

Taxonomic review of the genus *Tetraechma* Blanchard, 1842 (Coleoptera: Scarabaeidae: Scarabaeinae: Deltochilini)

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Abstract

The genus *Tetraechma* Blanchard, 1842 is revised for the first time, and species distribution data updated. Three species previously placed in *Canthon* are transferred to *Tetraechma*; *T. balteata* (Boheman, 1858), **comb.n.**, *T. chlorophana* (Mannerheim, 1829), **comb.n.**, *T. liturata* (Germar, 1822), **comb.n.** *Canthon balteatus lojanus* Balthasar, 1939 is considered a **syn.n.** of *T. balteata*, *Canthon apicalis* Lucas, 1859 is considered a **syn.n.** of *T. chlorophana*, and *Ateuchus pictus* Mannerheim, 1929 as **syn.n.** of *T. liturata*. **Lectotypes** are designated for *Tetraechma sanguineomaculata* Blanchard, 1845; *Canthon balteatus* Boheman, 1858, *C. balteatus lojanus* Balthasar, 1939, *Canthon apicalis* Lucas, 1859, *Ateuchus chlorophanus* Mannerheim, 1829, *Ateuchus lituratus* Germar, 1822, *Canthon lituratus solutus* Schmidt, 1920, *Canthon lituratus solutus* Schmidt, 1920, *Canthon lituratus bifasciatus* Schmidt, 1920 and *Ateuchus pictus* Mannerheim, 1929. *Tetraechma*, which was known only from two endemic species from Argentina, now has five species distributed from northern Colombia and Venezuela to the northern coast of Argentina.

Keywords

Tetraechma; *Canthon*; Deltochilini; dung beetle

Introduction

The genus *Tetraechma* Blanchard, 1842 was considered invalid for a long time by taxonomists and collectors during the 19th century until at least the first half of the 20th century. After its description (Blanchard 1845) as a monotypic genus, little more than two decades had passed when it was synonymized with *Canthon* Hoffmannsegg, 1817 by Harold (1868). However, later on *Tetraechma* was resurrected as a valid genus by

Pereira & Martínez (1956). Finally, Halffter & Martínez (1977) added *Canthon tarsalis* Balthasar 1939 in the genus *Tetraechma*.

Tetraechma belongs to the Deltophilini tribe (Tarasov & Dimitrov, 2016) and is very little studied. The only two species included in the genus up to now (namely, *T. sanguineomaculata* (Blanchard, 1842) and *T. tarsalis* (Balthasar, 1939)) present a peculiar behavior regarding the rodent species known as “*plains viscacha*” (*Lagostomus maximus* (Desmarest, 1817)), of the Chinchillidae family. Some authors reported collecting *T. sanguineomaculata* and *T. tarsalis* specimens, often near their burrows (Martínez 1949, 1959; Pereira & Martínez 1956), suggesting something akin to phoresy, but there are no reports of beetle species directly attached to the rodent, which leaves doubts about how to classify this behavior, as both species are also collected in pitfall traps, habits seemingly closer to what could be classified as commensalism. There are no detailed studies to state the type of relationship between these species and rodents, however it is important to highlight the record of some type of relationship to stimulate ecological studies on the subject and to emphasize once again the diversity of ecological interactions of the animals. Coleoptera of the subfamily scarabaeinae.

Both species, *T. sanguineomaculata*, and *T. tarsalis*, feature tubercles on the head, a rarely-observed characteristic in the Deltophilini tribe that was included in the “more conspicuous characters” in the revalidation of the genus (Pereira & Martínez 1956).

The main objective is to establish a consistent definition for the genus, as well as the species that compose it, which does not limit the possibilities of future studies that expand knowledge on taxonomy and distribution (mainly in Argentina), and phylogenetic relationships. In this work, we revise the systematics of the genus *Tetraechma* confirming its validity and diagnosing it in more detail, besides incorporating to it another three new species previously assigned to *Canthon* Hoffmannsegg 1817. We also revise the taxonomy of each species that now compose *Tetraechma*, presenting current data on their distribution, and when available, on their biology and behavior.

Material and methods

Different specimens from the same population and specimens from populations in different localities were meticulously observed and compared, including examination of type specimens of all available extant names.

The specimens examined are kept in the Entomology Sector of the Zoological Collection of the Federal University of Mato Grosso, and in other available collections (see list below), in addition to the type-specimens of the nominal species and subspecies already described, kept in other collections, also listed below.

The terminology of morphological characters followed Vaz-de-Mello et al. (2011) and Tarasov & Solodovnikov (2011). The extraction, treatment, and preservation of the sclerites of the endophallus followed the procedure described by Zunino (1978).

Examination of the specimens was conducted under stereo microscope Leica model EZ 4. Images were edited and stack pictures using the softwares Photo Filtre and Combine ZM version 1.0.0. Diva Gis version 7.5 was used for making the distribution maps. The drawings were made under stereo microscope with Nikon SZM800 camera lucida.

Type labels are numbered and separated by a slash symbol with a brief description in parentheses. The handwritten words are shown in italics, as well as scientific names, repository institute is given in parentheses. Any data that may be considered erroneous or inaccurate were copied verbatim and possible corrections are given in brackets. Non-type material was listed from the northernmost to the southernmost location.

The specimens are deposited in the following collections (curators in parentheses):

- CEMT Setor de Entomologia da Coleção Zoológica da Universidade Federal de Mato Grosso, Mato Grosso, Cuiabá, Brazil
MNHN Muséum national d'Histoire naturelle, Paris, France (Olivier Montreuil and Antoine Mantilleri)
MNHU Museum für Naturkunde der Humboldt Universität, Berlin, Germany (Johannes Frisch and Joachim Willers)
FMZH Zoological Museum Helsinki, Helsinki, Finland (Jaakko Mattila e Heidi Viljaven).
NMP Narodni Muzeum, Prague, Czech Republic (Jiří Hájek)
NRMS Naturhistoriska Riksmuseet, Stockholm, Sweden (Johannes Bergsten and Mattias Forshage).

Results and discussion

For the development of this study, the type specimens detainers species-group names of *Tetraechma*, and species included in the genus, were examined as well as 983 non-type specimens. Of the names analysed, in between specific names and to subspecific names, we designate ten lectotypes and propose three new synonym and three new combinations. The results are described in detail below.

Tetraechma Blanchard, 1842

Tetraechma Blanchard, 1842: Plate. 10, Figure 6 (first illustration and source of the availability of the name); Blanchard 1845: 167 (first description); Lucas, 1920: 634 (catalogue); Pereira & Martínez, 1956: 108 (revalidation); Martínez, 1959: 59 (catalogue); Halffter, 1961: 230 (monography); Vulcano & Pereira, 1964: 589 (catalogue); Halffter e Martínez, 1977: 35, 44, 59 (checklist and descriptions); Cupello & Vaz-de-Mello, 2018: 12, 13, 17, 34 (revision genus *Sylvicanthon*).

As synonym of *Canthon* – Harold, 1868: 15, 97 (synonym of the *Canthon*, and key for *Canthon*); Harold, 1869a: 993 (catalogue); Steinheil 1872: 554 (species list); Burmeister, 1873: 410 (catalogue); Kolbe, 1907: 61 (catalogue); Bruch, 1911: 185 (catalogue); Gillet, 1911: 33 (catalogue); Schmidt, 1922: 80 (key for *Canthon*); Balthasar, 1939: 210 (key for *Canthon*); Blackwelder, 1944: 201 (catalogue); Martínez, 1949: 186 (species list).

Type species: Tetraechma sanguineomaculata Blanchard, 1842, by original monotypy (Fig. 1F).

Diagnosis: Among Deltochilini, genera *Tetraechma* is distinguished by the following combination of characters: **Head.** Four or six teeth (four at clypeus), the two central teeth long and acute, with wide or narrow base; two shorter teeth with wider base; clypeo-genal junction distinctly angled, sometimes shaped like a smaller tooth or a sinuosity, or straight (i.e., continuous to the margin of clypeus). Cephalic disk with tubercles, with (three species) or without (two species). **Legs.** Protibiae with three teeth external (lateral), at least apical tooth with half-moon shape (falciform), never with three straight triangular teeth; protibiae with laterodorsal line of setae interrupted medially or with central angulation, without any tooth or transverse keel on its lateral side; metatibiae straight, never bent. **Parameres.** Unilobated in almost all species - except *T. balteata* (Boheman, 1858) with paramera bilobated.

Taxonomic remarks: Although the 1846 date for the description of *Tetraechma* is well known and reproduced in the scientific literature, Blanchard's work, in part written by Brullé, was published in 32 books from 1835 to 1847 (Evenhuis 1997; Bousquet 2016). An image accompanied by the binomial was published before the description, the plate with the figure referring to the description of *Tetraechma sanguineomaculata* Blanchard, was formally published for the first time in February 1842, while pages 167 and 168 where descriptions of the genus and species appear were published in 1845 (Bousquet 2016). Therefore the nomenclatural act of 1842 must be considered valid.

One of the justifications used by Harold (1868) to synonymize *Tetraechma* with *Canthon* was the similarity between the heads of *T. sanguineomaculata* and *C. lituratus* (Germar, 1822). Although we agree with this statement, and even list additional similarities between these two species, we corroborate Pereira & Martínez's (1956) revalidation of the genus as we reverse Harold's logic, considering *C. lituratus* and other species, previously included in *Canthon*, now as part of *Tetraechma* - and not synonymizing *Tetraechma* and *Canthon*.

Key to the species of *Tetraechma* Blanchard, 1842

1. Head with four or six teeth. Clypeus with four long, sharp teeth, with broad base. Protibiae with three teeth, at least the apical tooth in the shape of half moon (falciform) (Fig. 2F); Mesotibiae with the laterodorsal line of setae interrupted, or with an angulation near the central region, without any transverse tooth or keel on its lateral side (Figs 1E, 2E, 3E, 4E, 5E). Straight metatibiae ... *Tetraechma* Blanchard, 1842..... 2
- 1'. Head with two, four, six, eight or no teeth, either long or short, acute or obtuse, with broad or narrow base. Protibiae with three or four triangular teeth. Mesotibiae with straight or linear laterodorsal line of setae, without interruption, at most with a small central agglomeration of setae, with or without tooth or transverse keel on its lateral side. Metatibiae straight or curved other genera and subgenera of Deltochilini.
2. Pronotum completely convex, with the sides near the anterior angle not flattened, or only slightly flat (Figs 1C, 2C, 3C). Pygidium flat with no carina complete or

- keel separating it from the propygidium, if separated, with an incomplete visible carina only in the central region (Figs 1D, 2D, 3D).3
- 2'. Pronotum with sides close to the anterior angle flattened (Figs 4C, 5C). Concave pygidium, separated from propygidium by a complete carina, with the region central projected, forming a small keel (Figs 4D, 5D). 5
3. Pronotum with the posterolateral angle almost straight, forming a lateral dentiform projection facing backwards (Figs 3A, 3F). Parameres bilobed (Figs 3G, 3H) [Characteristic present only in this species of the genus]. ...
..... *Tetraechma balteata* (Boheman, 1858) **comb.n.**
- 3'. Pronotum with rounded posterolateral angle, without any dentiform projection. Parameres unilobed. 4
4. Head margin with six teeth, with the prominence of the genae forming a third pair of teeth, besides the two pairs of clypeal teeth (Fig. 2B). Pygidium and propygidium separated by a short, central carina (Fig. 2D).
..... *Tetraechma tarsalis* (Balthasar, 1939).
- 4'. Head margin with four teeth, with genae continuous to clypeus not forming the third pair of teeth, only with the two pairs of the clypeus (Fig. 1B). Pygidium without carina or keel separating it from propygidium (Fig. 1D).
..... *Tetraechma sanguineomaculata* Blanchard, 1842
5. Cephalic disk with three tubercles, one close to each eye and one central, more evident in males (Fig. 4B). Pronotum with a central longitudinal groove, also more evident in males (Figs 4A, 4B, 4C, 4F).
..... *Tetraechma chlorophana* (Mannerheim, 1829) **comb.n.**
- 5'. Cephalic disk without tubercles or horns (Fig. 5B). Pronotum with no longitudinal groove (Figs 5A, 5B, 5C, 5F).
..... *Tetraechma liturata* (Germar, 1822) **comb.n.**

***Tetraechma sanguineomaculata* Blanchard, 1842 (Figs 1A–H)**

Tetraechma sanguineomaculata Blanchard, 1842: Plate 10, Figure 6 (first illustration and source of the availability of the name); Blanchard, 1845: 168 (first description); Pereira & Martínez, 1956: 108; Martínez, 1959: 59 (catalogue); Vulcano & Pereira, 1964: 589 (catalogue); Halffter e Martínez, 1977: 59 (checklist and descriptions); Cupello & Vaz-de-Mello, 2018: 17 (revision genus *Sylvicanthon*).

As *Canthon sanguineomaculata* – Harold, 1868: 15, 97 (key for *Canthon*, new combination); Harold, 1869a: 993 (catalogue); Steinheil 1872: 554 (species list); Kolbe, 1907: 61 (catalogue); Bruch, 1911: 185 (catalogue); Gillet, 1911: 33 (catalogue); Schmidt, 1922: 80 (key for *Canthon*); Balthasar, 1939: 210 (key for *Canthon*); Martínez, 1949: 186 (species list).

As *Canthon sanguineomaculatum* – Blackwelder, 1944: 201 (catalogue).

As *Coprobius sanguinolentus* Burmeister, 1873: 416 (first description, catalogue); Martínez, 1959: 59 (new synonym); Vulcano & Pereira, 1964: 589 (catalogue, unexamined type).

As *Canthon tarsalis* – Martínez, 1949: 186 (new status).

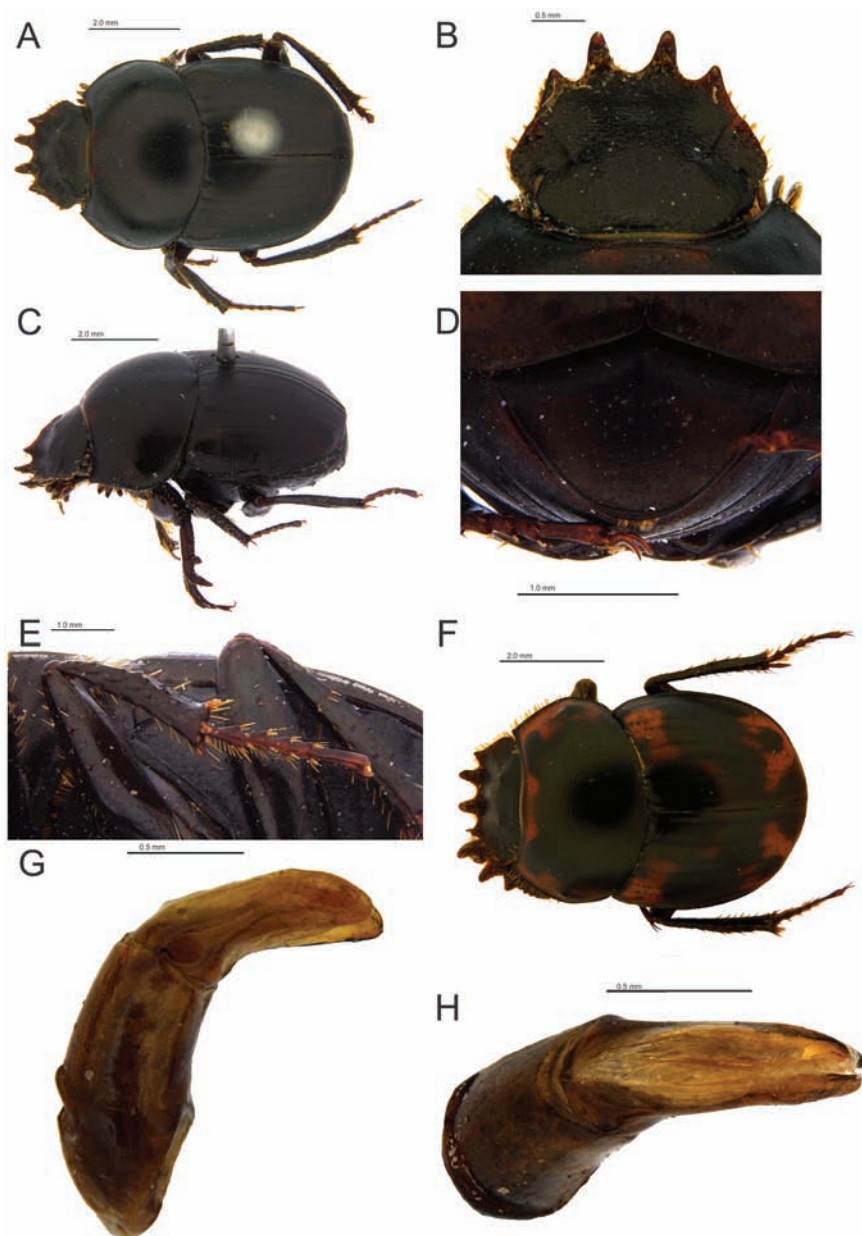


Fig. 1. *Tetraechma sanguineomaculata* Blanchard, 1842: (A) dorsal view. (B) head. (C) lateral view. (D) pygidium. (E) mesotibiae. (F) *T. sanguineomaculata*; chromatic variation. Parameres: (G) lateral view. (H) dorsal view.

Diagnosis: Among the *Tetraechma*, *T. sanguineomaculata* differs by the following combination of characters: **Head.** Four prominent clypeal teeth; presence of three well evident cephalic tubercles (Fig. 1A, 1B, 1C, 1F). **Pronotum.** Central longitudinal

groove absent, sides near the anterior angle slightly flat; posterior angle rounded, never straight or nearly with dentiform projection. **Pygidium**. Flat, never concave, not separated from the propygidium by central carina or keel (Fig. 1D). **Parameres**. Unilobed, with round apical margin. (Fig. 1G, 1H).

Taxonomic remarks: *T. sanguineomaculata* is one of the species that feature reported ecological interactions with *Lagostomus maximus* (Martínez 1949, 1959; Pereira & Martínez 1956). It presents chromatic variation: some individuals are entirely black (Fig. 1A), others have spots on the elytra, on the sides near the base and at the apex, and also on the anterolateral margin of pronotum (Fig. 1F). It is the only species of the genus that shows the anterior margin of clypeus and genae linear, without tooth projected (Fig. 1B).

Distribution: Argentina, from the northern province of Córdoba all the way to the southern province of Buenos Aires (Fig. 6).

Type material examined” *Tetraechma sanguineomaculata* Blanchard, 1842: **Lectotype (here designated ♀)**: (brown, round) 6059, 34 / 2. (brown) Museum Paris, Patagonie, (Patagones), D’orbigny 1834 / 3. (white, black border) *Tetraechma, sanguineomaculata, Blanchard, G.H.YA.M. Det.* 76 / 4. (red, black border) LECTOTYPE ♀, *Tetraechma, sanguineomaculata, Blanchard, des.* F.Z. Vaz-de-Mello 2014 (MNHN).

Paralectotypes: 1♀. (brown, round) 6059, 34 / 2. (brown) Museum Paris, Patagonie, (Patagones), D’orbigny 1834 / 3. (white, black border) *Tetraechma, sanguineomaculata, Blanchard, G.H.YA.M. Det.* 76 / 4. (yellow, black border) PARALECTOTYPE ♀, *Tetraechma, sanguineomaculata, Blanchard, des.* F.Z. Vaz-de-Mello 2014 (MNHN); 1♀. (brown, round) 6061, 34 / 2. (brown) Museum Paris, Patagonie, (Patagones), D’orbigny 1834 / 3. (white, black border) *Tetraechma, sanguineomaculata, Blanchard, G.H.YA.M. Det.* 76 / 4. (yellow, black border) PARALECTOTYPE ♀, *Tetraechma, sanguineomaculata, Blanchard, des.* F.Z. Vaz-de-Mello 2014 (MNHN).

Non-type material: 4 specimens (1♂ and 3♀) ARGENTINA: **Córdoba**, 1. *Canthon sanguineomaculatus, Corvova, BL. Argent* / 2. Museum Paris, Collection Léon Fairmaire 1906 / 3. Cordova. Argent. Davis (2♀ CEMT); **Buenos Aires**, Bahia Blanca, Argentine S.A. (1♂ CEMT; 1♀ CEMT).

***Tetraechma tarsalis* (Balthasar, 1939) (Figs 2A–H)**

Canthon tarsalis Balthasar, 1939: 235 (first description); Martínez, 1949: 186 (species list); Martínez, 1959: 59 (new synonym of *Canthon sanguineomaculata*).

As *Canthon tarsalis* – Blackwelder, 1944: 202 (catalogue).

Again as *Tetraechma tarsalis* – Halffter e Martínez, 1977: 59 (revalidation and new combination)

Diagnosis: Among the species of *Tetraechma*, *T. tarsalis* is differentiated by the following combination of characters: **Head**. Clypeus with six teeth, genae with a dentiform prominence in the external margin; presence of three well evident cephalic tubercles (Figs 2A, 2B, 2C). **Pronotum**. without central longitudinal groove; sides close to the

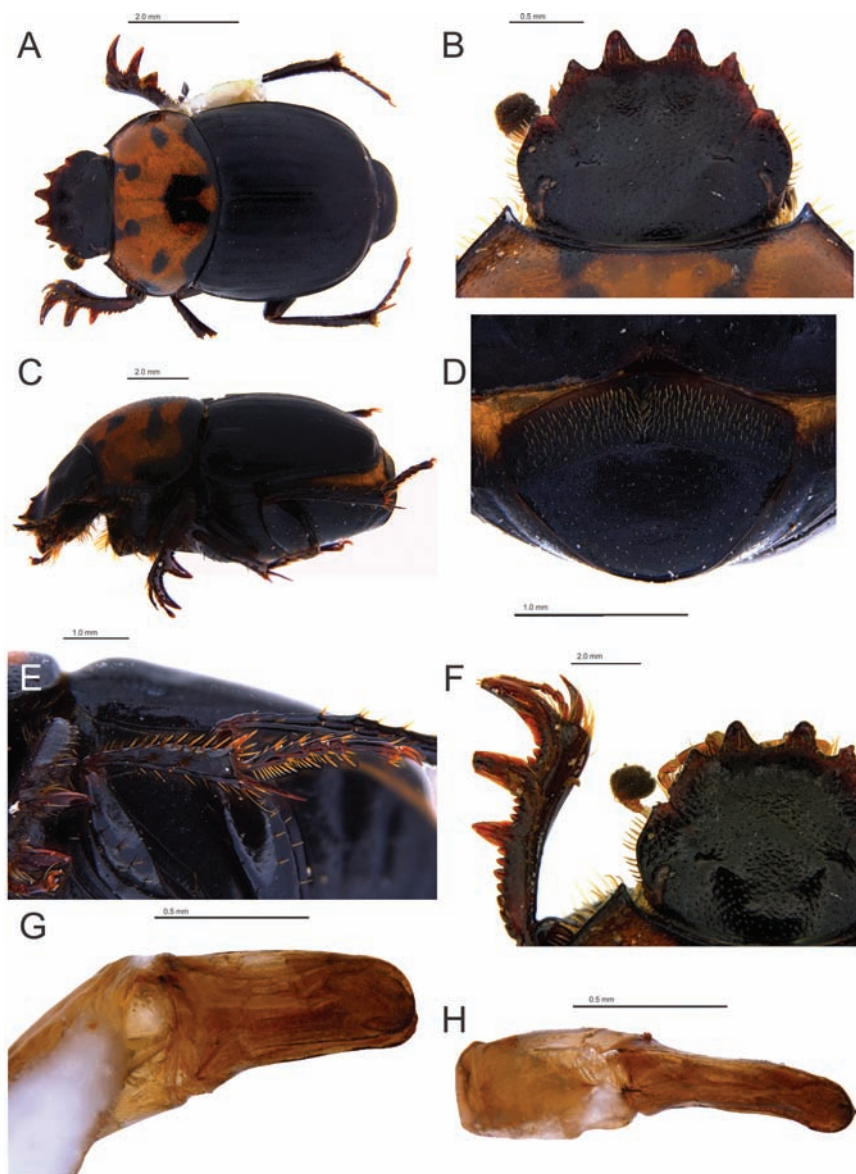


Fig. 2. *Tetraechma tarsalis* (Balthasar, 1939): (A) dorsal view. (B) head. (C) lateral view. (D) pygidium. (E) mesotibiae. (F) protibiae. Parameres: (G) lateral view. (H) dorsal view.

anterior angle, linear or slightly flat; rounded posterior angle, never straight or nearly straight, and without any lateral dentiform projection. **Pygidium.** Flat, never concave, with a linear carina not reaching the sides, and without any central keel, separating it from propygidium (Fig. 2D). **Parameres.** Unilobed, with the apical margin round (Figs 2G, 2H).

Taxonomic remarks: *T. tarsalis* is another species of the genus that presents ecological interactions with *Lagostomus maximus* (Martínez 1949, 1959; Pereira & Martínez,

1956). It is also the only species that does not present a registered chromatic variation. All individuals analysed have a very similar colouration (Fig. 2A).

Distribution: Distributed from the Chaco, in province of Boquerón, Paraguay, to the northwest province of Córdoba, Argentina (Fig. 6).

Type material examined: *Canthon tarsalis* Balthasar, 1939: **Holotype:** (red, black border) TYPUS / 2. (red) *Holotype* / 3. (green, black border) *tarsalis m.* / 4. (white) *Canthon, tarsalis n. sp.*, Dr. V. Balthasar det. / 5. (white) Argentina, Santiago d E., Wagner (NMP).

Non-type material: 8 specimens (4♂ and 4♀) ARGENTINA: **Córdoba**, Chancaní, II-1990, leg. E. Maldonado (4♂, 2♀ CEMT); 1.Chancaní, II-1990, leg. E. Maldonado / 2. *Tetraechma tarsalis* (1♀ CEMT); PARAGUAY: **Boquerón**, 30 km NW Mariscal Estigarribia [Mariscal José Félix Estigarribia], 28 - 29-I-2008, 180 m, A. Kudrna Jr. LGT (1♀ CEMT).

***Tetraechma balteata* (Boheman, 1858), comb.n. (Figs 3A–H)**

As *Canthon balteatus* Boheman, 1858: 41 (first description); Harold, 1868: 125 (key for *Canthon*); Harold, 1869a: 990 (catalogue); Gillet, 1911: 28 (catalogue); Schmidt, 1922: 73 (key for *Canthon*); Balthasar, 1939: 209 (key for *Canthon*).

As *Canthon baltheatus* Vulcano & Pereira, 1964: 604 (catalogue).

As *Canthon balteatus lojanus* Balthasar, 1939: 210 (first description). **syn.n.**

As *Canthon lojanum* – Blackwelder, 1944: 200 (catalogue).

As *Canthon balteatum* – Blackwelder, 1944: 198 (catalogue).

Diagnosis: Among the species of *Tetraechma*, *T. balteata* is distinguished by the following combination of characters: **Head.** Clypeus with six teeth, genae with a dentiform prominence in the margin extern; cephalic tubercles not so evident (Figs 3A, 3B, 3C, 3F). **Pronotum.** Without central longitudinal groove; sides close to the anterior angle, linear or slightly flat; posterior angle, almost straight, forming a lateral dentiform projection facing backward, never rounded (Figs 3A, 3F). **Pygidium.** Flat, never concave, without any carena keel, separating it from propygidium (Fig. 3D). **Parameres.** Bilobed, with the apical margin round in the dorsal lobe, and directly truncated in the ventral lobe (Figs 3G, 3H).

Taxonomic remarks: This species is the only one in the genus featuring almost straight pronotum latero-posterior angle, forming something similar to a lateral tooth (Figs 3A and 3F); it is also the only species of *Tetraechma* to have bilobed parameres (Fig. 3G). It also shows a variation in the size of the elytra's central spot, the elytra can be entirely or almost entirely black (Fig. 3F). This variation (black elytra, without spot) led Balthasar to describe the variety *Canthon balteatus lojanus*, never formally considered synonymous with "*C. balteatus*", and which we here consider to be synonym of *Tetraechma balteata*.

Distribution: Distributed along the coast of Ecuador to northern of Peru (Fig. 6). Despite the type locality label included Honolulu, Hawaii, the expedition that Boheman left for South America, and may have had those mixed with Hawaii (Bousquet 2016;

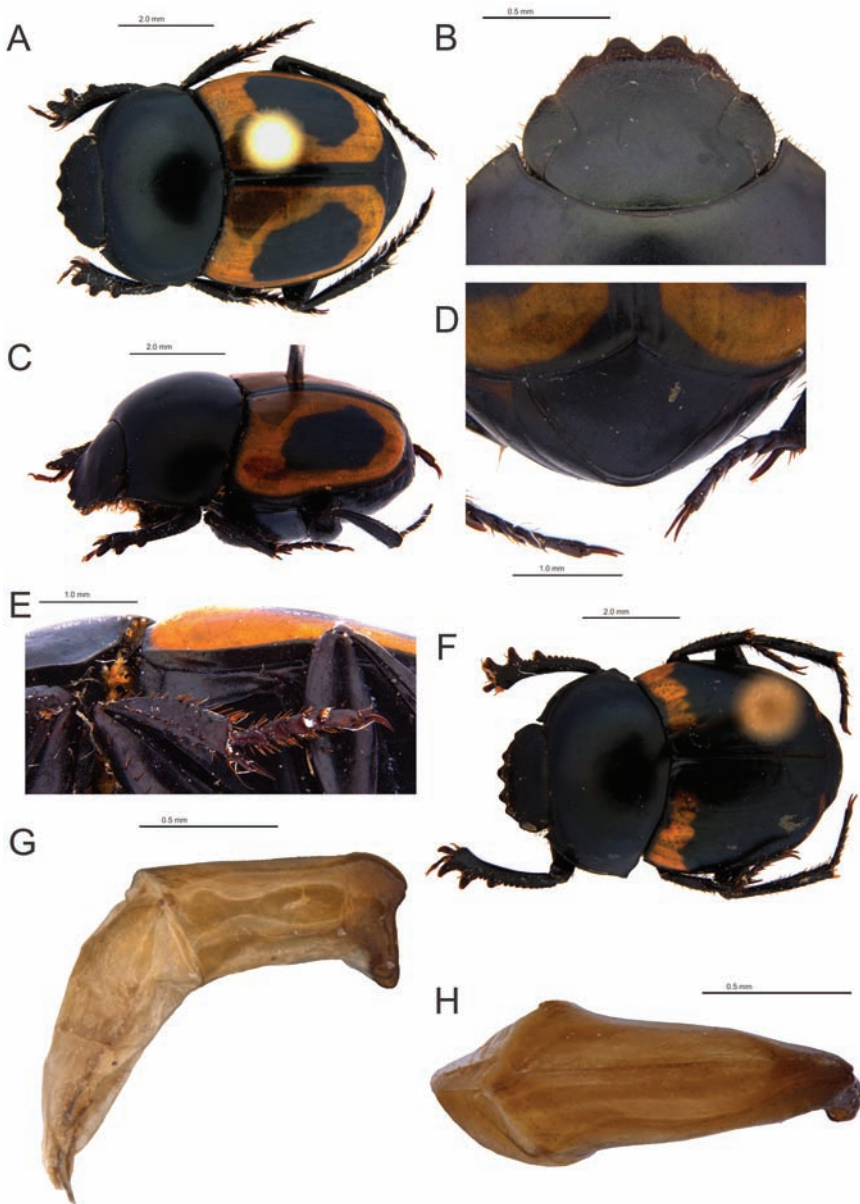


Fig. 3. *Tetraechma balteata* (Boheman, 1858): (A) dorsal view. (B) head. (C) lateral view. (D) pygidium. (E) mesotibiae. (F) *T. balteata*; chromatic variation. Parameres: (G) lateral view. (H) dorsal view.

Cupello 2018). Other coleopteran groups had standard series with collection data from Hawaii, and from the same expedition, questioned, as in carabidae (Liebherr et al. 2010). Therefore, we consider this record to be wrong for Hawaii, but we do not agree that *Tetraechma balteata* is endemic to Ecuador (Vulcano & Pereira 1964), there is also data on the occurrence of Piura, in northern Peru.

Type material examined: *Canthon balteatus* Boheman, 1858: **Lectotype (here designated ♂)**: (blue) 9269, E92 + / 2. (red) 15, 56 / 3. (white) NHRS-JLKB, 000021105 / 4. (white, old) Honolulu. / 5. (white, old) Kinb. / 6. (white, old) Type. / 7. (white, old) *balteatus* Bhm / 8. (red, black border) Typus / 9. (red, black border) LECTOTYPE ♂, *Canthon, balteatus* Boh., des. F.Z. Vaz-de-Mello 2013 (NRMS).

Paralectotypes: 1♀. (blue) 9263, E92 + / 2. (red, black border) Paratypus / 3. (white, old) Honolulu. / 4. (white, old) Kinb. / 5. (white) *Canthon, balteatus, Boh.*, P. Pereira det. 60 / 6. (yellow, black border) PARALECTOTYPE ♀, *Canthon, balteatus Boh.*, des. F.Z. Vaz-de-Mello 2013 (IRSN); 1♀. (azul) 9264, E92 + / 2. (red, black border) Paratypus / 3. (branca, velha) Honolulu. / 4. (white, old) Kinb. / 5. (white, old) 22. / 6. (yellow, black border) PARALECTOTYPE ♀, *Canthon, balteatus Boh.*, des. F.Z. Vaz-de-Mello 2013 (NRMS); 1♀. (azul) 9268, E92 + / 2. (red, black border) Paratypus / 3. (white, old) Honolulu. / 4. (white, old) Kinb. / 5. (yellow, black border) PARALECTOTYPE ♀, *Canthon, balteatus Boh.*, des. F.Z. Vaz-de-Mello 2013 (NRMS); 1♀. (white, old) Honolulu. / 2. (white, margem negra) Type / 3. (white, black border) Collection, E. Candèze / 4. (white, green border) *Balteatus, Bhm., Honolulu Bhm.* / 5. (yellow, black border) PARALECTOTYPE ♀, *Canthon balteatus, Boheman*, des. F.Z. Vaz-de-Mello 2014 (NRMS).

Canthon balteatus lojanus Balthasar, 1939: **Lectotype (here designated ♀)**: (white) Ecuador, Loja, Ohaus S. / 2. (red, black border) Typus / 3. (white, black border) *var., lojanus m.* / 4. (red, black border) LECTOTYPE ♀, *Canthon, balteatus var., lojanus Balth.*, des. F.Z. Vaz-de-Mello 2013 (NMP).

Non-type material examined: 151 specimens (63♂ and 88♀) ECUADOR: **Azuay**, 1. Azuay, Sta Isabel, 5 km W and 3 km S, 9-V-1998, leg. P Krol / 2. *Canthon balthaeum* Boh. Vaz-de-Mello dt. 99 (2♂ CEMT; 4♀ CEMT); Azuay, Sta Isabel, 5 km W and 3 km S, 9-V-1998, leg. P Krol (1♂ CEMT; 1♀ CEMT); **El Oro**, Arenillas, 3°34.24'S, 80°08.86'W, 13m, Pitfall Excremento, 15-VI-2012, leg D Marín (42♂ CEMT; 47♀ CEMT); **Loja**, Catamayo, 3°59'46"S, 73°[78°]24'9"W, 1100m, Pitfall Excremento, 22-VIII-2010, leg D. Domínguez (4♂ CEMT; 5♀ CEMT); **Santa Elena**, Olón, 1°47'46"S, 80°45'25"W, 8m, Pig faeces, 20-XII-2012, leg R Robalino (2♂ CEMT; 2♀ CEMT); PERU: **Piura**, Morropón, Caracucho, dry forest, pitfall feces, 16-III-2015, leg D. Saavedra (12♂ CEMT; 29♀ CEMT).

***Tetraechma chlorophana* (Mannerheim, 1829), revalidation and comb.n. (Figs 4A–H)**

As *Ateuchus chlorophanus* Mannerheim, 1829: 38 (first description); Castelnau, 1840: 69 (catalogue, natural history); Harold, 1868: 95 (sinonimizado com *C. lituratus*).

As *Canthon lituratus chlorophanus* – Harold, 1869a: 992 (catalogue); Bruch, 1911: 184 (catalogue); Schmidt, 1920: 120 (species list, species descriptions); Schmidt, 1922: 76 (key for *Canthon*); Balthasar, 1939: 218 (key for *Canthon*); Pereira, 1944: 87 (species list); Martínez, 1959: 35 (catalogue); Vulcano & Pereira, 1964: 604 (catalogue).

As *Canthon lituratum chlorophanum* – Blackwelder, 1944: 200 (catalogue); Martínez, 1947:112 (catalogue); Roze, 1955: 42 (species list).

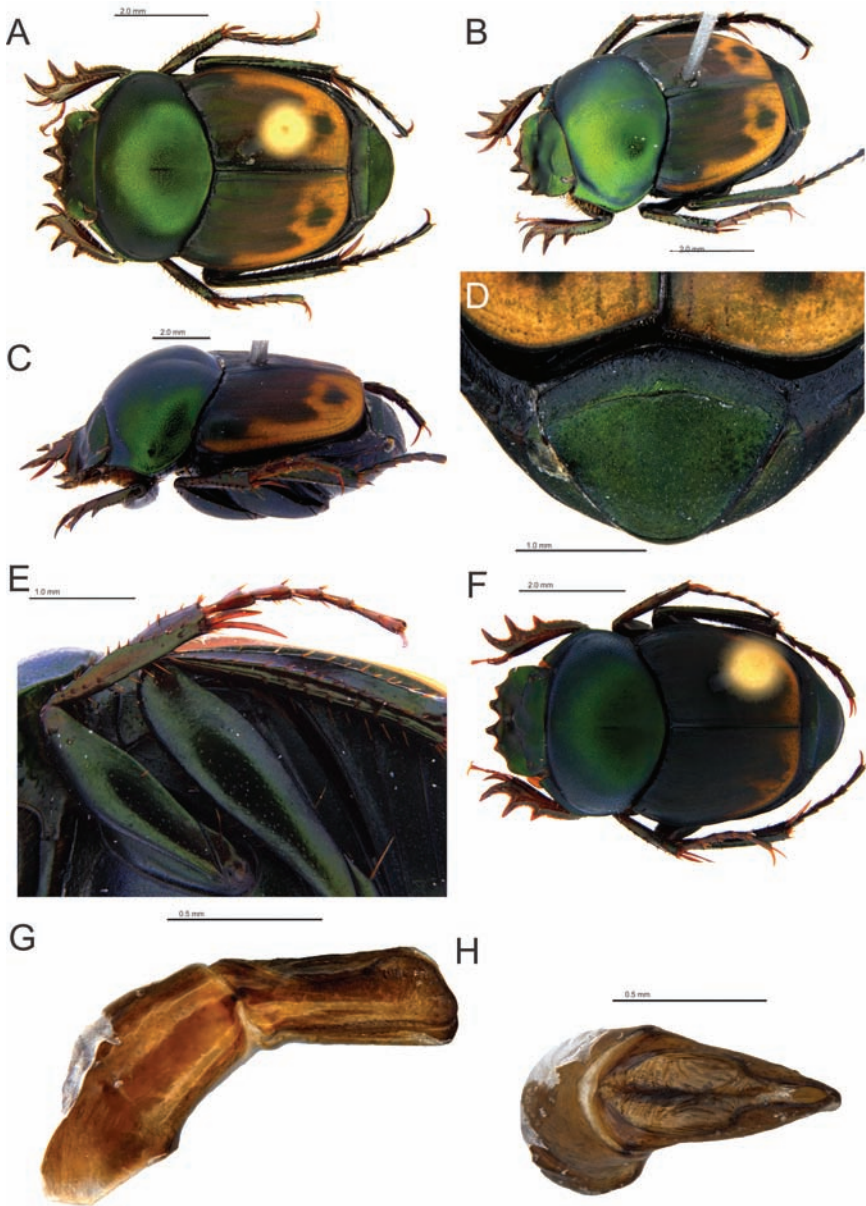


Fig. 4. *Tetraechma chlorophana* (Mannerheim, 1829): (A) dorsal view. (B) dorso-lateral view. (C) lateral view. (D) pygidium. (E) mesotibiae. (F) *T. chlorophana*; chromatic variation. Parameres: (G) lateral view. (H) dorsal view.

As *Canthon apicale* Lucas, 1859: 100 (first description). **syn.n.**

As *Canthon apicalis* – Harold, 1869b: 57 (new synonym of *C. lituratus*); Gillet, 1911: 31 (catalogue); Pereira, 1944: 87 (species list); Martínez, 1959: 35 (catalogue); Vulcano

& Pereira, 1964: 604 (catalogue); Daniel et al, 2014: 185, 187 (species composition and list). **syn.n.**

As *Canthon lituratus apicalis* – Schmidt, 1920: 120 (species list, species descriptions); Schmidt, 1922: 76 (key for *Canthon*); Balthasar, 1939: 218 (key for *Canthon*); Pessôa & Lane, 1941: 422 (catalogue);

As *Canthon lituratum apicale* – Blackwelder, 1944: 200 (catalogue).

Diagnosis: Among the *Tetraechma*, *T. chlorophana* is distinguished by the following combination of characters; **Head.** Four clypeal teeth, genae with a rounded prominence in the external margin; presence of three well evident cephalic tubercles (Figs 4A, 4B, 4C, 4F). **Pronotum.** Central longitudinal groove present (Fig. 4C); sides close to anterior angle, flattened; rounded posterior angle, without any lateral dentiform projection. **Pygidium.** Concave, never flat, separated from propygidium by complete carina. Carina projected forming a keel (Fig. 4D). **Parameres.** Unilobed, with truncated apical margin (Figs 4G, 4H).

Taxonomic remarks: This species was originally assigned to the genus *Ateuchus* Fabricius, 1801 (ec Weber, 1801) and later transferred to *Canthon* as a junior synonym of “*Canthon lituratus*” (Germar, 1822) by Harold (1868). Here, we revalidate this species name and transfer it to *Tetraechma*. *T. chlorophana* it has cephalic disk with three tubercles and pronotum with a central longitudinal groove, and also shares the main diagnostic characters of the genus, such as clypeus teeth shape and the tubercles in the cephalic disc, characters that were already known for the species, well as the protibiae with falciform tooth (Figs 4A, 4B), the modified lateral line of setae of mesotibiae (Fig. 4E) and the unilobated parameres (Figs 4G, 4H).

The analysis of the type specimens leads to the verification that *C. chlorophanus* and *Canthon apicalis* (Lucas, 1859) are synonyms. Both are currently considered synonyms of *Canthon lituratus*, but the two species (*T. liturata* and *T. chlorophana*) show quite distinct colouration patterns (Figs 4 and 5) - and therefore valid -, with *T. chlorophana* never featuring yellow at base of elytra. However, chromatic variation is present in both, and individuals of several localities can all present colours ranging from two yellow spots at the apex of the elytra (Fig. 4A), through to the intermediate stage, where only the apical end is yellow (Fig. 4F), up to individuals featuring completely green elytra; this last variation renders the dissociation between one species and the other most difficult. In order to reach this conclusion, it was necessary to analyse a large number of specimens, from several localities within the distribution range of this species, and also aspecimens from *T. liturata*, something that certainly could not have been done in the 19th century, leading to this synonymy. Furthermore, the morphological characteristics that separate the two species are quite difficult to observe, depending on the sex and viewing angle. Here we consider *C. apicalis* synonym with *T. chlorophana*.

Distribution: It is distributed throughout the Brazilian cerrado (in the states of Maranhão, Tocantis, Mato Grosso Goiás, Minas Gerais, Mato Grosso do Sul), as well as open areas of Santa Catarina, Paraguay, and the Bolivian Chaco (Fig. 6).

Type material examined: *Ateuchus chlorophanus* Mannerheim, 1829: **Lectotype** (here designated ♀): (red, nothing written) / 2. (brown) *Brasília, Min. Geraes* / 3. (white) *Ateuchus, chlorophanus* Mannerheim, 1829 / 4. (amarela) Muz. Zool. Helsinki, Loan

No. C 11 112 / 5. <http://id.luomus.fi/GL.577> / 6. (red, black border) LECTOTYPE ♀, *Ateuchus chlorophanus*, Mann, des. F.Z. Vaz-de-Mello 2014 (NRMS).

Canthon apicalis Lucas, 1857

Lectotype (here designated ♂): (round) 6, 47 / 2. (brown) Museum Paris, Minas Gerais, Serra D'Estrella, De Castelnau 1847 / 3. (white) *Canthon apicale*, Luc / 4. (big, with lines) *C. apicalis*, Lucas, Goyas, M de Castelanu, / 5. (red) Type / 6. (red, black border) LECTOTYPE ♂, *Canthon, apicalis*, Lucas, des. F.Z. Vaz-de-Mello 2014 (MNHN).

Paralectotypes: 1♂. (round) 6, 47 / 2. (white) Museum Paris, Goyaz, Castelnau / 3. (big, with lines) *C. apicalis*, Lucas, Goyas, M de Castelanu / 4. (yellow, black border) PARALECTOTYPE ♂, *Canthon, apicalis*, Lucas, des. F.Z. Vaz-de-Mello 2014 (MNHN); 1♂. (round) 6, 47 / 2. (brown) Museum Paris, Minas Gerais, Serra D'Estrella, De Castelnau 1847 / 3. (yellow, black border) PARALECTOTYPE ♂, *Canthon, apicalis*, Lucas, des. F.Z. Vaz-de-Mello 2014 (MNHN); 1♀. (round) 6, 47 / 2. (brown) Museum Paris, Minas Gerais, Serra D'Estrella, De Castelnau 1847 / 3. (yellow, black border) PARALECTOTYPE ♀, *Canthon, apicalis*, Lucas, des. F.Z. Vaz-de-Mello 2014 (MNHN); 1♂. (round) 6, 47 / 2. (brown) Museum Paris, Goyaz, Castelnau / 3. (white) *Canthon, apicalis*, Lucas / 4. (with lines and margins) *lituratus*, det. G. D'Olsufiew / 5. (yellow, black border) PARALECTOTYPE ♂, *Canthon, apicalis*, Lucas, des. F.Z. Vaz-de-Mello 2014 (MNHN); 1♂. (round) 6, 47 / 2. (brown) Museum Paris, Minas Gerais, Serra D'Estrella, De Castelnau 1847 / 3. (white) *Canthon, apicalis*, Lucas / 4. (with lines and margins) *lituratus*, det. G. D'Olsufiew / 5. (yellow, black border) PARALECTOTYPE ♂, *Canthon, apicalis*, Lucas, des. F.Z. Vaz-de-Mello 2014 (MNHN).

Non-type material examined: 429 specimens (166♂ and 263♀) BRASIL: **Maranhão**, Mirador, Parque Est. do Mirador, Povoado Pindaíba (Mel), 06°41'06"S, 45°00'26"W, Pitfall excrem. Humano, 1 – 5-VI-2011, legs. F. Limeira-de-Oliveira, M. M. Abreu & J. S. Pinto Júnior (3♂ CEMT; 6♀ CEMT); **Tocantins**, Porto Nacional, Mata1 Col1/1 nº1S, VI-2003, leg. J. C. Oliveira (1♀ CEMT); **Bahia**, Barreiras, Dist Placas, Faz. Girassol, 11°50'S, 46°10'W, Pitfall hum. feces, II-2010, leg. R. V. Nunes (1♀ CEMT); Ibicoara, Mucugê, 18-III-1975, leg. J. Velliard (3♀ CEMT); **Goiás**, Parque Nacional das Emas, 1999, leg. G. Machado (1♀ CEMT); **Mato Grosso**, Virapuru [Uirapuru], 8 – 10-III-1979, leg. C.R. Owen (1♀ CEMT); Chapada dos Parecis, 30 km N de Uirapuru, 14°17'S, 59°15'W, FIT, 1 – 15XII-2001, leg. A. Foucart (1♂ CEMT); Diamantino, Alto Rio Arinos, X-2003, leg. E. Furtado (2♂ CEMT; 1♀ CEMT); Diamantino, Alto Rio Arinos, XI-2002, leg. E. Furtado (1♀ CEMT); Diamantino, Vale da Solidão, 14°22'23"S, 56°07'25"W e 14°21'52"S, 56°07'23"W, pitfall, Cerrado, 31-I-2009, leg. D.C.T. Oliveira (2♂ CEMT; 1♀ CEMT); Diamantino, Faz. São João, 520m, 14°23'38"S, 56°08'50"W, pasture, ex. Dung tp2, 2001–24, 12-I-2001, leg. Génier & Vaz-de-Mello (3♀ CEMT); Chapada dos Guimarães, Faz. Toa toa, 15°20'34"S, 55°51'24"W, human faec, II-2011, leg. R.V. Nunes (1♀ CEMT); Chapada dos Guimarães, Parque Nacional, Véu de Noiva, 15°24'12"S, 55°49'43"W, human faec, II-2011, leg. R.V. Nunes (1♀ CEMT); Chapada dos Guimarães, Cidade de Pedra, 15°17'59"S, 55°50'23"W e 15°18'06"S, 55°50'21"W, III-2011, leg. R.V. Nunes (1♂

CEMT; 1♀ CEMT); Chapada dos Guimarães, Paredão do Eco, 15°20'07"S, 55°47'19"W; 15°20'08"S, 55°47'18"W; 15°20'09"S, 55°47'17"W e 15°20'10"S, 55°47'16"W, III-2011, leg. R.V. Nunes (1♂ CEMT; 5♀ CEMT); Chapada dos Guimarães, Buriti, 15°24'52"S, 55°46'58"W, III-2011, leg. R.V. Nunes (1♀ CEMT); Chapada dos Guimarães, Haras Talismã, 15°19'32"S, 55°52'42"W, human faec, III-2011, leg. R.V. Nunes (1♂ CEMT; 1♀ CEMT); Chapada dos Guimarães, Faz. Mutuca, 15°18'08"S, 55°57'54"W, Pitfall pulmão bovino, III-2011, leg. L.G.O.A. Nunes (1♀ CEMT); Chapada dos Guimarães, Faz. Mutuca, Eucalipto-6 [FIT], 29-XI-2008 e 30-IV-2009, [leg. L.G.O.A. Nunes] (2♀ CEMT); Chapada dos Guimarães, F. Sadia-Eucalipto, T1P5, 15°18'51"S, 55°58'21"W, 280m, Pitfall, 01-II-2013, leg. Gimo M. Daniel (1♂ CEMT); Chapada dos Guimarães, F. Sadia-Eucalipto, T2P1, 15°18'28"S, 55°58'13"W, 270m, Pitfall, 21-II-2013, leg. Gimo M. Daniel (1♂ CEMT); Chapada dos Guimarães, M. úmida, Rio Mutuca, P1, 15°19'19"S, 55°57'57"W, 250m, Pitfall, 09-I-2013, leg. Gimo M. Daniel (1♂ CEMT); Chapada dos Guimarães, Fazenda Mutuca, P2, 15°21'15"S, 55°58'03"W, 240m, Pitfall, 20-XII-2012, leg. Gimo M. Daniel (1♂ CEMT; 1♀ CEMT); Chapada dos Guimarães, Cachoeira Geladeira, P2, 15°25'25"S, 55°42'56"W, P3, 15°25'26"S, 55°42'55"W, P5, 15°25'26"S, 55°42'53"W, 620m, Pitfall, 09-I-2013, leg. Gimo M. Daniel (2♂ CEMT; 1♀ CEMT); Chapada dos Guimarães, Paredão do Eco, P1, 15°20'09"S, 55°47'14"W, 750m, Pitfall, 20-XII-2012, leg. Gimo M. Daniel (2♂ CEMT; 2♀ CEMT); Chapada dos Guimarães, Fazenda Toa Toa, T1P2, 15°20'32"S, 55°51'23"W, T1P3, 15°20'30"S, 55°51'22"W, T1P4, 15°20'39"S, 55°51'20"W, T1P5, 15°20'29"S, 55°51'19"W, T2P1, 15°20'31"S, 55°51'17"W, T2P4, 15°20'27"S, 55°51'15"W, 300 – 320m, Pitfall, 20-XII-2012, leg. Gimo M. Daniel (4♂ CEMT; 7♀ CEMT); Chapada dos Guimarães, Buriti, P1, 15°24'50"S, 55°46'54"W, P2, 15°24'50"S, 55°46'56"W, P3, 15°24'49"S, 55°46'58"W, P4, 15°24'49"S, 55°46'59"W, P5, 15°24'48"S, 55°47'01"W, 640 – 650m, Pitfall, 20-XII-2012, leg. Gimo M. Daniel (5♂ CEMT; 6♀ CEMT); Chapada dos Guimarães, Faz. Sadia, Cerrado, T1P1, 15°18'17"S, 55°58'00"W, T1P2, 15°18'18"S, 55°57'59"W, T1P3, 15°18'20"S, 55°57'59"W, T1P4, 15°18'21"S, 55°57'59"W, T1P5, 15°18'23"S, 55°57'59"W, T2P1, 15°18'05"S, 55°57'33"W, T2P2, 15°18'04"S, 55°57'33"W, T2P4, 15°18'01"S, 55°57'34"W, 280 – 290m, Pitfall, 01-II-2013, leg. Gimo M. Daniel (8♂ CEMT; 4♀ CEMT); Chapada dos Guimarães, PNCG-Véu de Noiva, T1P1, 15°24'11"S, 55°49'45"W, T1P2, 15°24'10"S, 55°49'46"W, T1P3, 15°24'09"S, 55°49'47"W, T1P4, 15°24'08"S, 55°49'48"W, T1P5, 15°24'06"S, 55°49'50"W, 160 – 640m, Pitfall, 20-XII-2012, leg. Gimo M. Daniel (9♂ CEMT; 5♀ CEMT); Chapada dos Guimarães, PNCG-Véu de Noiva, T2P1, 15°24'19"S, 55°49'43"W, T2P2, 15°24'20"S, 55°49'41"W, T2P3, 15°24'21"S, 55°49'40"W, T2P4, 15°24'21"S, 55°49'40"W, T2P5, 15°24'23"S, 55°49'39"W, 620 – 640m, Pitfall, 28-XII-2012, leg. Gimo M. Daniel (6♂ CEMT; 7♀ CEMT); Chapada dos Guimarães, PNCG-Véu de Noiva, T2P1, 15°24'19"S, 55°49'43"W, T2P2, 15°24'43"S, 55°49'57"W, T2P4, 15°24'21"S, 55°49'40"W, T3P5, 15°24'42"S, 55°50'07"W, 590 – 630m, Pitfall, 21-I-2013, leg. Gimo M. Daniel (3♂ CEMT; 1♀ CEMT); Chapada dos Guimarães, PNCG-Módulos, A2L1, 15°19'35"S, 55°52'24"W, A3L2, 15°19'12"S, 55°52'50"W, A3L3, 15°19'10"S, 55°52'51"W, A3L4, 15°18'01"S, 55°53'14"W, A3L5, 15°19'07"S,

55°52'52"W, A4L1, 15°18'52"S, 55°53'14"W, A4L3, 15°18'50"S, 55°53'16"W, A4L4, 15°18'49"S, 55°53'17"W, A5L1, 15°18'49"S, 55°53'40"W, A5L2, 15°18'28"S, 55°53'38"W, A5L3, 15°18'27"S, 55°53'38"W, A5L4, 15°18'26"S, 55°53'36"W, A5L5, 15°18'26"S, 55°53'34"W, B5L5, 15°18'00"S, 55°53'14"W, 280 - 320m, pitfall, 13-XII-2012, leg. Gimo M. Daniel (19♂ CEMT; 32♀ CEMT); Chapada dos Guimarães, PNCG-Módulos, A0L1, 15°20'19"S, 55°51'45"W, A0L2, 15°20'21"S, 55°51'34"W, A0L4, 15°20'24"S, 55°51'35"W, A0L5, 15°19'30"S, 55°52'20"W, A1L2, 15°19'57"S, 55°51'58"W, A1L3, 15°19'58"S, 55°51'56"W, A2L4, 15°19'31"S, 55°52'21"W, A3L1, 15°19'13"S, 55°52'49"W, B0L1, 15°19'53"S, 55°51'10"W, B0L2, 15°19'51"S, 55°51'09"W, B0L3, 15°19'50"S, 55°51'09"W, B0L4, 15°19'49"S, 55°52'07"W, B2L1, 15°19'11"S, 55°52'01"W, B2L2, 15°19'10"S, 55°52'00"W, B2L3, 15°19'09"S, 55°51'59"W, B2L4, 15°19'08"S, 55°52'57"W, B2L5, 15°19'08"S, 55°52'56"W, B1L1, 15°19'32"S, 55°51'36"W, B1L2, 15°19'31"S, 55°51'35"W, B1L3, 15°19'30"S, 55°51'33"W, B1L4, 15°19'31"S, 55°51'32"W, B1L5, 15°19'12"S, 55°51'30"W, B4L3, 15°18'24"S, 55°52'52"W, B4L5, 15°18'21"S, 55°52'53"W, 270 - 370m, pitfall, 14-XII-2012, leg. Gimo M. Daniel (47♂ CEMT; 65♀ CEMT); Chapada dos Guimarães, PNCG-Módulo, A0, 15°20'23"S, 55°51'34"W, 360m, FIT, 16 - 23-XII-2012, leg. Gimo M. Daniel (1♂ CEMT; 2♀ CEMT); Chapada dos Guimarães, PNCG-Módulo, A2, 15°19'32"S, 55°52'21"W, 350m, FIT, 16 - 23-XII-2012, leg. Gimo M. Daniel (1♀ CEMT); Chapada dos Guimarães, PNCG-Módulo, A4, 15°18'49"S, 55°53'16"W, 310m, FIT, 16 - 23-XII-2012, leg. Gimo M. Daniel (5♂ CEMT; 1♀ CEMT); Chapada dos Guimarães, 3 km aprox. Escola Evangélica do Buriti, *Chrysocyon* dung 05-V-1985, leg. J. D Pontes & C. Strussmann (1♀ CEMT); Chapada dos Guimarães, Parna Chapada dos Guimarães, Rio Claro, Trap 5, 15°18'59"S, 55°51'42"W, Trap 7, 15°19'02"S, 55°51'43"W, Trap 10, 15°19'36"S, 55°52'31"W, Trap 12, 15°19'36"S, 55°52'29"W, Trap 13, 15°19'31"S, 55°52'27"W, Trap 15, 15°19'28"S, 55°52'25"W, Trap 17, 15°19'56"S, 55°51'46"W, Trap 18, 15°19'54"S, 55°52'44"W, Trap 19, 15°19'52"S, 55°52'41"W, Trap 24, 15°19'39"S, 55°52'53"W, Trap 27, 15°20'02"S, 55°52'41"W, 280 - 524m, [pitfall] Human feces, 08-V-2016, leg. S. Montoya et al (7♂ CEMT; 7♀ CEMT); Chapada dos Guimarães, PARNA, Rio Claro, 15°19'58"S, 55°51'56"W, 06-XII-2012, leg. M. A. Carvalho & K Vecchi (7♂ CEMT); Cuiabá, Estrada do Manso, 15°12'07"S, 56°00'08"W e 15°12'02"S, 56°00'05"W, pitfall hum. faec, 07-V-2010, leg. L.G. Nunes (1♂ CEMT; 5♀ CEMT); Barra do Garças, P.E. Serra Azul, L1 P1 p1 (10m), 15°50'58.7"S, 52°15'47"W, 546,9m, Pitfall, 12-XII-2012, leg. J.L. Silva (2♂ CEMT; 8♀ CEMT); Barra do Garças, P.E. Serra Azul, L1 P1 p2 (60m), 15°11'0.07"S, 52°15'46"W, 546,9m, Pitfall, 12-XII-2012, leg. J.L. Silva (1♂ CEMT; 6♀ CEMT); Barra do Garças, P.E. Serra Azul, L1 P1 p3 (110m), 15°51'1.3"S, 52°15'45"W, 547,1m, Pitfall, 12-XII-2012, leg. J.L. Silva (2♀ CEMT); Barra do Garças, P.E. Serra Azul, L1 P2 p1 (60m), 15°50'41.8"S, 52°15'19.8"W, 520,7m, Pitfall, 12-XII-2012, leg. J.L. Silva (1♀ CEMT); Poconé, faz. Coceção, 16°19'58"S, 56°30'20"W; 16°19'54"S, 56°30'22"W; 16°19'57"S, 56°30'22"W; 16°19'49"S, 56°30'23"W; 16°19'50"S, 56°33'19"W e 16°19'56"S, 56°30'23"W; 31-III-2012, Hum. faec, leg. M. B. Pessoa (10♂ CEMT; 34♀ CEMT);

Poconé, faz. Coceição, 16°19'52"S, 56°30'19"W; 16°19'53"S, 56°30'22"W; 16°19'57"S, 56°30'22"W e 16°19'55"S, 56°30'21"W 20-V-2012, Hum. faec, leg. M. B. Pessoa (1♂ CEMT; 4♀ CEMT); Poconé, faz. Coceição, 16°19'49"S, 56°30'19"W; 16°19'58"S, 56°30'20"W e 16°19'56"S, 56°30'19"W, 18-XI-2011, Hum. faec, leg. M. B. Pessoa (1♂ CEMT; 3♀ CEMT); Poconé, faz. Coceição, 16°19'40"S, 56°30'16"W, 22-VIII-2011, Hum. faec, leg. M. B. Pessoa (1♂ CEMT); Poconé, faz. Coceição, 16°19'41"S, 56°30'21"W, 23 - 31-III-2011, Hum. faec, leg. M. B. Pessoa (1♀ CEMT); **Minas Gerais**, Diamantina, Campus UFVJM, 19-XII-2005, leg. S.L. Assis Junior (1♀ CEMT); Diamantina, 23-II à 03-III-2001, leg. N. Degallier (1♂ CEMT); Diamantina, Parque Estadual da Serra do Cabral, 17°54'48"S, 44°12'50"W, 891 mols, hum. Dung, 17-IV-2008, leg. M.F. Souza (1♀ CEMT); Parque Estadual da Serra do Cabral, 17°53'13"S, 44°17'48"W, 1244 mols, hum. Dung, 17-IV-2008, leg. M.F. Souza (1♀ CEMT); **Mato Grosso do Sul**, Corumbá, Faz. Nhumirim, 19°03'14"S, 56°40'26"W, 21-IX-2011, leg. M. B. Pessoa (2♂ CEMT; 4♀ CEMT); Jardim, B. das Araras, 21°29'43"S, 56°23'54"W, hum. faec., leg. L. O. Bavutti (1♀ CEMT); **Santa Catarina**, Anchiera, 26°31'S, 53°23'W, Pitfall isca, 08-XII-2014, leg. V.M. Alves (1♀ CEMT); **BOLÍVIA: Santa Cruz**, Parque Regional Lomas de Arena, 17°33'13"S, 63°05'47"W, 413 m, Pitfall feces, 5-XI-2008, leg. WD Edmonds (1♀ CEMT); **PARAGUAY**: Lagunita, XII-1994, leg. L. Peña (3♂ CEMT; 3♀ CEMT); **Cordilera**, Piribebuy, Naranjo, 05-XI-2000, leg. G. Arriagada (3♂ CEMT; 1♀ CEMT).

***Tetraechma liturata* (Germar, 1822) comb.n. (Figs 5A–H)**

As *Ateuchus lituratus* Germar, 1822: 117 (first description);

As *Ateuchus pictus* Mannerheim, 1929: 39 (first description); Harold, 1868: 93 (as synonym of *Canthon cinctellus* (Germar, 1823)); **syn.n.**

As *Canthon lituratus* – Perty, 1830: 38, Plate 8, Figure 4 (catalogue); Harold, 1868: 15, 95 (key for *Canthon*); Harold, 1869a: 992 (catalogue); Harold, 1869b: 57 (species list); Burmeister, 1873: 414 (catalogue); Harold, 1880: 15 (species list); Bates, 1887: 33, Plate 2, Tabela 2, Figure 12 (species list); Pittier & Biolley, 1895: 13 (species list); Bruch, 1911: 184 (catalogue); Gillet, 1911: 31 (catalogue); Bruch, 1915: 540 (catalogue); Schmidt, 1920: 119, 125 (species list, species descriptions); Schmidt, 1922: 76 (key for *Canthon*); Boucomont, 1928: 3 (species list); Balthasar, 1939: 218 (key for *Canthon*); Balthasar, 1941: 344 (catalogue); Pessoa & Lane, 1941: 416, 422, Figure 43 (catalogue); Pereira, 1944: 87 (species list); Lange, 1947: 306 (species list); Balthasar, 1951: 329 (species list); Martínez, 1959: 35, Figure 2 (catalogue); Vulcano & Pereira, 1964: 604 (catalogue); Halffter & Martínez, 1977: 89 (species list, species descriptions); Howden & Young, 1981: 25 (species list); Escobar, 2000: 207 (species list); Medina et al., 2001: 136 (species list).

As *Canthon lituratum* – Lucas, 1859: 100 (catalogue); Blackwelder, 1944: 200 (catalogue); Gacharná, 1951: 221 (catálogo); Roze, 1955: 41 (species list); Vaz de Mello, 2000: 191 (species list).

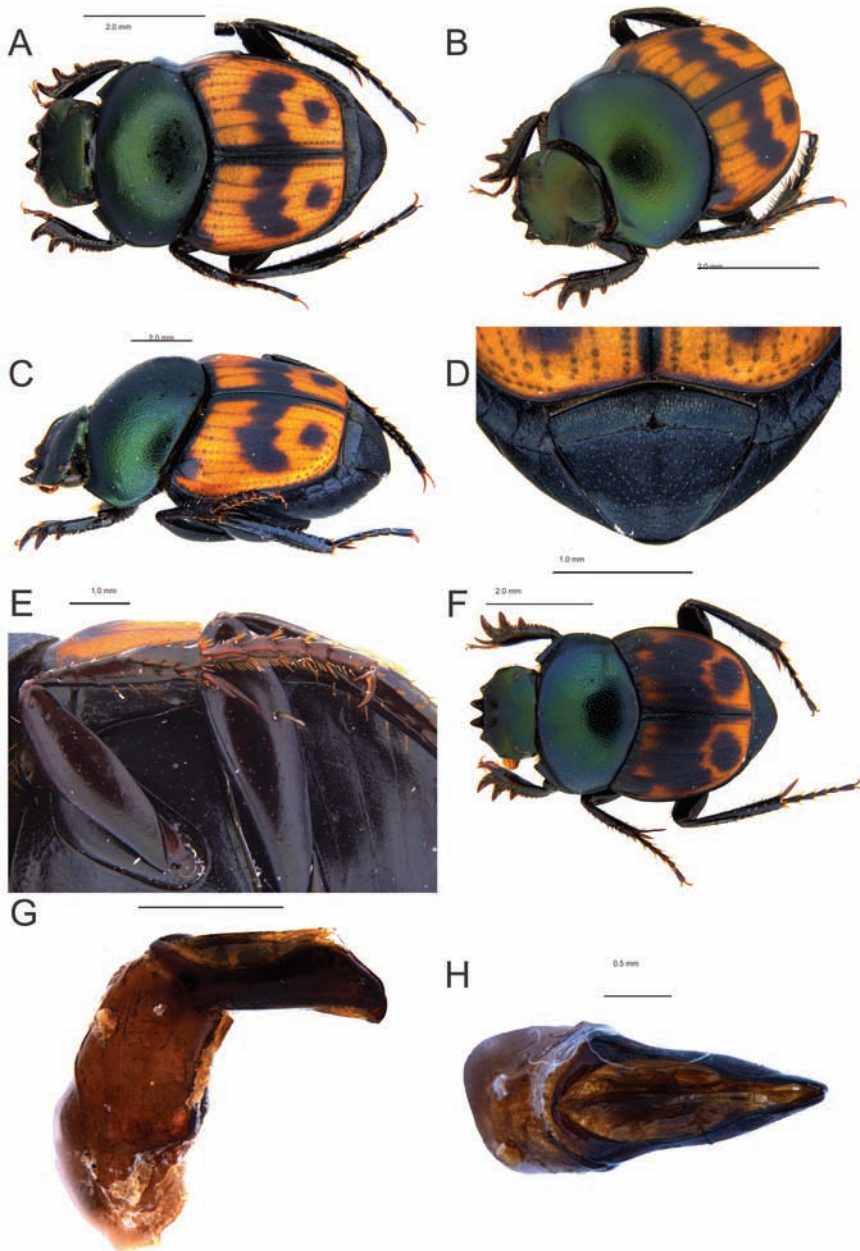


Fig. 5. *Tetraechma liturata* (Germar, 1822): (A) dorsal view. (B) dorso-lateral view. (C) lateral view. (D) pygidium. (E) mesotibiae. (F) *T. liturata*; chromatic variation. Parameres: (G) lateral view. (H) dorsal view.

As *Canthon lituratus bifasciatus* Schmidt, 1920: 125 (first description, species list, species descriptions); Schmidt, 1922: 76 (key for *Canthon*); Pessoa & Lane, 1941: 422 (catalogue); Pereira, 1944: 88 (species list);

As *Canthon lituratum bifasciatum* – Blackwelder, 1944: 200 (catalogue); Gacharná, 1951: 221 (catalogue); Roze, 1955: 41 (species list).

As *Canthon lituratus quadripustulatus* – Harold, 1868: 95 (key for *Canthon*, first time as subspecies); Harold, 1869a: 992 (catalogue); Bates, 1887: 33 (species list); Bruch, 1911: 184 (catalogue); Gillet, 1911: 31 (catalogue); Schmidt, 1920: 120 (species list, species descriptions); Schmidt, 1922: 76 (key for *Canthon*); Pessoa & Lane, 1941: 422 (catalogue); Pereira, 1944: 88 (species list);

As *Canthon lituratum quadripustulatum* – Blackwelder, 1944: 200 (catalogue); Gacharná, 1951: 221 (catalogue).

As *Canthon lituratus solutus* Schmidt, 1920: 125 (first description, species list, species descriptions); Schmidt, 1922: 76 (key for *Canthon*); Pereira, 1944: 88 (species list);

As *Canthon lituratum solutum* – Blackwelder, 1944: 200 (catalogue); Gacharná, 1951: 221 (catalogue).

As *Canthon quadripustulatus* Guérin, 1855: 587 (first description); Balthasar, 1939: 218 (key for *Canthon*; as synonym of *Canthon lituratus*)

Diagnosis: Among the *Tetraechma*, *T. liturata*, it is distinguished by the following combination of characters; **Head.** Four clypeal teeth, genae with a rounded prominence in the external margin; cephalic tubercles absent (Figs 5A, 5B, 5C, 5F). **Pronotum.** Central longitudinal groove absent; sides close to anterior angle, flattened; rounded posterior angle, never removed, and without any lateral dentiform projection. **Pygidium.** Concave, never flat, separated from the propygidium by a complete carina; carina medially projected (Fig. 5D). **Parameres.** Unilobed, with apical margin slightly rounded (Figs 5G, 5H).

Taxonomic remarks: This species was also described in *Ateuchus* Fabricius (non Weber), and is considered to be as part of *Canthon* since the work of Harold (1868). In the present work, we transfer *Canthon lituratus* to *Tetraechma*. The recent literature report also allows us to make a correction regarding the publication date of this species by Germar, different in what was presented in historical literature, was not published in 1813, but in 1822 (Bousquet 2016).

T. liturata, like *T. chlorophana*, also has a chromatic variation, with green or black pronotum, and the spots on elytra still vary in size in many specimens, in various populations, and distributed in different sites. (Fig. 5A e 5F). Populations of central Brazil, Bolivia, Paraguay, Argentina and Uruguay may have the pronotum and the elytra black, rather than the green, color more frequent in this species - and can be confused with *T. chlorophana*, which also inhabits central Brazil, and can also be all green. The type of *Canthon quadripustulatus* is not among the types of Guérin, who was found visiting as collections in Europe, it is possible that it was lost during the bombings of World War II in Milan (Vaz-de-Mello, personal communication). *Canthon quadripustulatus* Guérin, 1855, was described from localities in the equatorial Amazon, and recorded in places such as the Chiquiri volcano in Panama (Schmidt, 1922), as well as Colombia, Venezuela and Ecuador (Bates, 1887; Gillet, 1911; Schmidt, 1922). Harold (1868) when dealing with the “c” variety of “*Canthon lituratus*”, states that it inhabits the northern areas of the species distribution. Thus, even without direct consultation

of the type, we can reaffirm Balthasar's (1939) synonymy, as it is not an area of occurrence of *T. chlorophana*, and we did not find any species of this genus in the region in question, only *T. liturata*, and from *T. balteata*, unlikely to be confused with *T. liturata*.

We first treated *Ateuchus pictus* Mannerheim, 1829 as a junior synonym for *T. liturata*. Mannerheim described "*Ateuchus chlorophanus*", and he certainly noticed the slight differences between *T. liturata* and *T. chlorophana*. In that same work, not knowing about the description by Germar a few years earlier, he defined what would be a new species, which he called "*Ateuchus pictus*". In 1868, Harold treated "*Ateuchus pictus*" as synonymous of *Canthon cinctellus*, and now we have treated as synonymous with *T. liturata*, considering of type color pattern not occur in *T. chlorophana*.

Distribution: *Tetraechma liturata* is widely distributed in South America, being found from the dry forests in northern Colombia and Venezuela to the Pampas in Uruguay, near the border with the Brazilian state of Rio Grande do Sul. It is present in very diversified areas, including Dry Forests, Cerrado, Caatinga, Atlantic Forest, Pampas, Pantanal and Chaco. The only biome from which no records are available is the Amazon Forest, only in transition bands between this and other biomes (Fig. 6).

Type material examined: *Ateuchus lituratus* Germar, 1822: **Lectotype (here designated ♂)** 1. (brown, red border) *Brasilia*, C., *lituratus*, Germ. 47 / 2. (brown) *lituratus*, Germ. / 3. (white, black border) Ex Musaeo, E. Harold / 4. (white, black border) Museum Paris, ex Coll. R. Oberthur / 5. (red, black border) LECTOTYPE ♂, *Ateuchus, lituratus* Germar, des. F.Z. Vaz-de-Mello 2014 (MNHU).

Paralectotypes: 1♂. (blue) *lituratus*, Germar, *Type* / 2. (white, black border) *Canthon, lituratus*, (Germar), G.H. y A.M. det. 76 / 3. (brown, black border) Ex. Coll. Deyr, in ED. BROWN / 4. (yellow, black border) PARALECTOTYPE ♂, *Ateuchus, lituratus*, Germar, des. F.Z. Vaz-de-Mello 2014 (MNHN); 1♀. (brown) *Type, lituratus*, Germar / 2. (white, black border) Ex Musaeo, E. Harold / 3. (white, black border) Muséum Paris, 1952, Coll. R. Oberthur / 4. (yellow, black border) PARALECTOTYPE ♀, *Ateuchus, lituratus*, Germar, des. F.Z. Vaz-de-Mello 2014 (MNHU).

Canthon lituratus solutus Schmidt, 1920: **Lectotype (here designated ♀)** 1. (blue) 9776, E92 + / 2. (blue) *Columbia* / 3. (brown) var., *solutus*, M. / 4. (white) var., *solutus*, A. Schm. / 5. V; d. Harold / 6. (red, black border) LECTOTYPE ♀, *Canthon lituratus, var. solutus*, Schmidt, des. F.Z. Vaz-de-Mello 2013 (NRMS).

Canthon lituratus bifasciatus Schmidt, 1920: **Lectotype (here designated ♂)** 1. (blue) 9776, E92 + / 2. (blue) Columbien, Mérida a Magdalena, O. Thieme S. / 3. (brown) *bifasciatus* / 4. (white) var., *bifasciatus*, A. Schm. / 5. (red, black border) LECTOTYPE ♂, *Canthon lituratus, var. bifasciatus*, Schmidt, des. F.Z. Vaz-de-Mello 2013 (NRMS).

Ateuchus pictus Mannerheim, 1929: **Lectotype (here designated ♀)** 1. (yellow) Mus. Zool. Helsinki, Loan No., C11 13 / 2. (blue) *Photographed*, 2013, Pekka Malinen / 3. (brown) *Brasília, Barra da Lappa* / 4. (brown) *Ménér.* / 5. (brown) *a seguinte*, [illegible] *diversus* 6. (white) *Ateuchus, pictus* Mannerheim, 1829 / 7. (white) <http://id.luomus.fi/>, GL.580 / 8. (red) [nothing written] / 9. (red, black border) LECTOTYPE ♀, *Ateuchus, pictus* Mann., des. F.Z. Vaz-de-Mello 2014 (MZH).

Non-type material examined: 459 specimens (206♂ and 253♀) VENEZUELA: Vargas, Vargas La Sabana, 10°36'25.34"N, 66°16'31.08"W, 17m, Heces humanas,

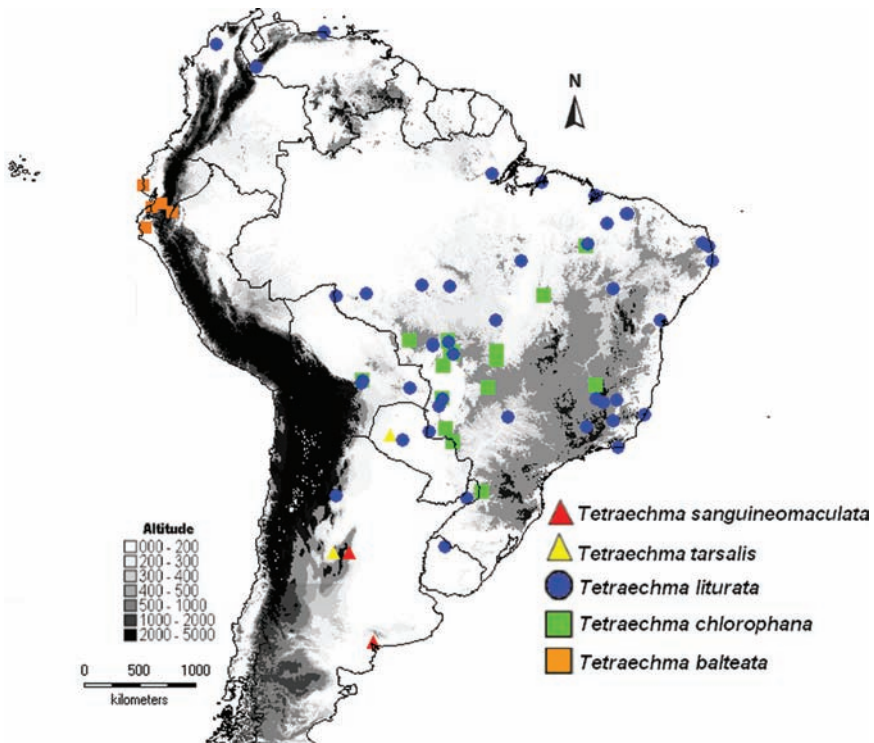


Fig. 6. Distribution map for species of *Tetraechma*: *T. sanguineomaculata* Blanchard, 1842 (red triangle); *T. tarsalis* (Balthasar, 1939) (yellow triangle); *T. liturata* (Germar, 1822) (blue circle); *chlorophana* (Mannerheim, 1829) (green square); *T. balteata* (Boheman, 1858) (orange square).

19-VII-2009, leg. H. Martínez, P. Cely, M. Córdova & M. Nuñez (1♂ CEMT); **Táchira**, Libertador, San Joaquin de Navay, 7.7741° N, -71.6675° W, 550m, VIII-2006, leg. T. Good (2♀ CEMT); **COLÔMBIA**: **Bolívar**, Zambrano Had, Monterrey, 9°37'48"N, 74°54'44"W, 120m, Bosque Seco, Ex. Humano, VIII-1996, leg F. Escobar (1♂ CEMT; 1♀ CEMT); **BRASIL**: **Pará**, Vigia, Faz. Mangue Seco, VGC Arm. 2D, VGC Arm. 2E, VGC Arm. 8D, VGE Arm. 8E, 02 – 04-IX-2011, leg. I. S. Araújo (2♂ CEMT; 2♀ CEMT); Monte Dourado, Jari Cellulose, 130 m, 0°49'S, 52°36'W, Eucalyptus, Dung pitfall trap, March-April 2005, leg. T. A. Gardner, M. I. M Hernández (1♂ CEMT); Barnacena, X-1993 (1♀ CEMT); Pau d'Arco, Faz Marajoara, 07°50'S, 50°16'W, 13-X-1998, leg. P. Y. Scheffler (2♂ CEMT; 1♀ CEMT); Redenção, Faz Marajoara, 07°50'S, 50°16'W, XI-1999, leg. P. Y. Scheffler (1♂ CEMT; 1♀ CEMT); **Maranhão**, São Luís, UEMA, Aléia, III-2009, leg. M. C. Batista (8♂ CEMT; 14♀ CEMT); São Luís, UEMA, Aléia, III-2009, leg. M. C. Batista (19♂ CEMT; 16♀ CEMT); São Luís, UEMA, Mandioca, III-2008, leg. M. C. Batista (2♂ CEMT); São Luís, UEMA, Mandioca, II e III-2009, leg. M. C. Batista (25♂ CEMT; 21♀ CEMT); São Luís, cmom[com] fezes humanas, leg. M. C. Batista (5♂ CEMT; 4♀ CEMT); São Luís, 18-I-2003, leg. W. W. Koller (1♀ CEMT); Chapadinha, 4°51'50"S, 43°20'51"W, 17-III-2012, leg. C. G. Silva (1♂ CEMT); Santa Quitéria de Maranhão, Fazenda Rodiador, 47m, Chapada,

3°24'50"S, 42°40'46"W, *Dung trap*, 23-II-2008, leg. Gillett (1♂ CEMT); Santa Quitéria de Maranhão, Fazenda Rodiador, 47m, Chapada, 3°24'50"S, 42°40'46"W, *Dung trap open PM*, 17-V-2008, leg. Gillett (4♂ CEMT; 1♀ CEMT); Santa Quitéria de Maranhão, Fazenda Rodiador, 47m, Chapada, 3°24'50"S, 42°40'46"W, *Dung trap evening col.*, 18-V-2008, leg. Gillett (1♂ CEMT; 1♀ CEMT); Mirador, Cana Brava, 1 – 11-VI-1993, leg. N. Degallier (1♀ CEMT); **Ceará**, Maranguape, São Benedito Santuario da Nossa Senhora de Penha, 160m, Atlantic Forest, 3°52'18"S, 38°40'53"W, *Dung trap*, 26-III-2008, leg. Gillett (1♀ CEMT); **Piauí**, Piripiri, PN Sete Cidades, 4°05'43"S, 41°42'34"W, 190m, pitfall hum dung, 9-II-2013, leg. Vaz-de-Mello & Grossi (1♂ CEMT; 1♀ CEMT); Piripiri, PN Sete Cidades, 4°06'38"S, 41°44'48"W, 180m, FIT, 12-II-2013, leg. Vaz-de-Mello & Grossi (1♂ CEMT); PN Sete Cidades, 4°05'48"S, 41°42'30"W, 190m, pitfall hum dung, 9-II-2013, leg. Vaz-de-Mello & Grossi (1♂ CEMT; 1♀ CEMT); PN Sete Cidades, 4°05'54"S, 41°42'31"W, 170m, FIT, 13-II-2013, leg. Vaz-de-Mello & Grossi (1♂ CEMT; 3♀ CEMT); PN Sete Cidades, 4°05'38"S, 41°44'48"W, 180m, FIT, 12-II-2013, leg. Vaz-de-Mello & Grossi (1♀ CEMT); PN Sete Cidades, 4°05'54"S, 41°42'31"W, 170m, FIT, 7 - 12-II-2013, leg. Vaz-de-Mello & Grossi (1♀ CEMT); Canto de Buriti, Cerrado, 8°07'56"S, 43°00'23"W, 366m, *Dung trap*, 05-IV-2008, leg. Gillett (2♀ CEMT); **Paraíba**, Araruna, Parque Estadual da Pedra do Boca, 6°27'S, 35°40'W, 350m, Caatinga, "Pitfall", V-2003, leg. M.I.M. Hernández (1♀ CEMT); Mamanguape, Rebio Guaribas, 6°41'S, 35°10'W, Tabuleiro, Arm. "pitfall" fezes, II-2002, leg. A.A. Endres (2♂ CEMT; 2♀ CEMT); **Pernambuco**, Igarassu, Refúgio Ecológico Charles Darwin, Mata Atlântica, 31-II-2006, Pitfall, 4P/AF, leg. Fernando A. B. Silva, et al (2♀ CEMT); **Rondônia**, Guajará Mirim, Fazenda Benezi, 10°44'53.56"S, 65°17'31.10"W, 170m, pasto, isca: fezes hum., 16/II/2010, leg. F. Coletti (3♂ CEMT; 2♀ CEMT); 1. Cacaúlândia, 10° 32'S, 62°48'W, 160-350m vic., 30 Oct. – 1 Nov. 1991, leg. John R. MacDonald / 2. Pitfall Trap, Baited with human feces / 3. *Canthon lituratus* (germar, 1824), FZ Vaz-de-Mello det 2004 (1♂ CEMT); Rolim de Moura, Pitfall 11, 11°44'25.66"S, 61°55'26.81"W, Pitfall 23, 11°44'25.11"S, 61°55'25.14"W, Pitfall 28, 11°44'24.49"S, 61°55'24.14"W, 272 - 273m - SAF, 27 - 29-VII-2015, leg. D. C. Castro (1♂ CEMT; 2♀ CEMT); Rolim de Moura, Pitfall 6, Pitfall 11, Pitfall 16 e Pitfall 19, 11°40'43.42"S, 61°53'32.13"W, 255m - SAF, 07 - 09-XII-2015, leg. D. C. Castro (1♂ CEMT; 10♀ CEMT); Rolim de Moura, Pitfall 1, 11°44'25.07"S, 61°55'27.09"W, Pitfall 8, 11°44'24.71"S, 61°55'27.41"W, Pitfall 12, 11°44'25.26"S, 61°55'26.77"W, Pitfall 15 11°44'25.70"S, 61°55'26.29"W, Pitfall 19, 11°44'24.03"S, 61°55'26.26"W, Pitfall 25, 11°44'24.98"S, 61°55'24.26"W, 275 - 275m - SAF, 07 - 09-XII-2015, leg. D. C. Castro (4♂ CEMT; 3♀ CEMT); **Bahia**, Pilão Arcado, Barra do Brejo, 10°6,677'S, 42°53,678'W, 416 m, 27-III-2006, leg. Mendes V. (1♂ CEMT); Pilão Arcado, Barra do Brejo, 10°6,677'S, 42°53,678'W, 416 m, 27-III-2006, leg. Lopes, P.P. (1♀ CEMT); 1. Bahia, Cruz das Almas, I-2005, col. Ribeiro Júnior, G & Brito, A / 2. *Canthon sp.*, Ident. Vaz-de-Mello & Ribeiro-Jr. (1♂ CEMT); Porto Seguro, RPPN Veracel, Pitfall c/ hum faec, XI-2004, leg. J.N.C. Louzada (1♀ CEMT); Porto Seguro, Pastagem, 16°23'49"S, 39°08'29"W 71m, Human feces, 16-V-2012, leg. L. D. Audino (3♂ CEMT; 5♀ CEMT); Porto Seguro, Pastagem, 16°23'49"S,

39°08'29"W 71m, Carcass, 16-V-2012, leg. L. D. Audino (3♂ CEMT); Porto Seguro, Pastagem, 16°23'35"S, 39°09'45"W 74m, Human feces, 15-V-2012, leg. L. D. Audino (2♂ CEMT; 1♀ CEMT); **Mato Grosso**, Cotriguaçu, Fazenda São Nicolau, Plantio Ficus, 220m, 9°49'32"S, 58°15'46"W, fezes hum., 10-II-2009, leg. Vaz-de-Mello, (9♂ CEMT; 4♀ CEMT); Alta Floresta, Frag. FAH, 09°53'41"S, 56°06'13"W, Pitfall c/ Hum face, III-2008, leg. E. Berenguer (2♀ CEMT); Alta Floresta, Frag. 145, 09°51'06"S, 56°59'04"W, Pitfall c/ Hum face, IV-2008, leg. E. Berenguer (11♂ CEMT; 5♀ CEMT); Diamantino, Vale da Solidão, 14°22'23"S, 56°07'25"W, 19-II-2009, Pitfall, Cerrado PT5, leg. DCT Oliveira (1♀ CEMT); Querência, Fazenda São Luiz, 12°39'9.30"S, 52°21'6.85"W e 12°39'6.62"S, 52°21'8.45"W, II-2009, Floresta Amazônica, Pitfall com Fezes Humanas, leg. R. Andrade (1♂ CEMT; 1♀ CEMT); Querência, Fazenda São Luiz, 12°38'S, 52°22'W, forest, Pitfall human feces, II-2009, leg. R. Andrade (32♂ CEMT; 43♀ CEMT); Querência, Fazenda São Luiz, 12°38'6.11"S, 52°22'6.37"W e 12°39'7.77"S, 52°22'6.30"W, Pasto, Pitfall com Fezes Humanas, II-2009, leg. R. Andrade (2♂ CEMT); Querência, Fazenda São Luiz, 12°39.30'S, 52°21.69'W, (BUF1-50m), 14- Pitfall, II-2009, leg. R. Andrade (1♀ CEMT); Tangará da Serra, Pitfall Fezes Humanas, Pasto, 16-VII-2008, leg. R. J. Silva (1♂ CEMT; 1♀ CEMT); Tangará da Serra, Cartódromo, 14°39'34"S, 57°25'51"W, 439m, Pastagem, Pitfall hum-pig dung, 18 - 20-I-2011, leg. R. J. Silva (3♂ CEMT; 7♀ CEMT); Tangará da Serra, Faz. Filé do Boi, 14°38'01"S, 57°24'48"W, 439m, Pasto, Pitfall hum-pig dung, 25 - 27-I-2011, leg. R. J. Silva (1♂ CEMT; 7♀ CEMT); Tangará da Serra, Chacára Paraíso, 14°39'40"S, 57°24'53"W, 448m, Pasto, Pitfall hum-pig dung, 26 - 28-I-2011, leg. R. J. Silva (1♂ CEMT; 3♀ CEMT); Tangará da Serra, Faz. Paraíso, 14°41'37"S, 57°24'51"W, 492m, Mata semidecidual, Pitfall hum-pig dung, 15 - 17-I-2011, leg. R. J. Silva (1♂ CEMT; 1♀ CEMT); Tangará da Serra, Faz. Art-Pão, 14°38'02"S, 57°24'52"W, 466m, Mata semidecidual, Pitfall hum-pig dung, 19 - 21-I-2011, leg. R. J. Silva (8♂ CEMT; 9♀ CEMT); Tangará da Serra, Faz. Bahia, 14°37'04"S, 57°25'00"W, 428m, Pastagem, Pitfall hum-pig dung, 26 - 28-I-2011, leg. R. J. Silva (6♂ CEMT; 10♀ CEMT); Tangará da Serra, Faz. Bahia, 14°37'04"S, 57°25'00"W, 428m, Pastagem, Pitfall-Cow, 26 - 28-I-2012, leg. R. J. Silva (1♂ CEMT; 5♀ CEMT); Tangará da Serra, Faz. Bahia, 14°37'04"S, 57°25'00"W, 428m, floresta semidecidual, Pitfall hum-pig dung, 26 - 28-I-2012, leg. R. J. Silva (1♂ CEMT; 2♀ CEMT); Tangará da Serra, Faz. Bahia, 14°37'14"S, 57°25'15"W, 419m, Pastagem, Pitfall hum-pig dung, 12 - 14-I-2011, leg. R. J. Silva (1♂ CEMT; 3♀ CEMT); Tangará da Serra, Sítio Mauá, 14°39'42"S, 57°24'20"W e 14°39'41"S, 57°24'27"W, 470 - 472m, Mata semidecidual, Pitfall hum/pig dung, 19 - 21-I-2011, leg. R. J. Silva (3♂ CEMT); Tangará da Serra, Sítio Mauá, 14°39'36"S, 57°24'28"W, 470m, Pasto, Pitfall hum/pig dung, 19 - 21-I-2011, leg. R. J. Silva (3♀ CEMT); Chapada dos Guimarães, Buriti, 15°24'52"S, 55°46'58"W, hum. Faec., III-2011, leg. R V Nunes (1♀ CEMT); Chapada dos Guimarães, Buriti, 15°24'50"S, 55°47'02"W, III-2011, leg. R.V. Nunes (1♂ CEMT); Santo Antônio do Leverger, São Vicente da Serra, Campus IFMT, 15°49'42"S, 55°25'11"W, hum. dung, pasture, 15 - 17-XII-2010, Tissiane & Vaz de Mello (4♂ CEMT; 2♀ CEMT); Santo Antônio do Leverger, São Vicente da Serra, Campus IFMT, 15°49'42"S, 55°25'11"W, hum. dung, pasture, 08 - 10-X-2011,

Tissiane & Vaz de Mello (3♂ CEMT; 2♀ CEMT); Santo Antônio do Leverger, São Vicente da Serra, Campus IFMT, 15°49'42"S, 55°25'11"W, 900m, hum. dung, cerrado, 21 - 23-X-2011, Tissiane & Vaz de Mello (1♀ CEMT); Várzea Grande, Parque Boa Vista, Hum. faec, 24 - 26-II-2011, leg. M. F. Silva (1♂ CEMT); **Minas Gerais**, Uberlândia, Fazenda 3, 18°47.747S, 48°17.359W, XII-2016, leg R. Carvalho, (1♂ CEMT; 1♀ CEMT); Uberlândia, Fazenda 23, 18°48.593S, 48°20.386W, XII-2016, leg R. Carvalho, (1♀ CEMT); Uberlândia, Fazenda 24, 18°49.352S, 48°20.114W, XII-2016, leg R. Carvalho, (1♀ CEMT); Curvelo, Fazenda do Roberto Lubernau, 18°47'43"S, 44°38'51"W, Cerrado, 655m, Human Dung, 26-I-2012, leg R. Macedo, (1♂ CEMT); Cordisburgo, Faz. Pontinha, XII-1993, F. Z. Vaz-de-Mello (2♀ CEMT); 1. Cordisburgo, Faz. Pontinha, XII-1993, F. Z. Vaz-de-Mello / 2. *Canthon lituratus* (Germ.), Det. B. D. Gill '97 (1♂ CEMT); Cordisburgo, Faz. Pontinha, I-1993, F. Z. Vaz-de-Mello (2♂ CEMT; 2♀ CEMT); Açucena, II-1952, leg. A. Machado (1♂ CEMT; 2♀ CEMT); Santana do Riacho, P. N. Serra do Cipó, 780m, 19°20'58"S, 43°37'08"W, 21-I-2001, open cerrado, ex. Dung tp1, 2001–70, leg. Vaz-de-Mello & Génier (1♀ CEMT); Viçosa, Pastagem, 1994–1995, leg. Louzada, Carvalho & Silva (1♀ CEMT); Lavras, 22-I-1999, leg J.N.C. Louzada (1♀ CEMT); **Mato Grosso do Sul**, Corumbá, RPPN E Eliezer Batista, 19°03'14"S, 56°40'56"W, 27-IX-2011, leg. M. B. Pessoa (1♂ CEMT; 1♀ CEMT); Corumbá, Rio Vermelho, 19°36'44"S, 56°56'50"W, Pitfall, XII-1998 – I-1999, leg. V. A. Lopes (2♀ CEMT); Porto Murtinho, Faz. Conceição, 21°41'12"S, 57°46'09"W e 21°41'13"S, 57°46'12"W, Hum. Faec., III-2011, leg. L.O. Bavutti (2♀ CEMT); Porto Murtinho, Faz. Conceição, 21°41'27"S, 57°45'42"W, FIT, III-201 [III-2011], leg. L.O. Bavutti (2♂ CEMT; 1♀ CEMT); **Distrito Federal**, Brasília, PNB, 15°42'8.82"S, 48°0'59.82"W, Armad. De Queda, P2 3500N3, Fezes, 03-III-2015, leg. M. V. C. Rocha (1♂ CEMT); **Espírito Santo**, Vitória, Parque do Tabuazeiro, II-1997, leg Schiffler (1♀ CEMT); **São Paulo**, Ilha solteira, Ex. Horse Dung, 08-II-1992, col. Rodrigues, S. R. (1♂ CEMT); **Rio de Janeiro**, Saquarema, Palmital, 26-XI-1994, leg F. Z. Vaz de Mello (1♂ CEMT; 1♀ CEMT); **BOLÍVIA**: **Santa Cruz**, Santiago, 3 – 13-II-1958, leg. F. Monrós (1♀ CEMT); Parque Regional Lomas de Arena, 17°33'13"S, 63°05'47"W, 413 m, pitfall feces, 05-XII-2008, leg W. D. Edmonds (1♂ CEMT; 1♀ CEMT); Chiquitos, 18°08'45"S, 59°16'45"W, 215 m, 20 km NE Santiago de Chiquitos, Human Feces, XI-2008, leg W. D. Edmonds & T Vidaurre (1♀ CEMT); **PARAGUAY**: Depto. De Boquerón, Cruce Lomo Plata [Loma Plata], 7 -28-I-1996, leg. G. Arriagada (1♀ CEMT); **ARGENTINA**: **Misiones**, Dos de Mayo, 23-I-1989 (1♀ CEMT); **Tucumán**, Tucumán [San Miguel de Tucumán], XII-1944, leg. R. Golbach (2♀ CEMT); **URUGUAY**: **Rivera**, Rivera, Bodegas Carrau Farm, 30°58'19"S, 56°26'40"W, FIT, 3 – 11-X-2011, leg. R. M. Moraes (2♂ CEMT; 5♀ CEMT).

Conclusions

The decision of transferring these three species from *Canthon* for *Tetraechma* it was possible after examining all species of *Canthon*, considered valid according to the most current lists published for the whole genera, and in database online in Catalogue of

Life (Halffter & Martinez 1977; Schoolmeesters 2022) in addition to the three species in question. Observing the shape of the margin and width of the bases of the clypeal teeth of the species groups of *Canthon*, we found a greater similarity between the specimens of “*C. lituratus*” with the type species of the genus *Tetraechma* than with genus *Canthon*, in the broadest sense. After the dissection of the specimens these three species, and *Tetraechma sanguineomaculata* and *T. tarsalis*, we could confirm those similarities also by the form of the monolobated parameres in most species of *Tetraechma*. Obviously, the exception in the case of *T. balteata* raises some doubts, however we chose to transfer this species due to the sharing of the character that led us to the development of this work, which is the form of the margin of the clypeal teeth, besides the protibiae with falciform tooth (Fig. 3A, 3F), and the modified laterodorsal line of setae of the mesotibiae (Fig. 3E), exclusive characteristics present in all species of the *Tetraechma*.

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