

A new species of the genus *Canthon* Hoffmannsegg (Coleoptera, Scarabaeidae, Scarabaeinae, Deltochilini) from central Brazil

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Abstract. A new species of *Canthon* is described, illustrated and the morphological similarities with related species are discussed. The species *Canthon cleidecostae* was named after Dr. Cleide Costa a great beetles specialist. The subgeneric category of species is considered *incertae sedis* until the taxonomic revision of the genus *Canthon* is fully addressed. Also, we provide a key for genera, subgenera and isolated species-groups that can be confused with the genus *Canthon*.

Key-Words. Dung beetles; South America; Subgenera key; Taxonomy.

INTRODUCTION

The genus *Canthon* Hoffmannsegg, 1817 is one of the most diverse groups in Scarabaeinae, comprising c. 180 described valid species (Halffter & Martínez, 1977; Schoolmeesters, 2018; Vieira *et al.*, 2019) belonging to nine subgenera (Halffter & Martínez, 1977). Besides that, there are nearly 32 described species and subspecies still considered as *incertae sedis* due to absence of diagnostic characteristics that can be used to classify these species into a subgenus of *Canthon* (Halffter & Martínez, 1977; Vaz-de-Mello *et al.*, 2011; Nunes *et al.*, 2018; Cupello & Vaz-de-Mello, 2018; Vieira *et al.*, 2019).

Here, we present a new species to science belonging to the genus *Canthon*. Considering the plasticity of characters of this group and the clear artificiality of many of its internal divisions, we decided not to include *Canthon cleidecostae* sp. nov. in any subgeneric position. Thus, to avoid the taxonomic complication we will keep *Canthon cleidecostae* sp. nov. as *incertae sedis*.

is used to a new line on a same label. Label colour or other additional information is given in brackets ([...]). Type specimens are deposited at Seção de Entomologia da Coleção Zoológica da Universidade Federal do Mato Grosso, Cuiabá, Brazil (CEMT). Morphological analysis and comparisons were conducted using a Leica stereomicroscope model S8AP0. All photographs were made using a stereomicroscope Leica model m205C (7.8X-160.0X) with image capture system MC190 HD.

The methods of extraction and preservation of internal sac follow Zunino (1978). The external morphology was based on Edmonds (1972) and Tarasov & Génier (2015). For the microsculpture description we follow the terminology proposed by Harris (1979). All length measurements mentioned in the description are in millimetres (mm).

Abbreviations used in the description: **Ax** = axial sclerite; **FLP** = fronto-lateral peripheric sclerite; **MP** = medial peripheric sclerite; **SA** = subaxial sclerite; **SRP** = superior peripheric sclerite.

MATERIAL AND METHODS

For type material, labels are transcribed *in verbatim* in quotation marks ("..."). The single slash (/

RESULTS

Note: The identification key presented here is an update to that presented by Vaz-de-Mello *et al.*

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(2011), since many genera have been modified from recent taxonomic revisions, such as the transfer of species of the genus *Canthon* for the genus *Sylvicanthon* Halffter & Martínez, 1977 (and vice versa) (see Cupello & Vaz-de-Mello, 2018); *Scybalocanthon* Martínez, 1948 species transferred to *Canthon* (Silva & Valois, 2019); the

genus *Vulcanocanthon* Pereira & Martínez, 1960 was synonymized with *Canthon* (Vieira et al., 2019); in addition to the rearrangement of various *Canthon* species considered “*incertae sedis*” for well-defined groups such as *Goniocanthon* Pereira & Martínez, 1956 and *Pseudepilissus* Martínez, 1954.

**Key to genera, subgenera and isolated
species-groups easily confused with *Canthon*
occurring in South America
(beginning from couplet 90 in Vaz-de-Mello et al., 2011)**

1. Basal meso- and metatarsomeres short, length about one-half that of the second tarsomere, obliquely (nearly 45°) truncated apically (Vaz-de-Mello et al., 2011, fig. 155). Lateral borders of meso- and metatarsomeres parallel, forming a continuous border for all tarsi, overall shape of tarsomeres 2-4 quadrate to rectangular. Dorsal surface of mesotibiae with dense setae, not in line. Pygidium never separated from propygidium by transverse carina. Widespread in tropical forest areas..... *Scybalocanthon* Martínez, 1948 (see Silva & Valois, 2019)
- 1'. Length of basal meso- and metatarsomeres only slightly less than, or greater than, that of tarsomere 2; if much smaller, then nearly transversely truncated apically. Lateral borders of meso- and metatarsomeres separately divergently apically, the overall shape of tarsomeres 1-4 trapezoidal; dorsal surface of mesotibiae with setae arranged in line..... 2
- 2(1'). Pygidial base covered by elytra; tips of elytra overhang base of pygidium (which is not separated from propygidium), not appressed to base. Pubescent dorsum with yellow to red spots on elytra. Sides of pronotum serrate. Bolivia, and maybe Brazil and Venezuela.....
..... *Canthonidia* Paulian, 1938 (revision is needed, probably monospecific)
- 2'. Pygidial base completely exposed (but propygidium not exposed); tips of elytra not overhanging base of pygidium, appressed to pygidial base. Glabrous dorsum; if pubescent, then monocoloured. Sides of pronotum not serrate 3
- 3(2'). Dorsum (especially prothorax) with irregular sculpturing (mosaic of smooth, sericeous and microgranular areas, irregular ill-defined elevations and depressions) or with well-defined prothoracic tubercles 4
- 3'. Pronotum with evenly distributed sculpturing, at most with posteromedian depression, never with tubercles. Widespread, except Chile *Canthon* Hoffmannsegg, 1817 (if transverse teeth or carinae are present in the lateral face of mesotibia, then check Vaz-de-Mello et al., 2011, couplet 89) 5
- 4(3). Protibiae truncated in straight angle at apex. Male with elongated Y-form expansion derived from clypeal teeth, female with clypeal teeth widely separated. Southernmost of Brazil (Rio Grande do Sul) and Argentina (Buenos Aires) *Xenocanthon* Martínez, 1952 (monospecific, *X. sericans* (Schmidt, 1922))
- 4'. Protibiae obtusely truncated at the apex. Both male and female with similar clypeus, with teeth separated by V emargination. Chacoan depression, Cerrado, Orinoquia and Amazonia *Anisocanthon* Martínez & Pereira, 1956 (under revision)
- 5(3'). Ventral surface of metafemora with longitudinal sinuous carina, nearer anterior edge at base and more distant towards apex..... 6
- 5'. Ventral surface of metafemora with either anterior margin (carina) straight and very close to anterior edge all over (sometimes vanishing apically) or with no anterior margin or carina 7
- 6(5). Green body. Longitudinal sinuous carina of metafemora nearly paralleling anterior border in the apical half (Fig. 3A). Metafemur postero-apically lobed at least in males. Pygidium very convex..... *Canthon* (s.l.) *cleidecostae* sp. nov. (Figs. 1A-D)
- 6'. Body black. Longitudinal sinuous carina of metafemora basally and apically very close to anterior border, but never parallel to it (Fig. 3B). Metafemur not postero-apically lobed. Pygidium feebly convex
..... *Canthon* (*Glaphyrocانthon*) (pars, species around *C. ibarragrassoi* (Martínez, 1952) and species still undescribed)
- 7(5'). Ventral surface of metafemora not margined anteriorly..... 8
- 7'. Ventral surface of metafemora with fine margination anteriorly (sometimes vanishing apically)..... 11
- 8(7). Pygidium strongly convex, very shiny. Amazon and Atlantic Forest *Canthon* (*Goniocanthon*) Pereira & Martínez, 1956 (see Nunes et al., 2018)
- 8'. Pygidium flat or slightly convex, dull or slightly shiny 9
- 9(8'). Metafemora elongate, claviform. Atlantic Forest *Canthon* (*Peltecanthon*) Pereira, 1953 (see Nunes et al., in press)
- 9'. Metafemora not claviform 10
- 10(9'). Dorsum with distinct and dense uniform pubescence, dorsum completely opaque. Body flattened. Protibial teeth closely set near the apex of tibia. Northern Amazonia..... *Canthon* (*Trichocanthon*) Pereira & Martínez, 1959 (monospecific, *C. sordidus* Harold, 1868)
- 10'. Dorsum either glabrous or with minute sparse pubescence. Protibial teeth widely spaced along apical half of lateral margin. Widespread, except Chile
..... *Canthon* (*Glaphyrocانthon*) Martínez, 1948 (probably to be split)
11. Pygidium and propygidium not separated by transverse carina. South and Central America..... *Canthon* Hoffmannsegg, 1817: *septemmaculatus* group
- 11'. Pygidium and propygidium at least partially separated by transverse carina 12
12. Head anteriorly either sinuous or slightly emarginated, sometimes without clypeal teeth. Pronotum with prescutellar depression; adjacent area of elytra with scutellar depression. Open areas in Chaco, Pampa, Cerrado and Caatinga..... *Canthon* (*Pseudepilissus*) Martínez, 1954 (see Vieira et al., 2019)
- 12'. Clypeus with at least two (sometimes more) well-defined clypeal teeth. Central teeth separated from each other by narrow emargination. Body usually not depressed around scutellum 13
13. Anterior margin of profemora either with one large tooth close to concavity or with several well-defined denticles (inside concavity or not). Brazil, Argentina, Bolivia, Paraguay, Uruguay; not present in Amazonia *Canthon* (*Franconrosia*) Pereira & Martínez, 1959
- 13'. Profemora lacking anterior denticles or teeth. Widespread in South America..... *Canthon* s. str. Hoffmannsegg, 1817 (to be split).

Family Scarabaeidae Latreille, 1802
Subfamily Scarabaeinae Latreille, 1802
Tribe Deltochilini Lacordaire, 1856
Genus *Canthon* Hoffmannsegg, 1817
***Canthon cleidecostae* sp. nov.**
(Figs. 1-3)

Type material: HOLOTYPE (♂ CEMT): First label [white, typeset]: "BRAZIL: Goiás, Monte / Alegre de Goiás, / 13°14'10"S, 47°09'19"W, / 13.iii.2013, *Kerodon / acrobata feces*, Alexandre / leg.". Second label [red, handwritten]: "*Canthon cleidecostae* / Vaz-de-Mello, Nunes / & Costa-Silva / HOLOTYPE". PARATYPE (1♂ CEMT): First label [white, typeset]: "BRAZIL: Goiás, Monte / Alegre de Goiás, / 13°14'10"S, 47°09'19"W, / 13.iii.2013, *Kerodon / acrobata feces*, Alexandre / leg.". Second label [yellow, handwritten]: "*Canthon cleidecostae* / Vaz-de-Mello, Nunes / & Costa-Silva / PARATYPE".

Diagnosis: *Canthon cleidecostae* sp. nov. is most similar to *Canthon ibarragrossoi*, with which it shares the metafemora with a sinuous carina close to the anterior margin (Fig. 3). Furthermore, it can be easily separated by the clypeal teeth, which are U-shaped in *C. cleidecostae* sp. nov. and V-shaped in *C. ibarragrossoi*. The colour is also characteristic while *C. cleidecostae* sp. nov. is metallic green and *C. ibarragrossoi* present black colouration.

Description (Holotype, Male): Dorsal habitus (Fig. 1A). Body length (except the head) 7.55 mm. **Head:** dorsal surface slightly concave with green alveolar microsculpture; posterior half with finely spaced punctation and anterior half with superficial rugosities. Two triangular clypeal teeth, with rounded apex, separated by a U-shaped emargination (Fig. 1D). Clypeal margin and lateral margin of head with yellow setae emanating from underneath. Clypeo-genal suture present and oblique until close to

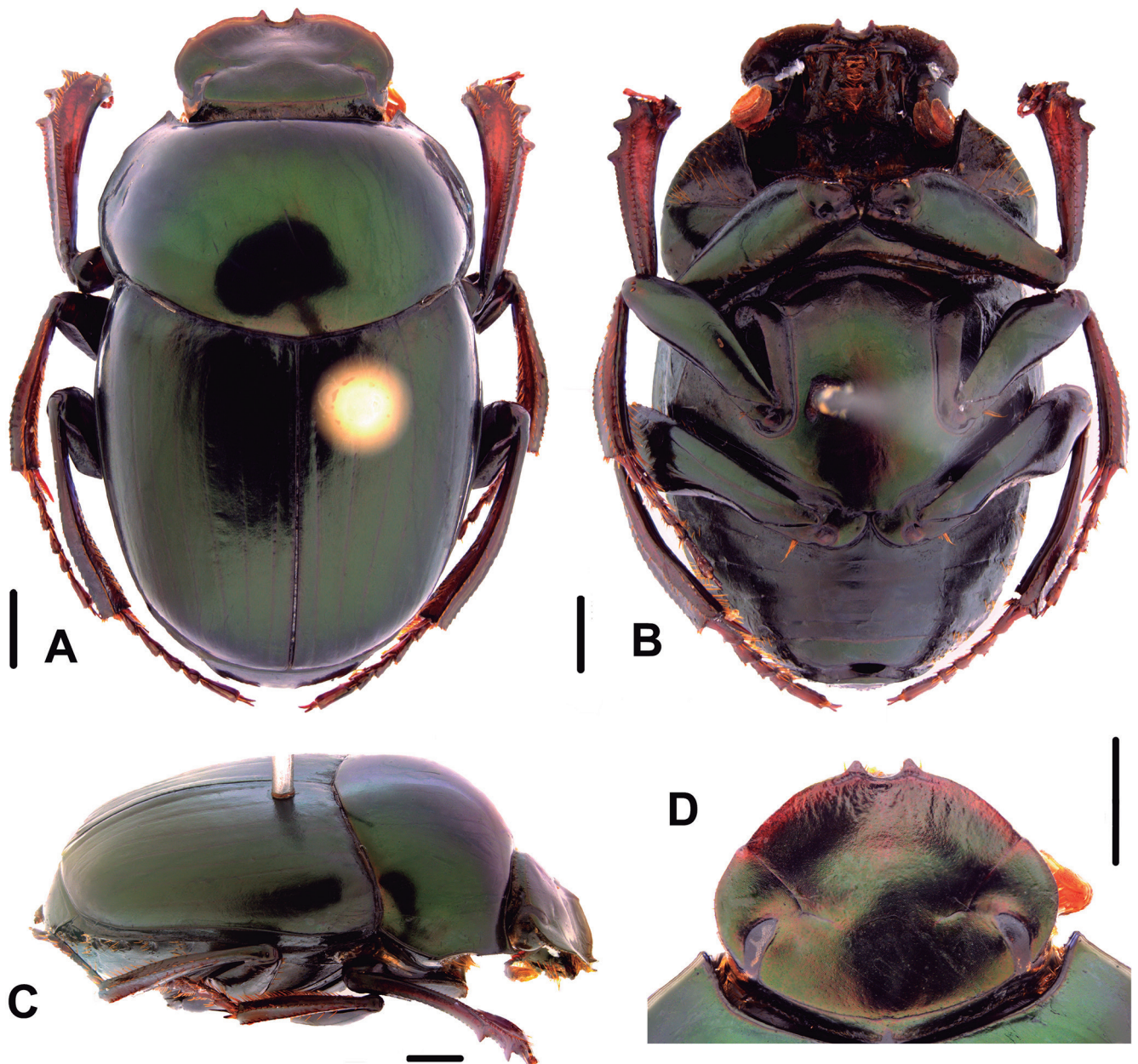


Figure 1. Holotype of *Canthon cleidecostae* sp. nov.: (A) dorsal; (B) ventral; and (C) lateral view; (D) head, dorsal view. Scale bar: 1 mm.

eyes. **Pronotum:** pronotal disc smooth, metallic green, bright with green alveolar microsculpture. Anterior angles acute, pointed forward (Fig. 1C). Lateral margin smooth with two little teeth and brief emargination between them (more visible in lateral view). **Hypomeron:** dark green, with coriarius microsculpture, sparse yellowish setae anteriorly, and thin transverse carina at centre not touching lateral margin; anterior region slightly concave (Fig. 1B). **Elytra:** surface with dark green colour, less bright than pronotum; with fine micropuncture. Striae narrow and poorly visible, with punctation; interstriae wide, flat. **Legs:** protibiae with three main teeth on outer edge and crenulated until the base; protibial spur flattened dorsoventrally, bifid, asymmetrical (Fig. 2A). Mesofemora with ventral side lacking anterior and posterior margin. Metafemora subclaviform, with a sinuous carina (Fig. 3A, white setae); yellow setae on the anterior edge and close to apex; posterior edge with lobe comprising two-thirds apically (Fig. 3A). **Abdomen:** surface with alveolar microsculpture; dark green. Ventrites with

tufts of small yellow setae on each side laterally and medially glabrous (Fig. 1B). **Pygidium:** as wide as long; bright green without punctation. Basal margin expanded, forming strong V-shaped carina between pygidium and propygidium. **Parameres:** lateral view: symmetrical; apex truncate (Fig. 2B). Superior edge straight and inferior concave, never sinuous. Apical-laterally edge with bulge at centre. Dorsal view: membranous portion separating parameres from base to apex. **Internal sac:** peripheral fronto-lateral sclerite (FLP) connected to of the axial sclerite (Ax), both sclerites forming an apical complex, in which Ax forms a central semiduct (Fig. 2E, Ax [black arrow]) and FLP completes the circumference in the semiduct (Ax) (like a roof), base and apex of all the complexes of equal size, without tapered region; subaxial sclerite (SA), about the same size as other sclerites, covering ventrally the FLP + Ax complex; peripheral medial sclerite (MP) flat, rolled, with the basal part more acute (in relation to the apex), lateral in relation to FLP + Ax; superior right peripheral sclerite (SRP) with lateral angular prolongation (Figs. 2E-F).

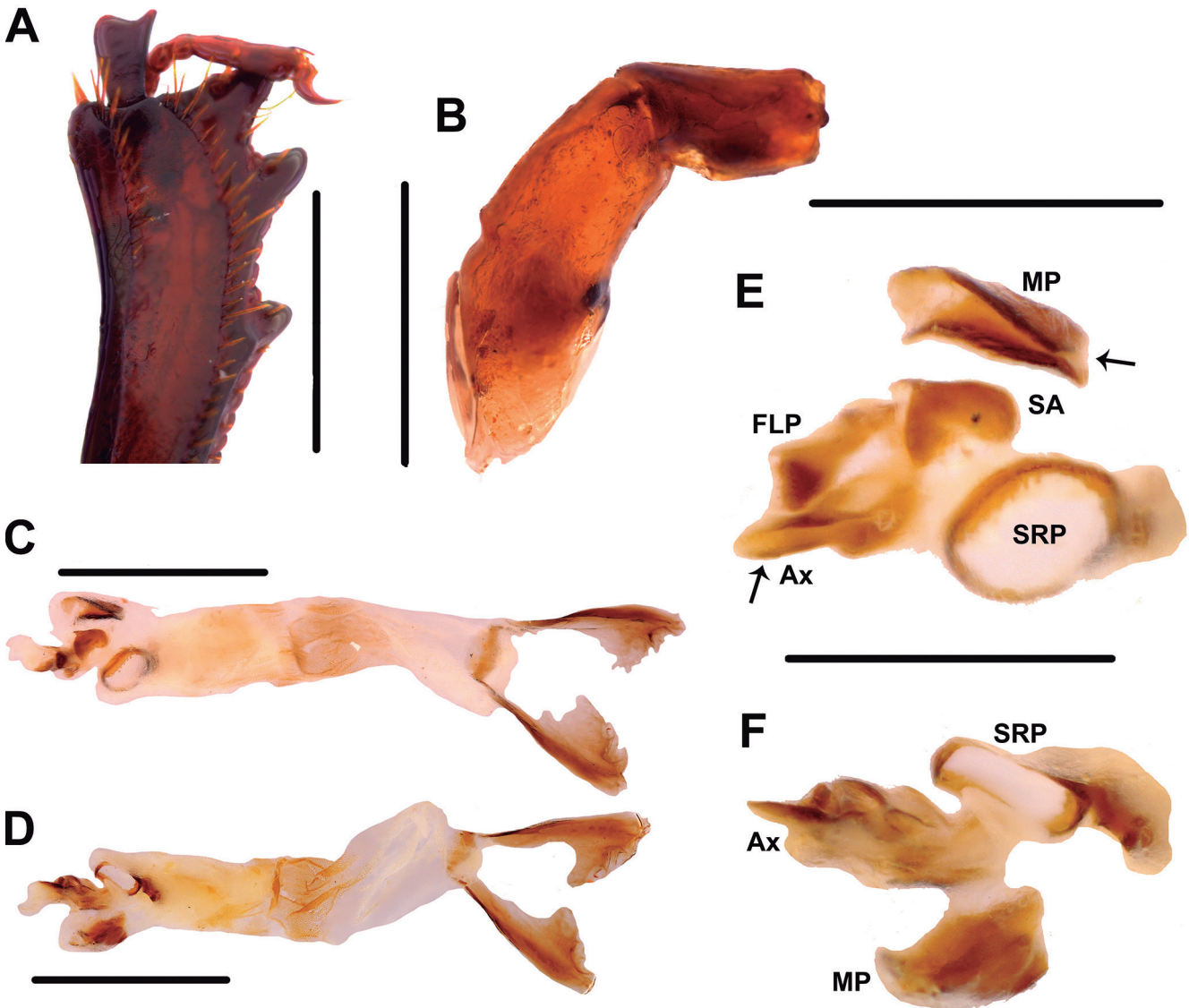


Figure 2. Details of structure in *Canthon cleidecostae* sp. nov.: (A) male protibial apex, dorsal; Male genitalia: (B) aedeagus, lateral; internal sac: (C) dorsal and (D) ventral views; internal sac apical and parietal sclerites: (E) dorsal and (F) ventral views [Ax = axial sclerite; FLP = fronto-lateral peripheric sclerite; MP = medial peripheric sclerite; SA = subaxial sclerite; SRP = superior peripheric sclerite]. Black arrow showing the semiduct. Scale bars: A-D = 1 mm; E and F = 0.5 mm.

Morphological variation: The variation between the two specimens of the type series is centred on the body length, which varied from 6.05 mm (paratype) to 7.55 mm (holotype).

Etymology: This species is named after Dr. Cleide Costa, in acknowledgement of her great contribution to the study of Coleoptera and for supervising many Brazilian coleopterists. An important remark is that the larva of this species is still unknown and we hope it will be described in collaboration with Dr. Costa when available.

Distribution: So far, this species is only known from the type locality (Monte Alegre de Goiás, Goiás state) (Fig. 4).

Biology: Nothing is known about the biology of *C. cleidecostae* sp. nov. The feeding habits are probably coprophagous, considering related species of the same genus. Besides, the type-series was collected in *Kerodon acrobata* Moojen, Locks & Langguth, 1997 faeces, a rodent endemic of Brazil and known only to Goiás state (Woods & Kilpatrick, 2005).

Comments: The placement of this new species within the subgenera of *Canthon* is still uncertain. Some morphological characteristics used to describe this species are similar to *Canthon ibarragrasoi* (Martínez, 1952), mainly considering the sinuous carina in the metafemur.

The geographic distribution of both species is distinct. *Canthon cleidecostae* sp. nov. is known for the type locality as aforementioned, while *Canthon ibarragrasoi* is recorded to Paraguay (type locality: Colonia Natalício Talavera), Argentina (Mesopotamia Argentina) and Brazil (Rio Grande do Sul, Santa Catarina, Paraná, São Paulo, Mato Grosso do Sul, Rio de Janeiro, Minas Gerais and Espírito Santo states, the latter state being the northernmost known record of the species).

As currently understood, *C. ibarragrasoi* belongs to the subgenus *Glaphyrocanthon* considering many characteristics listed by Halffter & Martínez (1977: 79).

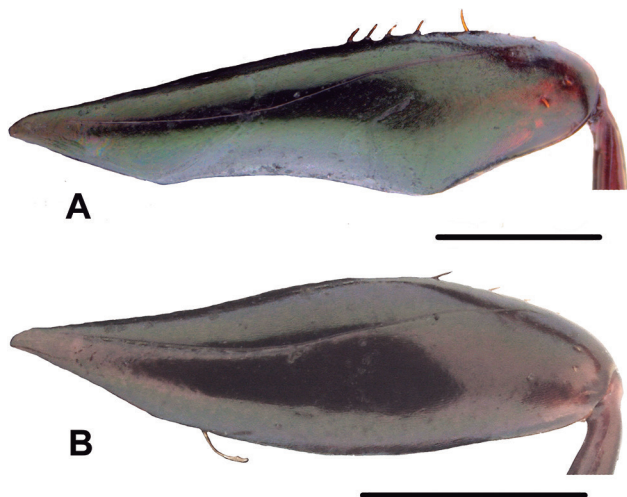


Figure 3. Metafemur, ventral view of (A) *Canthon cleidecostae*; and (B) *Canthon ibarragrasoi*. Scale bar: 1 mm.

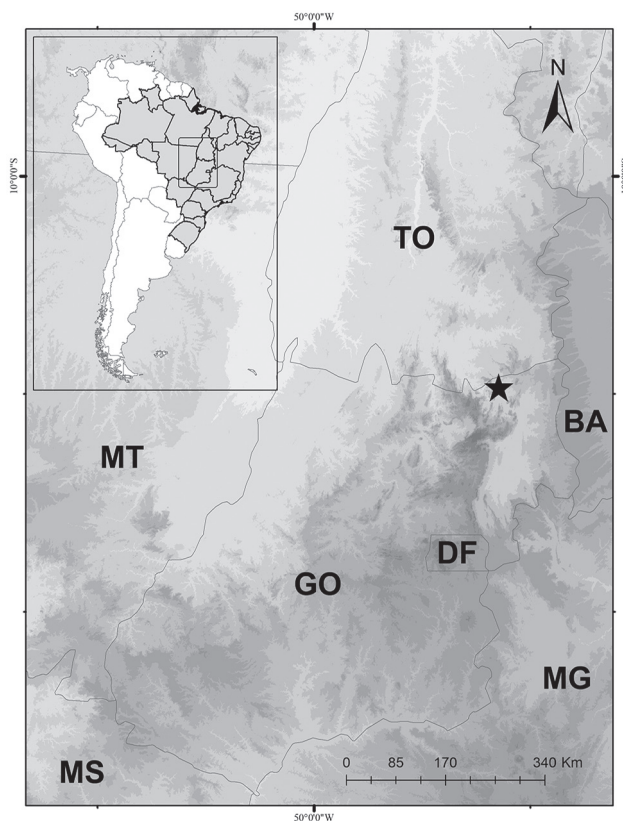


Figure 4. The distribution record of *Canthon cleidecostae* sp. nov., central Brazil [TO = Tocantins; MT = Mato Grosso; GO = Goiás; DF = Distrito Federal; BA = Bahia; MG = Minas Gerais; MS = Mato Grosso do Sul].

However, even *C. cleidecostae* sp. nov. sharing these characteristics with *C. ibarragrasoi* we concluded that the new species should not be included in the *Glaphyrocanthon* without a detailed taxonomic revision of this subgenus. Thus, to avoid "taxonomic instability", we regard *Canthon cleidecostae* sp. nov. as *incertae sedis*.

In addition, the sclerites of the internal sac are not similar to those found in *Goniocanthon* Pereira & Martínez, 1956 (Nunes *et al.*, 2018), nor in *Peltecanthon* (Nunes *et al.*, in press), where the Ax + FLP complex gradually tapers to a much thinner apex, or even other *Canthon* handled by one of the authors (Nunes, *personal remarks*). In *Canthon cleidecostae* sp. nov., the apex is not thin, something similar to that observed in *Tetraechma* Blanchard, 1845 (Nunes, *personal remarks*).

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