04" W 250 m alt, 20/XII/2003, Coll D.J. Mann & A.C. Hamel. 1♂. [OUMNH]; 23/XII/2003. 1♀. [OUMNH]. Villa Bella, 120 m, primary forest seasonally flooded, pitfall human dung, 20 km SW of Villa Bella 10° 21' S 65° 25' W F. Guerra, II-24 1996. 1♀. [NMNH]. **Santa Cruz:** RPPN Caparú, 14° 48' S 61° 10' W 180 m,

Fig. 8 *Dichotomius reclinatus*.

a. Dorsal habitus of the male.
b. Dorsal habitus of the female.
c. Lateral view of head and pronotum of male.
d. Lateral view of head and pronotum of female
 (scale bar 5 mm). **e.** Stria and interstriae (scale bar 1 mm)



11/XII/2005, Chiquitano-Amazonico, heces humano, Prep/Leg C. Hamel. 1♂. [OUMNH]. **BRAZIL: Amazonas:** Nova Olinda do Norte, II.1990 (30) Adrinel Gama. Coleção Ricardo Kolke. 1♂. [CEMT]. Manicoré, BR319 Km 450, Res[erva] Ex[trativista] [do] Lago [do] Capanã Grande, 6° 1' 5" S 62° 29' 24" W, 600 m, 31.X-02/XI/2019, hum dung, R.A. Azevedo. 1♂. [CEMT]. Manicoré, BR319 Km 450, Res[erva] Ex[trativista] [do] Lago [do] Capanã Grande, 5° 58' 52" S 62° 27' 38" W, 700 m, 31.X-02/XI/2019, hum dung, R.A. Azevedo. 1♀. [CEMT]. **Maranhão:** Balsas, Serra do Penitente, 5–13/XI/2004, Mielke, C.G.C. 1♂. [CEMT]. F[ortalezas] dos Nogueiras, Fazenda Santa Maria, Est[ação] Experim[ental] Agroserra, Armadilha Luminosa, 07–11/V/2010, L.L. Reis & L.M. Oliveira. 1♀. [CEMT]. **Mato Grosso:** Araputanga, Fazenda Araputanga, Bacia, Jauru, 15° 2' 48" S 58° 26' 03" W, XII/2002, M. Santos-Filho. 2♂. [CEMT]. Barra do Tapirapé, XI/1964, Malkin,

B. 1♂. 2♀. [MZSP]. Carlinda, 21/X/2008, B. Kain. 1♀. [CEMT]; 22/X/2008, Cruz, E.P.P. 1♀. [CEMT]; XI/2009. 1♀. [CEMT]. Carlinda, Agr. Verde Paraíso, 21/XI/2010. FIT. E.T. Silva. 1♀. [CEMT]. Cotriguaçu, Fazenda São Nicolau, Mata, 9° 50' 26" S 58° 15' 10" W, 250 m, 8/X/2009, Pitfall fezes humanas, Vaz-de-Mello, F. 2♂. [CEMT]. Diamantino, Vale da Solidão, Pitfall Mata Ciliar, 14° 21' 53" S 56° 07' 30" W, 31/I/2009, Oliveira. 1♀. [CEMT]. Paranaita, Rio Teles Pires, 9° 17' 55.85" S 56° 47' 48.92" W, XII/2008, Rede de neblina, Souza, M.F.; Prado, M.U. 1♂. [CEMT]. Paranaita, "Mero D", 50 m, 21/II/2009, Rede de neblina, M.F. Souza. 1♂. [CEMT]. Uhe, Fazenda São Manuel, 24/X–3/XI/2009, Faria, H.A.B. 1♂. [CEMT]. Sinop, X/1976, Alvarenga, M. 1♀. [CEMT]. Sinop, Fazenda Continental, M1 T1 P5, 24/X/2009, Pitfall fezes humanas. 2♀. [CEMT]; M1 T2 P2, 48 h, 18/III/2010. 1♂. [CEMT]; Modulo I, M1T2P8, 23/XII/2009. 1♂. [CEMT]; Modulo I, MM2P8, 23/XII/2009.

Fig. 9 *Dichotomius quadrinodosus*. **a.** Dorsal habitus of the male. **b.** Dorsal habitus of the female. **c.** Lateral view of head and pronotum of male. **d.** Frontal view of head and pronotum of female (scale bar 5 mm) **e.** Stria and interstriae (scale bar 1 mm)

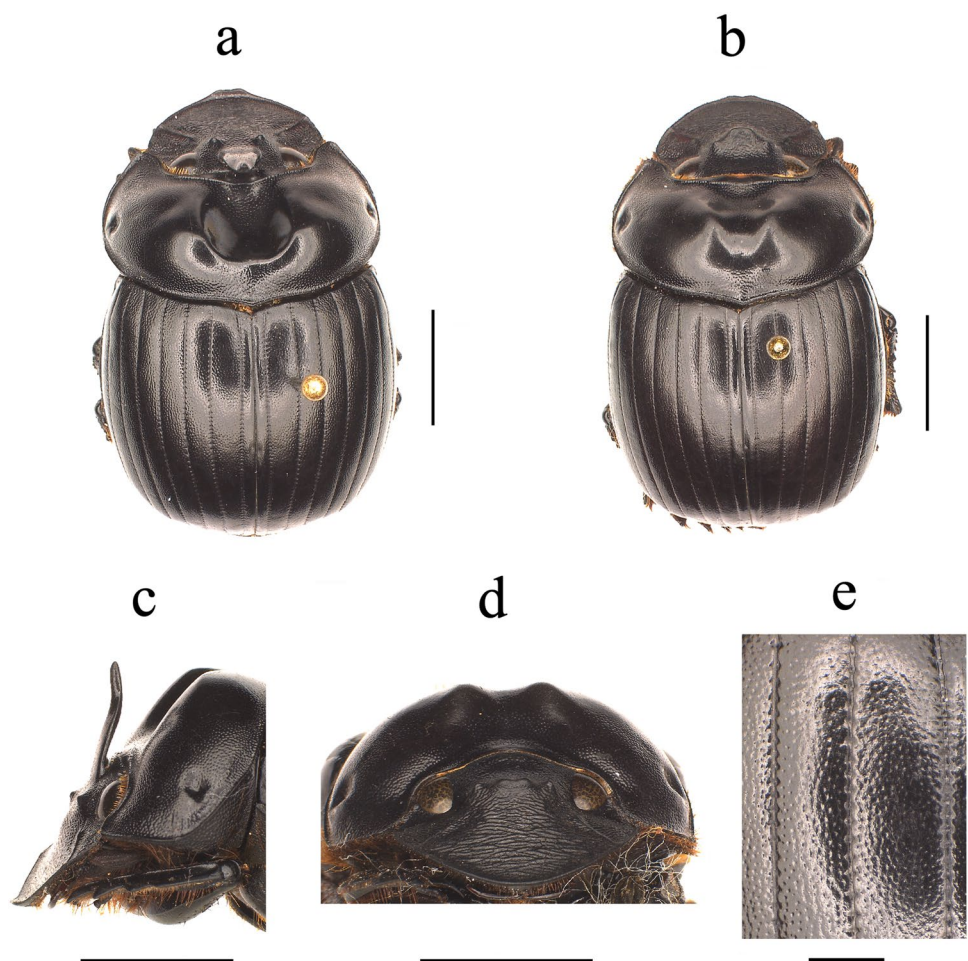


Fig. 10 *Dichotomius quadrinodosus*. **a.** Dorsal habitus of the males 2 (scale bar 5 mm). **b.** Lateral view of head and pronotum of males 2 (scale bar 1 mm)

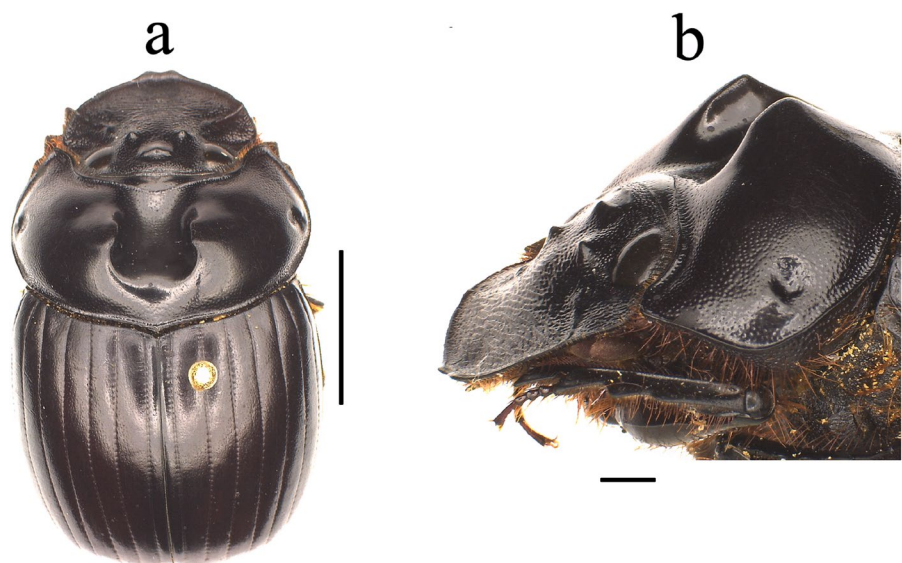
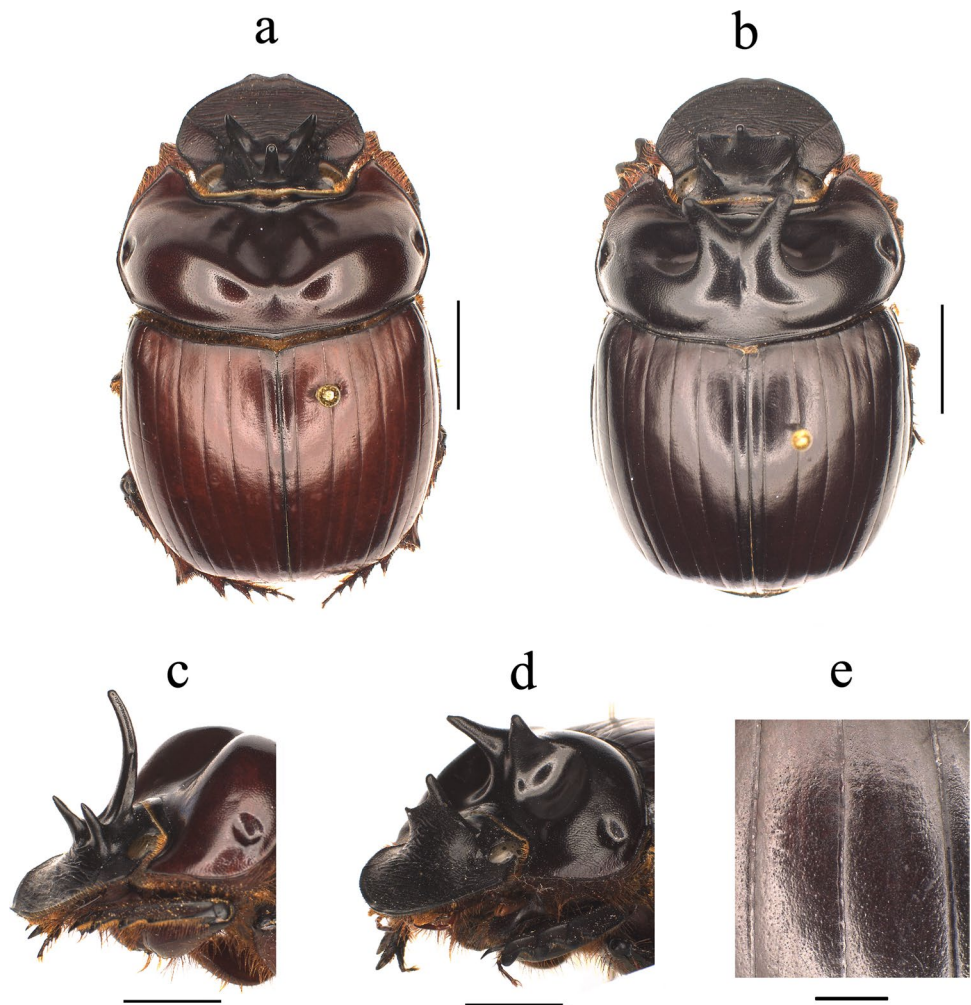


Fig. 11 *Dichotomius nim-
uendaju*. **a.** Dorsal habitus of
the male. **b.** Dorsal habitus of
the female. **c.** Lateral view of
head and pronotum of male.
d. Lateral view of head and
pronotum of female (scale bar
5 mm). **e.** Stria and interstriae
(scale bar 1 mm)



1♂. [CEMT]; MIT1P2, 48 h, 18/II/2010. 1♀. [CEMT]. Araputanga, Faz Bandeirantes, Floresta semidecidual, 15° 22' 14" S 58° 26' 02" W, 338 m, 20–22.I.2013, Pitfall hum-pig dung, Silva, R.J. 2♂. 1♀. [CEMT]. Araputanga, Faz Sudam, Floresta semidecidual, 15° 15' 45" S 58° 26' 23" W, 352 m, 29–31.I.2013, Pitfall hum-pig dung, Silva, R.J. 1♂. [CEMT]. Araputanga, Faz Bandeirantes, Floresta semidecidual, 15° 23' 04" S 58° 26' 00" W, 296 m, 21–23.I.2013, Pitfall hum-pig dung, Silva, R.J. 1♂. [CEMT]. Araputanga, Faz Sudam, Floresta semidecidual, 15° 15' 22" S 58° 27' 12" W, 352 m, 28–30.I.2013, Pitfall hum-pig dung, Silva, R.J. 1♂. [CEMT]. Indaiavai, Faz Alto Jaurú, Floresta semidecidual, 15° 26' 19" S 58° 34' 51" W, 231 m, 14–16.I.2013, Pitfall hum-pig dung, Silva, R.J. 1♂. [CEMT]. Indaiavai, Faz Alto Jaurú, Floresta semidecidual, 15° 27' 18" S 58° 33' 12" W, 308 m, 12–14.I.2013, Pitfall hum-pig dung, Silva, R.J. 1♂. [CEMT]. Figueiropolis d' Oeste, Faz Monte Fusco, Floresta semidecidual, 15° 31' 46" S 58° 38' 12" W, 308 m, 11–13.I.2013, Pitfall hum-pig dung, Silva, R.J. 1♂. [CEMT]. Tangará da Serra, Faz, Sudamata, Floresta semidecidual, 14° 37' 18" S 57° 58' 01" W, 354 m, 21–23.II.2012,

Pitfall hum-pig dung, Silva, R.J. 1♀. [CEMT]. Alta Floresta, P[arque] E[stadua] [do] Cristalino, 9° 35' 50" S 55° 53' 40" W, 287 m, 15–17/XI/2019, hum dung. R.A. Azevedo. 1♂. [CEMT]. Juína, Fazenda Quiles, 29/XI/2012, R.J. Silva, Carcasa. 2♂. [CEMT]. **Pará:** Jacareacanga, Rio Teles Pires, Fazenda Aragão, Margem direita, 9° 14' 03" S 56° 59' 24" W, II/2009, Coleta manual, Souza, M.F; Uehara-Prado, M. 1♀. [CEMT]. Novo Progresso Faz[enda] Florentino, 7° 08' S 55° 25' W, 230 m, X–XI.2010, FIT. Krinski, D. 1♀. [CEMT]. **Rondônia:** Porto Velho, Uhe, Jirau-Caiçara, Transsecto III, Parcela V, Margem esquerda, Pitfall 3, 24 h, 2/III/2010. 1♀. [CEMT]. Porto Velho, Abuná, T9P4A3, 9° 36' 43" S 64° 32' 47" W, fezes hum. 14–16/I/2011, JCF Falcão & LR Silva. 1♂. 1♀. [CEMT]; T9P2A3, 9° 37' 33" S 64° 33' 25" W, 13–15/I/2011. 1♀. [CEMT]; T9P1A3, 9° 37' 58" S 64° 33' 42" W, 13–15/I/2011. 1♂. [CEMT]; T11P2A2, 9° 38' 08" S 64° 32' 48" W, 13–15/I/2011. 1♀. [CEMT]. Porto Velho, Nova Mutum, Parana, T1P2A1, 9° 26' 21" S 64° 09' 21" W, Fezes Humanas, 06–08/I/2011, JCF Falcao & LR Silva. 1♂. [CEMT]; T1P2A2, 9° 26' 19" S 61° 09' 26" W. 1♀. [CEMT]. ESEC Cuniã, L1-500, 8° 4' 11.82" S 63° 28'

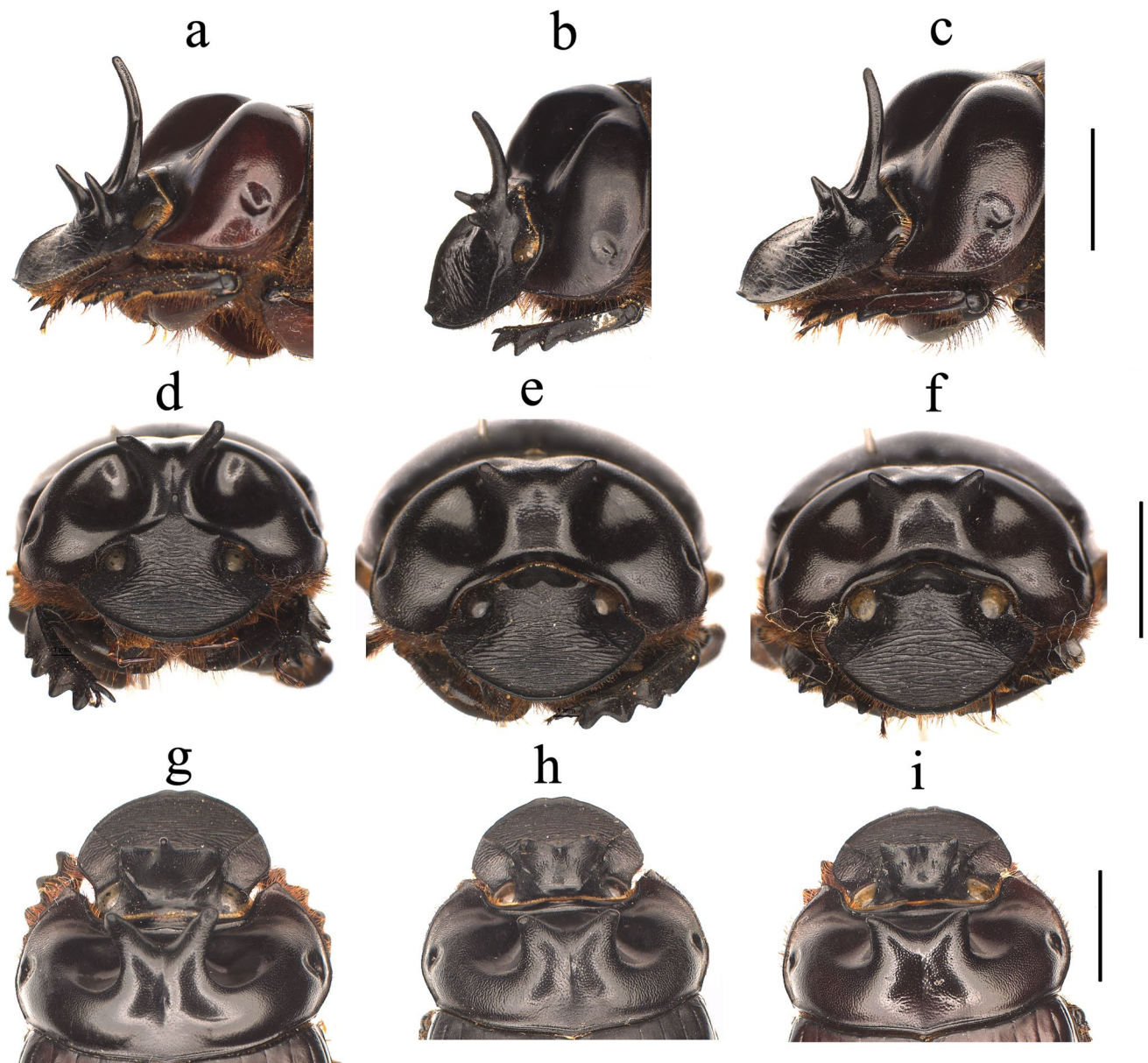


Fig. 12 Variation of *Dichotomius nimuendaju*. **a–c**. Lateral view of head and pronotum of different males. **d–f**. Frontal view of head and pronotum of different females. **g–i**. Dorsal view of head and pronotum of different females (scale bar 5 mm)

34.64" W, 83 m, 10–12.xi.2013, pitfall human dung, Silveira, M.A.P.A. 3♂. 2♀. [CEMT]. Rolim de Moura SAF, 11° 44' 4.93" S 61° 55' 9.19" W, 215 m, 08–10.xii.2015, pitfall human dung, Castro, D.C. 2♀. [CEMT]. **PERU: Madre de Dios:** Río Palma real Grande Limón camp, 12° 32'20" S 68° 51'41" W. Pitfall human dung, 400 m, T. Larsen. III-30/31, 1999. 1♂. [NMNH].

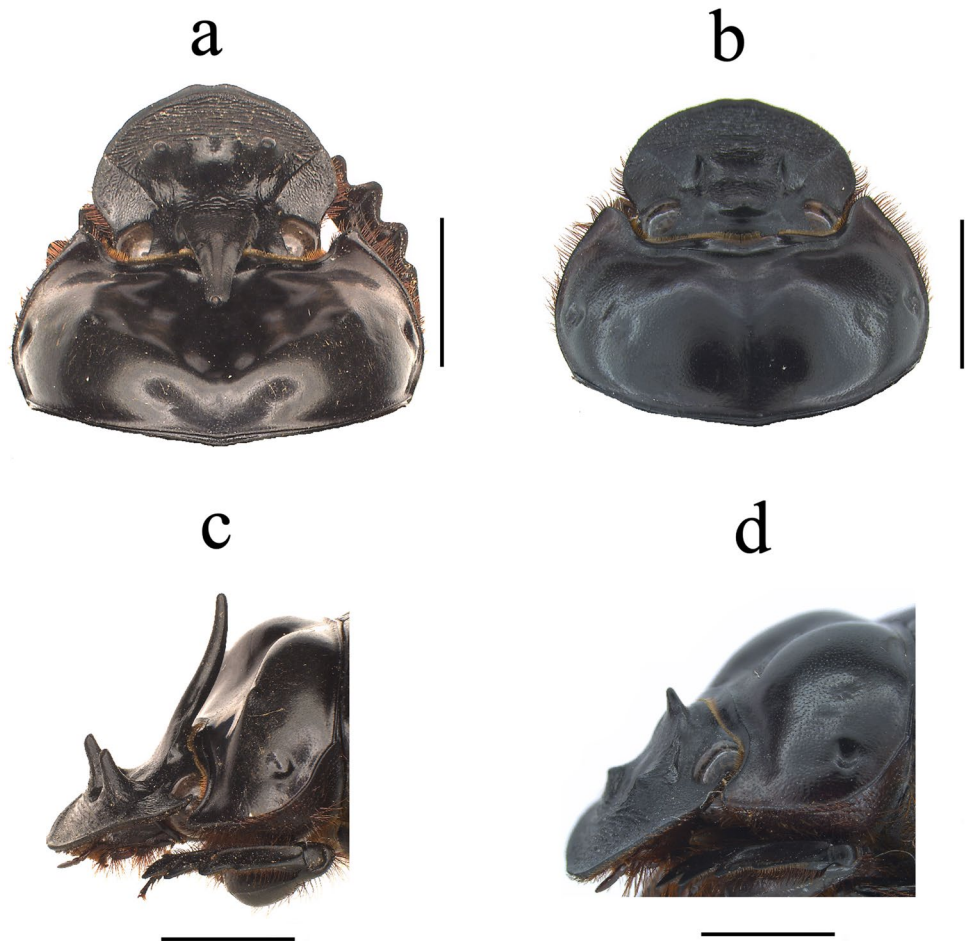
Diagnosis: Frons of males with three horns, the first one central, backward, long, and subcylindrical and two lateral horns with two or more millimeters (sometimes joined at the base of the first) (Figs. 11a, c and 12a–c). Male genital organ in lateral view with widened parameres (Fig. 2a), in

ventral view with curved and robust apex (Fig. 2c). Shape of endophallites (Fig. 2d–g). Fronto-clypeal region of females with three-pointed cephalic process (Figs. 11b, d and 12d–f), pronotum with “V”-shaped central process (Figs. 11b and 12g–i). Striae bicarinate and shallow impressed. Intestriae shagreened with small ocellate punctures spaced by about five times their diameter (Fig. 11e).

Males: Length 19–28 mm; width 13–19 mm (Fig. 11a). Black color and brown in teneral individuals.

Head: Wider than long. Anterior margin is oval. Clypeal teeth are weak, curved, and directed upwards (Fig. 11a, c). Clypeal surface strongly wrinkled. Gena surface with

Fig. 13 Variation in females of *Dichotomius horridus*. **a.** Dorsal view of head and pronotum of major female. **b.** Dorsal view of head and pronotum of minor female. **c.** Lateral view of head and pronotum of major female. **d.** Lateral view of head and pronotum of minor female (scale bar 5 mm)



wrinkles in the anterior area and small punctures in the posterior area. Frons with three horns, the first one is central, rearwards, long, cylindrical, smooth, and ending in a blunt tip (some specimens to 2/3 having a keel on each side). The other two horns emerging extend out from below the anterior edge of the eyes, directed upwards and parallel to the central horn, wide at their basal area and terminating in a sharp tip (Figs. 11c and 12a); in other specimens, the two horns emerging from the base directed upwards, diagonal and with process that joins to the central horn, wide at their basal area and terminating in a blunt tip (Fig. 12b) and small individuals with punctures in the central horn (Fig. 12c).

Thorax: Pronotum twice wider than long. Antero-central region with a central excavation forming a hump on each side (Figs. 11a, c and 12a–c). Surface with small punctures separated by at least two to three times their diameter. Punctures with circular shape in the posterior area and elongated toward the lateral area. Hypomerone with shagreened surface and large ocellate punctures separated by once their diameter (some with setae). Prosternum shagreened with dispersed setigerous punctures. Elytral striae bicrenate and shallow impressed. Elytral intestriae surface shallow shagreened with small ocellate punctures spaced by about five

times their diameter (Fig. 11e). Mesosternum shagreened. Mesepisternum shagreened with large ocellate punctures separated by once their diameter. Meso-metaesternal suture complete, shiny and shagreened. Metasternum with weak carina in the central area, going toward the back and ending in a shiny fovea. Lateral edges of anterior area shagreened with dense setigerous punctures; posterior region with large setigerous punctures separated by once their diameter. Metaepisternum with similar surface to mesepisternum.

Abdomen: Shagreened ventrites, from second to fifth with one row of setae, lateral edges with denser setigerous points. Sixth ventrite very narrow medially. Pygidium shagreened with small and disperse punctures, evident at 30×. Pygidium with basal margin complete.

Legs: Protibia with four lateral teeth. Protibial spur simple going to the base of the base of the last tarsomere. Meso and metatibia widened gradually toward apex, five lateral teeth, each with long erect setae; dorsal surface with two longitudinal lines of setae, apical side with setae throughout. Mesotibia with two spurs, unequal in length and acute apically. Metatibial spur apically truncate going to the base of the third tarsomere. Meso and metatibia with five tarsomeres, the first four sub-triangular, flattened

dorsoventrally, inner edge with long continuous erect setae, outer edge with three to four setae, and the apices with tufts of setae.

Male genital organ: Lateral view of aedeagus with subquadrangular phallobase, basal area with a medium bulge on both sides, apex with a constriction of approximately 115° and a notch on the lower edge. Subtriangular parameres, enlarged at the base, slender and curved at the apex and with a fleshy membrane; lower-basal area with an invagination (Fig. 2a). Dorsal view with symmetrical parameres with enlarged base. Central area with a constriction and widening apically. Apex of parameres curved and robust, with a strong curvature on the inside edge, surface with small punctures separated by at least five times their diameter (Fig. 2b). Ventral view with symmetrical parameres, with a wide central area (narrower in some individuals). Surface with similar punctures to dorsal view. At the base with an excavation in the middle of each paramere and on the inside an extension that continues beyond the edge of the phallobase (Fig. 2c). **Endophallites:** LC is large, asymmetrical and sclerotized (Fig. 2d). A + SA complex with undefined form, more sclerotized in the central area surrounded by a semi-sclerotized membrane (Fig. 2f). SRP has “C” form, wide and with undefined edges with serrated and indistinct edges (Fig. 2e). FLP has enlarged “C” form, widened in the apical area and basal area with some hair-shaped structures (Fig. 2g).

Females: Length 23.5–29.2 mm; width 13.3–19 mm. Differs from males as presents in the fronto-clypeal region a three-pointed process, some specimens with the three tips of the same size and others with the central tip higher than the lateral ones (Figs. 11b, d and 12d–i). Pronotum in dorsal view with central process “V” shaped extended to the anterior 1/3 of the pronotum or to the base of the head in major females (Figs. 11b, d and 12d–i). Sixth abdominal ventrite not shortened medially.

Commentaries: This species is associated with Amazonian evergreen and seasonal forests located south of the Amazon basin. It has been collected at 50 m of altitude and on several occasions has been captured in mist nets for birds. Spector and Ayzama (2003) recorded this species from Bolivia in a tropical evergreen forest. It is a rare species in entomological collections and with field captures, with only one or two individuals generally collected per sample, the species has an intraspecific variation in various forms in both males and females.

Vulcano et al. (1976) proposed *D. nimuendaju* as synonymous with *Dichotomius calcaratus* (Arrow 1913). Arias-Buritica and Vaz-de-Mello (2019) reviewed the holotypes of the two species and revalidated to *D. nimuendaju*, concluding that *D. calcaratus* is not related to *D. nimuendaju* and apparently, due to head and thorax morphology, proposed *D. calcaratus* to be a potential synonym for *Dichotomius mamillatus* (Felsche 1901). This synonymy (*D.*

calcaratus = *D. mamillatus*) was established by Rossini and Vaz-de-Mello (2020).

Distribution: Bolivia (Pando and Santa Cruz departments), Brazil (Amazonas, Maranhão, Mato Grosso, Pará and Rondônia states), and Peru (Madre de Dios department) (Fig. 13 (triangle)).

Dichotomius (Dichotomius) quadrinodosus (Felsche, 1901)

(Figs. 3a–g, 7, 9a–e, 10a–b (square)).

Pinotus quadrinodosus Felsche 1901: 136 (original description).

Pinotus quadrinodosus Luederwaldt (1929): 20 (characters in key); 24–25 (redescription); Pereira (1954): 463 (characters in key).

Dichotomius quadrinodosus Louzada and Lopes (1997): 118 (citation); Vaz-de-Mello (2000): 193 (citation); Falqueto et al. (2005): 20 (citation); Culot et al. (2013): 2, 5, 7, 9 (citation); Silva and Hernández (2014): 5 (citation); Silva and Hernández (2016): 78 (citation); Nichols et al. (2017): 338–339 (citation); Raine et al. (2018): 7 (citation); Amore et al. (2018): supporting information (citation); Genes et al. (2018): 93 (citation); da Silva et al. (2018a): appendix S2 (citation); da Silva et al. (2018b): 1682 (citation); Hernández et al. (2019): 696,699 (citation, photography male and female).

Material examined (112♂♂, 167♀♀). **Holotype:** Labels: {1: printed and handwritten text on red label} **HOLOTYPE** ♀ / {2: handwritten text on white label with purple margins} quadrinodosus felsche S. Brasilien / {3: handwritten text on white label with black margins} Honduras / {4: printed text on orange label} **Typus.** / {5: printed text on green label with black margins} Coll. C. Felsche Kauf 20, 1918. 1♀. [SMTD]. **Additional specimens.** **BRAZIL:** **Bahia:** Eunápolis, VII/2004, J.N.C Louzada 1♂. 1♀. [CEMT]. Porto Seguro, Veracel, Regeneração avançada, 13/XI/2004, pitfall fezes humanas, Louzada, J. 10♂. 8♀. [CEMT]. Porto Seguro, VII/1993, Grossi, E. 2♂. [CEMT]. Porto Seguro, VII/1996, Grossi, E. 1♀. [CEMT]. Porto Seguro, RPPN Estacao Veracel, 16° 21' 31" S 39° 7' 41" W, 85 m, secondary forest, 13-V-2012, human feces, Audino LD. 1♂. [CEMT]. **Espírito Santo:** 1169 comp/ de Staudinger. 1♀. [MZSP]. Cachoeiro de Itapemirim, Mata da Usina Palmeiras, Rod. Cachoeiro-Marataízes, I/2007, Pitfall fezes humanas, Louzada, J. 4♂. 2♀. [CEMT]. Conceição do Castelo, XI/1994, Arnaud, P.; Grossi, E.; Vaz-de-Mello, F. 2♂. [CEMT]. Vargem Alta, 680 m, 15/IX/1995, Louzada, J.; Louzada. 2♂. 1♀. [CEMT]. Vargem Alta, 680 m, IX/1995, Louzada, J. 2♂. 1♀. [CEMT]. Vargem Alta, I/2007, Pitfall fezes humanas, Louzada, J. 6♂. 16♀. [CEMT]. Vargem Alta, IX/1995, Louzada, J. 2♂. 3♀. [CEMT]. Venda Nova do Imigrante, XII/2001,

- Vaz-de-Mello, F. 2♂. 4♀. [CEMT]. Marechal Floriano, Pitfall, I-2003, L. Dias Leg. 3♂. 4♀. [CEMT]. Venda Nova do Imigrante, Vila Santa Cruz, 20° 20' 02" S 41° 08' 18" W, 800 m, 10–14-I-2011, hum dung, FZ Vaz-de-Mello. 1♀. [CEMT]. **Minas Gerais:** Viçosa, Campus da UFV, Mata da Biologia, 20° 45' 28" S 42° 51' 52" W, X/2000, M.G.F. de Mata. 1♂. [CEMT]. Viçosa, I/1994, Louzada, J. 1♂. [CEMT]. Serra do Sapo/Ferrugem floresta semidecidual, 20° 45' 28" S 42° 51' 52" W, 1230 m, Fagundes, R. 1♂. [CEMT]. Maripá de Minas, X/2009, Modesto, M.M. 1♂. [CEMT]. Conceição do Mato Dentro, Serra do Sapo/Ferrugem floresta semidecidual, Fagundes, R. 1♀. [CEMT]. Maripá de Minas, X/2009, Modesto, M.M. 1♂. [CEMT]. Maripá de Minas, Hum. Faec. XI/2009, Modesto, M.M. 3♀. [CEMT]. Viçosa, G9, I/1996, Louzada, Sperber y Vaz-de-Mello. 1♂. [CEMT]. Viçosa, G9, II/1996, Sperber, Louzada, Lopes y Vaz-de-Mello. 1♂. 5♀. [CEMT]. Viçosa, M17, II/1996, Sperber, Louzada, Lopes y Vaz-de-Mello. 1♂. [CEMT]. Viçosa, Mata da Biologia, 20° 45' 28" S 42° 51' 52" W, X/1998, Sobrinho, T. 2♂. [CEMT]. Viçosa, Mata do Paraíso, 20° 48' 02" S 42° 51' 38" W, X/1998, Pitfall fezes humanas, Falqueto y Vaz-de-Mello. 1♂. [CEMT]. Viçosa, 10/I/1994, Louzada, J. 1♂. [CEMT]. Viçosa, 2/X/1991, Lopes; Louzada, J. 4♂. 4♀. [CEMT]. Viçosa, 21/I/1994, Louzada, J. 3♀. [CEMT]. Viçosa, 3/X/1991, Lopes; Louzada, J. 3♂. [CEMT]. Viçosa, 4/X/1991 Lopes; Louzada, J. 3♂. 2♀. [CEMT]. Viçosa, 680 m, IX/1995, Louzada, J. 1♂. [CEMT]. Viçosa, II/1994, Louzada, J. 1♂. [CEMT]. Viçosa, IV/1995, Vaz-de-Mello, F. 3♂. 1♀. [CEMT]. Viçosa, Mata da Biologia, 20° 45' 28" S 42° 51' 52" W, XII/1992, Louzada, J. 5♂. 4♀. [CEMT]. Viçosa, XII/1992, Louzada, J. 3♂. 10♀. [CEMT]. Viçosa, XI/2000, F.Z. Vaz-de-Mello. 4♂. [CEMT]. Viçosa, XII/1998, F.Z. Vaz-de-Mello. 1♂. 3♀. [CEMT]. Barão de Cocais, Vale Mineração, 19° 57' 17" S 43° 33' 51" W, 860 m, forest, 4-XI-2011, rain season, human dung, RNMota. 1♂. 1♀. [CEMT]. São João Evangelista, 18° 34' 40" S 42° 53' 10" W, 898 m, forest, 2-IV-2011, rain season, human dung, RNMota. 1♂. [CEMT]. Barão de Cocais, 18° 34' 40" S 42° 53' 10" W, 898 m, forest, 2-IV-2011, rain season, human dung, RNMota. 1♀. [CEMT]. Viçosa, Mata do Paraíso, 20° 48' 20.5" S 42° 51' 12.4" W, 781 m, pitfall feces, 03-V-2013, T Vargas. 1♀. [CEMT]. Viçosa, Mata do Paraíso, 20° 47' S 42° 51' W, XII-199, FZ Vaz-de-Mello. 1♀. [CEMT]. Pradros APA, Flo. Est. Semid. S21° 04' 13.1" W 44° 07' 04.0", 1159, 17-II-2012, pitfall com baço, Leticia Vieira et al. Col. 1♂. [CEMT]. Mariana, 20° 17' 10" S 43° 19' 12" W, VIII-2019, Pitfall (human feces), Macedo-Reis L.E. 1♀. [CEMT]; 20° 19' 35" S 43° 24' 21" W, I-2019. 1♂. [CEMT]; 20° 19' 34.66" S 43° 24' 22.89" W, 15-VII-2018. 1♀. [CEMT]; 20° 15' 23.59" S 43° 24' 57.62" W, 15-VII-2018. 1♂. [CEMT]. **Paraná:** Morretes, Fazenda Bom Jardim, 25° 27' 55" S 48° 52' 47" W, 110 m, 25-II-2016, human feces. EH Raine. 2♂. 1♀. [CEMT]; 29-I-2016. 1♂. [CEMT]; 03-III-2016, pig feces. 1♀. [CEMT]; 26-I-2016, *Panthera onca* feces. 1♂. 1♀. [CEMT]. Morretes, Santuário Nhundiquara, 25° 25' 32" S 48° 53' 21" W, 100 m, 09-XII-2015, pig feces. EH Raine. 2♂. 2♀. [CEMT]; 05-II-2016. 1♀. [CEMT]; 15-I-2016, *Panthera onca* feces. 1♀. [CEMT]; 09-XII-2015, *Procyon cancrivorus* feces. 1♀. [CEMT]; 18-II-2016, human feces. 2♀. [CEMT]; 27-I-2016, human feces. 1♀. [CEMT]. Morretes, E.E. Embrapa, 25° 27' 11" S 48° 52' 57" W, 140 m, 17-XII-2015, human feces. EH Raine. 2♂. [CEMT]; 14-I-2016. 1♀. [CEMT]; 27-I-2016. 1♂. 2♀. [CEMT]. **Rio de Janeiro:** Rio de Janeiro, Floresta da Tijuca, 10/X/1979, Godinho, C. 1♂. [CEMT]. Rio de Janeiro, Floresta da Tijuca, 10/X/1979, Celso, J. 1♀. [CEMT]. Xerém, II/1991, Grodinho, C. 1♀. [CEMT]. Cachoeiras de Macacu, São José de Boa Morte, 22° 35.66' S, 42° 51.46' W, 18–22-II-2013, Pitfall pig dung, T Carvalho & M Uzêda. 1♂. [CEMT]. Cachoeiras de Macacu, Guapi-Açu, 22° 30.85' S, 42° 51.83' W, 18–22-II-2013, Pitfall pig dung, T Carvalho & M Uzêda. 1♂. [CEMT]. Guapimirim, PARNA Serra dos Órgãos, 800 m, -22.468017 -42.998243, 16–18-XII-2014, Pitfall, C Araújo & R Andrade. 3♂. 3♀. [CEMT]. Guapimirim, PARNA Serra dos Órgãos, 850 m, -22.468074 -42.997192, 16–18-XII-2014, Pitfall, C Araújo & R Andrade. 1♀. [CEMT]. Guapimirim, PARNASO Serra dos Órgãos, 22° 30' 05" S 42° 59' 54" W, 300 m, 16–18-XII-2014, Pitfall, C Araújo & R Andrade. 2♂. 2♀. [CEMT]. Itatiaia, PARNA Itatiaia, 650 m, 22° 27' 36.9" S 44° 35' 44.3" W, Pitfall, 23–26-XII-2011, C Araújo & R Andrade. 2♀. [CEMT]. Teresópolis, PARNA Serra dos Órgãos, 930 m, -22.448877 -42.983268, Pitfall, 28–30-I-2014, C Araújo & R Andrade. 1♂. [CEMT]. Teresópolis, PARNA Serra dos Órgãos, 1030 m, -22.45516 -42.99787, Pitfall, 28–30-I-2014, C Araújo & R Andrade. 1♀. [CEMT]. Cachoeiras de Macacu, Guapiaçu ER, 22° 27' 05" S 42° 46' 23" W 33 m, 22-IX-2019, *Tapirus* feces LR. Martínez. 1♂. 1♀. [CEMT]. **Santa Catarina:** Brusque, Chácara Edith, 27° 5' S 48° 53' W, XII/2009, Pitfall com isca, C.B. Marcon; M.I.M. Hernández. 2♂. [CEMT]. Corupá, I/1961, Mallei, A. 1♂. [MZSP]. Corupá, XI/1961, Mallei, A. 1♀. [MZSP]. Joinville, 1920, Schmith. 1♂. [MZSP]. Joinville, III/1943, Pohl, B. 1♀. [MZSP]. S[A]nt[O] Amaro da Imperatriz, Parque Estadual da Serra do Tabuleiro, 27° 44' S 48° 48' W, XI/2009, Pitfall com isca, C.B. Marcon; M.I.M. Hernández. 2♂. 1♀. [CEMT]. Anitápolis, plinio 1, Pinus, 27° 40' S 48° 30' W, 28-XII-2018, Pitfall, Col: TRO Simões-Clivatti. 1♂. [CEMT]. Anitápolis, Arnaldo, Mata atlântica, 28° 8' S 49° 38' W, 28-I-2018, Pitfall, Col: TRO Simões-Clivatti. 1♂. [CEMT]. S[an]to Amaro Da Imp[eratríz], 27° 44' 30.7" S 48° 48' 41.9" W, 16-XII-2015, Pitfall (fezes hum), Col PG da Silva (500 m, F5). 1♀. [CEMT]. S[an]to Amaro Da Imp[eratríz], 27° 44' 30.7" S 48° 48' 41.9" W, 16-XII-2015, pitfall (carne), Col PG da Silva (500 m, C1). 1♂. [CEMT]. Joinville, 26° 15' S 48° 50' W 6-IV-2014, armadilha pitfall

isca, Col: R.C. Campos. 1♂. [CEMT]. Itapema, 27° 04' S 48° 36' W 06-I-2012, Armadilha pitfall isca, PG Silva (IndaiáC-A2). 1♀. [CEMT]. São Paulo: Peruíbe, Est. Ecol-dR, XII/1998, A.D. Biescov-Col. 1♂. [MZSP]. PE Serra do mar, Nucleo Santa Virginia, Sede Vargem Grande, 23° 26' 37" S 45° 25' 37" W, 17-I-2012, Human Faec 30, Marion Boutefeu. 1♀. [CEMT]. PE Carlos Botelho, São Miguel Arcanjo, 24° 03' 47" S 47° 58' 43" W, 798 m, 29-I-2012, human feces, E Bovy. 3♂. 1♀. [CEMT]. São Miguel Arcanjo, PE Carlos Botelho, 24° 03' 35" S 47° 58' 43" W, 795 m, 18-X-2011, *Brachyteles* feces 5, E Bovy. 1♀. [CEMT]. São Miguel Arcanjo, PE Carlos Botelho, 24° 03' 35" S 47° 58' 43" W, 795 m, 18-X-2011, *Brachyteles* feces 5, E Bovy. 1♂. [CEMT]. Sete Barras, PE Carlos Botelho, 24° 11' 56" S 47° 55' 52" W, 30-I-2012, Hum faec. 1, E. Bovy. 1♂. [CEMT]. PE Serra do Mar, Nucleo Santa Virginia, Sede Vargem Grande, 23° 26' 27" S 45° 14' 19" W, 17-I-2012, human fec, E. Bovy. 1♂. 3♀. [CEMT]. PE Serra do Mar, Nucleo Caraguatatuba, 23° 35' 24" S 45° 25' 15" W, 13-I-2012, human fec, E. Bovy. 1♀. [CEMT]. PE Serra do Mar, Nucleo Picinguaba, 23° 20' 08" S 44° 50' 02" W, 14-I-2012, human fec, E. Bovy. 1♀. [CEMT]. PE Serra do Mar, Nucleo Picinguaba, 23° 20' 02" S 49° 58' W, 14-I-2012, human fec 25 E. Bovy. 1♂. 1♀. [CEMT]. PE Serra do Mar, Nucleo Picinguaba, 23° 20' 13" S 44° 50' 06" W, 14-I-2012, human fec, E. Bovy. 1♀. [CEMT]. São Miguel Arcanjo, PE Carlos Botelho, 24° 03' 50" S 47° 58' 47" W, 831 m, 29-I-2012, human feces 2. E Bovy. 1♂. 1♀. [CEMT]. São Miguel Arcanjo, PE Carlos Botelho, 24° 03' 49" S 47° 59' 30" W, 773 m, 15-X-2011, *Brachyteles* feces 9. E Bovy. 1♀. [CEMT]. Salesópolis, Estação Biológica de Boracéia, 23° 39' 20.1" S 45° 53' 23.7" W, 852 m, Pitfall feces, 18-IX-2012, T Vargas. 1♀. [CEMT]. Salesópolis, E B de Boracéia USP, Mata Atlântica, 20-IX-2012, Pitfall hum fec., A Diaz. 1♀. [CEMT]. Nazaré Paulista, Mata atlântica, 23° 16' 27.24" S 46° 28' 2.97" W 858 m, 11-III-2016, Pitfall, fezes suínas + humana. A. Tavares Leg. 1♀. [CEMT], 23° 14' 57.83" S 46° 28' 12.80" W 859 m. 1♀. [CEMT]. Santa Isabel, Mata atlântica, 23° 19' 59.93" S 46° 14' 48.26" W 734 m, 12-III-2016, Pitfall, fezes suínas + humana. A. Tavares Leg. 1♀. [CEMT]; 23° 18' 11" S 46° 16' 3.58" W 712 m. 1♀. [CEMT]; 23° 17' 15.06" S 46° 17' 13.42" W 629 m, 1♂. [CEMT]. Bragança Paulista, Mata atlântica, 22° 57' 30.20" S 46° 37' 37.97" W 872 m, 12-III-2016, Pitfall, fezes suínas + humana. A. Tavares Leg. 1♀. [CEMT]. Jarinú, Mata atlântica, 23° 9' 51.42" S 46° 39' 4.11" W 933 m, 25-I-2016, Pitfall, fezes suínas + humana. A. Tavares Leg. 2♀. [CEMT]. Atibaia, Mata atlântica, 23° 9' 50.66" S 46° 29' 29.27" W 817 m, 11-III-2016, Pitfall, fezes suínas + humana. A. Tavares Leg. 1♀. [CEMT].

Diagnosis: Male's frons with three horns, the first one central, backward, long, wide and dorsoventrally flattened, the others two horns are lateral and small with less than

2 mm (Fig. 9a, c). Others males with central horn very short (males 2) (Fig. 10). Male genital organ with asymmetrical parameres. In lateral view, parameres with prolonged apex directed downwards (Fig. 3a). Shape of endophallites (Fig. 3a–g). Fronto-clypeal region of females with four-pointed cephalic process, the two central larger (Fig. 9b, d). Striae bicrenate, deep and distinctly impressed with small ocellate punctures, some striae with continuous folds that give the impression of greater depth in the same (Fig. 9e). Intestriae shagreened with deep dimples separated by once their diameter (Fig. 9e).

Males: Length 18–24.3 mm; width 11–15.4 mm (Fig. 9a). Black color and brown in teneral individuals.

Head: Wider than it is long. Anterior margin is oval with a projection in the central area. Clypeal teeth are weak, curved, and directed upwards (Fig. 9a, c). Clypeal surface strongly wrinkled. Genae with curved side edge and surface with shallow wrinkles. Frons with three cephalic horns, the first one is central, backwards, long, wide, and dorsoventrally flattened from the basal area to 2/3 of the extension, with shallow and dispersed dimples; then compressed and becoming cylindrical, without punctures and ending in a blunt tip (Fig. 9c). The other two horns are lateral and small, wide at their basal area and terminating in a blunt tip, continuing to the level of the anterior edges of the eyes and separated from the central horn by the width of their base (Fig. 9c). Posterior area of the head and lateral surface of the eyes shagreened and with large dimples separated by once their diameter.

Thorax: Pronotum twice wider than long. Antero-central region with a strong central excavation forming a blunt hump on each side (Figs. 9a, c and 10). Surface with small punctures separated by at least two to three times their diameter. Punctures with circular shape in the posterior area and with large dimples separated by once their diameter on the anterior and lateral area. Hypomeron with shagreened surface and large setigerous punctures separated by once their diameter and joined in some areas. Prosternum shagreened with small ocellate punctures in the posterior area and large setigerous punctures in the central area giving the appearance of tuft. Elytral striae bicrenate, deep and distinctly impressed with small ocellate punctures in the whole extension spaced about by once their diameter; some striae with continuous folds giving corrugated appearance (Fig. 9e). Intestriae surface shagreened with deep dimples separated by twice their diameter (Fig. 9e). Mesosternum shagreened with short and weak setae, central area with a smooth surface that continues to the middle of the meso-metaesternal suture. Mesepisternum shagreened with large setigerous punctures separated by once their diameter. Meso-metaesternal suture complete, some specimens covered with a smooth surface in the middle that originates in the mesosternum. Metasternum with shagreened and shiny central area without setae, with strong

carina from 1/3 of metasternum to the posterior area ending in a deep fovea. Lateral and posterior edges shagreened with denser setigerous punctures. Metaepisternum with similar surface to mesepisternum.

Abdomen: Shagreened ventrites, with one or two rows of ocellate points in the anterior area becoming denser at the side edges. Sixth ventrite very narrowed medially. Pygidium shagreened with shallow punctures separated by twice their diameter. Pygidium with basal margin complete.

Legs: Protibia with four lateral teeth. Protibial spur simple going to the middle of the last tarsomere. Meso and metatibia widened gradually toward apex, five lateral teeth, each with long erect setae; dorsal surface with two longitudinal lines of setae, apical side with setae throughout. Mesotibia with two spurs, unequal in length and acute apically. Metatibial spur apically truncate going to the base of the fourth tarsomere. Meso and metatibia with five tarsomeres, the first four sub-triangular, flattened dorsoventrally, inner edge with long continuous erect setae, outer edge with three to four setae, and the apices with tufts of setae.

Male genital organ: Lateral view of aedeagus with subquadrangular phallobase, basal area with a medium bulge on both sides. Full apex with a sclerotized area extending diagonally to the upper and lower area. Subtriangular parameres, in the basal area, at the apex with a strong widening that is then projected and directed downwards forming an angle of approximately 45° with the lower base of each paramere (Fig. 3a). Dorsal view with asymmetrical parameres, with a widened base. Central area with a constriction, widening strongly at the apex and becoming dorsoventrally flattened, concave and directed downwards. Convex invagination in the inner area, going from the middle area to the base of parameres, apical area with a notch on the outer edge (Fig. 3b). Ventral view with asymmetrical parameres with a wide central area. At the base with a shallow invagination in the middle of each paramere and on the inside an extension that continues beyond the edge of the phallobase. Convex, elongated, and well sclerotized apices. Semi-sclerotized membrane between the two parameres (Fig. 3c). **Endophal-lites:** LC is large, asymmetrically, and sclerotized (Fig. 3d). A + SA complex are long with undefined form, more sclerotized in the central area surrounded by a semi-sclerotized membrane (Fig. 3f). SRP has a wide “C” form with serrated edges and the internal area is more sclerotized (Fig. 3e). FLP is small and “O”-shaped; central area with a well sclerotized line reaching the top edge (Fig. 3g).

Males 2: Differs from males 1 as presents the central horn of the head very short (Fig. 10a). The excavation of the pronotum is smaller, so that the pronotal humps are located in the middle of the pronotum and terminate in an acute process. In dorsal view, the pronotal process is “U” shaped (Fig. 10a, b). The other morphological characteristics, the

genital organ and endophalites are identical with the males 1.

Females: Length 18.5–24 mm; width 12–14.5 mm. It differs from males as presents in the fronto-clypeal regions a four-pointed process, the two central larger (Fig. 9b, d). Pronotum with less excavation in the central area, so that the humps are located closer to the anterior area of the pronotum (Fig. 9b). Sixth abdominal ventrite not shortened medially.

Commentaries: This species is associated with different types of vegetation in the Atlantic forest between 0 and 1200 m of altitude, and is common in fragments greater than 100 ha. According to Louzada and Lopes (1997), this species is coprophagous although an individual was captured in decaying flesh. With the material examined in the present study, this copro-necrophagous behavior is confirmed, where this species is commonly found in traps baited with carrion. The species has been captured in traps baited with dung of jaguar (*Panthera onca*), crab-eating raccoon (*Procyon cancrivorus*), Tapir (*Tapirus terrestris*), and muriquis (*Brachyteles* sp.).

Distribution: Brazil (Bahia, Espírito Santo, Minas Gerais, Paraná, Rio de Janeiro, Santa Catarina and São Paulo states) (Fig. 7 (square)).

Dichotomius (Dichotomius) reclinatus (Felsche, 1901)

(Figs. 4a–g, 7, 8a–e (circle)).

Pinotus reclinatus Felsche 1901: 135 (original description).

Pinotus reclinatus Gillet (1911): 62 (citation); Luederwaldt (1929): 22 (characters in key); Blackwelder 1944: 208 (citation); Pereira (1954): 464 (characters in key).

As *Dichotomius horridus* Escobar (2000): 208 (misidentification); Pulido et al. (2007): 307 (misidentification); Murillo et al. (2010): 105 (misidentification).

As *Dichotomius* aff. *horridus* Neita et al. (2003): 83–84, 87 (misidentification, citation).

Dichotomius reclinatus Vulcano and Pereira 1967: 584 (characters in key); Escobar (2000): 208 (citation); Medina et al. (2001): 138 (citation); Krajcik 2012: 92 (citation); Pardo-Locarno and Camero (2014): 201 (citation); Sarmiento-Garcés and Amat-García (2014): 33, 117 (diagnosis, holotype photography); Chamorro et al. (2018): 95 (citation); Chamorro et al. (2019): 124, 290 (catalog, distribution).

Material examined: (10♂♂, 8♀♀). **Holotype:** Labels: {1: Printed and handwritten text on red label with black margins] **HOLOTYPE** ♀ / {2: handwritten text on white label with purple margins] *reclinatus felsche* Columbia / {3: printed text on white label with black margins] Cachabé, low c. XII. 96. (Rosenberg) / {4: printed text on orange label with black margins] **Typus.** / {5: printed text on green label with black margins} Coll. C. Felsche Kauf

20, 1918. 1♀. [SMTD]. **Additional specimens.** COLOMBIA: **Chocó:** Quibdó, Corregimiento de Pandó, Estación Ambiental Pandó, Bosque húmedo tropical, 5° 42' 43" N 76° 37' 59" W, 43 m, 20/X/2006, Trampa de caída con excremento de cerdo, Andrade, J. & O. Rocha 1♂. [UPTC-CE]. Lloró, Granja UTCH, 5° 30' 52" N 76° 33' W, 90 m, Bosque secundario, 12/II/2003, Neita, J.C. 1♀. [CEMT]. Quibdó, Corregimiento de Pacurita 5° 40' 22.7" N 76° 35' 33.0" W, 81 m, bp-T Bosque moderado Intervenido secundario, 27-nov-2018, al vuelo Neita, J.C. 1♂. [IAvH]. **Nariño:** Barbacoas, Corregimiento Yacula, Vereda El Peje, 636 m, 1° 21' 38.9" N 78° 09' 57.7" W, Borde de Bosque, Trampa Pitfall 4.dic.2009 Castillo, J. & Botina, P. 1♂. [IAvH] **Santander:** Puerto Parra, Vereda y finca La Olinda, N 6° 36' 36.2" W 74° 00' 22", 160 m, T[rampa] Pitfall Copro, Bosque, 31/X/2001, Duque y Vélez 1♀. [CEUA]. Betulia, PN Pauxi, Bosque, 6° 59' 03.2" N 73° 27' 00.3" W, WGS84 929 m, T. Exc. Hum., 96 horas 09.mar.2019, Ramírez, M. 1♀. [IAvH]. **Valle:** Río San Juan Madecen, El Tigre. 70 m. 2/12/97. T exc H. 1♂. [ECC]. Dagua, Reserva Escalere, 31/III–4/IV/1991, Pardo, L.C. 1♂. [CEMT]. El Tagual, Bajo Calima, 11–18/IX/1992, Pardo, L.C. 1♂. [CEMT]. Escalere, S[an] Cipriano, B[ajo] Dagua, 5–15/IX/1991, Pardo, L.C. 1♂. [CEMT]. Estación Forestal Bajo Calima, 50msnm, 23/IV/1995, M. Hitchcox. 1♀. [ECC]. **ECUADOR:** **Esmeraldas:** Lita, 800 m, XI/1998, Curoe. 1♀. [CEMT]. **[Guayas]** Bucay, 300 m, 14/VII/1905, Ohs, F. 1♂ [MZSP]. **Pich[incha]:** 680 m, 16 km SE S[anto] Domingo, Tinalandia, S. Peck, 16–28.vi.75, for dung tps day 5. 1♀. [CMNC]. 250 m, 47 km S S[an]to Domingo, Río Palenque Station, 17–25.II.1979. Ling. L. 1♀. [CMNC]. 250 m, 47 km S S[an]to Domingo, Río Palenque Station, 17–25.II.1979. 1♀. [CMNC]. Estr. Chiriboga, 1800 m, II/1990, Arnaud, P. 2♂. [CEMT].

Diagnosis: This species can be distinguished from the others of the *D. reclinatus* species group because the head of both sexes has three horns; the first one is central, long, and directed backwards. The others two horns completely separated in the clypeal region (Fig. 8a–d). *D. reclinatus* is similar to *D. horridus* in their external morphology, to separate this species of *D. horridus* is necessary to review the interstriae microsculpture; this is heavily shagreened in *D. reclinatus* giving opaque appearance (Fig. 8e). Male genital organ in lateral view with shorter and wider parameres (Fig. 4a), in ventral view with smooth excavation near to the base (Fig. 4c), shape of all endophallites (Fig. 4d–g), and its distribution (The Chocó biogeographical region) (Fig. 7 (circle)).

Males: Length 22.1–30.5 mm; width 13.3–16.5 mm (Fig. 8a). Black color and brown in teneral individuals.

Head: Wider than it is long. Anterior margin is oval with a projection in the central area. Clypeal teeth are weak, curved, and directed upwards (Fig. 8a, c). Clypeal surface

strongly wrinkled. Central area with two cephalic horns located at the height of the inner side edge of the eyes. The horns are conical, directed upwards and terminating in a sharp tip, with a length of 1–3 mm (Fig. 8c). Genae surface with smooth wrinkles. Frons with a central cephalic horn is long, rearwards, pointing, flattened, smooth, and ending in a blunt tip (Fig. 8c). Posterior area of head and lateral area of eyes shagreened, with disperse and elongated punctures.

Thorax: Pronotum twice wider than long. Antero-central region with a central excavation forming a hump on each side (Fig. 8a, c). Surface with shallow punctures separated by at least two to three times their diameter. Punctures with circular shape in the posterior area and elongated toward the lateral area. Hypomeron with shagreened surface and setigerous punctures of different sizes separated by once their diameter and joined in some areas. Prosternum shagreened with small setigerous punctures in the posterior area and large punctures in the central area. Elytra with bicrenate striae, with small ocellate punctures spaced out by about five times their diameter (Fig. 8e). Interstriae surface heavily shagreened, giving opaque appearance (Fig. 8e). Mesosternum shagreened, some specimens with short and weak setae. Central area with a smooth surface that extends to the middle of the meso-metaesternal suture. Shagreened mesepisternum with large setigerous punctures separated by less than once their diameter. Meso-metaesternal suture complete, in some specimens covered in the middle with a smooth surface that comes from the mesosternum. Metasternum with shagreened and shiny central area, without setae; strong carina from 1/3 of the metasternum to the back ending in a deep fovea. Side edges of the anterior area are shagreened with dense setigerous punctures; posterior area is shagreened with large setigerous punctures separated by once their diameter. Metaepisternum with similar surface to mesepisternum.

Abdomen: Shagreened ventrites with one or two rows of setigerous points in the anterior area, becoming denser on the side edges. Sixth sternite very narrowed medially. Shagreened pygidium with some shallow punctures spaced by more than five times their diameter. Pygidium with basal margin complete.

Legs: Protibia with four lateral teeth. Protibial spur simple going to the base of the fourth tarsomere. Meso and metatibia widened gradually toward apex, five lateral teeth, each with long erect setae; dorsal surface with two longitudinal lines of setae, apical side with setae throughout. Mesotibia with two spurs, unequal in length and acute apically. Metatibial spur apically truncate going to the base of the fourth tarsomere. Meso and metatibia with five tarsomeres, the first four sub-triangular, flattened dorsoventrally, inner edge with long continuous erect setae, outer edge with three to four setae, and the apices with tufts of setae.

Male genital organ: Lateral view of aedeagus with sub-quadrangular phallobase, basal area with a medium bulge

on both sides, apex with a constriction of approximately 115° and a notch on the lower edge. Subtriangular parameres, widened at the base and a curved apex with a fleshy membrane, lower-basal area with an invagination (Fig. 4a). Dorsal view with symmetrical parameres with widened base. Central area with a constriction and widening apically. Apex of parameres curved and robust with a strong curvature on the inside edge (Fig. 4b). Ventral view with symmetrical parameres with a wide central area. At the base with a smooth excavation in the middle of each paramere and on the inside an extension that continues beyond the edge of the phallobase, inner edge straight with insertion of a membrane from the basal to the apical area (Fig. 4c). **Endophallites:** LC is large, asymmetrical, and sclerotized (Fig. 4d). A + SA complex with undefined form, more sclerotized in the central area surrounded by a semi-sclerotized membrane (Fig. 4f). SRP has a wide “C” form with undefined edges (Fig. 4e). FLP also has a “C” form, enlarged in the apical area and basal area with some hair-shaped structures (Fig. 4g).

Female: Length 23–27 mm; width 14.1–15.5 mm. It differs from males as presents a clypeus with a shorter extension (Fig. 8b) or without this extension with rounded clypeus with well-formed and visible clypeal teeth. Clypeal horns are shorter and robust (some specimens less than 2 mm), the frons process is shorter, wide and with evident punctures in the basal area; the depression formed between cephalic processes is shallow (Fig. 8d). Pronotum with less excavation in the central area, so that the humps are more prominent toward the middle (Fig. 8b). The sixth abdominal ventrite not shortened medially.

Commentaries: It is a rare species in entomological collections and with field captures of very few individuals. The species is captured in primary and secondary tropical rainforests of the Chocó biogeographical region of Colombia and Ecuador, between 43 and 1800 m of altitude (Neita et al. 2003). Andrade and Rocha (*com. pers.*) captured this species in traps baited with pig excrement (*Sus scrofa domestica*) in Pandó (Chocó-Colombia). Neita (*com. pers.*) captured this species flying with an entomological net in Pacurita (Chocó-Colombia).

Distribution: Colombia (Chocó, Nariño, Santander and Valle del Cauca departments) and Ecuador (Esmeraldas, Guayas and Pichincha provinces) (Fig. 7 (circle)).

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Declarations

Conflict of interest The authors declare no competing interests.

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